UTA

CAMPUS AND GRADUATE SCHOOL CALENDAR, 1979-1980
Dates of particular importance to graduate students shown in boldface type

	Fall 1979	Spring 1980	SUMMER SESSIONS, 1980 First Five Weeks	Second Five Weeks	Eleven Weeks
Advance Registration	**Aug. 6-10**	**Dec. 4-7**			
Last date to apply for thesis-only/dissertation-only tuition reduction	**Aug. 22**	**Jan. 2**	**May 23**	**July 2**	**May 23**
Registration	**Aug. 29-31**	**Jan. 9-11**	**May 30**	**July 9**	**May 30**
Labor Day Holiday	Sept. 3				
First Day of Classes	Sept. 4	Jan. 14	June 2	July 10	June 2
Late Registration	Sept. 4-7	Jan. 14-17	June 2-3	July 10-14	June 2-3
Census Date	Sept. 17	Jan. 28	June 5	July 16	June 5
Final Date to Reserve Courses for Graduate Credit	Sept. 17	Jan. 28	June 5	July 16	June 5
DEADLINE FOR GRADUATION—Final date for					
Master's and PhD candidates file Application for Graduation, pay Graduation Fee, and file Final Degree Plan	**Oct. 25**	**March 6**	**June 18**	**July 29**	**July 29**
Midsemester · Important deadlines: see catalog descriptions of incomplete grade (p. 33) and withdrawal-drop (p. 35) policies	**Oct. 25**	**March 6**	**June 18**	**July 29**	**July 29**
Final date for requesting PhD Dissertation Defense	**Oct. 12**	**March 14**	**June 6**	**June 27**	**June 27**
Final date for requesting Final Master's Examination	**Oct. 30**	**March 31**	**June 13**	**July 18**	**July 18**
Final date for submitting completed copy of thesis or dissertation to examining committee	**Oct. 30**	**March 31**	**June 13**	**July 18**	**July 18**
Final date to hold Dissertation Defense or Final Master's Examination	**Nov. 13**	**April 14**	**June 27**	**Aug. 1**	**Aug. 1**
Thanksgiving Holidays (inclusive dates)	Nov. 22-25				
Final date for submitting approved thesis or dissertation, Dissertation Defense Report and Final Master's Examination Report to Graduate School and for paying binding and dissertation microfilming fees	**Nov. 21**	**April 18**	**July 7**	**Aug. 8**	**Aug. 8**
Spring Vacation (inclusive dates)		Mar. 31 - Apr. 5			
Independence Day Holiday			July 4		
Final Examinations	Dec. 14-20	May 3-9	July 7-8	Aug. 14-15	Aug. 11-12
Official End of Semester or Session	Dec. 21	May 17	July 8	Aug. 19	Aug. 19
Commencement (8:00 p.m.)	To be announced	May 17			
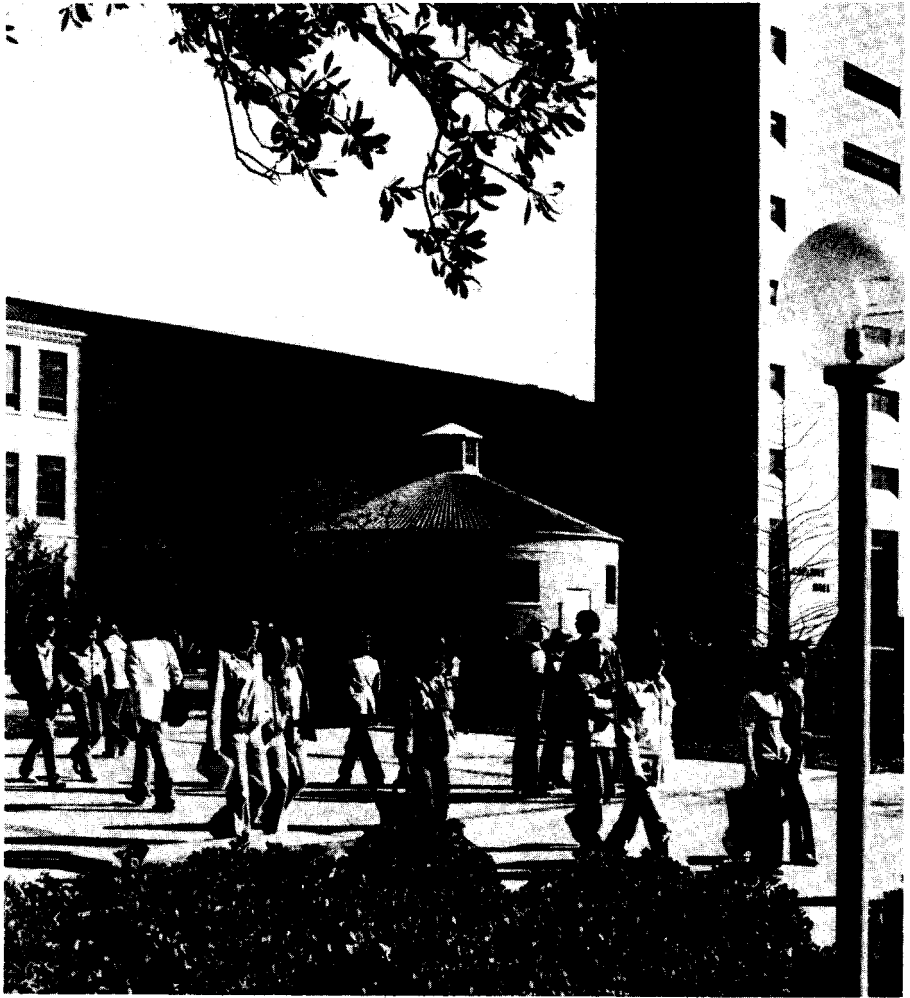
The University of Texas at Arlington

Graduate Catalog 1979-1980

CONTENTS

BOARD OF REGENTS
The University of Texas System

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 President 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, 333-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 seventeen 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 15,000 undergraduate and 2,700 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 35 disciplines or interdisciplinary programs and six doctoral degrees involving the faculties of more than 20 departments and interdepartmental areas.

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 (Loans, grants-in-aid, part-time employment, college work-study, financial counseling): Rm. 260, 273-3561

International Office: Rm. 201, 273-3363

Educational Support Services Office: Rm. 201, 273-3364

Health Center: 3rd and West Streets, 273-2771

Housing: Rm. 252, 273-2706

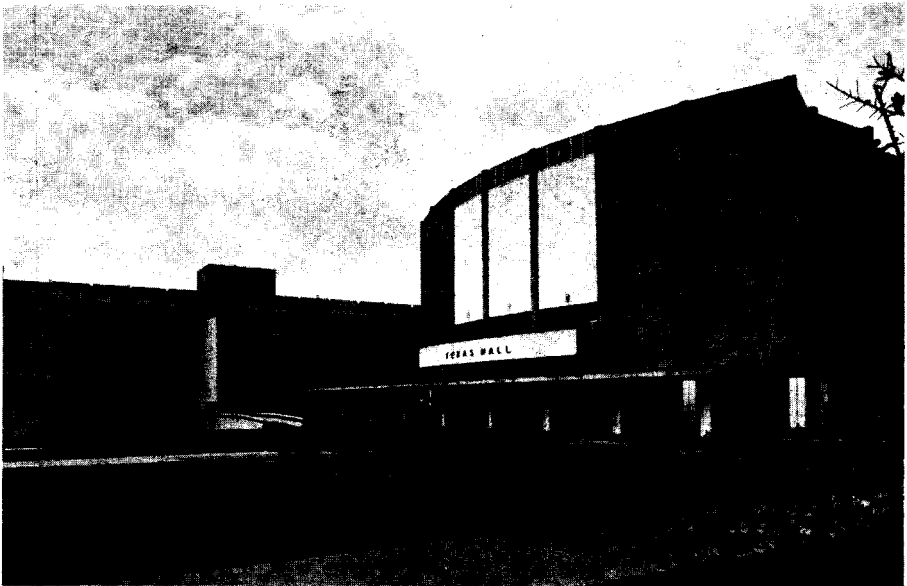**Minority Affairs:** Rm. 252, 273-3361

Special Services for Disadvantaged: Rm. 345, University Hall, 273-3783 or 3684

Student Affairs: Rm. 252, 273-3361

Students' Attorney: Rm. 201, 273-3185

Transcripts and Records: Rm. 129, 273-3371

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

FACILITIES FOR ADVANCED STUDIES AND RESEARCH

THE LIBRARY

The Library, housed in a seven-story, air-conditioned building, contains a rapidly expanding collection of more than 650,000 books, including government documents and technical reports. In addition, the Library subscribes to more than 3,000 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.

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 literature 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, housed in specially designed quarters on the sixth floor of the Library, is open 8-5 Monday through Friday and 12-5 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 collection 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. Also included among the collections are the papers of Texas writers, consisting of the personal and professional papers of some of the most important figures of southwestern literature.

The Division 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 Division of Archives and Manuscripts is the Yucatan Archives, which include microfilmed copies of the state, notorial, and ecclesiastical archives of the Yucatan, as well as almost all extant Yucatecan newspapers.

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.

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 Inter-University Council of the North Texas area, teletype inquiries will help 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 Inter-University Council 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 Associate University Librarian or the Head of Users' Services.

The Library now provides the University campus with access to Lockheed's Information Retrieval System with a new terminal located on the fourth floor. This system makes available more than 80 data bases in the areas of Science, Social Sciences/ Humanities, Technology/Engineering and Business/Economics.

The Library's Media Center maintains an audio-visual service with listening-recording booths, listening rooms, and projection rooms for motion pictures. Audio-visual services include the preparation of video tapes, transparencies, slides, audio tapes, and graphic materials; and the provision of projection equipment, recording equipment, and video monitors. Coin-operated photocopy machines are located on the first, second, third and fourth 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. - 6:00 p.m.
Saturday	10:00 a.m. - 6:00 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. - 5:00 p.m.
Saturday	10:00 a.m. - 5:00 p.m.
Sunday	2:00 p.m. - 10:00 p.m.

TAGER

The University of Texas at Arlington is one of ten North Texas area colleges and universities comprising The Association for Graduate Education and Research (TAGER). The association has established a closed-circuit television system which carries courses that can be received only by TAGER institutions or by the specially-equipped receiving classrooms located in business, industry, and neighborhood schools in the Dallas/Fort Worth Metroplex.

Each TAGER university or college has one or more television equipped studio classrooms or production studios from which it offers courses to students in remote locations and one or more classrooms in which its own students receive courses and other academic programming from other TAGER institutions. Industrial facilities and the elementary and secondary schools have receiving classrooms only. Receiving classrooms are equipped with television monitors and talkback telephones that allow students to communicate with the instructor or any other student in the course immediately.

Students must apply for admission to TAGER courses and must satisfy the registration requirements of the institution from which course credit is to be received. Prerequisites for a TAGER course are determined by the offering institution.

The current TAGER bulletin is available in the Admissions Office and should be consulted for course descriptions and schedules. Questions concerning TAGER course offerings should be directed to the UTA TAGER campus director, Michael DeFrank, 273-2103.

RESEARCH CENTERS, DIVISIONS, AND SPECIAL FACILITIES

ART COLLECTIONS AND MUSEUMS

The Department of Art hosts an ongoing series of public lectures, films, workshops, and special events centered around the University Art Gallery. The Metroplex area attracts major artists and performers from all over the country and a very stimulating environment exists 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 Business Administration, Economics, and Accounting. Acting Director: Walter E. Mullendore, Rm. 334-A B, 273-2881

CENTER FOR COMPARATIVE URBAN RESEARCH

Recognizing the accelerated growth of urban areas with their attendant problems of congestion, environmental pollution, high crime rates and a variety of additional economic and social pathologies, the Center for Comparative Urban Research 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 researching 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. 514 UH, 273-3071

CENTER FOR CRIMINAL JUSTICE RESEARCH AND PLANNING

The Center for Criminal Justice Research and Planning was established in 1977. Its main objective is to conduct research and provide technical assistance to adult and juvenile corrections facilities, jails, defense and prosecuting attorneys, judges, probation and parole departments, law enforcement agencies, sheriffs, citizen action groups and others concerned with the administration and operation of criminal justice services.

The Center responds to agency requests for evaluation of program effectiveness, trains staff 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.

The Center also engages in demonstration research projects to test for more effective ways to restore offenders to acceptable modes of behavior. 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: Charles L. Newman, Rm. 523 UH, 273-3071

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 many small grants for research can be channelled. 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, and health care delivery systems. Director: William A. Stacey, Rm. 443 UH, 273-2661

CHICANO RESOURCE CENTER

The Chicano Resource Center was established in 1978. The objectives of the Center are (1) to provide technical assistance and pursue grant opportunities pertinent to community and cultural development of the Chicano and university communities; (2) to cultivate local leadership within Chicano communities; (3) to organize and promote educational outreach programs beneficial to Chicano communities; (4) to serve as a resource and referral center for agencies operating within Chicano communities; and (5) to establish an exchange program between the Center and other institutions of higher learning in the United States and in foreign countries (e.g. Spain, Mexico, Central and South American countries). Director: Reyes Ramos, Rm. 526 UH, 273-3071

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. Executive Officer: John H. Matthys, Rm. 220 Engr. Lab Bldg., 273-3701

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

ENERGY SYSTEMS RESEARCH CENTER

The Energy Systems Research Center is concerned principally with electrical power generation, transmission and distribution and emphasizes planning and operational aspects of practical power systems. Established in 1968, it has attained national recognition as one of the most important research centers of its kind in the United States and is the largest center of its type in the South and West. The graduate program is well established with equivalent of 20 full-time students and eight full-time staff members per semester. The short course, "Modeling and Analysis of Modern Power Systems," now in its 15th year, is continually updated to reflect the most advanced concepts and practices in planning, design, and operation of electrical power systems and has become one of the outstanding programs in the industry. The ESRC sponsors a Distinguished Lecture Series and informal industrial seminars as part of the graduate program. The ESRC provides practical academic programs with maximum flexibility. Research at the center emphasizes practical application. The ESRC has a 3-phase program which serves undergraduate, graduate, and continuing education students. It offers special non-degree graduate programs and in-plant and on-campus continuing education programs for practicing power system engineers. 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.

HOUSING RESEARCH AND DESIGN CENTER

The Housing Research and Design Center was established in the fall of 1976. Its main objectives are: research about low cost, mass housing as related to changing demographic and economic trends, social needs, and technological developments; and the study and design of various housing types and systems, in conjunction with local and regional developers, builders, and government agencies. The HRDC assists students in the study of theoretical and practical aspects of housing design and provides a framework for interdisciplinary cooperation with other professions. Interested graduate students can 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, Rm. 208 SC, 273-3083

HUMAN RESOURCE CENTER

The Human Resource Center is an adjunct facility to the Graduate School of Social Work. It supports classroom and field instruction in a variety of ways including the use of sophisticated technological equipment, such as video-tape and biofeedback apparatus. The Center also serves as a facilitating resource for the development and implementation of student and faculty research. Continuing education for social work professionals and other groups include local, regional, and national programs. Seminars, workshops, and other training modalities are developed to meet specific individual, agency, or multi-agency needs. Finally, the Center staff offers personalized social services for the student body of the University as well as the community. Director: John J. Litrio, HRC CC, 273-3607

INNER CONTINENTAL SHELF CORE REPOSITORY

In 1973 the Department of Geology established the Inner Continental Shelf Core Repository. The Repository houses sediment cores from the inner continental shelves of the United States collected by the Army Corps of Engineers. Useful in engineering as well as geological studies, these cores will ultimately represent the entire coastal area of the continental United States as well as the Great Lakes. Currently there are approximately 1,500 cores from both the east and west coasts. Director: Charles I. Smith, Rm. 107 GS, 273-2987

URBAN STUDIES RESEARCH AND SERVICE PROGRAMS DIVISION

The mission of the Institute of Urban Studies Research and Service Programs Division, established in 1967, is to provide guidance for public agencies seeking to anticipate and deal effectively with local issues and organizational change. The Division employs several full-time Senior Research staff members and qualified graduate students who participate actively in Division projects as Research Associates. The Division maintains a strong and active program of problem- and policy-oriented research, training, advisory services, and continuing education activities designed to assist elected and appointed officials at local, regional, and state levels. Director: Frank Anderson, Rm. 502 UH, 273-3071

INTERNATIONAL LINGUISTIC CENTER

The International Linguistic 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, four miles 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: Marvin K. Mayers, Rm. 330 HH, 298-3331

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.

MICROCRYSTAL POLYMER SCIENCE CENTER

The Center for Microcrystal Polymer Science, the first center of its kind in the world, conducts research in a new field of polymer science. Microcrystal Polymer Science is of interest to biologists, biochemists, physicists, materials engineers, and others; it proffers unique opportunities for interdisciplinary investigations. Extensive industrial potentials are foreseen because of the fundamental properties of individual polymer microcrystals which, in the form of suspensions, possess properties not possible from conventional forms of polymer products. The new Center has the primary objectives of conducting basic research on polymer microcrystals and training students in this field. Director: O. A. Battista, Rm. 221 SH, 273-3171

PLANNING RESEARCH AND DESIGN CENTER

The Planning Research and Design Center became operational in January, 1974, to provide an opportunity for interdisciplinary investigation. The Center pursues practical as well as theoretical research in Architecture and City and Regional Planning for graduate students and faculty. Since its inception, the Center has received research funds for environmental analysis, planning and design from the private sector as well as EPA, HUD and HEW. Fourteen research publications have been completed, including three model procedures for preparing environmental impact statements with record review for water quality management for housing and community development projects. The Center has also been engaged in extensive training programs focusing on environmental assessment and impact analysis for municipal, Council of Governments and federal officials in the Southwest region. Rm. 110 SC, 273-3083

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. 132 HH, 273-3591

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 hot water heater, and the domestic hot 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. Easy access is thus provided for visitors, students, workers, and researchers for observation, demonstration, and maintenance of the solar collectors. 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 (600 square feet) is currently in the design phase with installation planned for the near future. This array will be located as an eastern extension on the roof and is being added to facilitate the study of the economics of the solar assisted heat pump mode of operation. An array of solar-voltaic cells for direct conversion of solar energy to electrical energy is being installed to provide approximately 5kw of electric power for test and experimental purposes. Director: Ghazi Darkazalli, Rm. 335 E, 273-2561

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 of Western Art, Dallas Museum of Fine Arts, Fort Worth Art Museum, and the Kimball 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, 273-2894

PUBLICATIONS

ALLEGORICA

Allegorica is a new 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. Editor: Simone F. Turbeville, Rm. 202 Car H, 273-2701

AMERICAN LITERARY REALISM, 1870-1910

American Literary Realism, 1870-1910 is a scholarly semi-annual publication with a bibliographic and textual focus. 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 prepared according to the professional specifications of the journal may be considered for publication. *ALR* is published by the Department of English. Editor: James M. Moffett, Rm. 611 Car H, 273-2782

ENGLISH IN TEXAS

English in Texas, now in its tenth year of publication, is the official journal of the Texas Joint Council of Teachers of English and an affiliate journal of the National Council of Teachers of English. It is published quarterly by the TJCTE, with the support of the Graduate School and the Department of English, to disseminate current pedagogical goals and practices. It is valuable to all teachers of English in the state and, as a member of the NCTE Information Exchange Agreement, is recognized and distributed nationally with a current circulation figure of twenty-five hundred. Editor: Ernestine P. Sewell, Rm. 209 Car H, 273-2692.

THE JOURNAL OF NONLINEAR ANALYSIS—THEORY, METHODS AND APPLICATIONS

The *Journal of Nonlinear Analysis—Theory, Methods and Applications* (Pergamon Press) affords students and faculty the opportunity of a role in an important area of mathematics. The Department of Mathematics also publishes faculty and student research results as technical reports. Approximately two hundred American and foreign institutions receive copies of these reports. Editor: V. Lakshmikantham, Rm. 132 HH, 273-3591

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. 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 approx-

imately 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 structure 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 fourteenth year, are delivered each spring in honor of Texas' most distinguished historian, Walter Prescott Webb. The lectures are published annually by the University of Texas at Austin Press. 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: Stanley Palmer, Rm. 202 UH, 273-2861

WORLD LITERATURE WRITTEN IN ENGLISH

Now in its eighteenth year of publication, the bi-annual journal *World Literature Written in English* is the official organ of the Modern Language Association's section on "English Literature Other Than British and American." Internationally known as the outstanding journal in Commonwealth literature, *WLWE* contains interviews, articles, bibliographies, and reviews addressed primarily to writing from India, Africa, the West Indies, Canada, New Zealand, and Australia. The journal is especially valuable to graduate students completing theses in Commonwealth literature. Student clerical positions are usually available. *WLWE* is supported by the Graduate School and the Department of English. Editor: Robert E. McDowell, Rm. 612 Car H, 273-2782
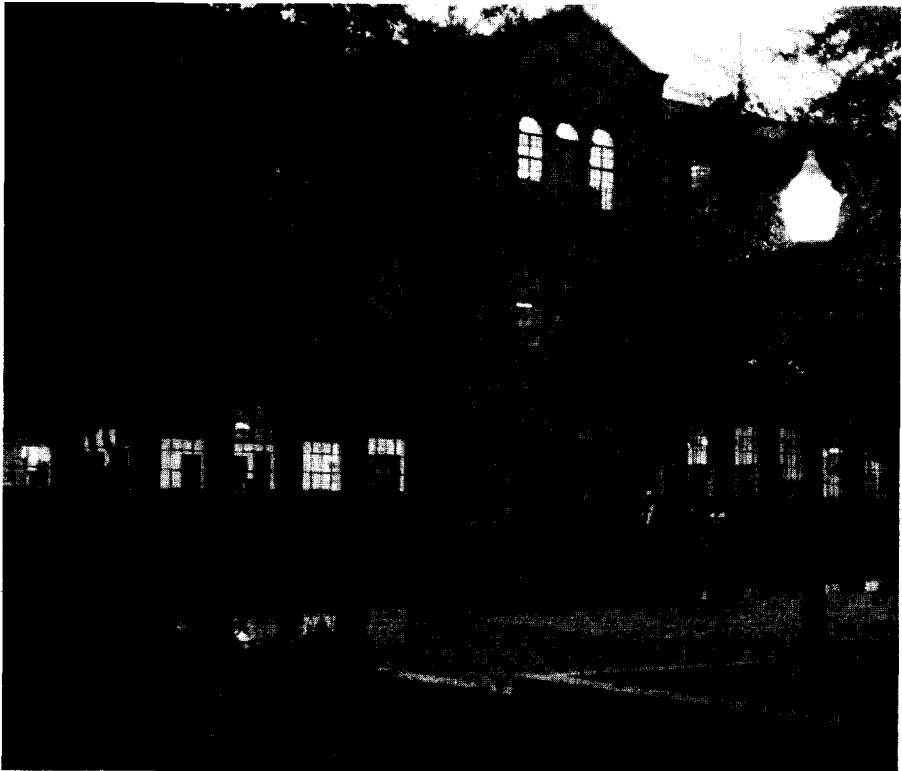
ADMISSION REQUIREMENTS AND PROCEDURES

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 Graduate Dean. 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, if required 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.

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: (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, if required by the department or program to which application is being made; (5) if his native language 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 525) on the Test of English as a Foreign Language (TOEFL); (6) acceptance into a departmental program; and (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. (An affidavit supporting the Financial Statement should be completed by parents, guardian, financial sponsor or bank and submitted with the Financial Statement.)

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.

ADMISSION PROCEDURES

NEW STUDENTS

An applicant holding a degree or degrees from a United States or foreign university should file an application form (available from the Director of Admissions and the Dean of the Graduate School) and the following credentials at least 60 days (30 days for University of Texas at Arlington degree holders) prior to the beginning of the semester or summer session in which he plans to register: (1) *official* transcripts 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 applicable; and (3) three letters of recommendation completed according to the instructions accompanying the official application form. International students must submit by the same deadline the additional credentials listed above in the section on Admission of International Students.

FORMER STUDENTS

A student previously registered 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 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.

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 for admission (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 departmental or program requirements given later 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 given 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 may be substituted for the GRE aptitude scores for admission 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 given four times a year (usually in November, January, March, and July). The University of Texas at Arlington is an approved test center for the GMAT. The GMAT and GRE application procedures are the same.

TEST OF ENGLISH AS A FOREIGN LANGUAGE (TOEFL)

An applicant whose native language is *not* English must submit a satisfactory score (normally 525) on the Test of English as a Foreign Language (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 applicants' Graduate Advisor and approved by the Dean of the Graduate School. The TOEFL is given 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 for the GRE. The University of Texas at Arlington is an approved testing center for the TOEFL.

OTHER ADMISSIONS TESTS

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

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 that (1) he has been accepted under one of the categories of admission listed below or that, (2) his applicancy has been denied, or (3) that a decision has been deferred for reasons listed in the notice. An admission permit will be issued by the Dean of the Graduate School stating the conditions of admission and period of validity for the permit.

UNCONDITIONAL ADMISSION

An applicant meeting all the requirements given above is normally granted unconditional admission.

PROBATIONARY ADMISSION

An applicant not meeting 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 credentials prior to the admission deadline but otherwise appearing 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 student wishing to take graduate courses at The University of Texas at Arlington but not planning 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 student wishes to study. A person wishing to apply for special student admission must submit a completed "Special Student Application" form available from the Graduate School and an official transcript of previous college work showing evidence of an undergraduate degree and graduate degree if applicable. 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 9 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 grades in all courses taken as a special student will be considered in computing a student's grade-point average. Special students may not hold assistantships or enroll in research, thesis, internship, or dissertation courses.

A student engaged in a graduate degree program at another institution and wishing to take courses at The University of Texas at Arlington for transfer to that institution may be admitted as a special student.

A former or currently enrolled special student who wants to apply for regular admission status must submit a regular Graduate School Application for Admission and all supporting documents as listed in this catalog under the section "Admission Proce-

dures, New Students." Admission as a special student in no way guarantees subsequent unconditional admission into a graduate program or into the Graduate School. Under normal circumstances a student who has been denied admission to or dismissed from the Graduate School will not be allowed to enroll as a special student.
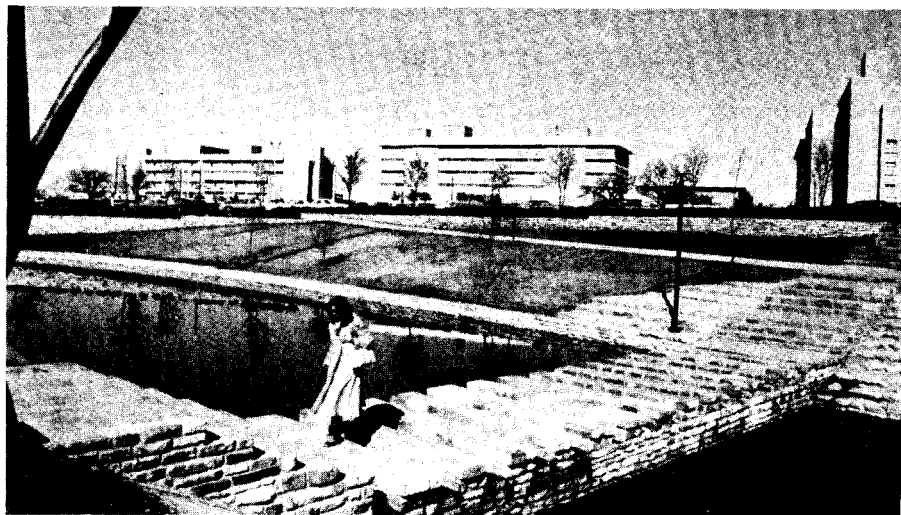
DEFERRED ADMISSION

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.

