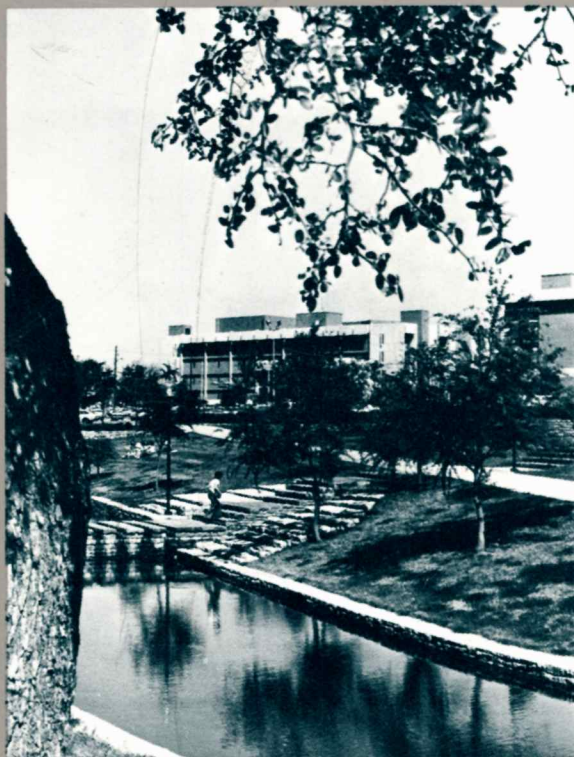


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THE UNIVERSITY OF TEXAS  
AT ARLINGTON

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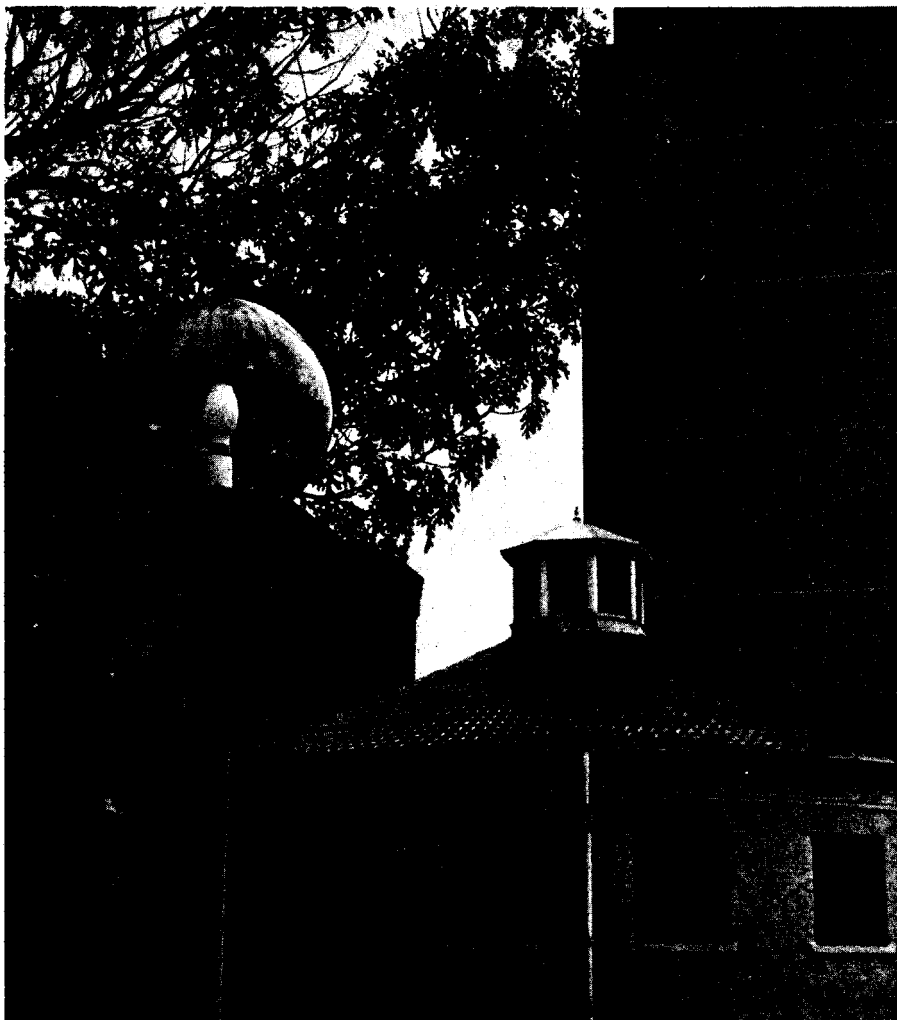
GRADUATE CATALOG  
VOL. LXXI NO. 3 JUNE 1988

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## CAMPUS AND GRADUATE SCHOOL CALENDAR, 1988-1989

**Dates of particular importance to graduate students are shown in boldface type.** Graduating students should see p. 40 for the final semester checklist. All Graduate School deadlines, unless otherwise stated, are final at 5:00 p.m. of the date specified (p. 41)

	<b>SUMMER SESSIONS 1989</b>				
	<b>FALL</b>	<b>SPRING</b>			
	1988	1989	1st 5 Weeks	2nd 5 Weeks	11 Weeks
Application and Readmission Deadline for <b>International Students</b>	<b>April 22</b>	<b>Sept. 9</b>	<b>Jan. 27</b>	<b>Jan. 27</b>	<b>Jan. 27</b>
Application Deadline for <b>U.S. Students</b>	<b>July 1</b>	<b>Oct. 28</b>	<b>March 31</b>	<b>March 31</b>	<b>March 31</b>
Readmission Application Deadline for <b>U.S. Students</b>	<b>July 29</b>	<b>Dec. 2</b>	<b>April 21</b>	<b>April 21</b>	<b>April 21</b>
Application for Thesis/Dissertation	Should be filed no less than one week prior to student's planned registration				
Tuition Reduction	registration				
<b>NEW STUDENT REGISTRATION</b>	<b>Aug. 23-26</b>	<b>Jan. 10-13</b>	Check Summer/Fall Class Schedule		
<b>First Day of Classes</b>	<b>Aug. 29</b>	<b>Jan. 16</b>	<b>June 5</b>	<b>July 12</b>	<b>June 5</b>
<b>Late Registration</b>	<b>Aug. 29, 30</b>	<b>Jan 16, 17</b>	<b>June 5, 6</b>	<b>July 12, 13</b>	<b>June 5, 6</b>
<b>Census Date: Final Date to Reserve Graduate Courses for Graduate Credit</b>	<b>Sept 12</b>	<b>Jan. 30</b>	<b>June 8</b>	<b>July 18</b>	<b>June 8</b>
<b>Completion of "X" Grade from Previous Semester:</b>					
<b>Last date to submit work to instructor</b>	<b>Oct. 7</b>	<b>Feb. 24</b>			
Last date to submit grade change to Dean of the Graduate School	<b>Oct. 21</b>	<b>March 10</b>			
Midsemester: Last Date to Drop or Withdraw (p. 38)	Oct. 21	March 10	June 21	Aug. 1	July 10
Deadline For GRADUATION: Last Date to File Application for Graduation, pay Diploma Fee, and File Final Program of Work	<b>Sept. 27</b>	<b>Feb. 14</b>	<b>June 30</b>	<b>June 30</b>	<b>June 30</b>
Final Date for <b>Requesting Master's Exam/Dissertation Defense</b> , and Submitting Copy to <b>Examining Committee</b>	<b>Nov. 14</b>	<b>March 31</b>	<b>July 14</b>	<b>July 14</b>	<b>July 14</b>
Final Date to <b>Hold Master's Examination/Dissertation Defense</b> and to Submit Copy of Thesis/Dissertation to Graduate School for <b>Mechanical Check</b>	<b>Nov. 28</b>	<b>April 14</b>	<b>July 28</b>	<b>July 28</b>	<b>July 28</b>
Final Date to Submit <b>Approved Thesis/Dissertation</b> to the Graduate School, and to Submit <b>Report of Final Master's Examination/Dissertation Defense</b>	<b>Dec. 5</b>	<b>April 24</b>	<b>Aug. 4</b>	<b>Aug. 4</b>	<b>Aug. 4</b>
Final Exams	Dec. 12-16	May 5-11	July 11	Aug. 16	Aug. 16, 17
<b>End of Semester Deadline</b> (see in <i>Absentia</i> Registration, p. 41)	<b>Dec. 19</b>	<b>May 15</b>	<b>Aug. 18</b>	<b>Aug. 18</b>	<b>Aug. 18</b>
Graduation Exercises:	Winter: December 17, 1988		Spring: May 20, 1989		
HOLIDAYS: Labor Day—Sept. 5	Thanksgiving—Nov. 24-27		Spring Vacation—March 20-26		



# The University of Texas at Arlington®

(USPS 620-500.)