RETENTION OF APPLICATION RECORDS

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 from the Graduate School the "Request to Update Application" form for use anytime within one calendar year from the registration date for which the applicant was initially accepted.

GRADUATE STUDENT ADVISING

After being admitted, the student should confer with the Graduate Advisor of the proposed major area, preferably in a personal interview, 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 would not be applied toward the degree.

REGISTRATION SCHEDULE

Students should consult 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.

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 $5 per semester hour General Fee, a $2.50 per semester hour Student Activity Fee (up to a $30 maximum), a $1.25 per semester hour Student Union Fee (up to a $15 maximum), and a $1 per semester hour Health Services Fee (up to a $10 maximum).

Semester Hours	Texas Residents	Non-Texas Residents	International Students (Exempt Country)
1	$ 67.75	$ 57.75	$217.75
2	77.50	107.50	227.50
3	87.25	157.25	237.25
4	97.00	207.00	247.00
5	106.75	256.75	256.75
6	116.50	306.50	266.50
7	126.25	356.25	276.25
8	136.00	406.00	286.00
9	145.75	455.75	295.75
10	155.50	505.50	305.50
11	164.25	554.25	314.25
12	173.00	603.00	323.00
13	180.00	648.00	328.00
14	189.00	693.00	333.00
15	198.00	738.00	348.00
16	207.00	783.00	367.00
17	216.00	828.00	386.00
18	225.00	873.00	405.00
19	234.00	918.00	424.00
20	243.00	963.00	443.00
Each Additional Hour	9.00	45.00	19.00

5-WEEK SUMMER SESSIONS

The tuition and mandatory fees given below include $4 per capita building use fee, plus a $5 per semester hour General Fee, a $2.50 per semester hour Student Activity Fee (up to a $15 maximum), a $1.25 per semester hour Student Union Fee (up to a $7.50 maximum), and a $1 per semester hour Health Services Fee (up to a $5 maximum).

Semester Hours	Texas Residents	Non-Texas Residents	International Students (Exempt Country)
1	$ 38.75	$ 53.75	$113.75
2	48.50	103.50	123.50
3	58.25	153.25	133.25
4	68.00	203.00	143.00
5	77.75	252.75	152.75
6	86.50	301.50	161.50
7	94.50	346.50	166.50
8	103.50	391.50	183.50
Each Additional Hour	9.00	45.00	19.00

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 $200.00 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. To qualify for the thesis-only or dissertation-only tuition reduction the student is required to:
   a. have a degree plan on file in the Graduate School 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. 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 7 days prior to the first day of registration.

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.

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 given 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 from time to time, 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 $2 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, when cashing checks at the University Bookstore, University Center, or Bursar's Office, 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 $2.

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	$18	$10	$10	$ 5
Spring Semester	10	6	5	3
First Summer Session	5	4	2	2
Second Summer Session	4	4	1	1

Commuting students have found that car pools are an economical way to travel between home and school. 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 ACTIVITY FEE

The Student Activity Fee is required of all students and provides either free or reduced fees to intercollegiate events at home, formal competition events, newspaper, and activity programs in Hereford University Center.

STUDENT UNION FEE

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

HEALTH SERVICE FEE

The compulsory Health Service Fee entitles a student to the services of the Student Health Center but does not cover medication, laboratory, or X-ray charges.

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.

YEARBOOK FEE

The student yearbook, THE REVEILLE, is available at a cost of $12, which is nonrefundable. This optional fee is payable at registration.

MATRICULATION FEE

Students withdrawing from the institution before the first day of classes will be assessed a $15 Matriculation Fee.

DIPLOMA FEE

Upon graduation each student will be required to pay a $6.50 Diploma Fee. This fee includes the cost of a diploma cover. 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 writing theses, internship reports and 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 library.

MICROFILMING FEE

The $25 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.

RESIDENCY REGULATIONS

All students attending The University of Texas at Arlington who are non-residents of this state will be charged additional tuition in accordance with the state law.

According to interpretations by the Coordinating Board, Texas College and University System, of Article 2654c, Vernon's Civil Statutes, with amendments through 1969, 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 residence of the individual in the state is primarily for the purpose of attending an educational institution. After residing 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, Texas College and University System.

Two of the most common exceptions included in the state statute are 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 or 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 is currently on permanent assignment in the state. (3) 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

A student who officially withdraws* through the Student Administration section of the Registrar's Office will receive a refund according to the following schedules:

Fall and Spring Semesters

Prior to first class day	100% refund
During first five class days	80% refund
During second five class days	70% refund
During third five class days	50% refund
During fourth five class days	25% refund
After fourth five class days	no refund

Summer Sessions or Terms

Prior to first class day	100% refund
During first, second, or third class day	80% refund
During fourth, fifth, or sixth class day	50% refund
After sixth class day	no refund

*A student withdrawing prior to first day of classes will be assessed a $15 Matriculation Fee.

A student will receive a 100% refund of additional costs that apply to the course(s) dropped when the course(s) is dropped before the census date and the student remains in school.

Refund checks cannot be prepared until a computerized audit of fees has been performed after the Census date; thus, refunds normally cannot be issued until approximately six weeks after a semester starts.

The housing deposit will be refunded at the end of the lease period if the resident's room has been thoroughly cleaned and no damage has been incurred, inventory card completed, and room key returned to the Housing Office. The Business Office will mail the refund to the student at the address specified on the inventory card.

Refunds for recipients of certain types of financial aid through the University will be applied to the account from which funds were received.

STUDENT SERVICES AND FINANCIAL AID

HOUSING

Students desiring campus housing should make application as early as possible before registration. Applications and information are available at the Housing Office, 252 Davis Hall, 273-2706. Reservations for residence hall space are for two semesters and are not valid until an application and the housing deposit are received in the Housing Office. Applications cancelled after the cancellation date for the current term will result in forfeiture of the housing deposit.

For off-campus housing, contact the Rent Properties Office, 536 Campus Center, 273-2583. The University has a limited number of rent houses available for married students.

STUDENT HEALTH SERVICES

The full-time staff is equipped to care for most routine health needs of students. There is no charge for seeing a physician, but charges—at cost—are made for medicine, x-rays and laboratory tests. Inpatients are also charged for laundry and meals.

Because the Service is not equipped to provide obstetrical, surgical, dental and other more extensive diagnostic and hospital services, students are urged to subscribe to an appropriate medical insurance program (see below).

State Law Regarding Immunization: State law requires all students of institutions of higher learning to present a physician's proof of immunization to tetanus and diphtheria; specifically, proof of a minimum of three doses, the last of which was within the past ten years. Students who have not yet reached their 19th birthday must show proof of a minimum of three oral polio doses, one of which must have been after age four. State law permits students to register without having presented proof of immunization, but stipulates that they must immediately proceed to meet the requirements. These immunizations are available at the Health Center at cost.

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.

For information concerning the current student health and accident insurance, contact the Student Affairs Office, Room 252, Davis Hall, 273-3361.

COUNSELING, TESTING, AND CAREER PLACEMENT

The Office of Counseling, Testing, and Career Placement offers a means for students at The University of Texas at Arlington to receive information and help as they are going from one academic or career stage to another. The Office is located at 216 Davis Hall, 273-3671 or 3672.

COUNSELING

With an emphasis on group methods, counseling at UTA is designed to assist students in recognizing problems, opportunities, and areas for activity. Counseling is available in such areas as study skills, career/life assessment, career exploration, career development, and job readiness.

TESTING

Primary emphasis is on administering tests and dispensing applications and information on the Graduate Record Examination, Graduate Management Admission Test, Law School Admission Bulletin, and the Test of English as a Foreign Language. The Miller Analogies Test is available by appointment. Specialized tests of aptitudes, interests, and abilities may be administered to assist the counseling process.

CAREER PLACEMENT

Students are able to meet potential employers through this service. Many employers visit the campus each year, usually in October, November, February, or March, to conduct initial job interviews. In addition, the service provides a listing of job openings, available to all graduating students and alumni. Any UTA graduate may call on a special "jobs hotline" phone number at any time to learn of position openings. The Career Resource Center, maintained by this office, is a library of printed and audio-visual materials about educational institutions and programs, employers, labor statistics, obtaining employment in varied fields, entry level job requirements and duties and study skills information.

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 the staff 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 201 Davis Hall, 273-3363.

EDUCATIONAL SUPPORT SERVICES OFFICE

The objective of the Educational Support Services Office is to help physically impaired students. The Coordinator of the Services Office requires a personal interview 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 Educational Support Services Office, 201 Davis Hall, 273-3364.

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.

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 201 Davis Hall, 273-3185.

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 or academic 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

The Bursar's Office, located on the first floor of Davis Hall, is where 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 person who gives UTA a bad check (one in which the bank is not at fault) will be dropped from the University unless the check is made good within five days after official notification by the Bursar's Office. 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" as the cause of the bad check.

STUDENT FINANCIAL AID

The Financial Aid Office is located at 260 Davis Hall, 273-3561.

PART-TIME EMPLOYMENT

The Financial Aid Office maintains a file of part-time jobs in this area for students who need this type of employment. Local businesses keep in close touch with this office to inform the students of job openings.

SHORT-TERM LOANS

Loans up to $200 are made for current expenses and are to be repaid during the semester in which the money is borrowed. Applicants must have a grade point ratio of 2.0 and have completed 15 semester hours at The University of Texas at Arlington. A co-signer may be required. Application deadline will be 2 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.

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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 full-time studies at the University. The programs offered at The University of Texas at Arlington are Hinson-Hazelwood College Student Loan Program, National Direct Student Loan Program, and the Federally Insured Loan Program.

The Federally Insured Loan Program is generally available to all eligible students who are enrolled on at least a half-time basis at the University.

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 $5 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.

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.

GENERAL GRADUATE SCHOOL REGULATIONS AND INFORMATION

STUDENT RESPONSIBILITY

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

COURSE GRADES AND NUMBERING SYSTEM

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 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.

INCOMPLETE GRADE

A 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. 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, THESIS, OR DISSERTATION COURSES

All research, dissertation, and thesis courses will be graded on a pass-fail basis. A final grade may be given in a research, thesis, or dissertation course only if the work is completed during the semester in which the student is registered in the course.

If a student undertakes a research, 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 (research in progress) will be given instead of an X. The grade of R is a permanent grade, but is not included in any academic evaluation and does not carry any credit value. A student receiving a grade of R must re-register for the course in order to obtain academic credit. This grade may be issued to graduate students only for the courses mentioned above.

COURSE NUMBERING 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 AUDITING, CHANGES, AND LOAD

AUDITING

The auditing of courses is a privilege open to any person (if space is available) who has credit in the course or has a demonstrated need. Auditing grants the privilege of hearing and observing only, and does not grant credit. 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.

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(2) A graduate student withdrawing from 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 the withdrawal the student is passing the course (has a grade of A, B, or C); otherwise an F will be received. A graduate student withdrawing after the midsemester date will automatically receive a grade of F. Exceptions to this policy will be considered by the Graduate Dean only under extreme circumstances and only after the instructor has justified a request for an exception in a petition to the Graduate Dean.

(3) A graduate student who desires to drop all courses for which he or she is enrolled is reminded that such action results in 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.

WITHDRAWAL

A student who wishes to withdraw (resign) voluntarily from the University must execute the proper resignation form in the Office of Student Administration. Voluntary withdrawal from the University after the midsemester date is subject to the grade restrictions given under regulation number two of the section above entitled Adding and Dropping Courses.

MAXIMUM 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 Graduate Dean only in exceptional circumstances.

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 or she (1) is absolving 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 6 hours of graduate coursework taken as a graduate student, he or she must during the subsequent 6 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 6 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.

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.

COURSE AND TRANSFER CREDIT

MAXIMUM UNDERGRADUATE CREDIT

No more than 9 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.

COURSES APPLIED 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

Credit will be granted for equivalent course work from other institutions in The University of Texas System upon the approval of the appropriate Committee on Graduate Studies and the Dean of the Graduate School. Credit for graduate level work completed at other institutions of recognized standing may, upon the recommendation of the department or other academic unit concerned, be accepted for a maximum of one-half of the formal graduate level course work requirement for a master's degree. All work submitted for transfer credit must have been completed no more than five years before enrollment in The University of Texas at Arlington graduate program.

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.

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 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 file with the Graduate Dean a "Reservation of Courses for Graduate Credit by Undergraduate Students" (available in the Graduate School Office) no later than the Census Date of the semester or session. 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.

A maximum of 12 hours of credit may be reserved and applied to a graduate degree 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 courses to be reserved for graduate credit.

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 a form available for that purpose in the Office of the Graduate Dean. Students are encouraged to consult the Graduate Advisor of the new program regarding program admission and degree requirements before initiating a program change.

PETITIONS

Students may request exceptions to published rules by 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 are regarded as fully justifying the exception 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.

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 Graduate Dean's Office and should be used for this purpose.

Degrees are awarded at the end of the Fall semester, the Spring semester, and each Summer session, but formal public ceremonies are held only at the conclusion of the Spring and Fall semesters.

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 a Diploma Application and pay the Diploma Fee. 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 report;
   c. a completed Thesis and Dissertation Data Sheet;
   d. the Final Master's Examination Report; and

   pay
   e. the thesis binding fee.

3. **Doctoral degree candidates** must:

   file
   a. the final degree plan;
   b. three unbound copies of the final approved dissertation;
   c. a completed Thesis and Dissertation Data Sheet;
   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 (optional); and

   pay
   h. the dissertation binding, microfilming, and copyright (optional) 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 Graduate School Office.

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.

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 best realize the principal objectives for which Graduate Assistants are em-

ployed, 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 Graduate Dean.

ADMISSION STATUS

A student must be unconditionally admitted to the Graduate School 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 9 semester hours per semester. They may register for and must complete no more than 12 semester hours and no less than 6 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 6 semester hours for students who have completed all course work, are registered for thesis or dissertation only, and have filed an approved degree plan. A load greater than 12 semester hours must be approved in advance by the Graduate Dean.

ADDITIONAL EMPLOYMENT

In accepting a Graduate Assistantship a student agrees to devote his effort to his graduate studies and assistantship responsibiilties 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

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outside the assistantship appointment is required to file a Request for Approval of Outside Employment.

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 permission 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 send a written request for a copy of the record. Another person may not see a student's educational records unless written permission is 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 a copy for their own use. A student must sign a request form in the Registrar's Office or send a signed, written request to release the transcript. Requests will not be accepted by telephone or from persons other than the student unless the student has given written permission.

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, weights and heights of members of athletic teams, 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 violate 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, applicants must submit their Social Security number. It 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.

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.
	Administration	PH.D.
Administration	*Business Administration*	PH.D.
	Social Work	PH.D.
	Urban Affairs	PH.D.
Aerospace Engineering	*Aerospace Engineering*	M.S., M.ENGR.
	Engineering: Undifferentiated	PH.D.
Architecture and Environmental Design	*Architecture*	M.ARCH.
	City & Regional Planning	M.C.R.P.
	Landscape Architecture	M.L.A.
Biology	*Biology*	M.A.
Biomedical Engineering	*Biomedical Engineering*	M.S., PH.D., M.D./PH.D.
	Clinical Engineering	CERTIFICATE OF INTERNSHIP CERTIFICATE OF RESIDENCY
Business Administration	*Business Administration*	M.B.A.
	Administration	PH.D.
Chemistry	*Chemistry*	M.A.
Civil Engineering	*Civil Engineering*	M.S., M.ENGR.
	Engineering: Undifferentiated	PH.D.
Computer Science	*Computer Science*	M.S.
	Engineering: Undifferentiated	PH.D.
Criminal Justice	*Criminal Justice*	M.A.
Economics	*Economics*	M.A.
Electrical Engineering	*Electrical Engineering*	M.S., M.ENGR.
	Engineering: Undifferentiated	PH.D.
Engineering	*Engineering Interdisciplinary*	PH.D.
Engineering Mechanics	*Engineering Mechanics*	M.S.
	Engineering: Undifferentiated	PH.D.
English	*English*	M.A.
	Humanities	M.A., PH.D.
	Teaching	M.A.T.
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., PH.D.
	Teaching	M.A.T.
Geology	*Geology*	M.S.
History	*History*	M.A.
	Archival Administration	CERTIFICATE OF ARCHIVAL ADMINISTRATION

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Humanities	Humanities	M.A., PH.D.
	Teaching	M.A.T.
Industrial Engineering	Industrial Engineering	M.S., M.ENGR.
	Engineering: Undifferentiated	PH.D.
Interdisciplinary Studies	Interdisciplinary Studies	M.A., M.S.
Management	Business Administration	M.B.A.
	Administration	PH.D.
Marketing	Business Administration	M.B.A.
	Administration	PH.D.
Materials Science	Materials Science	M.S.
	Engineering: Undifferentiated	PH.D.
Mathematics	Mathematics	M.A.
	Mathematical Sciences	PH.D.
Mathematical Sciences	Mathematics, Applied Mathematics	PH.D.
Mechanical Engineering	Mechanical Engineering	M.S., M.ENGR.
	Engineering: Undifferentiated	PH.D.
Nursing	Nursing	M.S.N.
Physics	Physics	M.A.
	Radiological Physics	M.S.
Political Science	Political Science	M.A.
Psychology	General Experimental Psychology	M.A., PH.D.
Radiological Physics	Radiological Physics	M.S.
Social Work	Social Work	M.S.S.W.
	Administration	PH.D.
Sociology	Sociology	M.A.
Systems Analysis	Business Administration	M.B.A.
	Administration	PH.D.
Urban and Regional Affairs	Urban Affairs	M.A.
	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, 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 or written examination or both 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 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.

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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 6 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 3 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 6 semester hours in the internship course.

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 Economics, English, Sociology, and Radiological Physics.

DEGREE PLAN APPROVAL

A degree plan 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 is applying 9 or more semester hours of transfer credit to his degree program, the degree plan 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 an application for candidacy with the Dean of the Graduate School approximately 60 days prior to the end 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 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 by 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.

At least two weeks prior to the time the thesis defense or comprehensive examination (oral, written or both) is to be given the candidate should submit a request to the Office of the Graduate Dean for designation of an official examination place, time, and date.

The Final Master's Examination Report must be filed in the Graduate School no later than three weeks before the date on which the degree is 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 or internship report must be prepared according to the regulations described in *An Illustrated Guide to the Preparation of Theses and Dissertations* available from the Graduate School Office. Consult the catalog section on Tuition and Fees for thesis and internship report binding fees.

The Assistant to the Graduate Dean 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 a copy of the final draft of the thesis (preferably the master copy *before* having additional required copies prepared) sufficiently 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 examination copy of the final draft, the student will be given a written format evaluation 48 hours later (excluding weekends and holidays).

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:

Biology	Interdisciplinary Studies
Chemistry	Linguistics
Economics	Mathematics
English	Physics
Foreign Languages	Political Science
History	Psychology
Humanities	Sociology
	Urban Affairs

MASTER OF SCIENCE (MS)

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

Aerospace Engineering	Geology
Biomedical Engineering	Industrial Engineering
Civil Engineering	Interdisciplinary Studies
Computer Science	Materials Science
Electrical Engineering	Mechanical Engineering
Engineering Mechanics	Radiological Physics

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 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 Aerospace, 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 given 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 Graduate Dean. 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 Graduate Dean for details.

REQUIREMENTS FOR THE DOCTOR OF PHILOSOPHY DEGREE

The Doctor of Philosophy (PhD) is the highest degree offered by The University of Texas at Arlington. The degree is 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 Doctor of Philosophy listed below set the minimum standards required by the Graduate School. The meeting of all of these requirements does not result in the automatic awarding of the doctoral degree. Most departments and programs have additional requirements and high level of scholarly achievement that must be met by successful PhD candidates. In all PhD 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 Doctor of Philosophy 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 PhD 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 Humani-

ties but a substitute is permitted in the PhD program in Psychology. There is no foreign language requirement for the PhD in Engineering 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 to retake the examination 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 passing 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 fields 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.

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 the names 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 *An Illustrated Guide to the Preparation of Theses and Dissertations* available from the Graduate School Office.

The Assistant to the Graduate Dean 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 a copy of the final draft of the dissertation (preferably the master copy *before* having additional required copies prepared) sufficiently 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 examination copy of the final draft the student will be given a written format evaluation 48 hours later (excluding weekends and holidays).

DISSERTATION DEFENSE

An application for the dissertation defense must be filed in the Graduate School by the student no later than 5 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.

Academic Programs
and
Courses of Instructions

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.
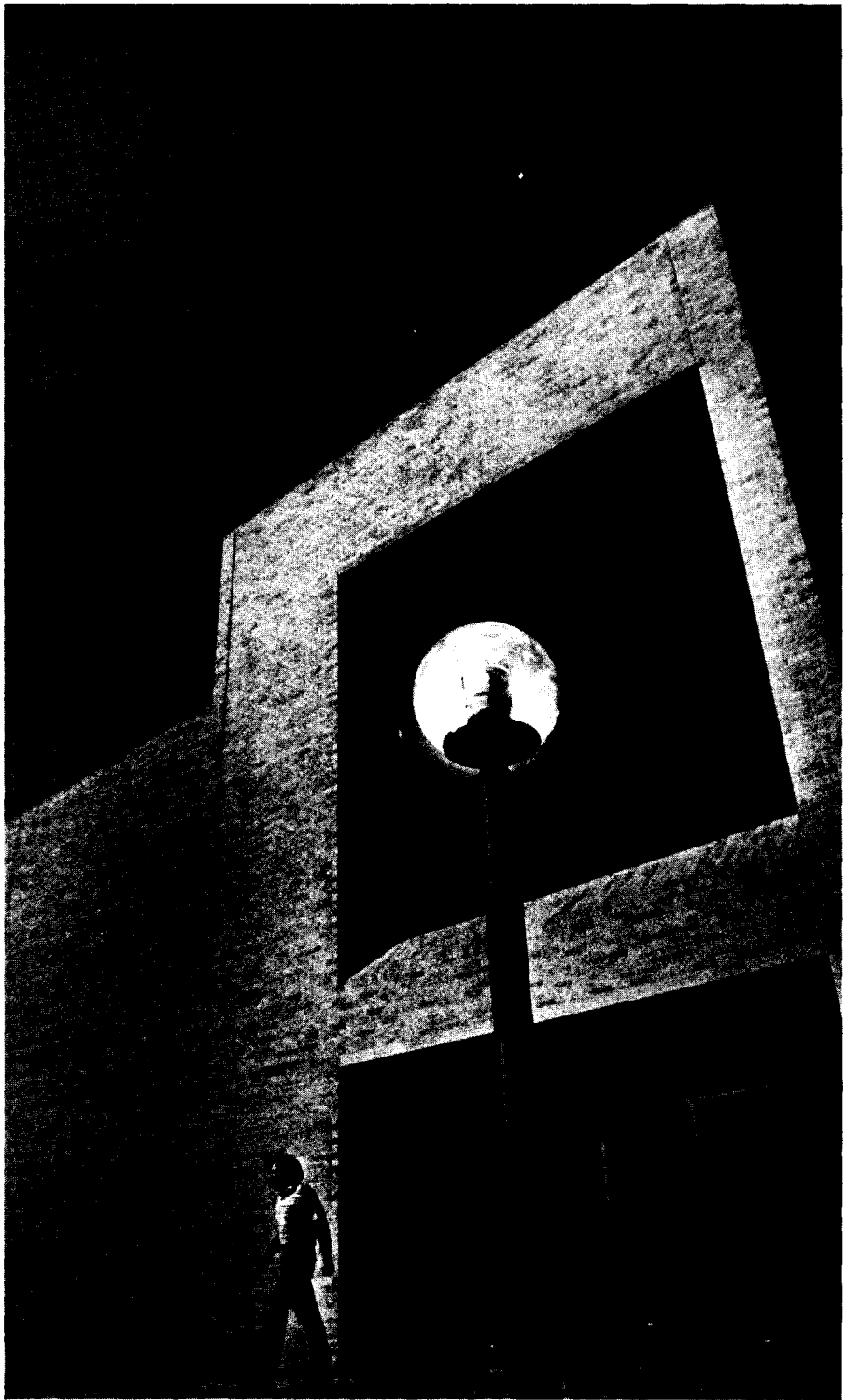
Department of
ACCOUNTING (ACCT)

Areas of Study		*Degrees*
Accounting		M.P.A.
Administration (See Interdepartmental and		
Intercampus Programs, p. 165)		PH.D.

Master's Degree Plans: Thesis and Thesis
Substitute

Chairman: Darwin Casler	409 Business	273-3481
Graduate Advisor: Lola F. Rhodes	413 Business	273-3481

Graduate Faculty:

Professors Casler, Courtney, Imke, Ross, Snavely, Vargo
Associate Professors Solomon, Witt
Assistant Professors Abbott, Dierks, McConnell, McGillivray,
Raiborn, Tsay
Lecturers Horstmann, Rhodes, Strickland

OBJECTIVE

The objective of the Master of Professional Accounting degree program is to prepare students for careers as professional accountants, in public, private, or government accounting. As a part of this larger objective the program is designed to provide the educational background to become Certified Public Accountants or to attain other appropriate professional certification. In addition, the program is designed to provide the student with a sound understanding in selected fields such as finance, management, behavioral sciences, management sciences and economics. Thus, the program seeks to provide the student with 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 degree program is based upon the general admission requirements of the Graduate School. However, a satisfactory score on either the Graduate Management Admission Test or the Graduate Record Examination may be used to qualify an applicant for admission to the program.

The program, which can be completed by part-time students who attend classes during the evening hours, is designed to accommodate students with divergent educational backgrounds and career interests.

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 includes 30 semester hours of work if the student chooses to write a thesis. If the student chooses not to write a thesis, 33 semester hours (including a thesis substitute) are required.

ACCOUNTING

Foundation 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)

Category I MPA Program

Financial Accounting I (ACCT 5311)
Financial Accounting II (ACCT 5312)
Financial Accounting III (ACCT 5319)
Cost Accounting (ACCT 5317)
Study of Federal Income Tax Law (ACCT 5314)
Auditing Concepts and Practices (ACCT 5316)
Law I (BUSA 3311)
Business Policy (BUSA 5333)

In addition to the courses listed above (or their equivalent) the student will either prepare a thesis or take Contemporary Issues in Accounting Theory (ACCT 5327) and prepare a thesis substitute.

Background Category II

Students who have an undergraduate degree in business administration with their major area of study being some field other than accounting are included in this category. These students typically need not take any of the Foundation Program courses. They will, however, fulfill the requirements of the Category I MPA program as listed above. Equivalent courses taken in a student's previous degree program cannot be repeated for credit. A minimum of 12 semester hours of accounting coursework is required of the student who chooses to write a thesis. The student who chooses to write a thesis substitute is required to take a minimum of 15 semester hours of accounting. The student must also complete at least one appropriate graduate course in statistics or management science. A minimum of 30 semester hours of work is required if the student chooses to write a thesis. Otherwise 33 semester hours (including a thesis substitute) are required.