## Graduate Catalog 1988 - 1990

Volume LXXI

Number 3

June 1988

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# BOARD OF REGENTS

## The University of Texas System

### OFFICERS

Jack S. Blanton, Chairman  
 Shannon H. Ratliff, Vice Chairman  
 Bill Roden, Vice Chairman  
 Arthur H. Dilly, Executive Secretary

### MEMBERS

(Terms Expire February 1, 1989)

Robert B. Baldwin III .....	Austin
Jess Hay .....	Dallas
Mario Yzaguirre .....	Brownsville

(Terms Expire February 1, 1991)

Jack S. Blanton .....	Houston
Shannon H. Ratliff .....	Austin
Bill Roden .....	Midland

(Terms Expire February 1, 1993)

Sam Barshop .....	San Antonio
Louis A. Beecherl, Jr. ....	Dallas
W. A. "Tex" Moncrief, Jr. ....	Fort Worth

### GOVERNMENT

The government of UT Arlington is vested in a nine-member Board of Regents of The University of Texas System, nominated by the Governor, and approved by the Senate. The Office of the Chancellor is the chief administrative office of The University of Texas System and is located in Austin. The chief administrative officer of UT Arlington is the University President, under authority of the Office 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.

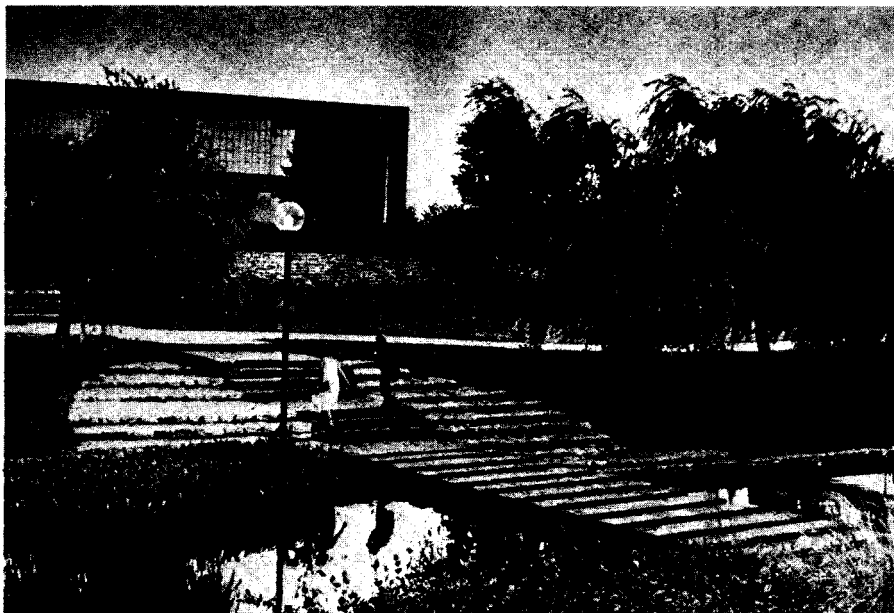
**The University reserves the right to withdraw courses at any time, change fees, rules, calendar, curriculum, degree programs, degree requirements, graduation procedures, and any other requirements affecting students. Changes will become effective whenever the proper authorities so determine and will 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.**

# THE UNIVERSITY

The University of Texas at Arlington is located on a modern, 348-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 thirteen institutions in The University of Texas System. It is fully accredited by the Southern Association of Colleges and Schools. 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 Association Board for Engineering and Technology. 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 Master of City and Regional Planning is accredited by the American Planning Association.

Founded in 1895 as Arlington College, a private liberal arts institution, UT Arlington has changed with the times and its surroundings, undergoing a maturing process and a succession of names, ownerships, and missions. In 1959, it was elevated to senior college rank, and, in 1965, was transferred from the Texas A&M System to The University of Texas System. It is now the second-largest institution within that system, the largest in the North Texas area, and the fifth-largest in the state. Its 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 76 foreign countries enrolled at the present time. Today the enrollment is approximately 20,000 undergraduate and 3,000 graduate students.

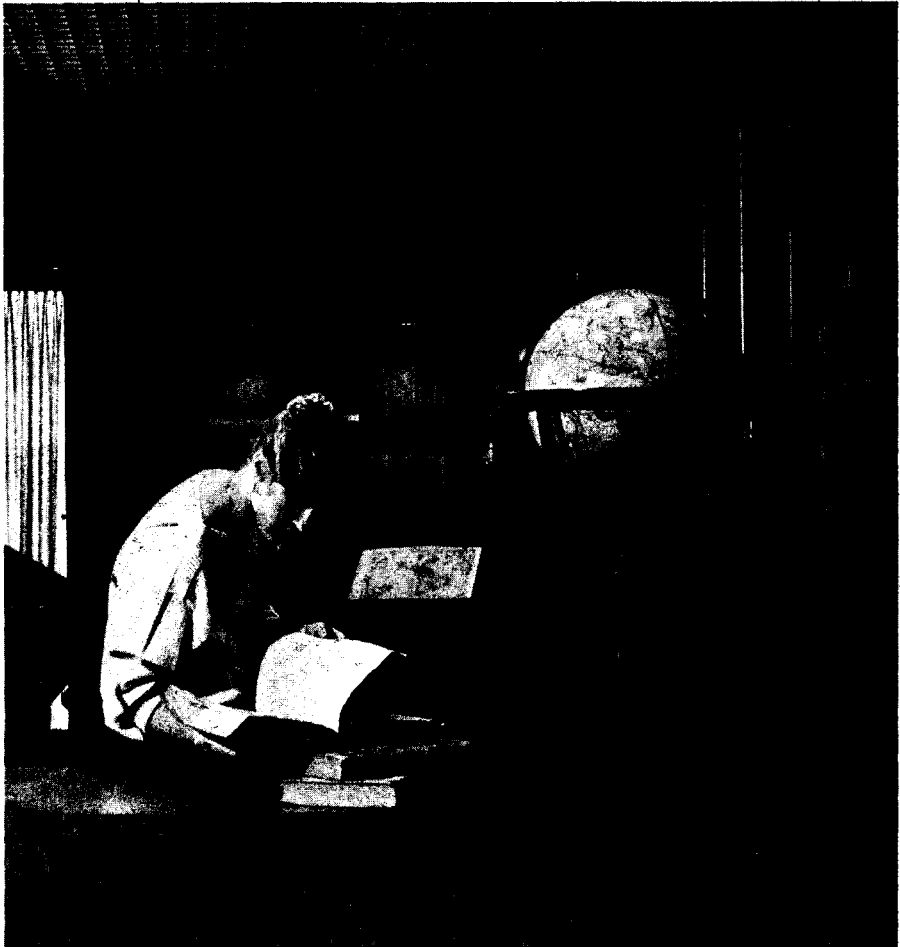


# THE GRADUATE SCHOOL

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

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

The Graduate School of The University of Texas at Arlington was established in 1966 with the initiation of six master's degree programs. Doctoral degree programs were begun in 1969 with a Ph.D. program in engineering. Today the University offers master's degrees in 45 disciplines or interdisciplinary programs and 18 doctoral degree programs.