Background Category III

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 educational needs in light of previous academic work and career objectives. The student may select courses for specialization in Financial Accounting, Managerial Accounting, or Tax Accounting.

A minimum of 12 semester hours of accounting is to be selected from the courses offered, except that the accounting internship may not be included in this minimum. Of the semester hours required, six semester hours may be represented by undergraduate courses. Undergraduate courses submitted for graduate credit must be approved by the student's Graduate Advisor. At least six semester hours of graduate courses in business administration and/or economics are required including an appropriate graduate course in statistics or management science. Also required is BUSA 5333 emphasizing the integrating analysis and policy determination at the overall management level. This course is waived if the student had a similar course before admission to the MPA program. A minimum of 30 semester hours of work is required if the student chooses to write a thesis. If the student chooses not to write a thesis, 33 semester hours (including a thesis substitute) are required.

During the final semester, students who have written a thesis must defend the thesis in an oral examination.

The above requirements are in addition to the general regulations and requirements given in the introductory sections of this catalog.

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.

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. Topics included are: price level and fair-value accounting, pensions, leases, earnings per share, and partnerships. 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.

5314. **STUDY OF FEDERAL INCOME TAX LAW** (3-0). Determination and taxation of income of individuals, partnerships and corporations. Emphasizes understanding 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.

5315. **TAX PLANNING AND RESEARCH** (3-0). Intensive study of the more complex provisions of the internal revenue code pertaining to individuals, partnerships, corporations, and estates and trusts. Emphasizes tax planning for business enterprises and student research into tax problem areas. Prerequisite: ACCT 5314 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. Also, differential analysis of costs for special decisions, analysis of variances and application of quantitative techniques. Prerequisite: ACCT 5302 or equivalent.

5318. **STUDIES IN AUDITING** (3-0). Critical analysis of generally accepted auditing standards and their application in independent audits of financial statements; SEC reporting and contemporary topics in auditing. Prerequisite: ACCT 5316 or equivalent.

5319. **FINANCIAL ACCOUNTING III** (3-0). Accounting for business combinations, preparation of consolidated financial statements, and special accounting situations including segment reporting, interim statements, bankruptcy, and fiduciary and institutional accounting. 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. Extensive use of computer facilities. May not be taken for credit by students who previously received credit for ACCT 3314 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). Representative topics include inter-industry studies of planning and control, PERT/Cost systems, corporate financial models and planning and control. 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: six 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.

5341. TAX PROBLEMS OF PARTNERSHIPS AND PARTNERS (3-0). Analysis of the federal income tax rules governing partners and partnerships. Prerequisite: ACCT 4301 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 4301 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 4301 or equivalent.

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 4301 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 4317 or equivalent.

5346. SEMINAR IN FEDERAL TAXATION (3-0). In-depth study of current matters in the operations of the federal taxation system. Subjects include practice and procedure before the Internal Revenue Service, employee benefit programs, Keogh and individual retirement plans, charitable and educational organizations, and other tax exempt entities. Prerequisite: ACCT 4317 or equivalent.

5150, 5250, 5350. ACCOUNTING INTERNSHIP. Part or full-time work of an accounting nature; paper required. May be repeated to earn a maximum of three hours credit. Prerequisite: consent of departmental coordinator.

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. 165

Department of
AEROSPACE ENGINEERING (AE)

Areas of Study	*Degrees*
Aerospace Engineering	M.S., M.ENGR.
Engineering: Undifferentiated (See Interdepartmental and Intercampus Programs, p. 176)	PH.D.

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

Chairman: Donald D. Seath   306C Engineering   273-2603

Graduate Advisor: Fred R. Payne   301B Engineering   273-2604

Graduate Faculty:

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

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
   k. Gas dynamics and MHD power generation
   l. V/STOL aerodynamics and dynamics

AEROSPACE ENGINEERING

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.

DEGREE REQUIREMENTS

Students wishing to pursue the Master's Degree in Aerospace Engineering should have the Bachelor of Science degree in Aerospace Engineering (or equivalent) from an accredited school. Doctoral candidates must also demonstrate the equivalent of the Master's degree level of competency prior to formal admission to doctoral level studies. Students with degrees in other disciplines may be required to take undergraduate courses which are deemed by the graduate faculty to be appropriate prerequisites for a proposed program of graduate study. All students will be expected to have some proficiency 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.)

General degree requirements for the Master of Engineering are given on page 45.

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 ENUD 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). Fundamental laws of motion for a viscous fluid and laminar boundary layer theory from an advanced viewpoint. Some aspects of incompressible turbulent boundary layers are introduced. Prerequisite: a course in fluid mechanics.

5306. BOUNDARY LAYER THEORY II (3-0). Study of transition phenomena and turbulent boundary layers from an advanced viewpoint. Influence of compressibility on boundary layer characteristics. 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. Perequisite: AE 5312.

5311. ADVANCED ASTRONAUTICS (3-0). Continuation fo AE 4302 (Astronautics). Considers the more sophisticated aspects of orbital mechanics, gyrodynamics, inertial navigation, and centers on the space vehicle as a spinning, variable mass body stabilized by passive means.

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 non-linearities ("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.

DISSERTATION. See Engineering: Undifferentiated, page 176. 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 Program: C. Lee Wright	328 Fine Arts	273-2801
Graduate Advisor: Richard D. McBride	331 Fine Arts	273-2801

Graduate Faculty:

Professors Buckley, Myrick, G. Wright

Associate Professors Antoniades, Brooks, Ferrier, Goldsteen, Hamilton, Henry, McBride, Moreland, Pinno, Price, Spears, L. Wright

Assistant Professors Boswell, Duncan, Schaar, Scherr, Yingling

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.

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 and obtain course and schedule approval from him each semester at least one month prior to registration.

Applicants to the Professional degree programs 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 from an accredited college or university.

A minimum of 54 approved semester hours, plus 6 hours approved practicum or an option of 6 approved elective semester hours for a total of 60 credit hours is required. Program requirements include a three-hour Program Development and a six-hour Thesis. In some cases, a nine-hour thesis substitute may be approved as an exception to a design thesis. The student taking thesis substitute will have 63 credit hour total requirement.

The core curriculum of 42 semester hours required for this program of study is Architecture **5308 (or 5309 or 5310), 5325, 5326, 5330, 5331, 5350, 5363,** 12 hours of design studio, and **5397** with a thesis **5698** or its equivalent.

One graduate course in architectural history, Architecture 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 21 semester hours must be taken in an area of concentration designed by the student and approved and directed by the Graduate Advisor. Students taking the 6-hour practicum will be given credit for these courses on two bases: (1) part credit earned for part-time practical experience and/or research in an approved architect's office with an approved program during the period of enrollment; and (2) full credit during one semester up to three credit hours for full-time employment and/or research in an approved architect's office. All other students will earn the remaining required hours in their area of concentration from courses approved by the Graduate Advisor.

All 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.

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 complete a Basic Course Series in architecture theory and practice including: ARCH 5301, 5302, 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. A special program of basic courses will be arranged to fit the needs of each student and will include at least the previously listed Basic Course Series. Students must begin the Basic Course Series in the fall semester and complete the series within one calendar year. Program II students are required to take a full load of 15 hours for fall and spring semesters unless otherwise approved by the Graduate Advisor. The student's program following the successful completion of that series will conform to the requirements of Program I and will usually require an additional two years.

ARCHITECTURE

Professional Degree Program III

For applicants who hold a five-year professional degree in architecture (BArch)

Thirty semester credits are required of students in Program III with thesis, while 33 hours will be required of students with a thesis substitute. (This latter program includes 12 hours of Design Studio.) 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.

Environmental Studies Option

This option requires 60 semester hours of work including ARCH 5308 (or 5309 or 5310), 5325, 5326, 5351, 5352, 5363, 12 hours of design, and nine hours of thesis (5397, 5698). In addition, candidates must complete 31 hours of approved electives.

Applicants should consult the Graduate Advisor for the specific requirements for this option prior to admission to the program. All curriculum 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 ARCH 5308 (or 5309 or 5310), 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 21 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 course-work 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.

JOINT M.B.A. AND M.ARCH. DEGREE PROGRAM

Students in the joint program can earn both the Master of Business Administration and the Master of Architecture degrees in a curriculum of approximately 90 semester credit hours. Applicants must meet the admission requirements of both the MBA and the MArch programs. Business Administration students wishing to earn the MArch degree will be required to take Program II (see above). Programs of study should be designed with the assistance of the Graduate Advisors in both areas. Students may select upon consultation with the Graduate Advisors either the thesis plan of the MArch program or a thesis substitute plan of the MBA program. The thesis committees will be formed from the joint faculties of the College of Business and the School of Architecture and Environmental Design. The successful candidate will be awarded both degrees rather than one joint degree.

5301. INTRODUCTION TO ENVIRONMENTAL DESIGN (2-3). Study of man's relationship to his total environment with lectures and exercises to develop an awareness of the natural and built environment and the forces which shape them. Prerequisite: permission of instructor. **$2 lab fee.**

5302. INTRODUCTION TO ENVIRONMENTAL DESIGN (2-3). Continuation of ARCH 5301. Prerequisite: ARCH 5301 and permission of instructor. **$2 lab fee.**

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.

5314. HISTORIC RESTORATION AND 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 archaeological and bibliographic research, technical problems of conservation and restoration, and current problems in adaptive use of existing structures.

5315. ARCHITECTURE OF THE ANCIENT MEDITERRANEAN (3-0). Cross-cultural analysis of the earliest architectural traditions: the Mesopotamian, Egyptian, Anatolian, and Aegean civilizations which culminate during the Bronze Age. Prerequisite: ARCH 2303 or equivalent.

5316. ARCHITECTURE OF THE CLASSICAL WORLD (3-0). Cultural and environmental forces which conditioned the design of classical Greek and Roman architectural monuments and urban form.

5317. ARCHITECTURE OF THE MIDDLE AGES (3-0). Development and culmination of Medieval architecture and urban design.

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. CONSTRUCTION MATERIALS AND STRUCTURAL CONCEPTS (3-0). Introduction to architectural structures related to construction materials, including statics and strength of materials. Prerequisites: PHYS 1347, MATH 1326, or 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. Prerequisite: ARCH 5325.

5327. STRUCTURES (3-0). Continuation of ARCH 5324 presenting the theory of structural design of timber and in structural steel. Prerequisite: ARCH 5324 with a grade of C or better.

5328. STRUCTURES (3-0). Continuation of ARCH 5327 which presents the theory of structure design in masonry and in reinforced concrete. Prerequisite: ARCH 5327 with a grade of C or better.

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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: CS 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 in the investigation of environmental behavioral research and the execution of independent design research.

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: SPECIAL PROJECTS (3-12). Design studio in special projects to be announced before the beginning of the semester.

5693. 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.

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. No more than six total credit hours in Practicum are allowed for degree. Graded P/F.

5397. PROGRAM DEVELOPMENT (3-0). Individual study and research by thesis candidates for preparation of a written statement of objectives, programming for design, and outline of results to be achieved. Statement of intent and names of supervising commit-

tee to be filed with graduate advisor during the preceding semester. Graded P/F. Prerequisite or concurrent enrollment in ARCH 5363.

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 and lecture courses to explore and present selected topics in architecture and environmental design. May be repeated for credit as topics change.

5698. THESIS. To be taken in final semester to assure completion of prescribed professional courses. A design problem of research in architectural, structural, or related topics may be selected for the thesis.

Department of
ART (ART)

Chairman: Vincent Bruno   144 Fine Arts   273-2891

Graduate Faculty:

Professors Bruno, Hodnett, Merrill, Turner
Associate Professors Keens, Henderson, Rascoe
Assistant Professor Rifkin

OBJECTIVE

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

5301. MYTH AND LITERATURE IN ART (3-0). Interaction between literature and art, with special emphasis on narrative styles in periods such as the classical, Renaissance, and the 19th century. Focuses upon comparisons between literary and narrative forms in painting and sculpture of a given myth or poetic theme, in order to develop broad overview of the stylistic treatment of major themes in a variety of poetic and artistic contexts. May be repeated for credit as the area or period of concentration changes.

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.

Department of BIOLOGY (BIOL)

Area of Study	Degree
Biology	M.A.

Master's Degree Plans: Thesis and Non-Thesis

Chairman: William C. McDonald   337 Life Science   273-2871

Graduate Advisor: C. C. Hall   344 Life Science 273-2871

Graduate Faculty:

Professors Arnott, Hall, Hellier, Kennerly, McCrady, McDonald, Meacham, Pyburn

Associate Professors Boley, Bragg, Butler, Frye, McMahon, Neill

Assistant Professors Bacon, Hopkins, Maclean, Sharp, Stewart, Tuttle, Whitmore

OBJECTIVE

The program leading to the degree of Master of Arts 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.

DEGREE REQUIREMENTS

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.

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 those students in non-research oriented fields.

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.

5210. EVOLUTION (2-0). Study of the origin of living systems and the mechanism of their evolution. Prerequisite: consent of instructor.

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.

5280. METHODS IN DEVELOPMENTAL BIOLOGY (0-6). Introduction to a number of plants, animals, and microorganisms commonly used to study developmental problems. Students will participate in the design and execution of special experimental

projects with various living organisms including echinoderms, amphibians, chick embryos, mice, simple vascular plants, and selected lower eucaryotes. **$8 lab fee.**

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 GENETICS (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.

5305. CONCEPTS OF MEDICAL CARE (3-0). Seminar on understanding disease and injury; prevention, diagnosis, treatment, and rehabilitation of physical and emotional disorders.

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.

5312. COMPARATIVE IMMUNOLOGY (3-0). Current concepts regarding components and mechanisms of expression of immune potential in various invertebrate and vertebrate phyla. 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.

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.

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.**

5347. PHYCOLOGY (2-3). Study of marine, terrestrial, and fresh-water algae. Lecture topics include group characteristics, evolution, and taxonomy. Field and laboratory work emphasize classification, ecology, culturing, and collecting. Prerequisite: BIOL 3345 or its equivalent or consent of instructor. **$2 lab fee.**

5351. BIOLOGICAL ULTRASTRUCTURE (2-3). 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. **$2 lab fee.**

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: BIOL 4346 and consent of instructor. **$4 lab fee.**

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.

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.**

5450. PATHOLOGY OF PARASITIC DISEASES (3-3). Study of the lesions caused by protozoal and multicellular parasites in man and animals. Special attention to the mechanisms by which parasites produce pathology in their hosts. Prerequisite: consent of instructor. **$4 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
4344. NATURAL HISTORY OF THE VERTEBRATES
4348. AQUATIC BIOLOGY
4357. RESEARCH METHODS IN CELL BIOLOGY
4361. METHODS OF IMMUNOLOGY
4443. COMPARATIVE INVERTEBRATE PHYSIOLOGY
4445. ADVANCED GENERAL MICROBIOLOGY
4460. ENTOMOLOGY
4680. FIELD BIOLOGY

BIOMEDICAL ENGINEERING
Program

See Interdepartmental and Intercampus Programs, p. 166.

BUSINESS ADMINISTRATION
Program

See Interdepartmental and Intercampus Programs, p. 170.

Department of
CHEMISTRY (CHEM)

Area of Study	*Degree*
Chemistry	M.A.

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

Chairman: Richard B. Timmons   201 Science Hall   273-3171

Graduate Advisor: Martin Pomerantz   201 Science Hall   273-3171

Graduate Faculty:

   Professors Baker, Francis, Girardot, Martin, Pomerantz, Ternay,
      Timmons
   Associate Professors Bellion, Blake, Schelly
   Assistant Professor Brown
   Adjunct Professor Battista

OBJECTIVE

The objectives of the Chemistry Department's program leading to the Master of Arts 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.

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.

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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/MA Program

This accelerated program is designed for students wishing to spend minimum time in completing the requirements for the BS and MA 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 MA degrees.

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.

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, 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 space; Boltzmann, Fermi-Dirac and Bose-Einstein distributions; thermodynamic functions; kinetic theory of gases; Debye-Huckel Theory; time-correlation function. Prerequisite: CHEM 3322.

5332. CHEMICAL KINETICS (3-0). Kinetics and mechanisms of reactions in the gas phase, solutions and on surfaces, theory of rate processes, structure-reactivity correlations and photochemical kinetics. Contemporary experimental methods to study reaction dynamics on a molecular basis. 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; time-dependent 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.

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.

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

Dean, School of Architecture and
   Environmental Design: George S. Wright   335 Fine Arts   273-2801

Director of City and Regional Planning and
   Graduate Advisor: Joel B. Goldsteen   329 Fine Arts   273-2801

Graduate Faculty:
   Professors Myrick, G. Wright
   Associate Professors Antoniades, Brooks, Goldsteen, Henry,
      McBride, Moreland, Pinno, Price
   Assistant Professors Rubin, Scherr

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 inter-disciplinary relationships in city and regional planning with focus upon guidance of development of the future physical city and region. Academically, the program purports to equip the student with knowledge of problem-solving techniques, practical skills, an understanding of the dynamics of change, implementation methods, design control, and 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 degree program. Specialization in specific subject areas of planning is obtained 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 at the School of Architecture and Environmental Design. Research centers within the school and university are equipped to investigate planning problems and planning opportunities with staff recruited from the faculty and student body. The centers are: Planning Research and Design Center, Institute of Urban Studies, Housing, Research and Design Center, Center for Energy Policy Studies, and the Construction Research Center.

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 environment. Analytical methods and empirical research skills are the emphases of the professional education in planning at the University of Texas at Arlington.

Experience in Planning, Social Science, and Urban Affairs along with emphasis upon Research Methods should provide those new skills necessary to guide and control the future city and region.

CITY AND REGIONAL PLANNING

DEGREE REQUIREMENTS

The 54 semester hours program for thesis plan students is composed of:
39 semester hours of planning core courses,
6 semester hours of advanced urban affairs courses,
6 semester hours of urban affairs core courses, and
3 semester hours of electives or practicum.

The thesis-substitute program is composed of 57 semester hours and includes all of the courses listed above under the thesis plan in addition to 3 semester 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 specific interest areas for academic concentration to submit their intention 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. 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 and may be asked to submit a portfolio of work, previous coursework or other evidence of scholastic or professional accomplishment for evaluation by the department. A personal interview is recommended and letters of reference are required.

Those students who do not have prior experience in related subjects and disciplines may be required as directed by the planning faculty committee to take certain leveling courses prior to graduation. Some leveling courses may become a prerequisite to acquire other sufficient knowledge or skills to accomplish project planning (studio work). Others may be required to enhance the student's background and capabilities for understanding the complexities of the urban environment. Such supplemental courses will be in addition to the 54 credit hours specified for the MCRP degree and will be required as a condition for provisional admission only after a thorough review of each individual's background and professional objectives.

The 54 hour core curriculum includes: CIRP 5301, 5302 or 5315, 5305, 5309 or 5310, 5316, 5317, 5318, 5319, 5612, 5613, 5698; 9 credit hours of URBA electives; seminars; three credit hours of elective or practicum.

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, management 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.

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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.

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

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.

5195-5695. SPECIAL TOPICS IN PLANNING. Selected topics in City and Regional Planning. May be repeated for credit.

5612. PROJECT PLANNING (3-9). Skills, practical experience, problem-solving methods and techniques are gained from mapping, design, planning, and research

projects. Studio and seminar meetings are the format for field studies in the practical application of city and regional planning.

5613. PROJECT PLANNING (3-9). Skills, practical experience, problem-solving methods and techniques are gained from mapping, design, planning, and research projects. Studio and seminar meetings are the format 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.

5398, 5698, 5998. PLANNING THESIS.

Department of
CIVIL ENGINEERING (CE)

Areas of Study	Degrees
Civil Engineering	M.S., M.ENGR.
Engineering: Undifferentiated (See Interdepartmental and Intercampus Programs, p. 176)	PH.D.

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

Chairman: Noel J. Everard · 435-B Engineering · 273-2202

Graduate Advisor: Tseng Huang · 435-J Engineering · 273-3665

Graduate Faculty:

Professors Everard, Haynes, Huang, Nedderman, Poor, Qasim
Associate Professors Armstrong, Spindler, Yuan
Assistant Professors Clark, Matthys, Petry
Adjunct Professor Santry
Adjunct Assistant Professor Chiang
Visiting Assistant Professor Argento

OBJECTIVE

Graduate study in civil engineering is a continuation of professional development beyond the baccalaureate degree with emphasis in a specialization in civil engineering.

The MS program is designed to strengthen and broaden the knowledge of the fundamentals and the state-of-art in the specialization areas. The Master of Engineering degree with specialization in civil engineering is a design-oriented program. The PhD program is designed to prepare students to carry out research and development in their areas of specialization.

The 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)

DEGREE REQUIREMENTS

Students wishing to major in civil engineering should have the Bachelor of Science degree in civil engineering from an accredited school. Students with degrees in other disciplines may qualify for graduate study in civil engineering after the completion of a faculty approved program of undergraduate courses. These courses are specified in the "Handbook for Graduate Studies in Civil Engineering" which is available in the department. Students working toward an MS degree are encouraged to take the thesis degree plan, although the non-thesis or thesis substitute plan is available.

General degree requirements for the Master of Engineering are given on page 45.

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.

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 tri-axial. 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 through 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.

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.

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.**

5350. FLEXIBLE PAVEMENT DESIGN (2-3). Loads on pavements, stress analysis in flexible pavement systems, and design practices. Certain laboratory procedures involved in the design of flexible 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 interpreta-

tion, 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.

6301.   TRAFFIC MODELING (3-0). Simulation of traffic operating on streets and inter-sections. Statistics, car-following and queueing behavior, and programming techniques utilized in the formulation of the simulation models. Simulated traffic studies using developed models. Prerequisite: CS 1201, MATH 3310, or the equivalent of these courses.

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). Theory of rigid pavement design along with current design practices and methods of construction.

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.

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, CE 6336, CE 6337, 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 regulators, individual industries, and combined municipal and industrial waste treatment. Prerequisite: CE 3314.

6327.   HIGHWAY PLANNING, ECONOMICS AND FINANCE (3-0). Study of the nature of highway transport, needs studies, planning surveys, classification and administration, forecasting and programming, the basis of economic analysis and feasibility studies, vehicle operating costs, apportionment formulas and other considerations of finance. Stresses functioning of highways as a regional system. Prerequisite: instructor's approval.

6328.   PLANNING AND DESIGN OF AIRPORTS. (3-0). Study of the growth and demand of air transport, airport site selection and configuration, geometric design of runways and taxiways, terminal areas, lighting, structural design of pavements and drainage problems. The design of heliports and special short take-off facilities. Prerequisite: instructor's approval.

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.

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.

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 structures. Beam methods for long shells discussed. Prerequisite: CE 5312.

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.

(Credit can be earned for only one of CE 6334 or CE 5347; the latter is described in the Graduate Catalog 1974-75).

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.

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

DISSERTATION—See Engineering: Undifferentiated, page 176.

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

COMPUTER SCIENCE
Program (CS)

Areas of Study	Degrees
Computer Science	M.S.
Engineering: Undifferentiated (See Interdepartmental and Intercampus Programs, p. 176)	PH.D.

Master's Degree Plans: Thesis and Non-Thesis

Graduate Advisor: Ted M. Sparr   206 Engineering   273-3785

Graduate Faculty:

Professors Barker, Lawrence
Associate Professors Cannon, Pierce, Schember, Sparr, Underwood, Walker, Ward, Wilson
Assistant Professor Rinewalt

OBJECTIVE

The graduate program in Computer Science is multidisciplinary and designed to fill the special educational needs currently existing in the computer profession. The program leads to the degree of Master of Science in Computer Science and is available to students with a variety of undergraduate backgrounds. Course work is offered during the evening and the day to accommodate the working professional.

DEGREE REQUIREMENTS

Students with degrees from any discipline may qualify for graduate study in computer science; however, if an entering graduate student has an inadequate background in computer science, appropriate deficiency and/or foundation courses must be taken.

All entering students must take or have had the equivalent of the following foundation courses: CS 5313, CS 5319, and CS 5320.

Four core courses must be taken by all candidates for the degree: CS 5301 Advanced Information Structures, CS 5303 Design of Operating Systems, CS 5306 Information Retrieval I, and CS 5304 Compiler Design I. A B average must be maintained on the core courses and CS 5320.

At least 21 hours, including thesis, must be in computer science. A maximum of 3 hours of foundation courses in computer science and a maximum of six hours of foundation courses in a minor area can be counted toward the minimum course work requirements. The degree can be interdisciplinary in nature and thus the remaining courses may be in any area related to computer science, subject to approval by the Computer Science Graduate Studies Committee.

In addition, a student will be required to demonstrate proficiency in the usage of two approved (high level) programming languages. (This requirement may be satisfied by making a grade of A or B in CS 5313.)

A student pursuing a Master of Science in Computer Science may specialize in one of three areas:

1. **Application of Computers in Other Disciplines**—This program is available to students from any discipline. It is designed to prepare students to utilize the computer in applications within their own disciplines. Some possible options within this area of study are business information systems, numerical analysis, and math sciences.
2. **System and Compiler Theory**—This area of specialization involves the study of operating systems design, compiler design, and systems software associated with real-time systems, data management systems, and artificial intelligence.
3. **Computer Hardware/Software Design**—With the advent of the microprocessor, computer systems have evolved to tightly interwoven systems of hardware and software. To achieve the full capability of modern systems, graduates must be able to work creatively in both hardware design and computer programming.

Typical areas of study within these categories are: Systems Software, Information Retrieval, Information Systems, Microprocessor/Microcomputers, and Computer Organization.

5301. ADVANCED INFORMATION STRUCTURES (3-0). Representation and applications of binary trees, forests, and multi-linked structures. Table construction and search techniques. Sorting techniques and other appropriate main-memory processing algorithms. Prerequisite: CS 4306 or 5319 and corequisite CS 5313.

5302. COMPUTER GRAPHICS (3-0). Input/output devices and programming techniques suitable for the visual representation of data and images. Prerequisite: CS 5301 or concurrent.

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: CS 5320.

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. Prerequisite: CS 5320 and 5301.

5305. COMPILER DESIGN II (3-0). Definitions of additional language types and their processors (e.g. LL(k), LR(k), etc.). The techniques and use of translator writing systems such as XPL. Extensive treatments of code generation and optimization. Prerequisite: CS 5304.

5306. INFORMATION RETRIEVAL I (3-0). File structures, retrieval and update processing. Database concepts including logical models, data description and manipulation languages. Emphasis on systems design aspects. Prerequisite: CS 5301.

5307. COMPUTER ORGANIZATION I (3-0). Basic digital circuits, Boolean algebra and combinational logic, data representation and transfer, and digital arithmetic. Digital storage and accessing, control functions, input-output facilities, system organization and reliability. Prerequisite: CS 3341 or 5319 or concurrent.

5308. COMPUTER ORGANIZATION II (3-0). Continuation of CS 5307. Topics include various large scale computer organizations, microprogramming, pipeline and array processors, cache memories and the uses of other computer hardware structures in various computer organizations. Prerequisite: CS 5303 and CS 5307.

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: CS 1201 or 2306 or equivalent and graduate standing in engineering or science.

5310. ADVANCED COMPUTATIONAL METHODS FOR ENGINEERS AND SCIENTISTS II (3-0). A continuation of CS 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: CS 5309 or 4301 and consent of instructor.

5311. 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. Review of needed probability, statistics and queueing theory. Prerequisite: CS 5303.

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: CS 5320 or concurrent.

5313. ALGORITHMIC LANGUAGES (3-0). Survey of higher level programming languages to solve common computational problems including numeric, string, list and data processing applications. Languages selected from PL/1, APL, SNOBOL4, PASCAL and others. Prerequisite: CS 1201 or 2302 or 2306 or equivalent and CS 5319 or concurrent.

5315. COMPUTER NETWORKS AND COMMUNICATIONS SYSTEMS (3-0). Hardware and software requirements for network and communication computing facilities. Prerequisite: CS 5303.

5316. INFORMATION PROCESSING SYSTEMS (3-0). Data processing systems including project definition systems design, project coordination, implementation and documentation. Also includes a study of implementing a Management Information System (MIS). Intended to develop systems analysts and project leaders. Prerequisite: CS 5301.

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: CS 4301 or 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 AND INFORMATION STRUCTURES (3-0). Accelerated course for students entering the graduate computer science program. Includes a study of machine language instruction sets and assembly language programming. Introduc-

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tory data structures such as strings, arrays, and linear lists also treated. Prerequisite: CS 2302, 2306, 3301, or equivalent 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: CS 5319 and corequisite CS 5313.

5321. COMPUTERIZED IMAGE MANIPULATION (3-0). Extraction of information from visual images. Image enhancement, feature extraction, scene analysis, and image modeling. Prerequisite: CS 5302.

5322. COMPUTER SIMULATION TECHNIQUES (3-0). Computer simulation, Monte Carlo modeling, and selected simulation programming languages. Special emphasis on simulations of computer systems. Prerequisites: CS 1201 or 2306, 5320 or equivalent, and a basic knowledge of probability and statistics.

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: CS 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: CS 5301 and CS 5313.

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. Prerequisite: CS 5307 and MATH 2325.

5326. LIST PROCESSING AND SYMBOL MANIPULATION (3-0). List and string manipulation languages including SNOBOL4, LISP, and SAIL. Applications presented in a variety of areas. Design of list-processing systems considered. Prerequisite: CS 5313 and 5301.

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: CS 5304.

5328. INFORMATION 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: CS 5307 and a basic knowledge of probability and statistics.

5329. INFORMATION RETRIEVAL II (3-0). Relational database systems; inferential question answering systems; document retrieval including classification, content analysis and clustering. Perequisite: CS 5306.

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: CS 5313.

5331. ARTIFICIAL INTELLIGENCE (3-0). Survey of the methods and concepts of artificial intelligence. Prerequisite: CS 5301.

5332. THEORETICAL ASPECTS OF INFORMATION SYSTEMS I (3-0). Introduction to some basic problems of general systems theory, and the development of a systems algebra for information systems based on matrices and related structures. Discussion, in general terms, of the design and functioning of information systems and the meaning and value of information in a system. Prerequisite: CS 4306 or 5301 and MATH 3330 or equivalent.

5333. THEORETICAL ASPECTS OF INFORMATION SYSTEMS II (3-0). Application of the systems algebra to specific problems in information theory, including the grouping of processes, consolidation of files, the design of systems, organization of files, and some data processing problems. Prerequisite: CS 5332.

5334. MICROCOMPUTER ORGANIZATION AND PROGRAMMING (3-0). Study and applications of micro/mini computer systems. Includes microprocessors and other support components which make up the micro-computer. Emphasis on microcomputer programming and system design applications. Prerequisite: CS 5319 and corequisite CS 5307 and 5313.

5335. ADVANCED MICRO SYSTEMS DESIGN (3-0). Advanced studies in the design and implementation of microprocessor/microcomputer based systems. Prerequisite: CS 5334.

5339. ADVANCED COMPUTER ARCHITECTURE (3-0). Includes a study of the role of microprogramming in digital computer systems. Consideration given to the use of microprogramming as a tool for the implementation of specific architectures as well as advanced applications in interpretive architectures. Prerequisite: CS 5308.

5191, 5291, 5391. SELECTED TOPICS 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.

5398 or 5698. THESIS. Prerequisite: graduate standing in computer science.

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.

DISSERTATION—See Engineering: Undifferentiated, page 176.

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 and Graduate Advisor: Allan K. Butcher
549   University Hall   273-3071

Graduate Faculty:

Professors Newman, Stevens
Associate Professors Almore, Butcher
Assistant Professors Price, Smith

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

Degree plan selection 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 one research course and certain specified core courses in Urban Affairs and 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.

Non-thesis option students will be required to take a written evaluation examination after completing 18 semester hours but before completing 24 semester hours of graduate work in the program. They will be required to take a final oral comprehensive examination.

5305. CRIME AND THE URBAN COMMUNITY (3-0). Analysis of the interaction between crime and society considering the concepts of social control, law, deviance, crime and the criminal as these relate to social change, bureaucratization and the political and social ideologies.

5306. THE NATURE OF CRIME (3-0). Surveys available data and theories relating to the scope and nature of the crime problem, to the characteristics of offenders, and to factors that are correlated with crime and which increase the probability of criminal careers. Special attention given to social institutions that play significant roles in the amelioration of the crime problem as it exists in the United States and other cultures.

5307. DEVIANT BEHAVIOR (3-0). Analysis of psychological and sociological factors involved in delinquent 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.

5317. SYSTEMS APPROACH TO CRIMINAL JUSTICE (3-0). Examination of the interactive processes between criminal justice subsystems. Concentrates on the impact of decision making both within and outside subsystems, political and societal implications of decision making, strategies for interagency cooperation.

CRIMINAL JUSTICE

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.

5328. DEVELOPMENT OF INTERPERSONAL SKILLS (3-0). Provides methods and techniques for facilitating understanding between and among individuals. Purpose: to increase coping behavior in emotional situations to facilitate understanding of possible solutions, to learn how to react in traumatic situations and to act as stabilizing forces. Verbal and non-verbal communication examined to demonstrate the impact of personal interaction.

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.

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.

5336. INTRAMURAL CORRECTIONS (3-0). Analysis of the development of institutional corrections for both adults and juveniles with special attention to contemporary problems and programs such as indeterminant sentencing, work-study release, institutional design and halfway house programs.

5337. EXTRAMURAL CORRECTIONS (3-0). Analysis of the development of other than institutional corrections for both adults and juveniles with special attention to contemporary problems and programs including probation, parole, pre-adjudication counseling, day care facilities and working with other community agencies.

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.

5340. THEORIES OF INTERVIEWING AND COUNSELING IN CRIMINAL JUSTICE AGENCIES (3-0). Examination of current theories of counseling and interviewing with special reference to their application in correctional or diversion settings. Consideration also given to principles of interrogation.

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 urban affairs 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)

Area of Study	Degree
Economics	M.A.

Master's Degree Plan: Thesis only

Chairman: S. T. Keim, Jr.	309-C Business	273-3061
Graduate Advisor: G. B. Duwaji	312 Business	273-3061

Graduate Faculty:

Professors Carney, Holland, Keim, McCrea, Mullendore, Nelson, Reher

Associate Professors Duwaji, Hayashi, McCall, Ziegler

Assistant Professor Tansey

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.

A minimum of 30 semester hours, including credit for the thesis, is required. The total may include up to 12 hours in supporting subjects within or outside the department. Nine hours of the total course work may be from the following advanced undergraduate courses: ECON 4304, 4325, ACCT 4311, 4313, BUSA 4322, FINA 4313, 4314, 4315, MARK 4311, 4322. Not more than six hours of such courses may be in either the major or the supporting area. A minimum of 18 hours, including the thesis, shall be taken in economics, including a core of ECON 5310, 5312, and 5336. Enrollment in courses, other than this core, will be with the approval of the Graduate Advisor in economics.

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.

ECONOMICS

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, organization of firms, and government regulation to market structure of an industry. Legal intent for regulating industry compared with actual economic effects of regulation. Prerequisite: ECON 5309 or equivalent.

5316. MATHEMATICAL ECONOMICS (3-0). Mathematical methods useful in economics; differential calculus; determinants and matrices. Prerequisite: ECON 5309 **or** 5311 or the 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.

5329. ARBITRATION AND DISPUTE SETTLEMENT (3-0). Study of the 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. Prerequisite: ECON 5309 or ECON 5312 or equivalent.

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.

5336. ECONOMETRICS (3-0). Adaption of mathematical and statistical methods to analysis of economic problems; estimation problems in time-series, e. g., autocorrelation, least squares bias and collinearity; contemporary econometric work. Prerequisite: BUSA 5301 or equivalent.

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.

5191, 5291, 5391. RESEARCH AND SPECIAL TOPICS IN ECONOMICS.

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

Center for
PROFESSIONAL TEACHER
EDUCATION (EDUC)

Acting Director: Charles W. Funkhouser   304 Carlisle   273-2591

Graduate Faculty:

   Professor Crow
   Associate Professors Buckner, Leffingwell
   Assistant Professors Beach, Black, Brooks, Bruscemi, Martin, Reinhartz, Ryan

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 aspects of society, and the cultural, social, and philosophical forces that shape educational policies and programs.

5305. ADVANCED INSTRUCTIONAL STRATEGIES (3-0). Conditions of learning as related to the learner and the learning process. Emphasis given to an analysis and evaluation of the teaching act, the derivation and application of appropriate teaching strate-

gies from research in human learning and an application of theories and paradigms for teaching to the total educational process.

5306. ADVANCED CURRICULUM DEVELOPMENT (3-0). Curriculum decision-making process. Includes such topics as general model of instruction, educational objectives, design of learning experiences, curriculum evaluation, and a summary of the factors that influence the curriculum decision-making process.

5307. ADVANCED EDUCATIONAL PSYCHOLOGY (3-0). Analysis of psychological variables that affect learning in the classroom. Major emphasis on practical classroom application of research founded in the major theories of learning.

5325. CLINICAL PRACTICES IN DIAGNOSIS AND REMEDIATION OF READING DIS-ABILITIES (2-2). Covers the proficient administration of a battery of diagnostic tests related to analyzing reading and language arts difficulties. Emphasis given to interpreting test results, writing diagnostic reports, and designing individual remediation programs in the clinical setting.

5335. 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 not prerequisite.

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.
Engineering: Undifferentiated (See Interdepartmental and Intercampus Programs, p. 176.	PH.D.

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

Chairman: Floyd L. Cash 317A Engineering 273-2671

Graduate Advisor: Charles W. Jiles 317H Engineering 273-2671

Graduate Faculty:

Professors Cash, Chen, Crumb, Fitzer, Jiles, Potvin, Rao, Salis, Spradlin

Associate Professors Cannon, Dillon, Owens, Smith

Adjunct Associate Professors Shoults, Welch

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 Related Topics
3. Electronics—Solid State Theory, Device and System Theory
4. Power Systems—Efficient Operation and Planning in Generation, Transmission, and Distribution
5. Information Transmission and Communication Systems
6. Digital Logic and Systems
7. Interdisciplinary Programs in Materials Science, Direct Energy Conversion, Stability and Control/Automatic Controls, Bioengineering, and Computer Science.

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 degree. The four courses in the core curriculum are marked with an asterisk. Students admitted to the program beginning in Fall Semester, 1974 must take EE 5313 and at least one of the other three core courses.

General degree requirements for the Master of Engineering are given on page 45.

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 microprocessor systems. Prerequisite: EE 4336 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). Study of digital communication systems with emphasis on current applications to voice channels, computer communications, and digital radio systems. Course I covers system models, applications of convolution, correlation and circuit concepts to digital communications system design, matched filters and their applications. Modulation techniques such as FSK, PSK, combined FM-PM and combined AM-PM. Prerequisite: EE 4330 or consent of instructor.

5305. DIGITAL COMMUNICATIONS II (3-0). Calculation of error rate performance and comparisons based upon channel capacity between various modulation techniques used in digital communications systems. Special applications including pseudo random sequences, multi-level pseudo random sequences, spread spectrum techniques, and coding for error detection, error correction and spectral control. 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: consent of instructor.

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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.

5312. PROPAGATION OF ELECTROMAGNETIC WAVES (3-0). Diffraction, reflection and refraction of electromagnetic waves at plane and spherical boundaries; propagation in ionized media. Prerequisite: EE 3214 or equivalent.

*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, sub-harmonic 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. Prerequisite: EE 5328.

5325. LOGIC CIRCUITS I (3-0). Introduction to theory and design of combinational and sequential digital systems. Prerequisite: graduate standing. Credit given for only one of the following: EE 5325, EE 4336, EE 5442 (no longer offered).

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. LOGIC CIRCUITS II (3-0). Advanced combinational and sequential digital system design. Includes such combinational logic circuits as multiplexers, demultiplexers, code converters, ROMS, PROMS, and PLAS, as well as clock-mode, pulse-mode and level-mode sequential systems. Prerequisite: EE 4336, 5325 or 5442.

5329. DIGITAL SIGNAL PROCESSING (3-0). Discrete linear systems; design and analysis of digital filters; high speed convolution and correlation with applications to digital filtering and linear filtering. Prerequisite: EE 4330 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 or instructor.

5335. MICROWAVE SYSTEMS ENGINEERING (3-0). Relationships between system parameters and system performance in pulsed, C-W, doppler and monopulse radars.

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.

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.

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.

5361. POWER SYSTEM DYNAMICS (3-0). Theory of advanced synchronous machines, steady-state stability, transient stability and dynamic stability of a power system. Prerequisite: EE 4333.

5362. POWER SYSTEM OPERATIONS (3-0). Economic and security methods in power system operation. Prerequisite: EE 4333.

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 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.

DISSERTATION—See Engineering: Undifferentiated, page 176.

A limited number of the following courses may be applicable toward the graduate program if approved in advance by the Graduate Advisor.

4304. ELECTRICAL MACHINERY
4305. PRINCIPLES OF DIRECT ENERGY CONVERSION
4306. INTRODUCTION TO PROTECTIVE RELAYING
4310. MICROPROCESSORS
4312. ADVANCED ELECTROMAGNETIC FIELDS
4314. SERVOMECHANISMS AND CONTROLS
4317. INTRODUCTION TO NETWORK SYNTHESIS
4321. COMPUTER AIDED DESIGN
4326. MICROWAVES
4327. THEORY AND DESIGN OF ANTENNAS
4329. PHYSICAL ELECTRONICS
4330. INFORMATION TRANSMISSION
4331. EFFECTS OF NOISE IN COMMUNICATION SYSTEMS
4332. ELECTRONIC DEVICES
4333. INTRODUCTION TO THREE-PHASE POWER SYSTEMS
4336. DIGITAL CIRCUITS
4337. COMPUTING CIRCUITS
4339. DESIGN OF ELECTRONIC CIRCUITS

NOTE: For course offerings in computer software, see Computer Science section.

ENGINEERING: UNDIFFERENTIATED

See Interdepartmental and Intercampus Programs, p. 176

ENGINEERING MECHANICS Program

See Interdepartmental and Intercampus Programs, p. 177

Department of
ENGLISH (ENGL)

Areas of Study	Degrees
English	M.A.
Humanities (See Interdepartmental and Intercampus Programs, p. 180)	M.A., PH.D.
Teaching (See Interdepartmental and Intercampus Programs, p. 181)	M.A.T.

Master's Degree Plan: Thesis only

Chairman: Emory D. Estes   203 Carlisle Hall   273-2692

Graduate Advisor: Simone F. Turbeville   202 Carlisle Hall   273-2701

Graduate Faculty:

Professors Eichelberger, Estes, Fortenberry, Garner, Goyne, Green, Kauffman, Kendall, Littlefield, R. McDowell, Porter, Sewell, Turner, Whaling

Associate Professors Beaudry, Burns, Frank, Golladay, Lacy, Lewis, Moffett, Richardson, Roemer, Rogers, Swadley, Turbeville, Zacha

Assistant Professors J. McDowell, Potvin, Reddick, Ryan

OBJECTIVE

Study toward the master's degree in English at The University of Texas at Arlington aims at professional competency in literature and language. In literature the student is directed toward sound critical judgment of English and American writings in context. He is trained in the techniques of research, teaching, and writing as preparation for a career suited to his personal inclinations. In language he is schooled in historical and contemporary approaches to the development and description of English. The aims are an understanding of linguistic phenomena and the application of this knowledge to teaching at various levels and to using the language precisely, appropriately, and imaginatively. Sufficient variety in course offerings allows the student to direct his degree plan toward a terminal Master of Arts degree or toward further graduate study.

The Department of English offers a complete program of courses in American literature for graduate students who wish to specialize in or emphasize their native culture and its sources, for study as a minor, or for the enrichment of any other course of study. The University Library is particularly strong in resources in the field, and rich in the area of American Realism. In addition, scholarly projects being conducted within the department offer additional support to the study of American literature and make possible original theses and dissertations of national importance. For those whose background in the field is incomplete, the following survey courses at the graduate level are offered: ENGL 5320, 5321, 5322, and 5323. In addition, the following non-survey courses are offered to those whose undergraduate background is adequate: ENGL 5324, 5325, 5326, 5327, 6325, and 6326.

Comparative literature courses taught in the Department of English are designed to acquaint the student with literary and artistic endeavors from a broader perspective than that generally available in courses limited to the literature of a single nation or language. For this reason, it is generally advisable that students have facility in at least one language in addition to English in order to fully benefit from these courses, al-

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though in most instances translations are available. Because Comparative courses are, for the most part, listed according to historical periods, great flexibility in approach is possible. Each individual course concentrates at various times on different aspects of a literary era. For instance, 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 various literatures, on the development and transformations of genres and motifs, or on the seminal influence of a single author or work on world literature. The inter-relationships of the other arts with literature may also be emphasized, as well as the theory and practice of literary translation. Due to the breadth and depth of its concerns, Comparative literature offers the student an attractive opportunity to expand his literary horizons, to enrich his understanding of the process of human expression, and to develop techniques and methodological approaches which will enable him to deal more wisely and efficiently with the literature of a single culture or language if that should be his choice.

DEGREE REQUIREMENTS

For the Master of Arts degree in English, a minimum of 30 semester hours is required: a minimum registration of six hours for the thesis and a minimum of 24 hours of course work at the 5000 or 6000 level. Advanced undergraduate courses are not acceptable for graduate credit.

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.

Each student will select his thesis 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 bibliography of major sources must be approved by the Graduate Studies Committee.

With the prior permission of the Graduate Advisor, the master's candidate may submit six hours of course work in an appropriate graduate minor field outside the Department of English.

Graduate standing is prerequisite for the courses listed below. Any course may be repeated for credit as often as its 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.

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 comprehensive 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.

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 THE FIRST WORLD WAR. (3-0). Modern literature which has accompanied and expressed the experience of America as a world power. Recommended for students who have not previously studied the period at the undergraduate level.

5323. AMERICAN LITERATURE SINCE 1910 (3-0). Modern American literature. May center on genre, major writers individually or in selected groups, thematic patterns.

5324. AMERICAN POETRY (3-0). Major figures of the 17th, 18th, and 19th Centuries will be studied, followed by a survey of 20th Century poets to the present.

5325. AMERICAN DRAMA (3-0). Representative plays of the 18th and 19th Centuries. Major emphasis on 20th Century playwrights.

5326. MAJOR FIGURES IN NINETEENTH-CENTURY AMERICAN LITERATURE (3-0). Focus on one or two writers, the names of whom will be announced prior to registration.

5327. MAJOR FIGURES IN TWENTIETH-CENTURY AMERICAN LITERATURE (3-0). Focus on one or two writers, the names of whom will be announced prior to registration.

5330. THE COMPUTER AND NATURAL LANGUAGE (3-0). Also listed as Linguistics 5330 and Computer Science 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 present.

5332. TOPICS IN ENGLISH LINGUISTICS (3-0). (1) Dialectology, (2) English as a second language, (3) English for the disadvantaged. May be repeated for credit when subject matter changes.

5333. COMPARATIVE STUDY OF ENGLISH GRAMMATICAL THEORIES (3-0).

5334. ADVANCED GRAMMAR AND STYLE (3-0). Study of literary style.

5335. RESEARCH AND BIBLIOGRAPHY (3-0).

5336. STUDIES IN RHETORIC (3-0). Historical and theoretical study of rhetoric.

5340. LITERARY CRITICISM (3-0). Alternates between a historical-theoretical approach and a practical emphasis on its subject matter. Development of principles of literary criticism from ancient through modern times, or application of those approaches to literary criticism that have proved most fruitful for 20th Century scholars.

5341. THE CLASSICAL INFLUENCE. (3-0). Classical works and English literary works: genres, themes, transmission, iconology, and influences.

5342. COMPARATIVE MEDIEVAL LITERATURE (3-0). Western Medieval literature: genres, themes, iconology, and movements.

5343. COMPARATIVE RENAISSANCE LITERATURE (3-0). Western literature from the Stilnovisti to Donne: genres, iconology, themes, movements, and the interrelation of the arts.

ENGLISH

5344. COMPARATIVE LITERATURE OF THE BAROQUE AGE (3-0). Western literature in the 17th Century: genres, motifs, iconology, themes, movements, and the interrelation of the arts.

5345. COMPARATIVE LITERATURE OF THE EIGHTEENTH CENTURY (3-0). Western literary traditions during the century of literary ferment that includes the Age of Reason and gives rise to that of Romanticism. Emphasizes, though not exclusively, the literatures of France, England, and Germany.

5346. COMPARATIVE NINETEENTH-CENTURY LITERATURE (3-0). Western literature in the nineteenth century: genres, movements, themes, and iconology.

5347. COMPARATIVE TWENTIETH-CENTURY LITERATURE (3-0). Western literature in the 20th Century: movements, themes, genres, and iconology.

5348. COMPARATIVE LITERATURE: THE INFLUENCE OF ORIENTAL AND SOUTH ASIAN LITERATURE (3-0). Selected classics from China, Japan, and India; an investigation of the influence of Oriental and South Asian works in the West, particularly on 19th and 20th Century writers.

5350. ADVANCED TECHNICAL WRITING (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.

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.

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. SEMINAR IN WORLD LITERATURE (3-0).

6333. SEMINAR IN LITERARY GENRE (3-0). Generic, transformational, structural, or historical aspects of a single literary genre.

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 (FINA)

Areas of Study	*Degrees*
Business Administration (See Interdepartmental and Intercampus Programs, p. 170)	M.B.A.
Administration (See Interdepartmental and Intercampus Programs, p. 165)	PH.D.

Acting Chairman: Don Cantwell　　　　107 Business　273-3705

Graduate Faculty:

Associate Professors Cantwell, Edgar, Green, Helm
Assistant Professors Ferguson, Schwendiman

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.

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.

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.

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.

5334. ADVANCED REAL ESTATE EVALUATION (3-0). Market, cost, and income approaches with stress on income forecasting and capitalization.

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.

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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, p. 180)	M.A., PH.D.
Teaching (See Interdepartmental and Intercampus Programs, p. 181)	M.A.T.

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

Chairman: Ronald N. Werth   221A Hammond Hall   273-3161

Graduate Advisor: Ted E. Frank   221E Hammond Hall   273-3161

Graduate Faculty:

> Professors Adams, Jett, Longacre, Monostory, Stuart, Werth
> Associate Professors Acker, Frank, Gibson, Keilstrup, Poulter, Sanchez, Steinecke
> Assistant Professors Holder, Nogueira-Martins, Studerus, Vina, Wallace
> Adjunct Professors Mayers, Merrifield, Rensch
> Adjunct Associate Professors Davis, Greenlee, Hale, Huttar, Peck, Robbins, Thomas
> Adjunct Assistant Professors Bascom, Beekman, Bendor-Samuel, Burquest, Deibler, Fleming, Franklin, Hess, Lee, McKinney

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.

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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.

FOREIGN LANGUAGES

FRENCH (FREN)

Students pursuing the MA degree in French must 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 RE-SEARCH (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 SEVEN-TEENTH 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 Rochfoucauld 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 Socio-cultural 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 Ph D level. May be repeated when content changes.

A course may be repeated for credit when the topic changes.

GERMAN (GERM)

Students pursuing the MA degree in German must take GERM 5300, 5301, 5302, 5305 or 5306, 5317.

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 (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.

FOREIGN LANGUAGES

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 socio-cultural 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)

Students pursuing the MA degree in Spanish and concentrating in Spanish literature must take SPAN 5300 and nine hours in Peninsular and six hours in Spanish-American Literature (or vice versa). Students pursuing the MA degree in Spanish and concentrating in Spanish language must take SPAN 5300 and three hours in Peninsular literature and three hours in Spanish-American literature.

5101. TEACHING PRACTICUM I (1-0). Required of all Teaching Assistants in Spanish in their first semester. May not be counted toward the 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 NINETEENTH AND TWENTIETH CENTURIES (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 socio-cultural 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 LING 5309; (2) LING 5308 or equivalent; (3) LING 5332 or 5333.

FOREIGN LANGUAGES

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.

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, proposition, 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. LINGUISTIC PRINCIPLES OF TRANSLATION: LEXICOLOGY (3-0). Cross-language transfer procedures with emphasis on idiomatic translation: implicit and explicit information; semantic structure of words; lexical equivalence between languages; and multiple function of grammatical structures. 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 down to the present.

5314. LINGUISTIC PRINCIPLES OF TRANSLATION: CLAUSE AND DISCOURSE (3-0). Semantic structure of discourse, formulating propositions and displaying them and their relations, aspects of naturalness in major discourse types (e.g., cohesion, prominences, etc.); theory and practice of translation consultation. Prerequisite: LING 5311 or consent of instructor.

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 5336 and SOCI 5342 are applied.

5337. TOPICS IN NEUROLINGUISTICS (3-0).

5338. LITERACY MATERIALS: READING THEORY AND LINGUISTICS (3-0). Survey of reading theory, with practical application to the preparation of literacy materials for pre-literate 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). Contributions of the fields of anthropology, linguistics, psychology and philosophy to the contemporary studies of meaning, reference, propositions and discourse within the concerns of semantics.

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.

5351. LANGUAGE, MEANING, AND MATURITY (3-0). Analysis of the effect of the structure of language on thought and behavior. Evaluation and communication methodologies of general semantics, especially as applied to language teaching. Methods of improving general evaluative habits.

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 linquistics as they relate to language study and linguistic and cultural analysis.

6309. PROSEMINAR IN LINGUISTICS (3-0).

6310. SEMINAR IN LINGUISTICS (3-0).

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.

Students pursuing the PhD degree in Humanities with a concentration in linguistics are expected to elect courses that shall include attention to the developing edge of linguistics, namely, discourse, sociolinguistics, and semantics.

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 Boon, McNulty, Perkins, Smith
Associate Professors Burkart, Cooper, Nestell, Reaser
Assistant Professors Kirkland, Sides, Waller
Adjunct Professors 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. 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.

DEGREE REQUIREMENTS

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. 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 before unconditional admission to the graduate program can be granted: mineralogy (2445), petrology-petrography (2446), 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 except the semester of graduation. 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 disciplines. 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.**

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. Emphasis is on North America and Europe, but exceptional successions elsewhere are included.

5312. DEPOSITIONAL SYSTEMS: TERRIGENOUS CLASTICS (3-0). Depositional processes, physiographic and environmental components, and facies characteristics and relationships of fluvial, deltaic, barrier bar-strand-plain, lagoon bay-estuary, shelf, slope-abyssal, eolian, lacustrine and alluvial fan depositional systems and their application to ancient stratigraphic analogues.