# DIRECTORY OF OFFICES

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

**Graduate Admissions:** Rm. 333, 273-2688

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

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

**Graduate Advisor:** See departmental and program description.

**Counseling and Career Development:** Rm. 216, 273-3671 or 3672

**Financial Aid:** Rm. 252, 273-3561

**International Office:** Lower Level, University Center, 273-2355

**Handicapped Student Services Office:** Lower Level, University Center, 273-3364

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

**Housing:** 104 University Center, 273-2706

**Minority Student Services:** Lower Level, University Center, 273-2099

**SOAR—Special Services:** Rm. 132, Hammond Hall, 273-3684

**Student Affairs:** Rm. 241, 273-3361

**Transcripts and Records:** Rm. 129, 273-3372

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

# FACILITIES FOR ADVANCED STUDIES AND RESEARCH

## THE UNIVERSITY LIBRARIES

The Libraries of The University of Texas at Arlington include the Central Library, the Art and Architecture Library, and the Science and Technology Library. The Central Library is a seven-story building in the center of the campus containing a rapidly growing collection of more than 1,000,000 books, journals, documents, and technical reports. In addition, the Libraries subscribe to 5,500 periodicals and newspapers and maintain a collection of microfilm, microfiche, motion pictures, sound recordings, video tapes, filmstrips, and slides. The Art and Architecture Library, located in the School of Architecture and Environmental Design Building, has a collection of more than 20,000 volumes, while the Science and Technology Library in the new Engineering Building has more than 100,000 volumes. Books are on open shelves and are arranged by subject to facilitate research and browsing. Seating is provided for more than 1,250 students, with many in individual study carrels. In the Central Library, a limited number of private carrels is available to faculty and graduate students. Applications for these carrels may be obtained at the Information Counter on the first floor.

To supplement the Libraries' collections, the Interlibrary Loan Office Information Services locates and borrows research materials not held by the Libraries. As a member of the Association of Higher Education (AHE) of the North Texas area, Interlibrary Loan can make inquiries to locate materials and to obtain much of it very quickly, often saving travel time to other campuses. Telefacsimile equipment, online access to data bases, and a daily courier service support this activity. As an additional service to faculty and graduate students, the AHE Library Courtesy Card enables such students to go directly to the libraries of academic institutions in North Central Texas and to borrow materials needed for their research. This card may be obtained by application to the Head of the Circulation Department.

The Libraries' collections are particularly strong in several specialized areas. The collection of American fiction of the late nineteenth century is one of the finest collections of its type in the country. The Minority Cultures Collection, on the fourth floor of the Central Library, is a circulating and reference collection covering the political, social, cultural, economic, and intellectual history of American Indians, Blacks, and Mexican Americans in the southwestern United States from U.S. independence to the present, with emphasis on 20th century problems and progress.

Another area of distinction is the Division of Special Collections, housed in specially designed quarters on the sixth floor of the Central Library. Special Collections includes the extensive body of rare books, graphics, manuscripts, newspapers, and microfilm in the Jenkins Garrett Library. Specializing in the Spanish, Mexican and American colonization of Texas, the Civil War, ranching, community histories, politics, biography, and literature, the Garrett Library also contains the nation's most comprehensive collection of books and documents on the Mexican War of 1846-48. A second major division of Special Collections is the Cartographic History Library, a center for the study of the history of five centuries of exploration and mapping of the New World, with emphasis on Texas and the Gulf of Mexico. The Library contains thousands of rare maps and atlases featuring the original works of the world's greatest cartographers and a wide variety of journals and reference works. A wealth of historical documents pertaining to early Texas history is also found in the Robertson Colony Collection. These records are being published by the UT Arlington Press in the prize-winning series, *Papers Concerning Robertson's Colony in Texas*, compiled and edited by Dr. Malcolm D. McLean.

Two other collections relate to historical events of the twentieth century. The Texas Political History Collection consists of the papers of elected officials and private citizens, past and present, who have influenced the course of Texas politics and government. The Texas Labor Archives serve as the official depository of the Texas AFL-CIO and its affiliates and contains extensive primary records and publications relating to the history of organized labor in Texas and the Southwest. The Division of Special Collections contains the University Archives, which document the history of the campus in publications, photographs, correspondence, and oral history. Also included are extensive collections of microfilm of the state, national, and ecclesiastical archives of Yucatan and Honduras. A recent addition to Special Collections is the Collection of Texas Photography, based on the donation to UT Arlington of over 380,000 photographic prints and negatives from the *Fort Worth Star-Telegram*.

The Division of Special Collections offers many opportunities for advanced research for stu-

dents and faculty. It also sponsors speakers, conferences and exhibits related to its areas of specialization. A graduate program, "Principles of Archives and Museums," leading to professional certification, as well as undergraduate and graduate courses in the history of cartography are offered by the UT Arlington Department of History in collaboration with Special Collections.

Online access to over 300 databases covering virtually all disciplines is offered through the Computer Search Services Office in the Central Library. This access is obtained by contract with outside vendors or information utilities, such as Bibliographic Retrieval Services (BRS), Dialog Information Services, the National Library of Medicine, and System Development Corporation.

Other Library services include coin-operated photocopy machines on each floor and coin-operated electric typewriters and a photocopy center on the basement floor. Regular and special hours of the Library and its branches and departments are posted.

## TELEVISED INSTRUCTION

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

For further information or for a bulletin of courses available via the AHE closed-circuit television network (formerly TAGER), contact the UT Arlington Engineering Television Office, Rm. 119 Engineering Building, Box 19077, Arlington, TX 76019, or (metro) 273-2352, Fax (817) 794-5630.

## RESEARCH CENTERS, DIVISIONS, AND SPECIAL FACILITIES

### ACADEMIC COMPUTING SERVICES

Academic Computing Services provides computing facilities and services for the academic and research needs of the University and is separate from the administrative computing facility. The Academic Computing Services hardware consists of an IBM 4381/P03 with 16 MB of memory, IBM 4341/P12 with 16 MB of memory, VAX 8700 with 32 MB, and DEC VAX 11/785 with 8 MB of memory plus three remote batch terminals and a large number of interactive terminals. A Tektronix Graphic Terminal and plotter, a CALCOMP drum plotter, a high-print-quality Diablo terminal, and a page scanner are also available. Most of the major programming languages and packages are available on one or more of the computers. Other micro-computers and mini-computers are available in various departments and laboratories. An IBM PC Lab is available containing standalone PCs. Director: Melvin L. Pierce, 273-3666.

### AERODYNAMICS RESEARCH CENTER

The Aerodynamics Research Center at The University of Texas at Arlington was developed to provide modern test facilities for the support of research and graduate educational programs in experimental aerodynamics, aerothermodynamics, and propulsion. When fully operational, experimental simulation capabilities of the Center will span the complete flight spectrum from low to hypersonic speeds.

The Aerodynamics Research Center occupies a 1000 square meter laboratory complex housing the experimental test facilities, supporting control room, a central computer room for data processing, model shop, instrumentation lab, and adjoining staff office complex. The principal laboratories consist of Low Speed Wind Tunnel Lab; High Speed Aerodynamics Lab containing transonic, supersonic, and hypersonic wind tunnels; and the Aeropropulsion Lab. The test labs are equipped with microprocessor-based facility control and data acquisition systems, and will be supported by modern optical flow visualization and diagnostics capability as well as standard force, pressure, and heat transfer measurement systems.

## **FACILITIES**

Current research activities at the Center emphasize the development of powered lift concepts for STOVL applications, investigation of helicopter rotor blade-vortex interaction phenomena, development of transonic flow visualization systems using holographic interferometry, shock wave/boundary layer interaction, and development of diagnostics techniques and test facility concepts for fundamental research in hypersonic aerodynamics.

For information, contact D. R. Wilson, D. D. Seath, or F. K. Lu, P.O. Box 19018, Arlington, TX 76019, 273-2603.

## **ART GALLERY AND PROGRAMS**

The Gallery program of exhibitions and related events are hosted by the Center for Research in Contemporary Art and have University-wide ramifications for students, faculty, and staff. Exhibitions and programs are devoted to defining, extending, and contributing to the discourse on contemporary art as well as drawing on all cultures and periods as they relate to the contemporary. The Gallery and the Department of Art host an ongoing series of public lectures, films, workshops, and special events. The programs attract major artists and performers from all over the country providing a stimulating environment for all of the arts. Cooperation is continual with neighbor institutions as well as with the Amon Carter Museum, Dallas Museum of Art, Fort Worth Art Museum, and the Kimbell Art Museum. For more information, contact Jeff Kelley, Director, Rm. 335, Fine Arts Building, 273-2891.

## **AUTOMATION & ROBOTICS RESEARCH INSTITUTE**

UT Arlington's Automation & Robotics Research Institute (ARRI) is the first in a series of premier research programs in The University of Texas System aimed at enhancing high technology in Texas and the US. ARRI was conceived through a tripartite agreement among the Fort Worth Chamber Foundation, Newell & Newell (owners of RiverBend Industrial Park) and The University of Texas System. The Fort Worth Chamber Foundation raised \$5 million to fund construction of the 48,000 square foot research building, furnishings and equipment, and to provide capitalization funds for an Endowed Chair and operations. Newell & Newell gifted a \$5 million, 18.5 acre tract at RiverBend for an Engineering Research Campus for UT Arlington, the first encumbent being ARRI. This facility was completed and occupied in September 1987. The program has received line-item support from the Texas Legislature since 1985.

By utilizing the multi-disciplinary resources of UT Arlington, the major engineering university in the Dallas-Fort Worth metroplex, ARRI's mission is to enhance value-added product and service companies in Texas and the US, thus augmenting their international competitiveness. ARRI aims to establish a rich environment of people, equipment, and know-how in automation and robotics; to build interactions with all sizes of companies; to educate and train relevant skilled manpower; and to create alongside itself a synergistic high-tech industrial park. ARRI addresses the following categories of companies: (1) Large-size companies whose needs are for advanced innovation both at the R&D level and in manufacturing systems, (2) Medium-size companies whose needs are next-generation products and enhanced market penetration, (3) Small-size companies whose needs include know-how on specific processes and access to facilities for computer-aided manufacturing, and (4) Entrepreneurs with identified market niches whose needs are for access to people and equipment resources to implement their plans rapidly.

In staffing, ARRI's emphasis is placed on the fusion of many talents. Multi-disciplinary faculty and students, ARRI's full-time professional staff, and engineers seconded from industry will combine their areas of expertise in specific joint projects with state-of-the-art vendor equipment deployed at ARRI in user-type environments.

ARRI is establishing the following functions to support joint projects with industry in automation and robotics: (1) Computer Integrated Manufacturing Systems (CIMS) Laboratories, (2) Robotics Vision Laboratory, (3) Artificial Intelligence for Manufacturing Laboratory, (4) Parallel Processing Laboratory, (5) Education and Training, and (6) Technical Information Services and Consultancy. Specific projects are now underway in manufacturing systems, expert systems, planning and scheduling, control of flexible robots, water jet cutting, and unattended machining. Director: J.H. Collins, 7300 Jack Newell Blvd. S., Fort Worth, Texas, 76118, (817) 284-6103

**CENTER FOR ACCELERATOR SCIENCES AND TECHNOLOGY**

In recognition of the worldwide commitment to high-tech advances in the area of advanced accelerator technology and materials science, the Center for Accelerator Sciences and Technology was established in 1981. In addition to operating a 20 MeV electron linac, the Center is interdisciplinary in nature and is dedicated to research primarily in novel advanced concepts in particle acceleration and mass drivers. Since the inception of the Center, ample federal and corporate support were secured to sponsor research in collective acceleration, laser-plasma interactions, inductive frictionless mass driver concepts, and wake-field acceleration mechanism. The Center is also conducting research in the area of pulsed power conditioning, Superconducting Super Collider, and high temperature superconducting materials. Projects underway are synthesis and characterization of superconductors, high brightness electron beam sources, and high energy storage concepts. Students involved at the Center initiate and carry out much of the research under development. The Center currently supports senior personnel, technical staff, graduate and undergraduate students and postdoctoral fellows, visiting and adjunct scientists. Graduate and undergraduate assistantships are available for qualified students in the areas of electrical engineering, mechanical engineering, and physics. For further information, contact K. W. Chen, Director, Box 19363, Arlington, TX 76019, 273-2298, 273-2238.

**CENTER FOR ADVANCED ELECTRON DEVICES AND SYSTEMS (CAEDS)**

The CAEDS is a National Science Foundation Industry/University Cooperative Research Center engaged in research in the areas of active and passive electronic devices and circuits, and microwave systems and their applications. Since the Center was established in 1974, an international reputation has been gained in the area of microwave and millimeter wave magnetic devices and materials. The Center is also actively involved in III-V field effect transistor and monolithic integrated circuit research. Fifteen full-time graduate students, five full-time faculty members, and several advanced undergraduate students conduct research in the Center. Facilities are available for photolithographic mask production, vacuum evaporation, liquid phase magnetic garnet epitaxial growth, GaAs vapor phase and molecular beam epitaxial growth, ion implantation, noise measurements, and time and frequency domain microwave evaluation (0.1-100GHz). Graduate assistantships and fellowships are available for qualified candidates. For information, contact Professor Ronald L. Carter, P.O. Box 19016, Arlington, Texas 76019, 273-2671.

**CENTER FOR ADVANCED POLYMER RESEARCH**

The Center for Advanced Polymer Research is involved in the development of new polymeric materials for new applications. The research groups are presently focusing efforts in the areas of electrically conductive polymers, ionically conductive polymers, dielectric polymers, liquid crystalline polymers and organometallic polymers, along with new organic and organometallic monomer systems, using graduate students, postdoctoral fellows and undergraduate students in research positions. Modern experimental facilities have been constructed that give the Center state-of-the-art polymer characterization capabilities in high field nuclear magnetic resonance, spectroscopy for solids and liquids, electron paramagnetic resonance, Fourier transform infrared spectroscopy, pyrolysis gas chromatography/mass spectrometry, gel permeation and high pressure liquid chromatography, optical and electron microscopy, thermal analysis, electrochemistry, electronic measurements, theoretical modelling and carbon, hydrogen and nitrogen elemental analyses. Joint research programs exist both internally and with industrial and governmental laboratories. Doctoral candidates spend 4-6 months in industrial research internships as part of their degree requirements. For information, contact John R. Reynolds (Room 229B Science Hall, 273-3813) or Martin Pomerantz (Room 300D Science Hall, 273-3811), both at the Department of Chemistry, Box 19065, Arlington, Texas 76019.

**CENTER FOR ADVANCED REHABILITATION ENGINEERING**

The Center for Advanced Rehabilitation Engineering (CARE) was established in 1983 to consolidate a major component of biomedical engineering research activities. Its goal is to improve the quality of life for individuals with physical and mental handicaps through engineer-

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ing research and development. The Center represents a cooperative effort with The University of Texas Southwestern Medical Center at Dallas and the Dallas Rehabilitation Institute. An additional liaison exists with the Dallas VA Medical Center. Faculty, staff, and students conduct collaborative research in engineering laboratories at UT Arlington and in laboratories at the above named facilities, which are located within the Dallas/Fort Worth Metroplex. Areas of concentration include development of devices and systems to assess the functions of handicapped individuals; understanding and measuring human performance; microprocessor-based aids to the handicapped; evaluation of drugs, surgical procedures, exercise regimens, and assist devices in controlled clinical trials; and development of devices to reduce the duration and extent of disability. Planning is under way to apply computers to assist the handicapped by improving communications and independent living. Research funding for the Center's activities support graduate assistantships, postdoctoral fellowships, visiting and adjunct scientists and engineers, as well as staff, laboratory equipment, and supplies. Director: George V. Kondraske, Box 19180, 719 Carlisle Hall, 273-2335

### **CENTER FOR THE CHICANO AGED**

The Center for Chicano Aged offers a unique and innovative opportunity for bilingual individuals to study the Chicano Elderly. This one-of-a-kind center is concerned with the training of bilingual professionals in the field of aging by preparing students for a Master of Science in Social Work degree, including specialized courses in gerontology and the Chicano experience, individual research projects supervised by faculty members, field instruction in human service agencies providing services to the Chicano aged, and placement services aimed at facilitating post graduate employment in human service agencies. For further information, contact Charles Mindel, 273-3407.

### **CENTER FOR COLLOIDAL AND INTERFACIAL DYNAMICS**

The objective of the Center for Colloidal and Interfacial Dynamics is to facilitate and to coordinate the research efforts of faculty associates, postdoctoral fellows and graduate students interested in rate processes in colloidal systems and at interfaces. Such processes are relevant in chemistry, physics, geology, bio- and environmental sciences, and many areas of engineering. Examples of the studies include the investigation of the rate and mechanism of the formation of colloidal particles and thin films, adsorption-desorption at interfaces, and mass transport across membranes. State-of-the-art instrumentation for the rate studies on the subsecond time scale include stopped-flow, temperature-jump, pressure-jump, electric field-jump, laser induced electric birefringence apparatus, and a rapid scan time resolved spectrometer. For information contact Z.A. Schelly, Department of Chemistry, Box 19065, Arlington, Texas 76019-0065 (phone (817) 273-3803).