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. **$2 lab fee.**

5314. SEMINAR IN PLATE TECTONICS (3-0). Geologic, geophysical and geochemical processes in plate tectonics.

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.

5317. QUATERNARY GEOLOGY (3-0). Quaternary environments and deposits with emphasis on process.

5330. ENGINEERING GEOLOGY (3-0). Geologic principles and techniques applied to evaluation of geological hazards and construction such as dams, highways and foundations.

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.**

5344. SANDSTONE PETROGRAPHY (2-3). Thin-section examination of mineralogy and texture of terrigenous clastic sandstones with emphasis on paleogeographic, tectonic, and environmental interpretation. Prerequisite: GEOL 4345 or equivalent. **$2 lab fee.**

5345. 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.**

5346. ADVANCED MINERALOGY (2-3). Classification and associations and identification of minerals using X-ray and differential thermal analysis. **$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. COMPUTER APPLICATIONS IN GEOLOGY (3-0). Analysis of geologic problems that can be treated by means of computer techniques. Presents methods of programming and includes running of actual programs involving reduction of geologic data.

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.**

5356. PETROLOGY OF METAMORPHIC ROCKS (2-3). Origin and development of metamorphic facies and textures. Prerequisite: GEOL 4345. **$2 lab fee.**

5357. PETROLOGY OF IGNEOUS ROCKS (2-3). Controls on the origin of magmas and their evolution; emphasizes tectonic and chemical controls. Prerequisite: GEOL 4345. **$2 lab fee.**

5359. PETROLEUM RESERVOIR EVALUATION (2-3). Evaluation of various types of petroleum reservoirs. **$2 lab fee.**

5360. ANALYTICAL GEOCHEMISTRY (1-6). Techniques in rock, mineral, soil and water analysis. **$2 lab fee.**

5361. GEOPHYSICAL EXPLORATION (2-3). Gravity, magnetic, seismic, electrical and resistivity in exploration for mineral deposits. **$2 lab fee.**

5362. ANALYTICAL TECHNIQUES AND INSTRUMENTATION. Introduction to instrumental techniques of rock and mineral identification and analysis. X-ray diffraction and fluorescence, atomic absorption, differential thermal analyses, and gamma ray spectrometry are included. Intensive two-week study on the UTA campus for students in the Permian Basin Graduate Center Program. Prerequisite: permission of the instructor. **$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.**

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.**

5172, 5272, 5372. RESEARCH IN ENVIRONMENTAL GEOLOGY. Conference course which may include 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.**

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 student and faculty research. Required each semester of all graduate students. Graded P/F.

Department of HISTORY (HIST)

Areas of Study	Degree
History	M.A.
	Certificate
Archival administration	ARCHIVAL ADMINISTRATION

Master's Degree Plans: Thesis and Non-Thesis

Chairman: Richard G. Miller   202 University Hall   273-2861

Graduate Advisor: George Wolfskill   202 University Hall   273-2861

Graduate Faculty:

Professors Hall, Kerr, Lackner, McLean, Miller, Rodnitzky, Wolfskill

Associate Professors Bock, Chester, Green, Myres, Palmer, Phillip, Reinhartz, West

Assistant Professors Anguizola, Kushma, May, Richmond, Stark, Yazawa

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.

HISTORY

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).
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).
5312. COLLOQUIUM IN AFRICAN HISTORY (3-0).
5313. COLLOQUIUM IN ASIAN 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).
5332. SEMINAR IN MIDDLE EASTERN HISTORY (3-0).
5333. SEMINAR IN AFRICAN HISTORY (3-0).
5334. SEMINAR IN LATIN AMERICAN HISTORY (3-0).
5335. SEMINAR IN ASIAN HISTORY (3-0).
5340. AMERICAN HISTORIOGRAPHY (3-0).
5341. EUROPEAN HISTORIOGRAPHY (3-0).

5342. HISTORICAL DEVELOPMENT OF ARCHIVES AND MANUSCRIPT COLLEC-TIONS (3-0).

5343. ARCHIVAL PROCEDURES AND TECHNIQUES (3-0).

5344, 5644. ARCHIVAL INTERNSHIP.

5391, 5691, 5991. INDEPENDENT STUDY. For graduate students whose needs are covered by no course immediately available.

5398, 5698, 5998. THESIS.

HUMANITIES Program

See Interdepartmental and Intercampus Programs, p. 180.

Department of
INDUSTRIAL ENGINEERING (IE)

Areas of Study	*Degrees*
Industrial Engineering	M.S., M.ENGR.
Engineering: Undifferentiated (See Interdepartmental and Intercampus Programs, p. 176)	PH.D.

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

Chairman: G. T. Stevens, Jr.	214B Engineering	273-3092
Graduate Advisor: H. W. Corley, Jr.	216A Engineering	273-3092

Graduate Faculty:

Professors Meier, Stevens
Associate Professors Corley, Stanfel
Assistant Professors Deivanayagam, Pape
Adjunct Professor Matheny

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. Management Systems and Control—Methods of resource allocation for industrial activities.

INDUSTRIAL ENGINEERING

5. Computer Systems and Applications—The use of the computer in decision making for industry.

In addition, special programs of study may be arranged.

DEGREE REQUIREMENTS

Students with degrees in other 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.

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 a written comprehensive examination similar in format to and administered concurrently with the PhD diagnostic examination. Both the written MS comprehensive examination and the PhD diagnostic examination are administered at the end of each semester. The following eight areas are covered on these examinations:
  (1) administration and organization,
  (2) human factors,
  (3) operations research and systems engineering,
  (4) probability and statistics,
  (5) engineering economy,
  (6) production and inventory control,
  (7) industrial engineering analysis and design, and
  (8) statistical quality control.

General degree requirements for the Master of Engineering are given on page 45.

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 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 functions—Chi-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 availability 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.

5329. MODELING AND CONTROL OF INDUSTRIAL SYSTEMS (3-0). Study and design of mathematical models for the effective control of industrial systems. Prerequisite: IE 5323.

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5330. DIGITAL PROCESS CONTROL AND MATHEMATICAL MODELING OF INDUS-TRIAL SYSTEMS (3-0). Describes the present status of automatic control in industry with emphasis 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.

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.

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.

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.

DISSERTATION—See Engineering: Undifferentiated, page 176.

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. 182.

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 Antoniades, Brooks, Goldsteen, Henry, McBride, Moreland, Pinno, Price
Assistant Professor Scherr

OBJECTIVE

The objective of the Master's degree program in landscape architecture is to offer opportunities for study and research in the modification or preservation of the exterior environment to meet society's needs and to prepare the student to practice in the professional field of landscape architecture. The program is designed to develop the skills of the student in the design manipulation of the man-made and horticultural elements utilized by the professional; to increase his understanding of the social influences and relationship to design; to provide a historical base for decision making; to

introduce the ethics and operation of the profession of landscape architecture and the clients of that professional; and to give the student experience in laboratory and real design situations, both as an individual and as a member of teams consisting of many different areas of expertise from the design fields. The emergence of landscape architecture as a strong discipline providing leadership in an increasingly man-made environment at widely varying scales requires knowledge and understanding of the other design disciplines. Much emphasis is placed throughout the program, both undergraduate and graduate, on an understanding of and experience in architecture, planning, urban design, urban studies and sociology.

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. The degree program consists of 60 approved semester hours, including three hours of practicum and a six-hour thesis or approved thesis substitute. The core curriculum designed for this program consists of: LARC 5301, 5322, 5324, 5331, 5341, 5342, 5381, 5395, 5672, 5674, for a total of 36 hours. Additional elective courses approved in advance, and a thesis, make up the 60-hour required total. A complete degree plan must be planned and approved in advance by the Graduate Advisor.

5301. MODERN HISTORY AND THEORY OF LANDSCAPE ARCHITECTURE (3-0). In-depth investigation into issues and solutions to contemporary problems (Frederick Law Olmsted to present) facing the landscape architect and the historical basis for these 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. Prerequisite: permission of instructor.

5322. SURVEYING, SOILS AND SUBSURFACE DRAINAGE (2-4). Basic concepts in surveying, measuring, and recording surface features, and investigations in soil characteristics including drainage, structure, and chemical composition.

5324. NATIVE PLANT MATERIALS (3-0). Native plants and related 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.

5336. PLANTING DESIGN (2-4). Ornamental plant materials and their application to landscape design. Prerequisite: permission of instructor.

5337. SITE DEVELOPMENT (2-4). Introduction to the use of landscape construction materials and their specifications, including paving materials for walks, plazas, roads and parking areas, low retaining walls, steps and other site details. Also covers basic information on topography, grading and drainage. Prerequisite: permission of instructor.

5339. LANDSCAPE PLANT MATERIALS (2-4). Basic course in the nature, identification, and requirements of ornamental plants. Covers shade and ornamental trees, shrubs and vines, flowers, and ground covering materials.

5340. LANDSCAPE CONSTRUCTION (2-4). Further study in application of construction materials to landscape design, and advanced grading concepts. Provides an introduction to site utilities, including sanitary and storm drainage and site lighting. Prerequisites: LARC 5337, or equivalent, and permission of instructor.

5341.   ADVANCED LANDSCAPE CONSTRUCTION (2-4). Techniques of construction and the materials used by the landscape architect.

5342.   ADVANCED ORNAMENTAL PLANTS AND PLANTING DESIGN (2-4). Detailed study of ornamental plants, their visual and growth relationships, and their relationship to structures.

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.**

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.

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.

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.

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, p. 170)		M.B.A.
Administration (See Interdepartmental and Intercampus Programs, p. 165)		PH.D.

Acting Chairman: Howard Garland   209 Business   273-3166

Graduate Faculty:

Professors Stanley, Wofford
Associate Professors Garland, Gerloff, Gray, Price
Assistant Professors French, Quick

MANAGEMENT

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 management concepts and organizational theory. Exposure to significant systems and environments of the organization that materially affect the decision-making process under conditions of uncertainty and factors that influence the determination of administrative policy.

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.

5324. GROUP AND INTERGROUP RELATIONSHIPS (3-0). Analyzes the operation of groups in the organization. Examines the effects on productivity and morale of such work group attributes as cohesiveness, group norms, group pressures, and leadership. Considers the effects of the group in individual behavior. Analyzes intergroup problems. 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. ORGANIZATIONAL INNOVATION AND CHANGE (3-0). Examines the change process in business, provides a basis for a critical analysis of factors involved in the change process, and sets forth the present research in the area to allow appropriate strategy and tactics to be developed. Prerequisite: MANA 5312 or equvialent.

5327. SEMINAR IN MANAGEMENT (3-0). Independent research by the student with emphasis upon depth of penetration into the chosen topic. 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 or 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. 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.

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.

MANAGEMENT SCIENCE

See Department of Systems Analysis, p. 157

Department of
MARKETING (MARK)

Areas of Study	Degrees
Business Administration (See Interdepartmental and Intercampus Programs, p. 170)	M.B.A.
Administration (See Interdepartmental and Intercampus Programs, p. 165)	PH.D.

Acting Chairman: Carl McDaniel   234 Business   273-2876

Graduate Faculty:

Professor Dickinson

Associate Professors Calabro, Gates, Kindel, Lucas, McDaniel, Solomon

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. BEHAVIORAL SCIENCE IN MARKETING (3-0). Examines the findings from anthropology, psychology, and sociology as they apply to understanding the marketing process. Emphasis on empirical findings, research methods, and specific marketing applications. Topics include comprehensive behavior models, learning, perception, attitude, cognition, diffusion, subculture, and reference groups. Prerequisite: MARK 5311 and MANA 5311 or equivalent.

5323. 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 BUSA 5301 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. PROMOTIONAL SYSTEMS MANAGEMENT (3-0). Analyzes the planning, organizing, directing, and controlling of the promotional mix. Social, psychological, and communications theory with applications to promotional case studies. Brings together the tools of management and interdisciplinary theory with practical applications. 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.

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. 183

MATHEMATICAL SCIENCES Program

See Interdepartmental and Intercampus Programs, p. 185

Department of MATHEMATICS (MATH)

Areas of Study	Degrees
Mathematics	M.A.
Mathematical Sciences (See Interdepartmental and Intercampus Program, p. 185)	PH.D.

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

Chairman: V. Lakshmikantham   132J Hammond Hall   273-3591

Graduate Advisor: Jacob T. B. Beard, Jr. 123 Hammond Hall   273-3261

Graduate Faculty:

Professors Laksmikantham, Bernfeld, Eisenfeld, Greenspan, A. R. Mitchell, R. W. Mitchell, Wall

Associate Professors Beard, Bolen, Dyer, Harvey, Heath, Huggins, Kannan, Lord, Marshall, Moore, Nestell, Perryman, Tennison, Williams

Assistant Professors Dean, Gillespie

Adjunct Professor Mishelevich

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

Students choosing the thesis or thesis substitute degree plan must take MATH 5317, 5333, either 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 degree plan must include (a) MATH 5317, 5333, either 5322 or 5324, either 5312 or 5320 or 5321, and three sequences, or (b) for students interested in public school teaching, three sequences, two of which must be mathematics education sequences, or (c) for students interested in actuarial science, the three sequences MATH 5350-51, 5352-53, and 5354-55. Students in each of the three degree plans must pass a comprehensive examination. For thesis plan students, this examination is in addition to the thesis defense. Before completion of the Master's Degree, the student must have knowledge of MATH 4335 and either MATH 4321 or 4331. 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 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.

MATHEMATICS

5300. MATHEMATICAL PROGRAMMING—COMPUTER PROGRAMMING AND APPLI-CATIONS (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. COMPARATIVE MATHEMATICAL SYSTEMS (3-0). Comparative structures of mathematical systems. Emphasis on system of real numbers and algebraic operations involved in arithmetic of real numbers. Geometric concepts studied and related to algebra. Prerequisite: consent of the instructor.

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.

5307. POINT-SET THEORY I (3-0). Foundations of topology developed by means of careful study of the properties of certain sets of points. These properties derived axiomatically. Prerequisite: MATH 3335 or 4303.

5308. POINT-SET THEORY II (3-0). Continuation of MATH 5307. Prerequisite: MATH 5307.

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 and 4338.

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 classical probability distributions by means of the method of characteristic functions. The basic limit theorems are developed. Applications of basic theory are made to Markov chains and stochastic processes. Prerequisite: MATH 3335 and 4311.

5312. MATHEMATICAL STATISTICS I (3-0). Study of the basic discrete and continuous univariate and multivariate families of distributions with emphasis on multivariate normal, derived distribution theory, and parametric estimation theory. Prerequisite: MATH 4335 or concurrent registration and 3313.

5313. MATHEMATICAL STATISTICS II (3-0). Decision theory and Bayesian methods, statistical hypotheses testing, linear models, and nonparametric methods. 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 VARIABLES I (3-0). Point sets, measurable sets, measurable functions, Lebesgue integral, Stieltjes integral, and indefinite Lebesgue integral. Prerequisite: MATH 4335.

5318. REAL VARIABLES II (3-0). Continuation of Real Variables I with an introduction to abstract measure theory. Prerequisite: MATH 5317.

5320. DIFFERENTIAL EQUATIONS (3-0). Linear and non-linear systems. Asympototic behavior of solutions and the concept of stability investigated as well as some important existence and uniqueness theorems. Prerequisite: MATH 4335.

5321. PARTIAL DIFFERENTIAL EQUATIONS (3-0). Classification of second order partial differential equations, characteristics, canonical forms, the Fredholm alternative, and Green's functions. Prerequisite: MATH 4324 or 4334 or 4335.

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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). Applications of complex variables in potential theory, ordinary differential equations, transform theory, and asymptotic expansions. Prerequisite: MATH 4322 or 5322.

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. FUNCTIONAL ANALYSIS I (3-0). Basic topological and metric properties with emphasis toward normed linear spaces, closed graph theorem, theorems of uniform boundedness, Hahn-Banach theorem and their application. Prerequisite: MATH 4335 and 4321 or 4331.

5328. FUNCTIONAL ANALYSIS II (3-0). Continuation of MATH 5327. 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: MATH 4321.

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.

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 EDUCATION I (3-0). Selected materials from Euclidean geometry, non-euclidean geometry, and projective geometry designed to increase the geometric maturity of the students.

5342. MATHEMATICS EDUCATION II (3-0). Selected materials from algebra and analysis presented to increase both the maturity of the students and their ability to teach these subjects to secondary students.

5343. MATHEMATICS EDUCATION III (3-0). Reading and study of selected materials from the literature of the teaching of mathematics, the history of mathematics education, history of mathematics, and research in mathematics education.

5344. MATHEMATICS EDUCATION IV (3-0). Selected materials from the literature of the teaching of mathematics, education, psychology, and application of these materials to the presentation of mathematics to secondary students.

5345. MATHEMATICS EDUCATION V (3-0). Selected materials from mathematics presented so as to increase both the maturity of the students and their ability to teach mathematics to elementary students.

5346. MATHEMATICS EDUCATION VI (3-0). Selected materials from the literature of mathematics teaching at the elementary level.

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.

MATHEMATICS

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. RISK THEORY AND DEMOGRAPHY (3-0). Individual risk theory including analysis of variance, distribution theory, ruin theory, stop-loss reinsurance. Also considered is the collection and analysis of census statistics, the construction of life tables from population statistics, and mortality projections. Prerequisites: MATH 4313 and 5353.

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. SELECTED TOPICS IN MATHEMATICS (3-0). 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.

A limited number of undergraduate mathematics courses may be applicable to a graduate program in mathematics if approved in advance 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
4338. INTRODUCTION TO NUMERICAL ANALYSIS II

Department of
MECHANICAL ENGINEERING (ME)

Areas of Study		*Degrees*
Mechanical Engineering		M.S., M.ENGR.
Engineering: Undifferentiated (See Interdepartmental and Intercampus Programs, p. 176)		PH.D.

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

Chairman: Henry Sebesta   335 Engineering   273-2561

Graduate Advisor: Jack R. Woolf   335H Engineering   273-2560

Graduate Faculty:

University Professor Woolf
Professors Barker, Blackwell, Files, Haji-Sheikh, Lawrence
Associate Professors Hullender, Lawley, Woods
Assistant Professors Darkazalli, Halliday
Adjunct Assistant Professor Axe

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. Mechanical Systems
5. Automatic Control and Instrumentation
6. Design
7. Manufacturing Processes

MECHANICAL ENGINEERING

DEGREE REQUIREMENTS

Students wishing to major in mechanical engineering should have the Bachelor of Science degree in mechanical engineering from an approved school. Students with degrees in other disciplines may be required to take certain undergraduate courses depending on their particular graduate program.

All students applying for admission to the graduate program in Mechanical Engineering are required to submit scores on the GRE Advanced Test (Engineering).

The following courses must be included in each student's program of work:
1. Four courses (12 hours) designated the Mechanical Engineering Core and comprised of:
   a. 6 hours of Advanced Engineering Analysis courses (ME 5331 and ME 5332 or approved mathematics).
   b. One 3-hour Advanced Thermal Science course (ME 5301 or ME 5321)
   c. One 3-hour Advanced Mechanical Systems course (ME 5339 or ME 5303)
2. Four courses (12 hours) designated the Mechanical Engineering Stem.
3. An elective group comprised of the additional work which with the 24 hours listed above will fulfill one of the three available degree plan options.

General degree requirements for the Master of Engineering are given on page 45.

A student wishing to have the degree designated Master of Engineering must comply with the State of Texas Engineering Practice Act, as applicable at the time the degree is awarded. This requires, at minimum, successful completion of the registration process through a level appropriate to the candidate's prior professional experience (Engineering-in-Training or Professional Practice Examinations).

Letters in parentheses at the end of the course descriptions refer to the semester in which the course will be scheduled to be offered: (F), Fall; (SP), Spring; (NS), Night Summer.

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 (F).

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.

5313. FLUID DYNAMICS (3-0). Advanced study of the kinematics and dynamics of fluid motion, stresses in fluids and surface flow (F).

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 (F).

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 (SP).

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 (NS).

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 (SP).

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 (F).

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 (SP).

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.

5330. METAL CUTTING (3-0). Metal cutting operations with special emphasis on machine tool, cutting tool and work material behavior.

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.

MECHANICAL ENGINEERING

5334. APPLICATIONS OF THE THEORY OF STATISTICS AND PROBABILITY TO ME-CHANICAL 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 (2-3). Hydraulic, pneumatic, and electromechanical component and system characteristics determined, and systems simulated on analog and digital computer equipment.

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 thermodynamic properties of gases and the analysis of problems in high-temperature gasdynamics. 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.

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.

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. DESIGN OF DIGITAL CONTROL CIRCUITS (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 (SP).

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 advanced radiation and convection problems using exact and approximate mathematical techniques. Prerequisites: ME 5317 and 5318 (SP).

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. Prerequuisite: 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). Computer techniques used in the design process. Consideration given to the mathematics and graphics of curved surfaces, curve fitting, curve smoothing, and the communication of the logical structure of problem solutions.

6339. OPTIMIZATION FOR DESIGN (3-0). Optimization methods adaptable for computer-aided design presented. A series of simple optimum design problems used to demonstrate several mathematical programming techniques. The unconstrained minimization problem and conversion of constrained to unconstrained problems considered. Several methods for constrained problems also considered using linear programming, gradient projection and feasible directions.

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.

DISSERTATION—See Engineering: Undifferentiated, page 176.

Department of
MUSIC (MUSI)

Chairman: James E. Richards   101 Fine Arts   273-3471

Graduate Faculty:

Professors Richards, Taliaferro
Associate Professor Ebensberger
Assistant Professors Lee, Powell

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   540 Business   273-2885

Graduate Advisor: Hazel M. Jay   512 Business   273-2776

Graduate Faculty:

Professor Pickard
Associate Professors Jay, Wyers
Assistant Professors Burns, Conrad, Richards, Spinella

OBJECTIVE

The purpose of the Nursing Graduate Program 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 Medical-Surgical Nursing, or Psychiatric-Mental Health Nursing. The Master of Science in Nursing degree program is accredited by the National League for Nursing.

DEGREE REQUIREMENTS

Students wishing to pursue the Master's Degree in Nursing should have the Bachelor of Science degree in Nursing from an accredited school.

In addition to the general Graduate School admission requirements, the School of Nursing may require the Miller Analogies Test. Additional requirements include completion of a basic statistics course with a minimum grade of C prior to enrolling or during the first semester of graduate study, or establish competency by examination approved by the Committee on Graduate Studies and the Graduate Dean, and evidence of current licensure as a Registered Nurse. The School of Nursing requires all nursing students to show evidence of professional liability insurance coverage. Students are required to have each semester's planned program approved by the Graduate Advisor prior to registration. A minimum of 38 semester hours for thesis candidates and 41 semester hours for non-thesis candidates is required for graduation.

All non-thesis candidates for the degree of Master of Science in Nursing shall pass an 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 defend the thesis in a final oral examination.

Required Courses

		Hours Credit
NURS 5427 Core I:	Theoretical Foundations of the Nursing Process	4
NURS 5428 Core II:	Nursing Process in Clinical Situations	4
NURS 5205 Core III:	Professional Issues and Influences in Nursing	2
NURS 5301:	Fundamentals of Research	3

Nursing Areas

Each student takes at least 12 semester hours in one major area.

Medical-Surgical Nursing: NURS 5404, 5222, 5320, 5321.

Psychiatric-Mental Health Nursing: NURS 5306, 5324, 5325, 5326.

Functional Areas

A student must select at least one functional area of concentration in addition to the major.

Nursing Administration: MANA 5311 or 5312, NURS 5303 and 5430

Teaching: NURS 5402 and 5329

Thesis: NURS 5398, 5698, and 5998

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.

5301. FUNDAMENTALS OF RESEARCH (3-0). Overview of logic, methods, and techniques of research with the development of a research proposal. Prerequisite: graduate standing.

5402. CURRICULUM AND INSTRUCTION IN NURSING (4-0). Explores the nature of education and the major learning theories. Focuses on the curriculum process and its application to a variety of educational programs. Prerequisite: NURS 5301 or consent of instructor.

5303. NURSING ADMINISTRATION (3-0). Applies theories of administration and management related to situations in which nurses work, including the study of human

resource management and analysis of issues relevant to health care delivery. Prerequisite: MANA 5311 or 5312, NURS 5427 and 5301.

5404. PHYSIOLOGICAL FOUNDATIONS IN HEALTH AND DISEASE (4-0). Focuses on advanced concepts and recent research on the physiological systems of man and the significance of alterations in their functions. Prerequisite: graduate standing.

5205. CORE III: PROFESSIONAL ISSUES AND INFLUENCES IN NURSING (2-0). Explores and evaluates contemporary issues and trends relevant to nursing.

5306. PSYCHIATRIC NURSING FOUNDATIONS (3-0). Provides theoretical foundations for understanding psycho-pathological processes. Emphasis on the concepts and principles which have implications for nursing practice.

5320. MEDICAL-SURGICAL NURSING I (1-6). Enables the student to gain increased knowledge and skills in assessment and intervention with clients in promoting health and adaptation throughout the age continuum. Prerequisites: NURS 5222 and 5404.

5321. MEDICAL-SURGICAL NURSING II (1-6). Focuses on the physical, psychological, social and cultural factors in the internal and external environment of the medical-surgical client. Prerequisite: NURS 5320.

5222. MEDICAL-SURGICAL NURSING FOUNDATIONS (1-3). Explores recent research studies in Medical-Surgical Nursing and tests findings in the clinical setting. Prerequisite: graduate standing.

5324. PSYCHOTHERAPEUTIC PROCESS WITH INDIVIDUAL CLIENTS (1-6). Provides for the opportunity to apply behavioral concepts and theories in therapeutic counseling with individual clients. Prerequisite: NURS 5306.

5325. PSYCHOTHERAPEUTIC PROCESS WITH GROUPS AND FAMILIES (1-6). Focuses on therapeutic intervention in dysfunctional behavioral patterns of families and/or groups. Prerequisite: NURS 5324.

5326. PSYCHIATRIC NURSING IN FOCAL SITUATIONS (1-6). Provides the opportunity to gain advanced skills in therapeutic intervention in area of student's concentration. Prerequisite: NURS 5325 or consent of instructor.

5427. CORE I: THEORETICAL FOUNDATIONS OF THE NURSING PROCESS (3-3). Relates philosophical and theoretical foundations from behavioral, natural and applied sciences to concepts and operations in the nursing process. Prerequisite: graduate standing.

5428. CORE II: NURSING PROCESS IN CLINICAL SITUATIONS (2-6). Focuses on critical analysis of nursing process, expands and strengthens concepts and operations through systematic inquiry in the case of selected clients. Prerequisite: NURS 5427.

5329. ROLES AND FUNCTIONS OF THE TEACHER IN NURSING (1-6). Investigates the roles and functions of the teacher in contemporary nursing programs with opportunity for directed teaching practicum. Prerequisite: NURS 5402.

5430. PROBLEMS AND FIELD STUDY IN NURSING ADMINISTRATION (2-6). Offers an opportunity to study selected aspects of the nursing administration process. Explores behaviors; proposes and tests hypotheses in nursing administration. Prerequisite: NURS 5303.

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. May be repeated for credit when topics vary.

5190, 5290, 5390, 5490. TOPICS IN NURSING. Different topics in advanced nursing. May be repeated for credit as topics change.

5398, 5698, 5998. THESIS.

Department of
PHILOSOPHY (PHIL)

Chairman: Thomas W. King   209 University Hall   273-2774

Graduate Faculty:

> Associate Professors King, Townsend
> Assistant Professor Langsdorf

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.

5391.   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.

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.

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Department of PHYSICS (PHYS)

Areas of Study	Degrees
Physics	M.A.
Radiological Physics (See Interdepartmental & Intercampus Programs, p. 187	M.S.

Master's Degree Plans: Thesis and Non-Thesis

Chairman: Louis A. Rayburn   108 Science Hall   273-2266

Graduate Advisor: R. S. Rubins   108 Science Hall   273-2266

Graduate Faculty:

Professors Diana, Herrmann, McNutt, Rayburn
Associate Professors Black, Cooke, Ellis, Fry, Rubins, Self, Terrell, Thompson
Adjunct Associate Professors Claytor, Cottam, Dowdey
Visiting Assistant Professors Brener, Coleman, Sharma

OBJECTIVE

The objective of graduate work in physics is to prepare the student for continued professional and scholarly development as a physicist. The Physics MA 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 Arts 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 Arts 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 0(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.

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 Arts 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 relativ-

ity and atomic physics will be covered. May not be used to satisfy any of the requirements for the Master of Arts 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

Department of
POLITICAL SCIENCE (POLS)

Area of Study	Degree
Political Science	M.A.

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 Dawson, Hagard, Hamlett, Richards
Associate Professors Moon, Odom, Taborsky, Van Cleve
Assistant Professors Clark, Hekman, Knerr, Marshall

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.

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 as follows:

Research Methods	3 hours
Courses from three of the six areas	9 hours
Public Administration/Public Policy	12 hours
Thesis	6 hours
	30 hours

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.

POLITICAL SCIENCE

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 levels—national, state, and local—in 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.

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.A., PH.D.

Master's Degree Plan: Thesis and Non-Thesis

Chairman: James R. Erickson   315A Life Science   273-2281

Graduate Advisor: James N. Bowen   506 Life Science   273-2281

Graduate Faculty:

Professors Amster, Bernstein, Bowen, Cox, Erickson, Gorsuch, McCain

Associate Professors Ambler, Kopp, Garland, Gatchel, Paulus

Assistant Professor Monson

Adjunct Assistant Professor Galosy

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.

The Department of Psychology has some rules which are more stringent than the minimums established by the University. Each entering graduate student will be furnished a copy of the departmental rules which will serve as guidelines for departmental actions and recommendations.

Master of Arts 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, 5422, 5323, 5360, 5361, 5362, 5363, and six hours of approved electives.

PSYCHOLOGY

Up to nine hours of approved undergraduate courses may be applied to the MA requirements provided these are taken outside the Psychology Department.

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. There is no specific residence requirement imposed by the Department.

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 CS 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. In either event, one of the two research courses should 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 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.

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 (4-0). 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 (4-0). Statistical hypothesis testing, Bayesian inference, decision theory, linear regression and correlation; analysis of variance; distribution-free techniques.

5307. EXPERIMENTAL DESIGN (3-0). 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.

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.

5338. OBJECTIVE PSYCHOLOGICAL TESTING (3-0). Survey of major objective psychological tests. Prerequisites: PSYC 5344.

5339. PRACTICUM IN TESTING AND ASSESSMENT TECHNIQUES (0-3). 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 learning, transfer, and retention in human adults, with emphasis upon associative processes and verbal responses. Considers theories, methods, and findings in paired-associate learning, serial learning, free recall, verbal discrimination learning, short-term memory, concept learning, connected discourse and word association.

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.

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 permission only. May be repeated for credit with permission 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 permission 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 permission of Graduate Advisor.

5617. RESEARCH IN PSYCHOPHYSIOLOGY.

5640. RESEARCH IN HUMAN PERFORMANCE AND PERCEPTION.

5641. RESEARCH IN LEARNING OR MOTIVATION.

5642. RESEARCH IN PHYSIOLOGICAL PSYCHOLOGY.

5643. RESEARCH IN DEVELOPMENT.

5644. RESEARCH IN MATHEMATICAL PSYCHOLOGY.

5645. RESEARCH IN GROUP PROCESSES.

5646. RESEARCH IN PERCEPTION.

5647. RESEARCH IN COGNITIVE PSYCHOLOGY.

5671. PRACTICUM IN PROGRAM EVALUATION. Supervised practice of evaluation in an applied or research setting. Prerequisite: permission of instructor.

5398, 5698, 5998. THESIS. Prerequisite: 12 hours of advanced psychology and permission 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.

RADIOLOGICAL PHYSICS Program

Graduate School of
SOCIAL WORK (socw)

Areas of Study	*Degrees*
Social Work	M.S.S.W.
Administration (See Interdepartmental and Intercampus Programs, p. 165)	PH.D.

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

Dean: Paul H. Glasser   301 Cooper Center   273-3181

Graduate Advisor: Lila B. Hagins   301 Cooper Center   273-3181

Graduate Faculty:

Professors Arangio, Callicutt, Duehn, Glasser, Gorsuch, Mayadas, Saleebey, Torgerson

Associate Professors Granvold, Hagins, Hunter, Litrio, Maldonado, McNeil, Mindel

Assistant Professors Barrett, Dangel, Grinnell, Kersey, Lobb, Nichols, Polster, Sanchez, Schwamm, Shannon, Watts, Welch, Wright

Adjunct Professors Gaupp, Roos

Adjunct Assistant Professor Bernstein

Visiting Assistant Professor Deschner

Specialist Martinez

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.

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) a Graduate Record Examination score which evidences graduate study aptitude; (3) leadership ability; (4) personal maturity; (5) motivation for a human service profession; and (6) social work/social welfare work experience, as evidenced by personal statements, reference letters and other materials. A personal interview may be required.

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.

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. A non-thesis degree plan involving the preparation of a substantial research report is available with special approval by the Committee on Graduate Studies.

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 or practicum 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 course work and field instruction in the area of specialization (Direct Practice or Community Practice) 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)

A part-time program exists which allows students to complete the first 24 hours of graduate work on a part-time basis. The remaining 40 hours must be completed on full-time status. The part-time program is designed to accommodate those persons who, due to employment, economic, or family reasons, would find it impossible to attend on a full-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.

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, including: nature and range of stressful conditions, impact of life-chances and life styles; environmental contexts; relationship of social-political oppression to stress and adaptation; sources of stress; coming changes; promotion of successful adaptive and coping styles. 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; the aged, the poor, ethnic minorities; the unemployed, single people, transients, disorganized families, as well as those who successfully adapt to and use 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 prob-

lems in mental health (e.g., "asylums", community mental health programs). Includes evaluation of the critical onslaught of the mental health enterprise.

5309. TASKS AND COPING STRATEGIES IN ADULT LIFE (3-0). Focuses on "usual" tasks of adulthood, many of which are stressful life events, and strategies of coping and adaptation. Developmental themes of "normal" growth and changes addressed—not pathology.

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. Includes demographic, developmental, ego psychological, social structural, Piagetian, etc. orientations. Implications for practice at the policy, community, and interpersonal levels discussed.

5311. POWER AND MARGINALITY (3-0). Psychological, social, and political experience of powerless groups in the U. S., structures and processes of domination affecting these groups, consequences of marginality, and possible alternative responses to institutionalized power.

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. Lectures supplemented with field trips and contact with personnel from agencies dealing with the aged.

6301. HUMAN BEHAVIOR AND THE SOCIAL ENVIRONMENT III (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.

6302. HUMAN BEHAVIOR AND THE SOCIAL ENVIRONMENT IV (3-0). Wide-ranging seminar exploring the potential impact of some recent theoretical, conceptual and empirical developments in the behavioral sciences upon the practice of social work and the institution of social welfare. Prerequisite: permission of the instructor.

6303. HUMAN BEHAVIOR AND THE SOCIAL ENVIRONMENT V (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.

6320. PERSONAL RELATIONSHIPS: PSYCHOLOGICAL UNDERSTANDINGS (3-0). Exploration of theoretical and empirical material on the development and ending of psychological intimacy. Intent is to increase knowledge of processes of psychological intimacy and targets of 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.

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 practice 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 social welfare administration.

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.

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 social welfare administration whose master's degree is in a field other than social work.

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.

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.

6351. **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.

SOCIAL WORK

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 methodology—criteria 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.

Upon successful completion of SOCW 5304 and SOCW 5305, all students electing to major in Direct Practice are required to take at least one of the following Direct Practice courses in each subsequent semester.

6307. SOCIO-BEHAVIORAL METHODS IN SOCIAL WORK PRACTICE AND COUNSELING (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.

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 AND FAMILY COUNSELING (3-0). Examination of various psychological, social and behavioral treatment approaches to the treatment of problems in marital and familial 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. MICROCOUNSELING: 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 the microcounseling model.

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.

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

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efficacy of cognitive intervention strategies with various clinical problems. Prerequisite: SOCW 5305 or equivalent and permission of the instructor.

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 Administration/Planning majors.

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 Administration/Planning majors.

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 majors at the master's level and doctoral students concentrating in Social Welfare Administration.

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.

6334. SOCIAL WORK AND THE POLITICAL PROCESS (3-0). Creates an awareness of the realistic aspects as well as theoretical aspects of the political process. Focuses upon identification of the systems (i.e., city council, school board, planning and zoning commission, etc.), relationships among the systems, areas of entry into the systems, general methods and strategies of intervention, and emerging "style" of each student consistent with principles developed in the course. Prerequisite: permission of instructor.

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.

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.

SOCIAL WORK

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.

6343. ORGANIZING IN THE AMERICAN CITY (3-0). Organizing strategies and tactics examined from social work, political science, and sociological perspectives. Assessing requirements and consequences of strategies and assessing community and organizational situations emphasized. Dynamics of exchange, alliance, conflict, and issue development explored.

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.

Research/Evaluation

6322. RESEARCH/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/EVALUATION METHODS IN SOCIAL WORK II (3-0). Advanced course in the application of research principles and techniques. Topics include multiple regression and statistical control, advanced 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. Required of all doctoral students concentrating in social welfare administration.

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.

SOCIAL WORK

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.

5150. INTRODUCTION TO SOCIAL WORK PRACTICE (0-4). A bridge between the classroom and initial field experience. Students will be exposed to: 1) prevailing concepts, ideas, and language of social work practice; 2) ideas about how to understand and work successfully in a social welfare bureaucracy; 3) current issues and local problems in both clinical and community practice, including practice with high risk urban groups. Required of all first year students. Graded P/F.

5151, 5251, 5351, 5451, 5751, 5851, 5951. APPLIED DIRECT SOCIAL WORK PRACTICE.

5152, 5252, 5352, 5452, 5752, 5852, 5952. APPLIED COMMUNITY PLANNING AND ADMINISTRATION.

6251, 6451, 6651. APPLIED DIRECT SOCIAL WORK PRACTICE.

6252, 6452, 6652. APPLIED COMMUNITY PLANNING AND ADMINISTRATION.

The settings listed below are those with which the University is affiliated for purposes of field instruction.

ACTION, Dallas
Alcohol Recovery Center, Ft. Worth
American Red Cross, Dallas
Area V Health Systems, Inc., Irving
Arlington Housing Authority
Arlington Neuropsychiatric Center
B'nai B'rith Youth Organization, Dallas
Brookhaven Medical Center, Dallas
Casa de Los Amigos, Dallas
Catholic Charities, Ft. Worth
Catholic Social Services, Ft. Worth
Child Care Association of Metropolitan Dallas
Child Guidance Clinic, Dallas
Child Study Center, Ft. Worth
Children's Medical Center, Dallas
Christian Services of the Southwest, Dallas
Community Council of Greater Dallas
Community Services Administration, Dallas
Community Services Clinic, UTA
Dallas City Dental Health Program
Dallas Council on Alcoholism
Dallas County Juvenile Probation
Dallas County MHMR
Dallas Epilepsy Association
Edna Gladney Home, Ft. Worth
Family and Individual Services, Ft. Worth
Ft. Worth Area Council of Churches
Ft. Worth Center for Ex-Offenders
Ft. Worth Children's Hospital
Ft. Worth State School
Golden Acres, Dallas
Harris Hospital, Ft. Worth
Human Resource Center, UTA
Jewish Family Service, Dallas

La Voz del Anciano Mexico-Americano, Dallas
Lena Pope Home, Inc., Ft. Worth
Marillac Social Center, Dallas
Mental Health Association of Dallas County
National Association for Retarded Citizens, Arlington
North Central Texas Council of Governments, Arlington
Parenting Guidance Center, Ft. Worth
Plano Independent School District
Rosemont Community School, Ft. Worth
Salvation Army, Dallas
Senior Citizens Centers, Inc., Ft. Worth
Senior Citizens of Greater Dallas
Stonewall Jackson Elementary School, Dallas
Tarrant County Juvenile Probation Dept., Ft. Worth
Tarrant County Tenants Union, Ft. Worth
Terrell State Hospital
Texas Coalition for Juvenile Justice, Dallas
Texas Department of Human Resources, Arlington, Dallas, Ft. Worth
Transitions, Arlington
Trinity Valley MHMR Authority, Ft. Worth
United Community Centers, Ft. Worth
United Way of Metropolitan Tarrant County
University Affiliated Agency, Dallas
University of Texas Health Science Center, Dallas
Volunteers of America, Ft. Worth
West Dallas Community Centers
Women's Center, Dallas

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.

Department of
SOCIOLOGY (SOCI)

Area of Study		Degree
Sociology		M.A.

Master's Degree Plan: Thesis only

Chairman: Charles E. Ramsey   205 University Hall   273-2661

Graduate Advisor: Anson D. Shupe, Jr.   424 University Hall   273-2661

Graduate Faculty:

Professors Ramsey, Taylor

Associate Professors Anderson, Bromley, Lord, Shupe, Stacey, Vidal

Assistant Professors Bastien, Eve, Robbins, S. Rombough, Snellings, Ventimiglia, Weed

OBJECTIVE

The Master's degree program in sociology seeks to simultaneously achieve goals designed to train persons to become competent sociologists whose subsequent professional activities will be understood, accepted, and appreciated by fellow members of the sociological community of scholars *and* to recognize and encourage the diversity of interests and abilities that has long characterized sociology. Specifically, the objectives of this program are:

1. *Students should learn to conduct competent, original social scientific research.*
2. *Students should learn to effectively communicate sociological information and perspectives to non-sociologists.*
3. *It is expected that students will come to identify with a collegial network of sociologists.*

In addition to the general objectives, for all students, noted above, the Master's degree program in sociology provides the opportunity for students having particular but diverse career goals to meet their own special objectives. In particular, the Master of Arts Degree is designed to meet the needs of students whose pursuit of the degree results from one or a combination of the following individual objectives: (a) attaining a Master's Degree in Sociology as an intermediate step between the Baccalaureate and Doctoral degree; (b) attaining a Master's Degree in Sociology for direct application in research, teaching, and/or community service; and (c) attaining a Master's Degree in Sociology as a contribution to one's ability to understand his or her social milieu.

DEGREE REQUIREMENTS

Admission to the Graduate Program in Sociology requires, in addition to the general Graduate School requirements, that the prospective student have a core knowledge of sociology. Normally, a Bachelor's Degree in sociology, which includes courses in theory, research methodology, and statistics as well as some breadth of substantive course work, will provide this core knowledge. When a student's record shows inadequate preparation in any major area he/she may be required to make up such deficiencies through additional course work. Such remedial course work will not be included in the required hours satisfying M.A. course requirements.

5301.   SOCIOLOGICAL THEORY (3-0). Development of sociological theory from 1800 to the present. Prerequisite: permission of instructor.

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. Prerequisite: permission of the instructor.

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. Prerequisite: permission of the instructor. Formerly SOCI 5347.

5304.   ADVANCED STATISTICS FOR SOCIOLOGISTS (2-2). Seminar concerned with the testing of scientific hypotheses. Analysis of variance, regression analysis, pearsonian or zero-order correlation, multiple and partial techniques considered. Prerequisite: permission of instructor. Formerly SOCI 5340.

5309.   SPECIAL TOPICS IN FORMAL SOCIOLOGY (3-0). May be repeated for credit as the topic changes.

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. Formerly SOCI 5325.

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 give to current literature and methodologies in stratification study. Prerequisite: permission of the instructor. Formerly SOCI 5304.

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. Prerequisite: permission of the instructor. Formerly SOCI 5307.

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. Prerequisite: permission of the instructor. Formerly SOCI 5343.

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. Formerly SOCI 5330.

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. Prerequisite: permission of the instructor. Formerly SOCI 5303.

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. Formerly SOCI 5318.

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.

SOCIOLOGY

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. STUDIES OF DEVIANCE (2-2). Oriented to a substantive study of deviant behavior and to divergent methodological approaches to deviance. A knowledge of the basic theories will be assumed so as to concentrate on current sociological and social-psychological studies. Prerequisite: permission of the instructor. Formerly SOCI 5341.

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.

5329. SPECIAL TOPICS IN SOCIAL PSYCHOLOGY (3-0). Covers different topics each semester, such as social attitudes and mass communication, symbolic interactionism, sociolinguistics. May be repeated for credit as the topic changes. Formerly SOCI 5394.

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.

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. Formerly SOCI 5348.

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. Formerly SOCI 5349.

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. Formerly SOCI 5395.

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. Prerequisite: permission of the instructor. Formerly SOCI 5342.

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.

5339. SPECIAL TOPICS IN APPLIED 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. Prerequisite: permission of the instructor. Formerly SOCI 5345.

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. Prerequisite: permission of the instructor.

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. Prerequisite: permission of the instructor. Formerly SOCI 5305.

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, p. 170)	M.B.A.
Administration (See Interdepartmental and Intercampus Programs, p. 165)	PH.D.

Acting Chairman: R. C. Baker 132 Business 273-3502

Graduate Faculty:

Professor Schkade
Associate Professors Baker, Pinney
Assistant Professors Brobst, McWilliams

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.

5322. ADMINISTRATIVE SYSTEMS ANALYSIS AND DESIGN (3-0). Explores the application of general concepts of systems to administrative systems with special emphasis on manual and automated systems for information processing. Contemporary concepts and techniques are applied in the analysis and improvement of existing information systems and the design and implementation of new systems. Prerequisite: MASI 5311 or equivalent.

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.

SYSTEMS ANALYSIS

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.

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.

5328. 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.

5340. INTRODUCTION TO MANAGEMENT INFORMATION SYSTEMS (3-0). An overview of MIS; examines the structure of information systems. Includes the theoretical concepts of information, the structure of a management information system, and MIS development and management. Prerequisite: MASI 5311 or equivalent.

5341. MANAGEMENT INFORMATION SYSTEMS PROCESSING TECHNOLOGY (3-0). Survey of characteristics and applications of computing equipment and programming languages used in Management Information Systems. Prerequisite: MASI 5340.

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: MASI 5340.

5344. DATA BASE MANAGEMENT (3-0). Concepts and methods in the management of data bases for MIS. Includes: objectives, data structures, data base design, interrogation languages, selection of data base management systems, data integrity, security and privacy. Prerequisite: MASI 5340.

5345. MANAGEMENT AND MAJOR APPLICATIONS OF MANAGEMENT INFORMATION SYSTEMS (3-0). Theory and practice of managing the information systems resource including staffing, organization, control, project selection and interface with the other areas in the business organization; some major applications of MIS discussed. Prerequisite: MASI 5340.

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.

URBAN AND REGIONAL AFFAIRS
Programs Division (URBA)

Areas of Study		*Degrees*
Urban Affairs		M.A.
Administration (See Interdepartmental and Intercampus Programs, p. 165)		PH.D.

Master's Degree Plans: Thesis and Thesis Substitute

Division Director: Scott Cummings   546 University Hall   273-3071

Graduate Advisor: Mark S. Rosentraub   544 University Hall   273-3071

Graduate Faculty:

 Professors Cornehls, Geisel, Schkade, Taebel
 Associate Professors Anderson, Cummings, Wyman
 Assistant Professor Rosentraub
 Research Associate MacKenna

OBJECTIVES

The activities of the Institute of Urban Studies are organized into three broad, functional areas: graduate instruction and related research; applied research and services provided public and private groups and officials; and criminal justice programs. The applied research and service activities are viewed as important adjuncts to the graduate instruction program. Graduate students in urban affairs may be involved in research and service projects that are relevant and timely in relation to contemporary urban problems. Members of the applied research and service staff may serve as resource specialists to graduate students and members of the graduate instructional staff. The wide contacts of institute staff members with public officials and agencies and private groups outside the University and involved in urban affairs can be helpful in arranging internships.

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 pro-

gram 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 courses are composed of 6 hours of classroom research courses and either a six-hour research practicum or thesis in the Graduate School of Social Work or an internship report 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:

Cities as political and administrative entities
Cities as social entities
Cities as economic entities
Cities as spatial and environmental entities
Historical, systemic and research approaches to cities

Within the first four areas, there is one core course required to be taken by all students, and there are two courses required under the fifth area. Students may elect either the generalist program in urban affairs or specialize in one of three areas. Under the generalist program, students would take one additional course in each of the five areas listed above in addition to core courses. A student may also elect to specialize in such areas as Urban Management, Urban Planning, and Community Relations. A student selecting one of the specialities would take the core courses and an additional 15 hours of course work related to the specialty. This course work may be taken either in the Institute of Urban Studies or in other departments and schools which offer appropriate courses related to the area of specialization.

Satisfactory completion of a minimum of 33 semester hours of courses or seminars will be required and completion of a thesis or thesis substitute, carrying a minimum of six semester hours credit, will be necessary to receive the degree. Additional prerequisite courses may also be required.

Cities and Urban Areas as Political and Administrative Entities

5300. THE URBAN POLITICAL SYSTEM (3-0). Examination of the city as a political system, including the impact of urbanization and fragmentation on politics; 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.

5301. POLITICS OF MINORITY GROUPS (3-0). Continuation of URBA 5300. Concentrates on recent developments related to partisan activities and political involvement of minority groups in cities and metropolitan areas. Emphasis on roles of Black and Mexican American groups and individuals.

5302. 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.

5303. ORGANIZATION THEORY AND DEVELOPMENT (3-0). Examines the 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 CRJU 5309 and POLS 5303; credit will be granted only once.

5304. URBAN MANAGEMENT (3-0). Historical and legal evolution of urban public organizational forms. Also provides an overview of the major administrative processes in local government such as budgeting, personnel, systems analysis, and information systems. Major role issues facing urban public managers explored.

5390. SPECIAL TOPICS IN URBAN POLITICS AND ADMINISTRATION (3-0). Different topics each semester from such areas as: interest groups in urban community, the judicial system, political conflict, outputs of the political system, and the urban bureaucracy. May be repeated for credit as the topic changes.

Cities and Urban Areas as Social Entities

5310. 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.

5311. URBAN SOCIAL PATHOLOGIES (3-0). Nature and extent of major types of social pathologies and deviant behavior in cities and urban areas: family disorganization, crime and delinquency, poor health, lack of education, and unemployment; newer concepts and techniques for maintaining "social accounts" and information systems for monitoring changes in socio-economic well-being.

5312. MINORITY GROUP RELATIONS AND SOCIAL PROBLEMS (3-0). Special problems of minority groups, primarily Black and Mexican-American groups; phenomenon of racial discrimination and causes and consequences of violence and direct action or confrontation tactics with emphasis on recent and contemporary problems and issues.

5313. 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.

5314. 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.

5391. SPECIAL TOPICS IN URBAN SOCIETY (3-0). Different topics each semester on such selected urban sociological problems as criminology, housing, and transportation. May be repeated for credit when topic changes.

Urban Areas as Economic Entities

5320. 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.

5321. URBAN ECONOMIC ISSUES (3-0). Examination of the structure of U.S. industry and its effects on various aspects of economic and consumer welfare; monopoly power, price fixing, and the exploitation of consumers (especially minorities and poor); public policy efforts to provide for industrial regulation and consumer protection assessed for their effectiveness and relevance to consumer exploitation.

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; increasingly complex dimensions of intergovernmental fiscal relations and public budgeting systems. Also offered as POLS 5322; credit will be granted only once.

5323. THE POLITICAL ECONOMY OF URBAN POVERTY (3-0). Topics include problems in measurement, definition and the conceptualization of poverty, as well as models of discrimination and the special place of minorities in poverty. Principal aims are to develop understanding of the significant issues in urban poverty and to provide a framework for evaluating public policy.

5392. SPECIAL TOPICS IN URBAN ECONOMICS (3-0). Different topics each semester focus on economic dimensions of selected urban problems from such areas as welfare, housing, transportation, manpower, and economic development. May be repeated for credit as topic changes.

Cities and Urban Areas as Spatial and Environmental Entities

5330. URBAN GEOGRAPHY (3-0). Emphasizes areal aspects associated with urban centers and the arrangements of urban centers in space as well as their internal patterns.

5331. SOCIAL ECOLOGY OF SPATIAL RELATIONSHIPS (3-0). Extensive readings into such social processes as social ecology, urban crime and violence, arson, slum and ghetto exemplified in the works of leading urbanologists.

5332. 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 as opposed to instruction in how to practice the art of planning. Also offered as ARCH 5302; credit will be granted only once.

URBAN AND REGIONAL AFFAIRS

5333. URBAN DESIGN (3-0). Seeks to provide understanding and appreciation on the part of serious and systematic non-architecture students 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 explored. Also offered as ARCH 5301; credit will be granted only once.

5334. 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 economic, 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.

5393. SPECIAL TOPICS IN URBAN GEOGRAPHY, PLANNING AND ENVIRONMENT (3-0). Different topics each semester focus on selected problems. May be repeated for credit as topic changes.

Historical and Research Approaches to the Urban Community

5341. 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.

5342. URBAN SYSTEMS (3-0). Urban processes as systems with emphasis on flows, transformation processes, performance criteria, physical and spatial factors, human dimensions and similar considerations.

5343. 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.

5344. 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.

5345. STRATEGIES FOR URBAN RESEARCH (3-0). Conceptual and methodological approaches for the analysis of urban processes and the design of selected urban systems.

5346. SPATIAL ANALYSIS OF SOCIAL PROCESSES (3-0). Research methodology, cartographic and statistical techniques useful in the spatial analysis of such social processes as urban crime and violence, social ecology, arson, slum and ghetto formation as exemplified in the research techniques utilized by urban social geographers.

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.

5395. SPECIAL TOPICS IN URBAN PROBLEMS (3-0). Based on an interdisciplinary approach, will focus on a single major urban problem, such as transportation or housing. May be repeated for credit when topic changes.

5396. 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.

5397, 5697. 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. THESIS. A thesis conforming to university and departmental requirements may be prepared by graduate students in urban affairs.

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
Walter E. Mullendore   334 A Business   273-2881

Social Work
David Maldonado   212B Cooper Center   273-3407

Urban Affairs
Paul N. Geisel   520 University Hall   273-3071

Graduate Faculty:

Professors Arangio, Callicutt, Carney, Cornehls, Courtney, Dickinson, Geisel, Gorsuch, Holland, Imke, McCrea, Mullendore, Nelson, Ross, Schkade, Snavely, Stanley, Stevens, Taebel, Vargo, Wofford

Associate Professors Baker, Edgar, Gates, Garland, Gerloff, Hayashi, McDaniel, Ziegler

Assistant Professor Brobst

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, economics, finance, management, management science, marketing, policy and planning processes, organization and administrative processes, urban systems and research, 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.