### **CENTER FOR COMPARATIVE URBAN STUDIES**

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

### **CENTER FOR *CORBICULA* RESEARCH**

The Center for *Corbicula* Research enhances ongoing research programs in the biology, physiology, and ecology of *Corbicula fluminea*, a freshwater clam endemic to Southwest Asia. Since its introduction to the United States in the early 1900s, this costly exotic aquatic pest species has spread throughout the drainage systems of 35 states and Northern Mexico. Biofouling by this species costs the electrical power industry more than one billion dollars per year. The Center for *Corbicula* Research coordinates research efforts, develops new research programs

in both the basic and applied (macrofouling) biology of *C. fluminea*, and seeks external funding from public and private sources for continued research on this species. Director: Robert F. McMahon, Room B28 Life Science Building, 273-2412

### CENTER FOR CRIMINAL JUSTICE RESEARCH AND TRAINING

The Center for Criminal Justice Research and Training was established in 1977 with the primary mission of providing technical assistance to law enforcement, criminal justice agencies, governmental institutions, and citizens groups concerned with the administration and operation of the criminal justice system.

The Center provides assistance when requested in the areas of program evaluation, personnel administration, organizational development, training, staff and program development, and other areas of organizational research. As part of the Institute of Urban Studies, the Center works cooperatively with other components of the University to develop effective community crime prevention models and to enhance community awareness of needed changes for the solution of crime problems. The Center also serves as the coordinator of international and comparative criminal justice study visits with exchange programs for training and research formally instituted with the West German Police Command Academy. Director: James W. Stevens, Room 546 UH, 273-3320

### CENTER FOR ECONOMIC EDUCATION

The Center for Economic Education was established in 1972 and is affiliated with the Texas Council on Economic Education and the Joint Council on Economic Education. The major purpose of the Center is to offer pre-service and in-service instruction in economics to elementary, secondary, and college teachers through credit courses and non-credit workshops, conferences, and seminars. Center staff also provides consultant services to teaching and administrative personnel in the school districts of the area. While maintaining a library of economic education instructional materials, Center personnel assist teachers in the location, review, and selection of materials appropriate for the levels to be taught. The Center is cooperating with the Texas and Joint Councils in the implementation of the Developmental Economic Education Program (DEEP), a national effort to raise the level of economic literacy. DEEP provides schools with a method and a process of introducing economic education into their curricula at the elementary and secondary levels. The Center also offers non-credit seminars and conferences for business, industrial, and service personnel of the area who wish to acquire a better understanding of the American economic system. Director: John B. McCall

### CENTER FOR ELECTRON MICROSCOPY

The Center for Electron Microscopy provides laboratories for research and training in the use and development of electron microscopy and related techniques. Training is provided for approved undergraduates, graduate and postgraduate students, and faculty who wish to utilize electron microscopy or analytical x-ray analysis as a research tool. The Center uses four electron microscopes: JEOL JEM-1200EX TEMSCAN equipped with analytical x-ray equipment; JEOL JSM-35C SEM with Tracor Northern x-ray equipment; Zeiss 9 TEM; and Hatachi HU-11A TEM. The Center contains preparation and ancillary equipment, and a scanning tunneling microscope is under development with the Department of Physics. Research and training involve faculty and/or students from biology, chemistry, geology, physics, psychology, anthropology, and the engineering disciplines. Director: H.J. Arnett, Room 206 Life Science Building, 273-3491.

### CENTER FOR ENERGY CONVERSION RESEARCH

The Center for Energy Conversion Research (CECR) is a grouping of laboratories, each active in various aspects of energy conversion research, sharing a common administrative and support staff. The center director reports to the Dean of Engineering.

The CECR is presently conducting research in the area of power generation and conditioning in space for the space station, space manufacturing, and the Strategic Defense Initiative. During the past year, the CECR designed, fabricated, tested and operated a critical portion of a high voltage space experiment aboard a rocket launched by the Air Force.

The CECR is also investigating the generation of very high power (MWs). very short (100 ps)

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electrical impulses using lasers and semiconductors for impulse radar systems and nuclear weapon effects simulation for industry.

The design of high power, wide bandwidth transmit and receive antennas also are being investigated by the CECR. These antennas are required to efficiently radiate and receive the high power impulse radar energy.

The CECR also supports the development of high energy-density energy storage systems through high permittivity polymer research and metal oxide electrochemical double layer capacitor research as a joint project between Electrical Engineering and the Chemistry Department.

Electromagnetic launchers or devices that convert electrical energy to kinetic energy are also being investigated within the CECR. A major program is the development of electrical and laser based, optical diagnostics for high current, high velocity arcs that form the armature of a rail accelerator.

Graduate assistantships, fellowships, and technical staff positions are available for qualified candidates. For information, contact W.C. Nunnally, or C.V. Smith, Jr., Box 19380, Arlington, TX 76019, (817)794-5100.

## **CENTER FOR FISH STUDIES**

The Center for Fish Studies was established to coordinate and promote faculty and graduate student research on fishes. Research sponsored by the Center covers both basic and applied areas in a wide spectrum of field and laboratory investigations. Current research is focused on fish respiration, biochemical genetics, and population structure and dynamics. The Center is housed in the Life Science Building and consists of several laboratories and a large aquatic facility for holding live fish. Director: Donald H. Whitmore, Rm 343 LS, 273-2425

## **CENTER FOR FOSSIL FUELS CHEMISTRY**

This Center for Fossil Fuels Chemistry brings together faculty, graduate students, postdoctoral associates and undergraduate students engaged in fundamental and applied research in the chemistry and utilization of fossil fuels. These include coals, oil shales, oil sands; petroleum crudes and related species. Current projects under investigation include structure elucidation studies of coal and related substances using various reactions and analyses, thermomechanical, thermophysical, and thermochemical changes in fossil fuels on application of heat, study of acoustic and dielectric properties and pretreatment of fossil fuels to facilitate processing and use. Modern, state-of-the-art instrumentation and techniques being used in these studies include gas chromatography/mass spectrometry with laser pyrolysis capability, gas chromatography/Fourier transform infrared spectroscopy, solids and liquids high field nuclear magnetic resonance spectroscopy, thermal, moisture and elemental analysis equipment, gas, high performance liquid and gel permeation chromatography, and rapid-scanning diode-array ultraviolet/visible spectroscopy. For information contact Martin Pomerantz (Room 300D Science Hall, 273-3811) or Krishnan Rajeshwar (Room 300E Science Hall, 273-3810) both at the Department of Chemistry, Box 19065, Arlington, Texas 76019.

## **CENTER FOR GEOENVIRONMENTAL AND GEOARCHEOLOGICAL STUDIES**

The Center for Geoarcheological Studies was established as a research center devoted to bringing geological, geophysical and geochemical techniques to bear on archeological research problems. The Center provides the infrastructure necessary to facilitate studies combining such widely differing disciplines. It is one purpose of the Center to identify areas where these disciplines can and should be applied. The Center also supports graduate student research oriented toward solving geoarcheological problems. The Center's office is located in Geoscience, Rm 142, 273-2300. Director: Brooks B. Ellwood, Rm 147 Geoscience, 273-2339

## **CENTER FOR MEDICINAL CHEMICAL RESEARCH**

The purpose of the Center for Medicinal Chemical Research is to develop new medicaments of value to the health professional. The current interests of the Center include (a) antimicrobial/antiviral agents; (b) prophylactic agents for chemical irritants; (c) substances to enhance protection from exposure to various forms of radiation; (d) neuroleptic agents. In addition to re-



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search in these areas, the Center is interested in enhancing educational opportunities for individuals interested in the medicine-chemistry interface. The Center includes facilities for synthesis, chemical and biochemical analyses and microbiological evaluation. For information contact A.L. Ternay, Jr. (Room 401 Science Hall, 273-3818) at the Department of Chemistry, Box 19065, Arlington, Texas 76019.

### **CENTER FOR PARASITOLOGY**

The Center for Parasitology was established within the Department of Biology to promote and develop applied and basic research in Parasitology. Research emphasis is on immunology and biochemistry of parasites of medical and veterinary importance with special focus on trichinosis, schistosomiasis, and filariasis. The Center is a focal point for collaborative research involving several other universities in the area and promotes seminars, research retreats, and exchange of graduate students with other institutions. Director: George L. Stewart, Rm. 331 LS, 273-2423

### **CENTER FOR POSITRON STUDIES**

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

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

Members of the Center include full-time and visiting faculty, post-doctoral research associates, and graduate and undergraduate students. The Center organized the Sixth International Conference on Positron Annihilation and International Symposium on Positron Annihilation Studies of Fluids, hosted by the University in 1982 and 1987, respectively. Director: Suresh C. Sharma, Rm. 120E SH, 273-2266

### **CENTER FOR RESEARCH IN CONTEMPORARY ART**

CRCA is programmatic in nature and devoted to the advanced study of contemporary art. It is interdisciplinary and intermedia in orientation and seeks to facilitate research by contemporary artists and critics from all of the fine arts as well as those from other fields who attempt to assess artistic practice with reference to its time and context. Activities include artist and critic residencies devoted to specific projects, exhibitions, lectures, and print, audio, and video publications. For information, contact Jeff Kelley, Director, Rm. 335 Fine Arts Building, Box 19089, 273-2891.