BIOMEDICAL ENGINEERING

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.

6301. **SEMINAR IN ADMINISTRATIVE ACCOUNTING** (3-0).
6302. **SEMINAR ON ADMINISTRATIVE APPLICATIONS OF ECONOMICS** (3-0).
6303. **ADVANCED SEMINAR IN FINANCIAL MANAGEMENT** (3-0).
6305. **SEMINAR IN URBAN POLICY PROCESSES** (3-0).
6306. **SEMINAR IN MARKETING** (3-0).
6307. **SEMINAR IN SOCIAL SYSTEMS** (3-0).
6308. **SEMINAR IN CONTEMPORARY MANAGEMENT THEORY AND RESEARCH** (3-0).
6309. **SEMINAR IN MANAGEMENT SCIENCES** (3-0).
6399, 6699, 6999. **DISSERTATION.**

BIOMEDICAL ENGINEERING
Program (BME)

Areas of Study	Degrees
Biomedical Engineering	M.S., PH.D., M.D./PH.D.
	Certificates
Clinical Engineering	Internship
	Residency

Master's Degree Plans: Thesis and Non-Thesis

Graduate Advisor: John R. Axe 225 Engineering Laboratory   273-2561

Graduate Faculty:

Professor Potvin (Chairman)
Assistant Professor Axe
Adjunct Associate Professors Allison, Eberhart, Finney, Mishelevich
Adjunct Assistant Professors Reitman, 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. Research and teaching efforts of various departments in the biological, engineering, mathematical, physical, and medical sciences of both institutions are coordinated through the program. 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, cardio-pulmonary assistance and oxygen transport, neurophysiological systems and cybernetics, radiological image processing, biomedical instrumentation, rehabilitation,

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biomaterials and 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 residence program is awarded a certificate.

Qualified students may enroll simultaneously in the PhD program in biomedical engineering and in a medical or dental program. The Graduate Advisor should be consulted for information.

ADMISSION

Application for admission should be made at either UTA or UTHSCD; however, a student will be enrolled in both institutions while in the program. Normally, the institution through which the student applies and is admitted is the student's home institution.

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 combined scores 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) PHYS 5680D is recommended but not required; Biochemistry (AHS 3311D) BIOC 5680D, CHEM 4311 and 4312, or TAGER Biochemistry (2 course sequence) may be substituted for AHS 3311D; Anatomy (BME 5383D).

One Engineering Area: Four courses*.

Biomedical Engineering: Fundamentals of Bioinstrumentation (BME 5381D); 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); Biological Materials, Mechanics, and Processes (BME 5335); Cardio-Pulmonary-Renal Systems Analysis (BME 5325); Clinical Instrumentation and Measurements (BME 5345); Irreversible Processes in Biological Systems (BME 6335), Hospital Internship for Biomedical Engineers (BME 6390); Special Topics in Biomedical Engineering (BME 5300 or 5096D); Real Time Computation and Communication (BME 5374D); Optical and Magnetic Instrumentation and Measurements (BME 5386D).

BIOMEDICAL ENGINEERING

Free Elective: One 3 hour course from Life Science, Engineering or BME.
Final Comprehensive Examination: The non-thesis student will be examined in all 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) 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

Students entering this program are required to take Medical Rounds (BME 6193 or MS 5176D, 2 semesters), 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; 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*: Neurophysiological Systems Analysis (BME 5311); Bioelectric Phenomena (BME 5311); Biological Materials, Mechanics, and Processes (BME 5335); Cardio-Pulmonary-Renal Systems Analysis (BME 5325); Clinical Instrumentation and Measurements (BME 5345); Irreversible Processes in Biology (BME 6335); Hospital Internship for Biomedical Engineers (BME 6390); Special Topics in Biomedical Engineering (BME 5300 or 5096D); Real Time Computation and Communication (BME 5374D); Optical and Magnetic Instrumentation and Measurements (BME 5386D).

Although qualified applicants are 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) 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 detail 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.

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 quantitative 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.

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.

5345. CLINICAL INSTRUMENTATION AND MEASUREMENTS (2-3). 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.

5383, 5683, 5983. SURGICAL LABORATORY FOR BIOMEDICAL ENGINEERING. Laboratory course designed to provide fundamental experience in surgical procedures and in evaluating medical instrumentation. Staff physicians from local hospitals assist in coordinating this course. May be repeated for credit if different topics are covered for each registration. Prerequisite: BME 5385D.

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.

6335. IRREVERSIBLE PROCESSES IN BIOLOGICAL SYSTEMS (3-0). Application of the non-equilibrium thermodynamics formalism to biological systems and the cross coupling of entropy fluxes in various processes. Prerequisite: BME 5335 and ME 3313, or permission of the instructor.

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, catheter-

ization, 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 Ph.D. in Biomedical Engineering.

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Additional Courses offered at The University of Texas
Health Science Center at Dallas (UTHSCD)
</div>

BME 5381D.	Biomedical Instrumentation
BME 5383D.	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 5374D.	Real Time Computation and Communication
BME 5386D.	Optical and Magnetic Instrumentation and Measurements
BME 5396D.	Individual Laboratory Projects
BME 5176D.	Medical Rounds

BUSINESS ADMINISTRATION Program

Areas of Study	Degrees
Business Administration	M.B.A.
Administration (See Interdepartmental and Intercampus Programs, p. 165)	PH.D.

Master's Degree Plan: Thesis Substitute only

Graduate Advisor: Albert S. Lewie, Jr.   434 Business   273-3004

Graduate Faculty:

All members of the Graduate Faculty in the departments of Accounting, Economics, Finance and Real Estate, Management, Marketing, and Systems Analysis.

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.

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.

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.

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.

Background Category II

Students with varying amounts of academic work in business may have the requirement waived for those Foundation Program courses for which they have completed equivalent college work.

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)

Advanced MBA Program

The Advanced MBA Program consists of 36 hours of course work to be selected by the student and approved by the Graduate Advisor. However, in no case is a student's program to exceed 60 hours and in those few cases where it is deemed advisable for the student to take the entire Foundation Program, he or she will be allowed to waive six hours of electives in the advanced program.

Required MBA Courses: The following advanced MBA courses are required of all students—BUSA 5333; 5391; and either 5330 or 5337. The Research Colloquium (BUSA 5391) is taken in the MBA Program as the thesis substitute.

Concentration Areas: A concentration of not more than 12 semester hours may be taken in one of the following curriculum areas: accounting, economics, finance, management, management science (see Department of Systems Analysis courses), marketing. A student who wishes to take a program of courses in a wider range of areas may choose not to take a concentration.

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BUSINESS ADMINISTRATION

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. Also, the election of an option does not prevent a choice of concentration areas as described 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.

Joint M.B.A. and M. Arch. Option

Students in the joint program can earn both the Master of Business Administration and the Master of Architecture degrees in a curriculum of approximately 90 semester credit hours. Applicants must meet the admission requirements of both the MBA and M. Arch. programs. Business Administration students wishing to earn the M. Arch. degree will be required to take Program II (see above). Programs of study should be designed with the assistance of the Graduate Advisors in both areas. Students may select upon consultation with the Graduate Advisors either the thesis plan of the M. Arch. program or a thesis substitute plan of the MBA program. The thesis committees will be formed from the joint faculties of the College of Business Administration and the School of Architecture and Environmental Design. The successful candidate will be awarded both degrees rather than one joint degree.

ACCOUNTING (ACCT)

See Department of Accounting for course descriptions, p. 51.

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
5315. TAX PLANNING AND RESEARCH
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
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
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.

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 for business in serving diverse interests studied along 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. Considers the legal environment of the business enterprise.

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. Provides the vehicle for presentation of research by the candidate and an arena for his examination by faculty and other candidates. Used as a substitute for the traditional type of thesis work. Prerequisite: permission of Graduate Advisor.

BUSINESS ADMINISTRATION

ECONOMICS (ECON) *See Department of Economics for course descriptions, p. 87.*

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**
5302. **NATURAL RESOURCE ECONOMICS**
5304. **ADVANCED PUBLIC FINANCE**
5306. **STATISTICAL METHODS IN ECONOMICS**
5310. **MICROECONOMIC THEORY**
5312. **MACROECONOMIC THEORY**
5313. **MANAGERIAL ECONOMICS**
5314. **INDUSTRIAL ORGANIZATION**
5316. **MATHEMATICAL ECONOMICS**
5321. **INTERNATIONAL ECONOMICS**
5324. **MONETARY AND FISCAL ECONOMICS**
5326. **HISTORY OF ECONOMIC THOUGHT**
5327. **INTERNATIONAL FINANCE**
5330. **ADVANCED LABOR ECONOMICS**
5331. **URBAN ECONOMICS**
5332. **TRANSPORTATION ADMINISTRATION**
5333. **ECONOMICS OF HEALTH**
5336. **ECONOMETRICS**
5337. **BUSINESS AND ECONOMIC FORECASTING**
5338. **SEMINAR**
5340. **ADVANCED MANPOWER ECONOMICS**
5391. **RESEARCH AND SELECTED TOPICS IN ECONOMICS**

FINANCE (FINA) *See Department of Finance and Real Estate for course descriptions, p. 99.*

5311. **BUSINESS FINANCIAL MANAGEMENT**—Foundation Course
5320. **SEMINAR IN CENTRAL BANKING**
5321. **REAL ESTATE INVESTMENT**
5322. **ADVANCED BUSINESS FINANCIAL PROBLEMS**
5323. **INVESTMENT MANAGEMENT PROBLEMS**
5324. **SEMINAR IN FINANCIAL THEORIES**
5325. **MANAGEMENT OF FINANCIAL INSTITUTIONS**
5326. **COMMERCIAL BANKING**
5331. **MULTINATIONAL FINANCIAL MANAGEMENT**
5334. **ADVANCED REAL ESTATE EVALUATION**
5192, 5292, 5392. **SELECTED TOPICS IN FINANCE**

MANAGEMENT (MANA) *See Department of Management for course descriptions, p. 119.*

5311. **BEHAVIORAL SCIENCES IN MANAGEMENT**
5312. **MANAGEMENT**
5320. **ORGANIZATIONAL BEHAVIOR**
5321. **ADVANCED MANAGEMENT THEORY**
5324. **GROUP AND INTERGROUP RELATIONSHIPS**
5325. **INDUSTRIAL RELATIONS**
5326. **ORGANIZATIONAL INNOVATION AND CHANGE**
5327. **SEMINAR IN MANAGEMENT**

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
5192, 5292, 5392. SELECTED TOPICS IN MANAGEMENT

MANAGEMENT SCIENCE (MASI) *See Department of Systems Analysis for course descriptions, p. 157.*

5311. DECISION MODELS AND INFORMATION SYSTEMS
5321. INTRODUCTION TO MANAGEMENT SCIENCES
5322. ADMINISTRATIVE SYSTEMS ANALYSIS AND DESIGN
5323. APPLIED DECISION THEORY
5325. ADVANCED STATISTICAL METHODS IN BUSINESS ADMINISTRATION
5326. SIMULATION AND BUSINESS MODELS
5327. APPLIED MATHEMATICAL PROGRAMMING
5328. GENERAL SYSTEM MODELS AND ANALYSIS
5340. INTRODUCTION TO MANAGEMENT INFORMATION SYSTEMS
5341. MANAGEMENT INFORMATION SYSTEMS PROCESSING TECHNOLOGY
5343. DISTRIBUTED INFORMATION SYSTEMS AND DATA COMMUNICATIONS
5344. DATA BASE MANAGEMENT
5345. MANAGEMENT AND MAJOR APPLICATIONS OF MANAGEMENT INFORMA-
      TION SYSTEMS
5192, 5292, 5392. SELECTED TOPICS IN MANAGEMENT SCIENCE

MARKETING (MARK) *See Department of Marketing for course descriptions, p. 121.*

5311. MARKETING
5320. BEHAVIORAL SCIENCE IN MARKETING
5323. MARKETING STRATEGY
5324. SEMINAR: CONTEMPORARY MARKETING PROBLEMS
5325. PHYSICAL DISTRIBUTION MANAGEMENT
5326. PROMOTIONAL SYSTEMS MANAGEMENT
5327. RESEARCH FOR MARKETING DECISIONS
5328. PRODUCT MANAGEMENT
5329. SALES, SALES MANAGEMENT
5331. INTERNATIONAL MARKETING
5332. INDUSTRIAL MARKETING
5335. RETAIL MARKETING MANAGEMENT
5192, 5292, 5392. SELECTED TOPICS IN MARKETING

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.

ACCOUNTING 5330. INTERNATIONAL ACCOUNTING AND FINANCIAL REPORTING.
BUSINESS ADMINISTRATION 5331. LAW OF INTERNATIONAL BUSINESS
ECONOMICS 5321. INTERNATIONAL ECONOMICS
ECONOMICS 5327. INTERNATIONAL FINANCE
FINANCE 5331. MULTINATIONAL FINANCIAL MANAGEMENT
MANAGEMENT 5331. MANAGEMENT OF INTERNATIONAL OPERATIONS
MARKETING 5331. INTERNATIONAL MARKETING

ENGINEERING: UNDIFFERENTIATED (ENUD)

Areas of Study		Degree
Engineering: Undifferentiated		PH.D.

Graduate Advisors:

Aerospace Engineering		
Fred R. Payne	301 B Engineering	273-2603
Civil Engineering		
Tseng Huang	435 J Engineering	273-3665
Computer Science		
Ted M. Sparr	206 Engineering	273-3785
Electrical Engineering		
Charles W. Jiles	317 H Engineering	273-2671
Engineering Mechanics		
J. H. Gaines	301 D Engineering	273-2603
Industrial Engineering		
H. W. Corley, Jr.	216 A Engineering	273-3092
Interdisciplinary		
Andrew E. Salis	204 Engineering	273-2571
Materials Science		
Carl D. Wiseman	335 D Engineering	273-2561
Mechanical Engineering		
Jack R. Woolf	335 H Engineering	273-2560

Graduate Faculty: the graduate faculty of the College of Engineering

OBJECTIVE

The Doctor of Philosophy degree in Engineering: Undifferentiated provides opportunities for students to study and participate in research in topic areas included in the areas of study listed. The individual student's program may include concentration in one or more areas of study. The interdisciplinary area of study 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. INTERDISCIPLINARY ENGINEERING RESEARCH. Individually approved research projects in one of the interdisciplinary programs in the College of Engineering. This course may be repeated for credit.

6399, 6699, 6999. DISSERTATION. Preparation of a doctoral dissertation in an 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.
Engineering: Undifferentiated (See Interdepartmental and Intercampus Programs, p. 176)	PH.D.

Master's Degree Plans: Thesis and Non-Thesis

Graduate Advisor: J. H. Gaines   301D Engineering   273-2603

Graduate Faculty:

Professors Dalley, Everard, Gaines, Huang, Lawrence
Associate Professors Stanovsky, Yuan

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 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

ENGINEERING MECHANICS

found in the areas of aerospace engineering, biomedical engineering, civil engineering, electrical engineering, mechanical engineering, materials science, and computer science.

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.

Engineering mechanics master's degree programs will normally include a thesis. With prior approval of the Engineering Mechanics Committee on Graduate Studies, however, it is possible to complete a master's program without thesis. For details on the non-thesis degree plan, consult the engineering mechanics Graduate Advisor.

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.

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 4331 or equivalent; AE 3303 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 4331 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.

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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.

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.

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.

DISSERTATION—See Engineering: Undifferentiated, page 176.

HUMANITIES Program (HUMA)

Areas of Study	Degrees
Humanities	M.A., PH.D.
Teaching	M.A.T.

Master's Degree Plans: Thesis and Non-Thesis

Graduate Advisors:

English (M.A., PH.D.)
Simone F. Turbeville   202 Carlisle Hall   273-2701
English (M.A.T.)
Ernestine P. Sewell   602 Carlisle Hall   273-2782
Foreign Languages and Linguistics (all degrees)
Ted E. Frank   221E Hammond Hall   273-3161

Graduate Faculty: The graduate faculties of the Departments of English and Foreign Languages and Linguistics.

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 traditional disciplines of language, linguistics, literature, history, philosophy, the visual arts, and music as they relate to the development of man's ideas about himself, ideas which are expressed in the monuments of his creation. The program leading to the doctoral degree in the humanities is aimed at developing scholars of literatures, languages, and linguistics, and interpreters of the humanities who can function effectively in a variety of situations to enrich the lives of people and to provide professional consultation.

The focus at The University of Texas at Arlington will be on literature and language (with concentrations in English, French, German, or Spanish) and linguistics. 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

A broad course of study is encouraged within the framework of the specific requirements detailed for the Master of Arts degree listed under English and Foreign Languages and Linguistics. A minimum of one-half and a maximum of three-quarters of the course work must be in the area of concentration (English, French, German, Spanish, or linguistics). All courses outside the area of concentration and fulfilling the humanities requirement must be approved by the Graduate Advisor in English or Foreign Languages and Linguistics and the Committee on Graduate Studies for the Humanities.

Master of Arts in Teaching in the Humanities (MAT)

A non-thesis degree, the Master of Arts in Teaching sequence is especially designed for teachers who wish to deepen knowledge of their fields and develop more expertise in the interdisciplinary teaching of the humanities. Sufficient variety in course offerings allows the student to direct his degree plan toward an MAT degree or toward further graduate study.

Concentration in English—The 36 semester hours of course work required for the degree should be distributed as follows:

6 hours	Pedagogy (English 5389 and 5390)
6 hours	Linguistics
15 hours	English
9 hours	Humanities courses taken outside the area of concentration.

The candidate for the MAT Degree will take a comprehensive oral examination during the final semester of enrollment in the program.

Concentration in French, German, or Spanish—Students intending to pursue this degree must present a baccalaureate degree with a major in the language of projected concentration, or have a minimum of eighteen advanced hours or the equivalent in language proficiency and advanced hours. A second field language is required, including listening, speaking, reading, and writing skills, as demonstrated by the successful completion of four semesters of course work or by an appropriate examination.

One of the following options will be selected:

1. *36 hour non-thesis option—36 hours* of graduate courses distributed as follows:

6 hours	Pedagogy
6 hours	Applied Linguistics
12 hours	Six language, 6 literature in the same language
12 hours	Humanities courses outside the area of concentration with no more than 6 hours in one department

2. *33 hour foreign study option—6 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; and *12 hours* humanities courses outside the area of concentration.

3. *36 hour bilingual/bicultural option—36 hours* of graduate courses in the following components:

3 hours	Foundations
3 hours	Educational Psychology
3 hours	Second Language Learning
6 hours	Applied Linguistics
6 hours	Language
15 hours	Culture and Contemporary Literature

The candidate for the MAT degree will take a comprehensive examination during the final semester of enrollment in the program.

Doctor of Philosophy in the Humanities

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 Doctor of Philosophy in the Humanities:

1. The student holding the MA or its equivalent may be required to submit satisfactory scores on the advanced GRE test (Literature in English, French, German, or Spanish, as appropriate to the academic background of projected concentration).

2. The amount of course work beyond the MA or its equivalent will be determined by the doctoral committee in consultation with the Graduate Advisor and will be subject to the approval of the Graduate Studies Committee. Approximately one-quarter of the total number of course hours for the degree must be taken outside the area of concentration.

3. The student will demonstrate reading proficiency in at least two foreign languages other than the language of the student's area of concentration.

4. The doctoral applicant will spend a minimum of two consecutive, regular semesters of full time study (9 credit hours per semester) beyond the MA, or its equivalent, and will earn at least 24 credit hours in residence.

5. Comprehensive examinations will be offered semiannually, during the Fall semester and Spring semester.

For course descriptions consult the course listings under the Departments of English and Foreign Languages and Linguistics. Humanities students may also consult the Graduate Advisor in their area of concentration concerning appropriate humanities courses offered at The University of Texas at Dallas.

5392. HUMANITIES (3-0). Historical, philosophical, or theoretical study of subjects outside the areas of concentration.

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 the Humanities degree will be conferred. Prerequisite: permission of the Graduate Advisor in English or Foreign Languages.

6330. SEMINAR IN THE HUMANITIES (3-0). Interdisciplinary study of genres, themes, and iconology in literature and the arts. May be repeated for credit when subject matter changes.

6391. READINGS IN 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 and Graduate Advisor: Walter E. Mullendore   334A Business   273-2881

Graduate Faculty: All members of the graduate faculty of The University of Texas at Arlington.

OBJECTIVE

The purpose of the degree programs is to allow individuals with extensive professional experience to update their formal education in view of recent developments in their field(s) of specialization or to develop the professional skills appropriate to the student's aspirations. The programs will not be open to persons who have recently received baccalaureate degrees and who have no professional experience.

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.

Most degree plans 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 have their degree plans approved by the Graduate Studies Committee for Interdisciplinary Studies *prior to registration for the first semester or session of work in the program.* Students not conforming to this regulation cannot be assured that the

courses taken prior to approval will be acceptable for degree credit. Students applying after the application deadline for the semester or·session in which they plan to enter the program may not be able to complete an approved degree plan in time for initial registration; therefore, the Graduate Studies Committee is not responsible for selection of courses taken prior to degree plan approval and cannot guarantee that such courses will apply to degree credit.

DEGREE REQUIREMENTS

The program is designed for a maximum of flexibility related to the specific professional objectives of the student. Prior to enrollment the student will be interviewed by the graduate advisor. If the student meets the normal requirements for admission to the graduate school 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 Graduate Dean, the supervising committee will have control of the individual's program. The student's program will typically work in (involve) at least two departments and may involve work in more than one of the schools (colleges). The primary emphasis is on the individual needs and aspirations of the student.

Students will normally take a minimum of 12 credit hours during the 12-month period. Students must complete at least 30 hours.

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.
Engineering: Undifferentiated (See Interdepartmental and Intercampus Programs, p. 176)		PH.D.

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

Graduate Advisor: Carl D. Wiseman   335D Engineering   273-2561

Graduate Faculty:

Professor Wiseman
Associate Professor Johnson
Visiting Assistant Professor Daniels

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.

MATERIALS SCIENCE

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 heterogeneous 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.

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.

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.

DISSERTATION—See Engineering: Undifferentiated, page 176.

MATHEMATICAL SCIENCES
Program (MSCI)

Areas of Study	*Degree*
Mathematics, Applied Mathematics	PH.D.

Graduate Advisor: Jacob T. B. Beard, Jr. 123 Hammond Hall   273-3261

Graduate Faculty: The Graduate Faculty of the Department of Mathematics with the support of the Graduate Faculties of the College of Science, Engineering, and Business and the Graduate Faculty of the Department of Mathematics of the University of Texas at Dallas and The University of Texas Health Science Center 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 and The University of Texas Health Science Center at Dallas. This joint program utilizes the faculty and courses from all three 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 abstract and applicable mathematics to a meaningful experience with various applications of mathematics. Finally, the nature of the dissertation will range from research in abstract mathematics to the discovery and testing of mathematical models for analyzing given problems 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, biometry, mathematical physics, management sciences, operations research, and mathematics education.

DEGREE REQUIREMENTS

Upon entering Graduate School, the student has the responsibility to consult with the mathematical sciences Graduate Advisor on a continuing basis.
The student must satisfactorily complete all deficiency courses.

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MATHEMATICAL SCIENCES

In addition to the Graduate School requirements for the Doctor of Philosophy degree, students must satisfactorily demonstrate competence in the following 30 graduate hours of core areas. Furthermore, the student must complete an additional 30 semester hours of graduate course work beyond these core areas and 18 semester hours of dissertation.

AREA	SEMESTER HOURS
Real Variables	6
Complex Variables	3
Differential Equations	3
Applied Analysis	3
Linear Algebra	3
Probability and Statistics	6
Computer Language and Applications	6
	30

Each student is expected to complete a minimum amount of graduate work in the Mathematics Department. However, this minimum amount will vary depending on the student's interest and background and will be determined on an individual basis by the Committee on Graduate Studies.

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 Committee on Graduate Studies.

After 40 semester hours of graduate work and with the approval of the Committee on Graduate Studies, a comprehensive examination will be administered. The examination is ordinarily both written and oral. To pass, the student must exhibit outstanding intellectual capacity and sufficient knowledge to continue doctoral studies and begin a program of research. By permission of the examining committee and the Graduate Dean, and after a lapse of a period of at least one semester, a student who has failed the comprehensive examination may request a single re-examination. 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. Therefore, the Committee on Graduate Studies for Mathematical Sciences has not identified the courses which are directly applicable for credit in this program. Consequently, every course in a student's program of work will be evaluated not only as to course content but also the way in which each course complements other courses in the program of work and also the ways in which each course broadens and furnishes depth to the program. Courses from a variety of departments (e.g., mathematics, physics, industrial engineering, computer science, management sciences, business administration, etc.) will be counted toward the PhD degree if taken with the prior approval of the Graduate Advisor. One should refer to the lists 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	*Degree*
Radiological Physics	M.S.

Master's Degree Plan: Thesis only

Graduate Advisor: R. S. Rubins   108 Science Hall   273-2266

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 The University of Texas at Arlington.