### **CENTER FOR RESEARCH ON INFORMATION SYSTEMS**

The field of information systems is developing rapidly, creating a pressing need for basic and applied research, professional development and the practical application of the discipline. A gap exists between industry needs for research in information systems and the areas of research in educational institutions. Recognition of this led to the creation of the Center for Research on Information Systems.

The Center was established in 1984 to promote faculty and graduate student research. Principal areas of interest for the Center include the strategic use of information, management of information systems, information centers, decision support systems, artificial intelligence, and systems analysis, design, and implementation. A key ingredient in the approach of the Center is its interaction with industry and funding agencies. Sponsors of the Center benefit from relevant research, applications in information systems, published working papers, monographs, workshops, and symposia. The University, the College and the department benefit from the interaction between professionals, faculty, and students. Director: Dr. M.K. Raja, Room 540B, 273-3563

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### **CENTER FOR RESEARCH ON ORGANIZATIONAL AND MANAGERIAL EXCELLENCE**

The Center for Research on Organizational and Managerial Excellence is within the Department of Management in the College of Business Administration. The Center's primary purposes are: to promote faculty and graduate student basic and applied research addressing the important and complex problems (challenges) faced by managers; to promote greater interaction between the University and industry in seeking solutions to these managerial problems; to gain support from industry, government and/or private foundations for critical managerial research. The intent of the Center is to build stronger ties with external constituents, support faculty research and graduate programs, provide a community service, and add to the positive external image of the College of Business Administration and the University. Research is conducted in all areas of management to include corporate strategy, human resource management, international management, labor relations, organizational behavior, organization theory, and production/operations management. Examples of current research through the Center are establishment of effective goal motivation models; means of effectively managing diversified corporations, means of measuring corporate performance for strategy development and implementation; development of effective leadership approaches; employee participation in the management of a firm; managerial prevention of stress. Director: David A. Gray, Rm. 209B, 273-3166

### **CENTER FOR SOCIAL RESEARCH**

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

### **CENTER FOR SOFTWARE ENGINEERING RESEARCH**

The Center for Software Engineering Research was established in 1988 to develop student and faculty advanced research programs at UT Arlington in the formulation and implementation of software engineering technology concepts. The secondary goal is to facilitate the transition of software technology to industry and government. Emphasis is placed on carrying fundamental ideas in software engineering from conceptualization through exploration and realization of prototype software engineering environments, and experimental applications in conjunction with industry and government.

Simply stated, university researchers are developing ideas, methods, tools, and architectures to advance the state-of-the-art in the software engineering area. Industry has challenging problems that can provide the basis for student and faculty research. These advances in computer science need to be transitioned into the real-world problems faced by industry. The Software Engineering Center is working to bring these two arenas together.

The Center is within the Computer Science Engineering Department. Research assistantships are available to qualified and interested candidates. Director: Dr Steve Hufnagel, P.O. Box 19015, Arlington, TX 76019. (817) 273-3618

### **COLLECTION OF VERTEBRATES**

The Collection of Vertebrates was established by the Department of Biology in 1956 primarily as a teaching resource to support classroom and field instruction. Since then it has grown into an internationally recognized research facility and serves the needs of faculty and students, as well as national and international scholars. The collection is particularly strong in its herpetological holdings which include some of the world's largest collections from Texas and the countries of Colombia, Guatemala, and Mexico. Various ancillary materials are available including voice recordings for many species of tropical frogs, publications, color transparencies, field notebooks and catalogues, and maps. The Museum houses about 30,000 amphibians

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ans, 25,000 reptiles, 1,100 birds, and 2,500 mammals, which include 30 holotype specimens.

Qualified investigators conducting research on vertebrates are welcome to use the museum facilities and materials which are located in the Life Sciences Building. For information, contact Jonathan Campbell, Curator, 337 LS, 273-2406.

### COMMUNITY SERVICE CLINIC

The Community Service Clinic, established in 1970, is a research, teaching, and service component of the Graduate School of Social Work. It serves as a field placement agency for graduate social work students enrolled in the University. Priorities are research and teaching. Counseling services are provided to individuals, couples, families, and groups. In addition to traditional social work treatment services, ongoing research has as its special emphasis the treatment for family violence and biofeedback. Director: John S. McNeil, (817) 273-2165

### COMMUNITY SERVICES DEVELOPMENT CENTER

The Community Services Development Center is an arm of the Graduate School of Social Work providing public service, education, and community research. It provides assistance to civic and professional organizations, community service agencies, and governmental agencies in identifying human services needs (health, welfare, recreational, etc.), determining feasible solutions to such needs, and implementing desired solutions. The Center provides supervised internships for undergraduate, graduate and postgraduate students from social work and other fields interested in learning community organization, human services planning, services and program development, community advocacy, program, policy or planning research, or administration skills. Director: Peter G. Gaupp, (817) 273-2084

### COMPOSITE MATERIALS RESEARCH LABORATORY

The Composite Materials Research Laboratory incorporates laboratory facilities for the research and study of composite materials and other materials used in structural engineering applications. These materials include polymers, metals, polymeric matrix composites, and metal matrix composites. Research programs involve interdisciplinary efforts between the Materials Science, Mechanical Engineering, and Engineering Mechanics graduate programs. Much of this research concerns the interrelationships between the processing, structure, and properties of materials. Particular emphasis is given to programs concerning the mechanical properties of materials. Available facilities include servohydraulic testing systems, materials fabrication and processing facilities, an autoclave, thermal analysis systems, optical and electron microscopes, and other materials related research capabilities. For information, contact R.D. Goolsby or David Y.S. Lou, P.O. Box 19023, Arlington, Texas 76019, 273-2561.

### CONSTRUCTION RESEARCH CENTER

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

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

### ENERGY SYSTEMS RESEARCH CENTER

The Energy Systems Research Center (ESRC) sponsors research concerning electrical power generation, transmission, distribution, and storage. The Center's research is pertinent to the utility industry and is readily applicable to the daily concerns of all practicing engineers. Established in 1968, the ESRC is the largest center of its type and is recognized as one of the most important research centers of its kind in the United States. The ESRC offers a three-phase

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program of study to serve undergraduate, graduate, and continuing education students. On the undergraduate level, six new power courses have been devised and added to the electrical engineering curriculum. The well-established graduate program supports thirty-five full-time students and ten full-time staff members. The ESRC also supports a relatively large postdoctoral program that requires at least some industrial experience for candidacy. Postdoctoral fellows may assist ESRC students in thesis or dissertation and in graduate seminars; fellows may be asked to perform limited teaching on the graduate level. The ESRC also accepts international exchange scholars from programs such as the Fulbright and IREX. Each year, researchers from different countries join the ESRC to aid in the research effort and to share their knowledge and experience in graduate seminar discussions. These researchers also contribute to the ESRC's special non-degree graduate programs as well as the in-plant and on-campus continuing education programs for practicing power system engineers. At the present time, ESRC is constructing a modern power-system laboratory to demonstrate the concept of total automation of the power industry in the future. This laboratory will also be used for the training of system operators for power industry and cogeneration companies. Graduate assistantships, fellowships, and postdoctoral fellowships are available for qualified candidates. Director: Mo-Shing Chen, Room 102, Engineering Annex Bldg., 273-2691 or 273-2268

## **ENGINEERING COMPUTING SERVICES**

The College of Engineering operates computing resources in support of research and teaching in the College. Facilities include a VAX-11/780 running VMS, a Harris HCX-7 running UNIX, and an Ethernet LAN.

## **ENVIRONMENTAL RESEARCH AND DESIGN CENTER**

The Center was established on January 1, 1979 as the consolidation of research activities of the School of Architecture and Environmental Design. Its objectives are to develop investigative programs and stimulate research related to architecture, landscape architecture, interior architecture, and various aspects of planning. Areas of concentration include design theory, architectural history, computer applications, energy conservation, historic preservation, housing, building materials, and component systems. The faculty of the center provides guidance and direction in identifying appropriate governmental agencies, institutions, developers, and builders to facilitate the initiation and execution of research projects. The Center assists students in the study of theoretical and practical problems and issues, working within a framework for interdisciplinary cooperation. Interested graduate students may serve as research staff and/or receive graduate credit for special projects upon approval of the Graduate Studies Committee and the Dean of the Graduate School.

## **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. 344 UH, 273-2861

## **FRANK E. LOZO CENTER FOR CRETACEOUS STRATIGRAPHIC STUDIES**

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

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

### HUMAN PERFORMANCE INSTITUTE

The Human Performance Institute is dedicated to using multidisciplinary scientific bases for human performance measurement, understanding and enhancement. The Institute was formed to integrate several aspects of ongoing research in human performance measurement and to launch a major effort in response to both clearly identified and emerging needs. The mission of the Institute is to define a systematic approach to the measurement and understanding of intrinsic parameters and laws which govern the ability of individuals to perform tasks in daily life, as well as to provide education, promote work, and serve as a resource in this area. Basic and applied research address populations ranging from the severely handicapped through normal individuals and super athletes, reflecting a view of performance as a common theme to all human endeavors. Systems performance theory concepts being developed by investigators are being applied to the engineering design process. Human performance engineering methods are being developed to allow optimum design of the devices and tools people use, whether these be a wheelchair, high performance military aircraft, robot, computer system, or intelligent software.

The HPI includes a multidisciplinary team of engineering, life science, and clinical investigators. Graduate students pursuing study in engineering disciplines carry out thesis and dissertation research under faculty supervision. Their efforts are supported by four primary laboratory facilities which include instrumentation and measurement development, a human performance "proving grounds," signal processing and data management, and artificial intelligence/expert systems. A Board of Associates program permits non-academic broad-based involvement including industry, government, and non-profit organization representatives. For further information, contact G. Kondraske, Director, 273-2335.

### HUMAN RESOURCE CENTER

The Human Resource Center at The University of Texas at Arlington's Graduate School of Social Work offers non-credit short courses on a variety of topics of interest to human service professionals and community groups. Participants from Texas and surrounding states take advantage of these continuing education opportunities which are delivered on campus throughout the year. The Center also develops contracts with agencies and organizations to design and implement training at the agency site, tailored to the particular needs of the agency staff. HRC CC, 273-2581

### INTERNATIONAL LINGUISTICS CENTER

The International Linguistics Center conducts linguistic training and research in cooperation with the linguistics faculty. It is administered by the Summer Institute of Linguistics, Inc. and located near Arlington, one mile west of Duncanville on Camp Wisdom Road. Its purpose is to provide facilities for linguistic training and research. Investigations are conducted pertaining to the world's languages for use by translators, linguists, missionaries, anthropologists, literacy workers, bilingual educators, government officials, and others. A number of competitive graduate Fellowship Grants are provided by the Center each semester. Director: Thomas H. Crowell, Rm. 330 HH, (ext. 4622), 709-2400 (ext. 2300)

### 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 more than 285 universities located in fifteen countries throughout the world. 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 Re-

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search 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: Dale Story, Rm. 413 UH, 273-3994

## **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 UT Arlington for the benefit of many departments and schools of the University; and to indicate and consolidate the analysis and synthesis capabilities of UT Arlington's various faculty groups. Director: V. Lakshmikantham, Rm. 469 Nursing, 273-3261

## **THE RYAN-REILLY CENTER FOR URBAN LAND UTILIZATION**

The Center was established in 1983 with the aid of a grant from John Ryan, chairman, and Michael Reilly, president, of the Ryan Companies. The major purpose of the Center is to enhance and support the quality of real estate education in the Dallas/Fort Worth Metroplex. The Center develops and markets real estate and financial seminars for students, faculty, industry members, and the community at large. It sponsors audio-visual programs covering all aspects of real estate and financial matters. The Center assists in the development of real estate courses emphasizing the operational skills involved in property management, asset management, commercial development, construction management and commercial leasing. Opportunities for interaction (such as research and consulting) between the faculty of the College of Business Administration and financial and real estate groups are encouraged. The Center provides graduate placement services to students seeking jobs with real estate and financial firms. The Center also supports Rho Epsilon, a national real estate fraternity, in its endeavors. Director: Rm. 106 B, 273-3825

## **SOLAR ENERGY RESEARCH FACILITY**

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

The solar collectors, two banks of Northrup concentrating solar collectors (21 collectors in each bank with a total area of 420 square feet), are located on the flat roof. The concentrating collectors were designed to operate at temperatures well over 200° F and hence provide adequate input to the absorption cooling machinery. The collectors are facing due south and are tilted at 27° from the horizontal. A tracking mechanism is required to continuously point the collectors toward the sun in order to receive the direct solar radiation. A flat-plate solar collector

array subsystem was installed in 1978 for direct solar heating and solar-assisted heat-pump heating of the SERF house. The flat-plate collector subsystem consists of 550 square feet of flat-plate collectors located on the lawn of the house and has an adjustable tilt angle. A 110 square meter 8 Kw pk photovoltaic system is used to supply the electric demands of the SERF house. Excess photovoltaic energy is fed back to the utility during peak demand hours. Director: David Y. S. Lou, Rm. 335 E, 273-2561

### **STRUCTURAL RESEARCH LABORATORY**

The Structural Research Laboratory is engaged in research in the areas of structural testing and experimental mechanics. The Laboratory is actively involved in the full scale test on pre-stressed concrete column and wall panel, steel vessel container, crawler tractor, and new model car made from composite material. Seven doctoral graduate students, 10 master level graduate students and several advanced undergraduate students conduct research in the laboratory. Available facilities include 200-ton hydraulic testing systems, 30-foot high reaction frame, 3000 square feet testing floor, 40 different sizes portable hydraulic rams, two forklifts, and computerized data acquisition systems. The Laboratory also operates an environmental control room for use in creep investigation of high strength concrete and structural elements made from composite material. Graduate assistantships and fellowships are available for qualified candidates. For information, contact Robert L. Yuan, Box 19308, Arlington, TX 76019, 273-2550.

### **URBAN STUDIES TRAINING, AND SERVICE**

An objective of the Institute's Training and Service Programs is to draw on the knowledge and skill of Institute faculty and staff to provide guidance and assistance to Texas public agencies and other community groups striving to deal with changing political, economic, and social conditions. The faculty provide a variety of services directly to agencies or other groups requesting assistance, and facilitates the work of other Institute faculty and staff members while conducting training, or delivering services. For information, contact: David Tees, Rm. 501B UH, 273-3304

### **WAVE SCATTERING RESEARCH CENTER**

This Center was established in 1984 to conduct theoretical and experimental research in electromagnetic wave scattering from area extensive targets such as earth terrains, sea surfaces, and modeled canopy and from objects such as antennas, ships, etc. In addition, the Center also conducts research in radar systems, bistatic radar scattering measurements, and numerical simulation of electromagnetic scattering and transmission through radomes and various types of earth surface. The Center operates a mobile truck-mounted, multi-polarization radar system in the L, C, and X band frequency ranges for taking backscattering measurements. The Center has joint research activities with government laboratories and is currently performing studies in support of research in local industries. Research funding for the Center's activities supports graduate assistantships, postdoctoral fellowships, visiting scientists, and engineers. For information, contact Adrian K. Fung or Andrew Blanchard, 219 E, Box 19016, Arlington, TX 76019, (817) 273-3422.

### **WOMEN AND WORK RESEARCH AND RESOURCE CENTER**

The Women and Work Research and Resource Center was established in 1985. The intent of the Center is to develop new knowledge about women and work and to put knowledge to work in the larger society in order to improve the quality of life for women and their families. The Center develops information that is useful in public and private policymaking, program development, and educational curricula. Research is focused on both new knowledge and information in areas such as college-to-career connection, visible and invisible barriers to achievement, productivity of women, employment and advancement of minority women, role conflicts and life-span issues, as well as existing programs for women such as training models for upward mobility, role of organizations in women's career development, and counseling programs of women. The Center disseminates information developed by its staff and associates, and provides consultation to constituents and corporations on specific problem identification, problem solving, program implementation, and program evaluation. The Center also conducts an annual symposium for presentations and papers on women and work, from which it publishes

## **FACILITIES**

an executive summary and a compilation of selected papers. Co-Directors: Marjie C. Barrett, and Sheila K. Collins. For information, contact LaVerne D. Knezek, Coordinator, Rm. 319 Social Work Complex, 273-3181.