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., *Chancellor*

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., *Assistant to the President, Dean of Student Administrative Services*
R. Zack Prince, M.A., *Registrar and Director of Admissions*
John A. Hudson, M.A., M.S. in L.S., *University Librarian*

DEANS OF THE COLLEGES AND DIRECTOR OF THE INSTITUTE

Walter E. Mullendore, Ph.D., *Acting Dean of the College of Business Administration*
Andrew E. Salis, 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*
David W. MacKenna, Ph.D., *Acting Director of the Institute of Urban Studies*

THE GRADUATE SCHOOL

Bob F. Perkins, Ph.D., *Dean*

GRADUATE FACULTY

ABBOTT, JOHN P., *Assistant Professor of Accounting (1973). B.S., Texas Tech University, 1959; M.B.A., 1969; J.D., 1969; LL.M., Southern Methodist University, 1973. CPA.*

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.*

ALMORE, MARY G., *Associate Professor of Urban Studies (1972). B.S., Florida State University, 1955; M.A., 1956; M.S., 1958; Ph.D., Texas Christian University, 1971.*

AMBLER, BRUCE A., *Associate Professor of Psychology (1972). B.A., Haverford College, 1966; M.A., Cornell University, 1968; Ph.D., University of Oregon, 1972.*

AMSTER, HARRIETT, *Professor of Psychology (1973). A.B., Bryn Mawr College, 1950; M.A., Clark University, 1954; Ph.D., 1957.*

ANDERSON, FRANK W., *Associate Professor of Urban Studies and 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.*

ANTONIADES, ANTHONY C., *Associate Professor of Architecture (1973). B.S., National Technical University, Athens, Greece, 1965; M.S., Columbia University, 1966; M.S., 1968; M.Ph., University of London, 1972. Registered Architect.*

ARANGIO, ANTHONY J., *Professor of Social Work (1969) B.S., Louisiana State University, 1962; M.S.W., 1964; Ph.D., Tulane University, 1970.*

ARGENTO, VITTORIO K., *Visiting Assistant Professor 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.*

AXE, JOHN R., *Assistant Professor of Biomedical Engineering and Adjunct Assistant Professor of Mechanical Engineering (1975). B.S., U.S. Naval Academy, 1950; M.S., 1958; D.Eng., Catholic University, 1970.*

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 and Acting Chairman of the Department 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 and Computer Science and Associate Dean of the College of Engineering (1960). B.S., University of Texas at Austin, 1953; M.S., California Institute of Technology, 1954; Ph.D., 1958. Professional Engineer.*

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.*

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., *Assistant 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.*

BATTISTA, O. A., *Adjunct Professor of Chemistry (1974). B.S., McGill University, 1940; Sc.D., St. Vincent College, 1955.*

BEACH, DON M., *Assistant Professor of Education (1973). B.S., Texas Tech University, 1969; M.Ed., 1970; Ph.D., George Peabody College for Teachers, 1973.*

BEARD, JACOB T. B., JR., *Associate Professor of Mathematics (1971). B.S., Tennessee Technological University, 1962; M.S., 1967; Ph.D., University of Tennessee, 1971.*

BEAUDRY, HARRY R., *Associate Professor of English (1966). A.B., Rice University, 1952; M.A., Boston University, 1956; Ph.D., Duke University, 1968.*

BEEKMAN, JOHN, *Adjunct Assistant Professor of Linguistics (1976). Graduate, Moody Bible Institute, 1946.*

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.*

BERNFELD, STEPHEN R., *Professor of Mathematics (1975). B.S., Rensselaer Polytechnic Institute, 1965; Ph.D., University of Maryland, 1969.*

BERNSTEIN, BARTON E., *Adjunct Assistant 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.*

BLACK, JANET K., *Assistant Professor of Education (1978). B.S., Otterbein College, 1963; M.A., Ohio State University, 1966; Ph.D., 1977.*

BLACK, TRUMAN D., *Associate 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.*

BLAKE, DANIEL M., *Associate Professor of Chemistry (1970). B.S., Colorado State University, 1965; Ph.D., Washington State University, 1969.*

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 College, 1949; M.S., Texas A&M University, 1960; Ph.D., Ohio State University, 1963.*

BOON, JOHN D., *Professor of Geology (1942). B.S., Southern Methodist University, 1936.*

BORO, JOSEPH, *Adjunct Assistant Professor of Social Work (1975). B.S., University of Texas at Arlington, 1972; M.P.A., Southern Methodist University, 1973.*

BOSWELL, BILL W., *Assistant 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., *Visiting Assistant Professor of Physics, (1975). B.A., Brandeis University, 1965; Ph.D., Louisiana State University, 1971.*

BROBST, ROBERT W., *Assistant 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.*

BROMLEY, DAVID G., *Associate Professor of Sociology (1974). B.A., Colby College, 1963; M.A., Duke University, 1966; Ph.D., 1971.*

BROOKS, DOUGLAS M., *Assistant 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.*

BROWN, KENNETH L., *Assistant Professor of Chemistry (1975). B.S., University of Chicago, 1968; Ph.D., University of Pennsylvania, 1971.*

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BRUNO, VINCENT J., *Professor and Chairman of the Department of Art (1976). B.A., Kenyon College, 1951; M.A., Columbia University, 1962; Ph.D., 1969.*

BRUSCEMI, JOHN N., *Assistant Professor of Education (1977). B.A., Seton Hall University, 1956; M.A., University of Arizona, 1967; Ph.D., Arizona State University, 1975.*

BUCKLEY, ERNEST L., *Professor of Architecture (1972). B.S., South Dakota State University, 1947; M.S., Kansas State University, 1949; Ph.D., University of Texas at Arlington, 1972. FASCE, Professional Engineer.*

BUCKNER, JOYCE P., *Associate Professor of Education (1970). B.A., Ouachita Baptist University, 1959; M.S.E., Henderson State University, 1964; Ph.D., North Texas State University, 1970.*

BURKART, BURKE, *Associate Professor of Geology (1970). B.S., University of Texas at Austin, 1954; M.A., 1960; Ph.D., Rice University, 1965.*

BURNS, JOHN S., *Associate Professor of English (1964). B.A., New York University, 1951; M.A., Rice University, 1953; Ph.D., 1964.*

BURNS, NANCY A. B., *Associate Professor of Nursing (1977). B.S.N., Texas Christian University, 1957; M.S., Texas Woman's University, 1974.*

BURQUEST, DONALD A., *Adjunct Professor of Linguistics (1975). B.A., Wheaton College, 1961; M.A., University of California at Los Angeles, 1965; Ph.D., 1973.*

BUTCHER, ALLAN K., *Associate Professor of Urban Studies and Director of Criminal Justice Programs Division (1970). B.A., University of Florida, 1960; M.A., New School for Social Research, 1963; Ph.D., University of Texas at Austin, 1970.*

BUTLER, JAMES K., *Associate Professor of Biology (1960). B.A., University of Texas at Austin, 1950; M.A., 1952; Ph.D., 1961.*

CALABRO, PAT J., *Associate Professor of Marketing (1973). B.S., John Carroll University, 1965; M.B.A., Kent State University, 1969; Ph.D., Michigan State University, 1973.*

CALLICUTT, JAMES W., *Professor of Social Work (1968). B.S., Memphis State College, 1951; M.S.S.W., University of Tennessee, 1958; Ph.D., Brandeis University, 1969.*

CANNON, DON L., *Associate Professor of Electrical Engineering (1970). B.S., Texas Tech University, 1961; M.S., Massachusetts Institute of Technology, 1963; Ph.D., University of Houston, 1970. Professional Engineer.*

CANTWELL, DONALD W., *Associate Professor and Acting Chairman of the Department of Finance and Real Estate (1959). B.B.A., Southern Methodist University, 1953; M.B.A., 1959; J.D., 1962. State Bar, 1962.*

CARNEY, MARNA K., *Professor of Economics (1967). B.S., Northwestern University, 1947; M.A., Southern Methodist University, 1965; Ph.D., 1968.*

CASH, FLOYD L., *Professor and Chairman of the Department of Electrical Engineering (1959). B.S., University of Oklahoma, 1946; M.S., University of Texas at Austin, 1951; Ph.D., 1955. Professional Engineer.*

CASLER, DARWIN J., *Professor and Chairman of the Department of Accounting (1978). B.A., Michigan State University, 1959; M.B.A., 1960; D.B.A., 1962. CPA.*

CHEAVENS, FRANK, *Adjunct Professor of Psychology (1957). B.A., Baylor University, 1927; M.A., University of Texas at Austin, 1946; Ph.D., 1957.*

CHEN, MO-SHING, *Professor of Electrical Engineering (1962). B.S., National Taiwan University, 1954; M.S., University of Texas at Austin, 1958; Ph.D., 1962. Professional Engineer.*

CHESTER, EDWARD W., *Associate Professor of History (1965). B.A., Morris Harvey College, 1956; M.A., University of Pittsburgh, 1958; Ph.D., 1961.*

CHIANG, W. WALTER, *Adjunct Assistant Professor of Civil Engineering (1975). B.S., Chung-Yuan Christian College, 1967; M.S., University of Texas at Austin, 1970.*

CLARK, DAYLE M., *Assistant Professor of Civil Engineering (1964). B.S., Texas Tech University, 1955; M.S., Southern Methodist University, 1967. Professional Engineer.*

CLARK, JILL, *Assistant Professor of Political Science (1978). B.S., Iowa State University, 1965; M.S., University of Wisconsin in Milwaukee, 1971; Ph.D., 1974.*

CLAYTOR, RICHARD N., *Adjunct Associate Professor of Physics (1973). B.A., Rice University; M.A., 1959; Ph.D., 1961.*

COLEMAN, PAUL G., *Visiting Assistant Professor of Physics (1976). B.Sc., University College of London, 1969; Ph.D., 1972.*

CONRAD, SUSAN L., *Associate Professor of Nursing (1978). B.S., University of Evansville, 1970; M.S.N., Texas Woman's University, 1973.*

COOKE, JAMES H., *Associate Professor of Physics (1968). B.A., North Texas State University, 1962; Ph.D., University of North Carolina, 1967.*

COOPER, JAMES E., *Associate Professor of Geology (1974). B.S., North Texas State University, 1954; M.S., 1955; Ph.D., Rice University, 1959.*

CORLEY, HERBERT W., JR., *Associate Professor of Industrial Engineering (1971). B.S., Georgia Institute of Technology, 1966; M.S., 1968; Ph.D., University of Florida, 1971.*

CORNEHLS, JAMES V., *Professor of Urban Studies (1970). B.A., University of the Americas, 1961; Ph.D., University of Texas at Austin, 1965.*

COTTAM, GENE L., *Adjunct Assistant Professor of Physics (1972). B.A., University of Kansas, 1962; M.S., University of Michigan, 1965; Ph.D., 1967.*

COURTNEY, HARLEY M., *Professor of Accounting (1970). B.B.A., Lamar University, 1955; M.B.A., Texas A&M University, 1961; Ph.D., University of Illinois, 1966. CPA.*

COX, VERNE, *Professor of Psychology (1970). B.A., University of Texas at Austin, 1960; Ph.D., University of Houston, 1964.*

CROW, MARY LYNN, *Professor of Education (1970). B.A., Texas Christian University, 1956; M.Ed., 1967; Ph.D., North Texas State University, 1970.*

CRUMB, STEPHEN F., *Professor of Electrical Engineering (1961). B.S., University of Texas at Austin, 1943; M.S., 1948; Ph.D., California Institute of Technology, 1955. Professional Engineer.*

CUMMINGS, SCOTT, *Associate Professor of Urban Studies and Director of Urban and Regional Affairs Programs Division (1976). B.A., University of Maine, 1966; M.A., San Jose State University, 1968; Ph.D., University of Connecticut, 1972.*

DALLEY, JOSEPH W., *Professor of Aerospace Engineering and Engineering Mechanics and Associate Dean of the College of Engineering (1960). B.S., University of Texas at Austin, 1947; M.S., 1951; Ph.D., 1959. Professional Engineer.*

DANGEL, RICHARD F., *Assistant Professor of Social Work (1977). B.A., Michigan State University, 1971; M.S.W., University of Michigan, 1973.*

DANIELS, CAROLE, *Visiting Assistant Professor of Mechanical Engineering (1977). B.S., Drexel University, 1968; M.S., 1971; Ph.D., 1977.*

DARKAZALLI, GHAZI, *Assistant Professor of Mechanical Engineering (1977). B.S., New York Institute of Technology, 1971; M.S., University of Massachusetts, 1972; Ph.D., 1976.*

DAVIS, IRVINE E., *Adjunct Associate Professor of Linguistics (1976). B.S., University of California, 1943; M.A., University of New Mexico, 1958; Ph.D., 1960.*

DAWSON, IRVING, *Professor and Chairman of the Department of Political Science (1971). B.A., North Texas State University, 1948; M.A., University of Texas at Austin, 1950; Ph.D., 1957.*

DEAN, EUDA E., *Assistant Professor of Mathematics (1961). B.A., Abilene Christian College, 1958; M.A., 1960; Ph.D., Texas Christian University, 1976.*

DEIBLER, ELLIS W., *Adjunct Assistant Professor of Linguistics (1978). B.S., Columbia University, 1951; B.D., Fuller Theological Seminary, 1954; M.A., University of Michigan, 1965; Ph.D., 1973.*

DEIVANAYAGAM, SUBRAMANIAM, *Assistant Professor of Industrial Engineering (1976). B.E., Annamalai University, India, 1963; M.S., 1966; Ph.D., Texas Tech University, 1973.*

DENISON, R. E., *Adjunct Professor of Geology (1974). B.S., University of Oklahoma, 1954; M.S., 1959; Ph.D., University of Texas at Austin, 1966.*

DESCHNER, JEANNE P., *Visiting Assistant Professor of Social Work (1978). B.A., Mount Holyoke College, 1950; M.A., University of Houston, 1968; Ph.D., 1972.*

DIANA, LEONARD M., *Professor of Physics and Associate Dean of the College of Science (1965). B.S., Georgia Institute of Technology, 1948; Ph.D., University of Pittsburgh, 1953.*

DICKINSON, ROGER A., *Professor of Marketing (1975). A.B., Williams College, 1951; M.B.A., University of California at Los Angeles, 1955; Ph.D., Columbia University, 1967.*

DIERKS, PAUL A., *Assistant Professor of Accounting (1976). B.S., Pennsylvania State University, 1955; M.B.A., University of Denver, 1964; Ph.D., University of Washington, 1975.*

DILLON, WILLIAM E., *Associate Professor of Electrical Engineering (1971). B.S., Texas A&M University, 1965; M.S., University of Texas at Arlington, 1969; Ph.D., 1972.*

DOWDEY, JAMES E., *Adjunct Associate Professor of Physics (1962). B.S., University of Texas at Austin, 1951; M.A., 1956; Ph.D., 1958.*

DUEHN, WAYNE D., *Professor of Social Work (1970). B.A., North Central College, 1961; M.S.W., Loyola University, 1964; Ph.D., Washington University, 1970.*

DUNCAN, CHESTER I., JR., *Assistant Professor of Architecture (1976). B.M.E., Villanova College, 1946; M.S., University of Pennsylvania, 1950. FASCE. Professional Engineer.*

DUWAJI, GHAZI, *Associate Professor of Economics (1966). B.A., American University of Beirut, Lebanon, 1959; Ph.D., Duke University, 1966.*

DYER, DANNY D., *Associate Professor of Mathematics (1963). B.S., University of Texas at Arlington, 1961; M.S., Southern Methodist University, 1963; Ph.D., 1970.*

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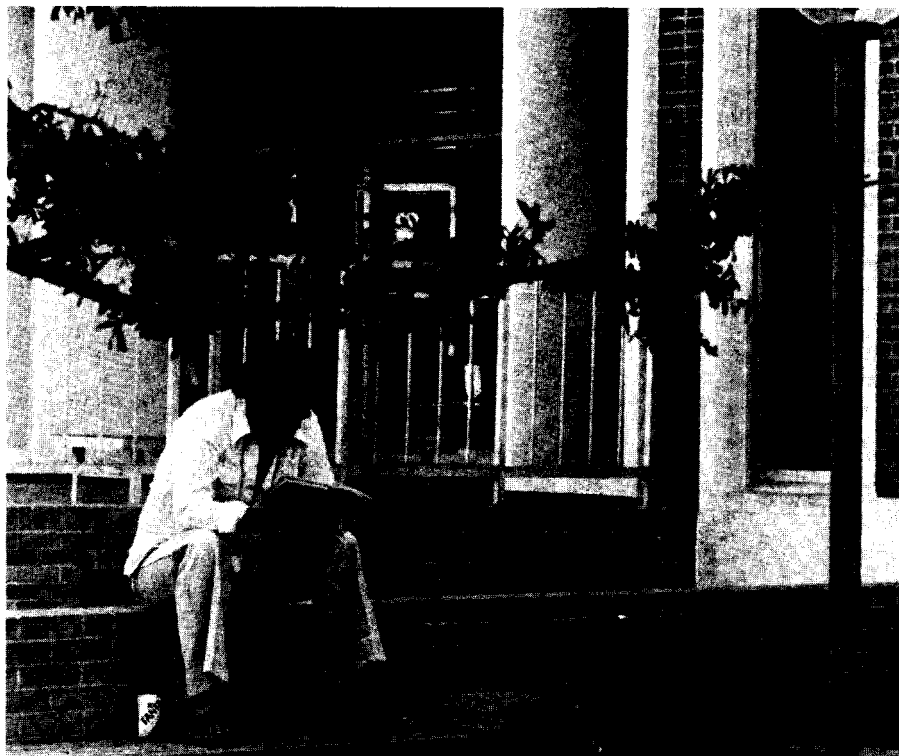
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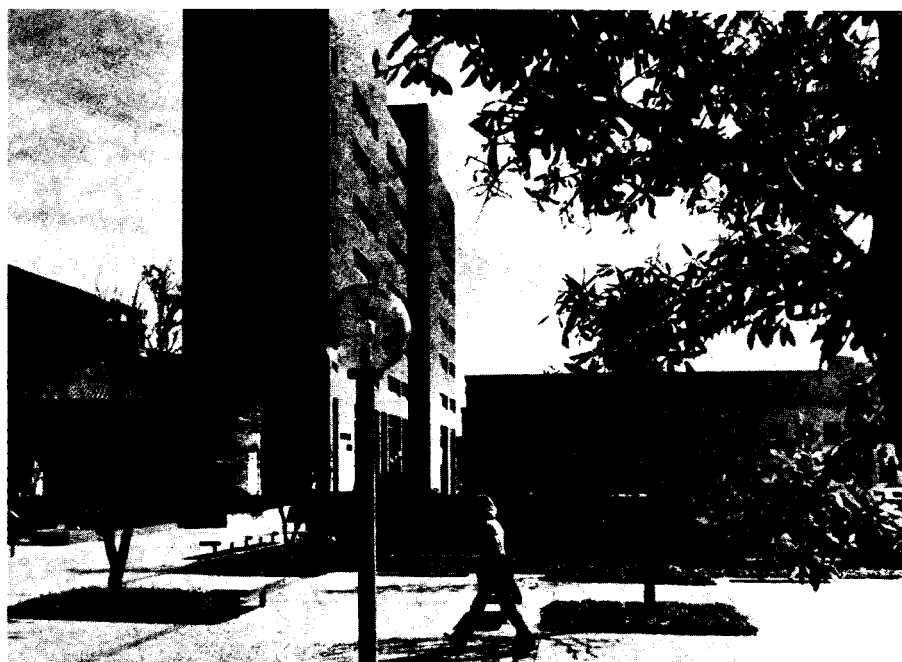
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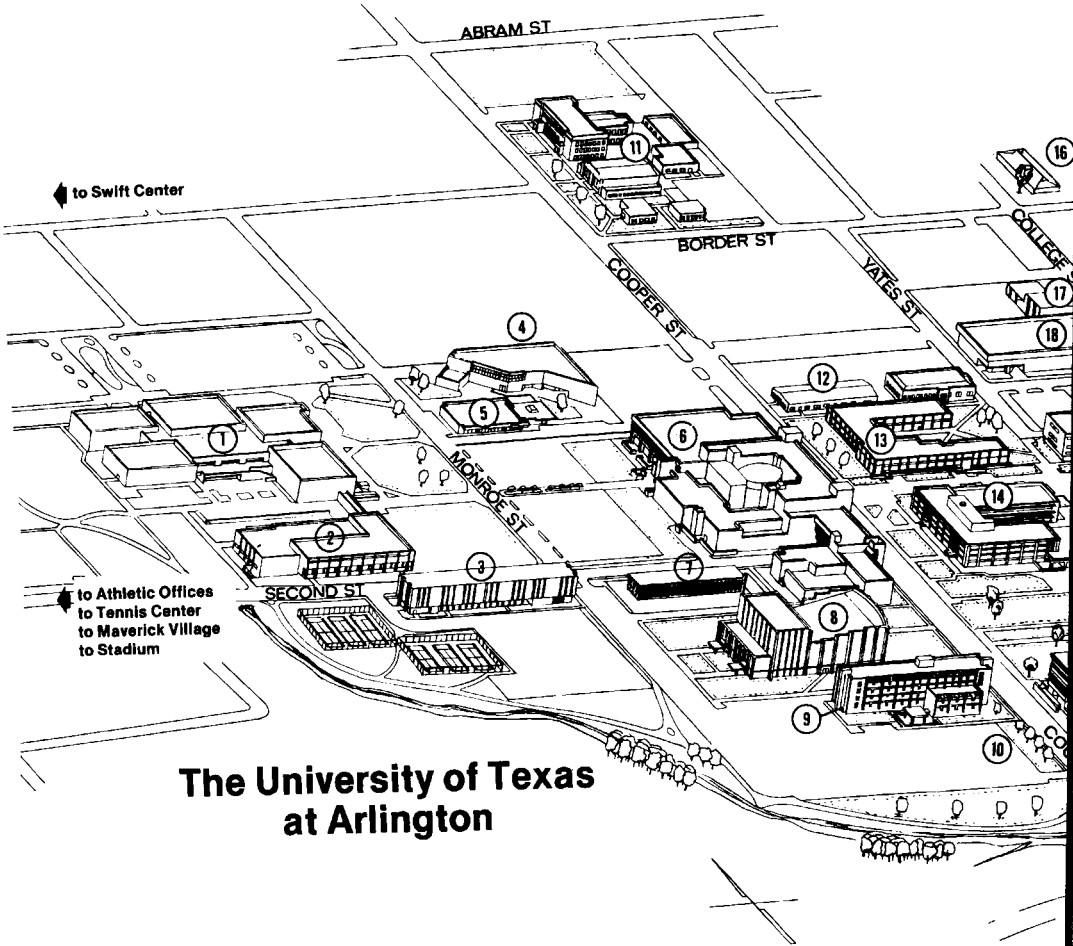
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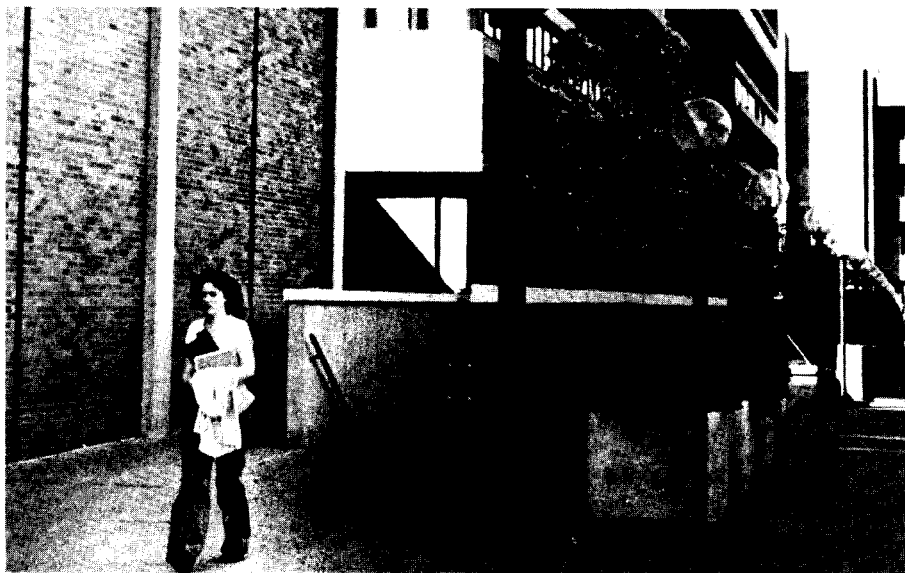
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WRIGHT, C. LEE, JR., *Associate Professor of Architecture (1968). B.Arch., University of Texas, Austin, 1963; M.Arch., 1969.*

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ZIEGLER, LAWRENCE F., *Associate Professor of Economics (1969). B.S., University of North Dakota, 1959; M.S., 1960; Ph.D., University of Iowa, 1969.*
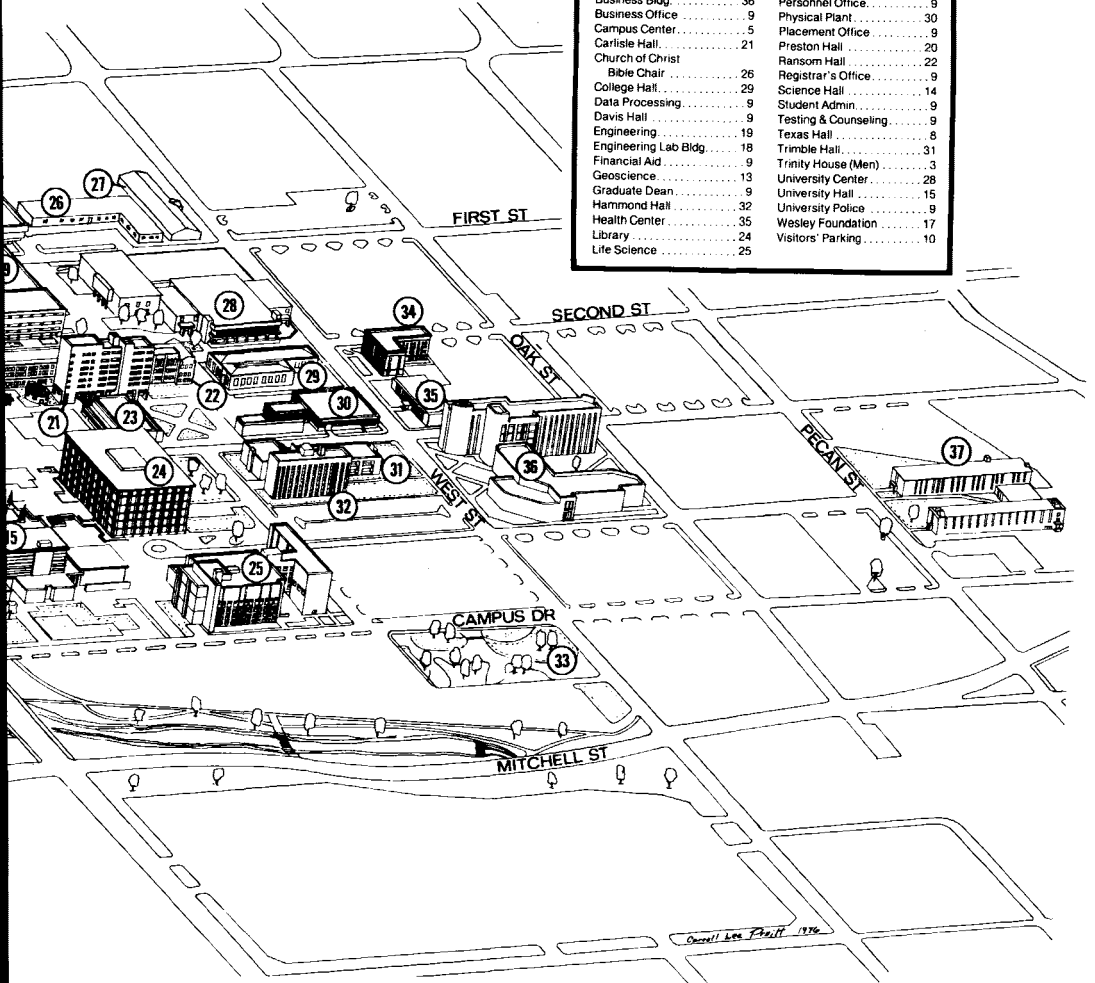
The University of Texas at Arlington

to Swift Center

to Athletic Offices
to Tennis Center
to Maverick Village
to Stadium

ABRAM ST

BORDER ST

SECOND ST

1. Activities Bldg.	11. Cooper Center (CC)
2. PE Bldg.	12. Aerospace Engr. Lab
3. Trinity House (Men)	13. Geoscience (GS)
4. Bookstore	14. Science (SH)
5. Campus Center	15. University Hall (UH)
6. Fine Arts Bldg. (FA)	16. Lutheran Student Center
7. Pachl Hall (Men)	17. Wesley Foundation
8. Texas Hall	18. Engineering Lab Bldg.
9. Davis Hall	19. Engineering (E)
10. Visitors Parking	

20.	Preston Hall	29.	College Hall
21.	Carlisle Hall (Car H)	30.	Physical Plant
22.	Ransom Hall	31.	Trimble Hall
23.	Physical Plant Bldg.	32.	Hammond Hall (HH)
24.	Library	33.	Park
25.	Life Science	34.	Brazos House
26.	Church of Christ Bible Chair	35.	Health Center
27.	Baptist Student Center	36.	Business Bldg. (B)
28.	University Center	37.	Lipscomb Hall (Women)

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