## **PUBLICATIONS**

### **KATHERINE ANNE PORTER MEMORIAL LECTURES**

This lecture series, originated in 1984, commemorates one of Texas' greatest writers and brings to the campus both creative artists and critics of national renown. Sponsored by the English Department, the Porter Memorial Lectures are open to students, faculty, and the community at large. Recent topics of the lectures have been the works of Katherine Anne Porter, Southwestern Indian Literature, and Hispanic American Literature of the Southwest. For information, contact Judith McDowell, Chair, Department of English, Box 19035, Rm 203, Carlisle Hall.

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

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

### **PAPERS CONCERNING ROBERTSON'S COLONY IN TEXAS**

Beginning in 1974, one volume of the *Papers Concerning Robertson's Colony in Texas* has been published each year. In 1976 The University of Texas at Arlington acquired most of the manuscripts that were still in private hands concerning this colony, which occupied an area 100 miles wide and 200 miles long in the heart of Texas, centering around Waco. UT Arlington built a special Robertson Colony Room on the sixth floor of the Library to preserve these documents and provided facilities for editing them. They are published by The UTA Press, Box 19929, The University of Texas at Arlington, Texas 76019-0929. Editor: Malcolm D. McLean, Room 650, Library, 273-3391, Ext. 4957

### **PRE/TEXT**

*An Inter-disciplinary Journal of Rhetoric* is a quarterly publication. Its objectives are to provide a forum for the rediscovery of rhetoric as historically an inter-disciplinary, "architectonic productive art," informing such fields today as philosophy, linguistics, art, mathematics, psychology, law, music, artificial intelligence, anthropology, and the sciences in general, and to publish particularly exploratory articles and working papers on the inter-disciplinary nature of rhetorical theory and meta-theory. P/T is supported by the Department of English. Graduate student clerical positions may be available. Editor and publisher: Victor J. Vitanza, Rm. 401 Car H, 273-2692

### **SCHATZKAMMER**

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



**SUMMER INSTITUTE OF LINGUISTICS PUBLICATIONS IN LINGUISTICS**

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

**WALTER PRESCOTT WEBB MEMORIAL LECTURES**

The lectures, inaugurated in 1964, are delivered each spring in honor of Texas' most distinguished historian, Walter Prescott Webb. Now considered among the most prestigious history lecture series in the country, the Webb Memorial Lectures give graduate students and others the opportunity to meet and to hear some of the nation's outstanding historians. Chair: Sandra Myres, Rm. 346 UH, Co-chair: Stephen Maizlish, 313 UH

**SHORT COURSES, CONFERENCES, AND SPECIAL PROGRAMS****SPECIAL COURSE IN GRANT PROPOSAL DEVELOPMENT**

The Office of Sponsored Projects offers through the Graduate School a special, broadly-based introductory course in grant proposal writing. This course includes identification of sources of funding, proposal writing and budgeting, the submission and review process, and postaward project management. Offered as GRAD 5101, this course is a regularly scheduled one-hour course open to students in any graduate program at UT Arlington. This course may be applied to degree credit if approved by the Committee on Graduate Studies of the student's program. Introduction to Grant Proposal Development will be offered each Fall semester and, on demand, may be offered in the Spring semester. Those wishing to take this course should register for GRAD 5101. For more information, contact Harold W. Keller, Director of Sponsored Projects, 201 Davis Hall, 273-2105.

**INTERNATIONAL CONFERENCE ON THERMOELECTRIC ENERGY CONVERSION**

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

**POWER SYSTEMS SHORT COURSES**

The "Modeling and Analysis of Modern Power Systems" short course has been presented annually by the Energy Systems Research Center (ESRC) for more than 20 years. It is the longest running course of its kind in the power field and has attracted engineers from as many as 37 states, 28 countries, and 250 companies. It is an intensive two-week course which is continually updated to reflect the most advanced concepts and practices in planning, design, and operation of electrical power systems.

The ESRC recently developed several new courses: "Advanced Power System Stability Intensive Training Program," "Fundamentals of Reactive Power in Power System Operation," "The Fundamentals of Power System Blackout," and seminars and short courses for power system operators.

## **FACILITIES**

Dr. Mo-Shing Chen, Professor of Electrical Engineering and Director of the Energy Systems Research Center, is responsible for the courses and is aided by members of the Electrical Engineering Department and the Energy Systems Research Center staff. Director: Mo-Shing Chen, Rm. 100B Engineering Annex Bldg., 273-2268

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

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



# ADVANCED DEGREES AND REQUIREMENTS

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

DEPARTMENTS AND PROGRAMS	AREAS OF STUDY	DEGREES AND CERTIFICATES
<b>Accounting</b>	<i>Accounting</i>	M.S.
	<i>Professional Accounting</i>	M.P.A.
	<i>Taxation</i>	M.S.
	<i>Administration</i>	PH.D.
<b>Administration</b>	<i>Business Administration</i>	PH.D.
	<i>Social Work</i>	PH.D.
	<i>Urban Affairs</i>	PH.D.
<b>Aerospace Engineering</b>	<i>Aerospace Engineering</i>	M.S., PH.D.
<b>Architecture and Environmental Design</b>	<i>Architecture</i>	M.ARCH.
	<i>Landscape Architecture</i>	M.L.A.
<b>Biology</b>	<i>Biology</i>	M.S.
	<i>Mathematical Sciences</i>	PH.D.
<b>Biomedical Engineering</b>	<i>Biomedical Engineering</i>	M.S., PH.D.
	<i>Clinical Engineering</i>	
CERTIFICATE OF INTERNSHIP CERTIFICATE OF RESIDENCY		
<b>Business Administration</b>	<i>Business Administration</i>	M.B.A.
	<i>Administration</i>	PH.D.
<b>Chemistry</b>	<i>Chemistry</i>	M.S.
	<i>Applied Chemistry</i>	D.SC.
	<i>Mathematical Sciences</i>	PH.D.
<b>City and Regional Planning</b>	<i>City and Regional Planning</i>	M.C.R.P.
<b>Civil Engineering</b>	<i>Civil Engineering</i>	M.S., M.ENGR., PH.D.
<b>Computer Science Engineering</b>	<i>Computer Science</i>	M.S., M.C.S., PH.D.
	<i>Computer Science and Engineering</i>	M.S., M.ENGR., PH.D.
	<i>Mathematical Sciences</i>	PH.D.
<b>Criminal Justice</b>	<i>Criminal Justice</i>	M.A.
<b>Economics</b>	<i>Economics</i>	M.A.
<b>Electrical Engineering</b>	<i>Electrical Engineering</i>	M.S., M.ENGR., PH.D.
<b>Engineering</b>	<i>Engineering Interdisciplinary</i>	PH.D.
<b>Engineering Mechanics</b>	<i>Engineering Mechanics</i>	M.S., PH.D.
<b>English</b>	<i>English</i>	M.A.
	<i>Humanities</i>	M.A., M.A.T., PH.D.
<b>Finance and Real Estate</b>	<i>Business Administration</i>	M.B.A.
	<i>Real Estate</i>	M.S.
	<i>Administration</i>	PH.D.
<b>Foreign Languages and Linguistics</b>	<i>French, German, Spanish</i>	M.A.
	<i>Linguistics</i>	M.A.
	<i>Humanities</i>	M.A., M.A.T., PH.D.
<b>Geology</b>	<i>Geology</i>	M.S.
	<i>Mathematical Sciences</i>	PH.D.

## DEGREE OFFERINGS/REQUIREMENTS

<b>History</b>	<i>History</i>	M.A., M.A.T., PH.D.
	<i>Humanities</i>	M.A., M.A.T., PH.D.
	<i>Archival Administration</i>	
	CERTIFICATE OF ARCHIVAL ADMINISTRATION	
<b>Humanities</b>	<i>Humanities</i>	M.A., M.A.T., PH.D.
<b>Industrial Engineering</b>	<i>Industrial Engineering</i>	M.S., M.ENGR., PH.D.
<b>Information Systems and Management Sciences</b>	<i>Business Administration</i>	M.B.A.
	<i>Information Systems Administration</i>	M.S. PH.D.
	<i>Mathematical Sciences</i>	PH.D.
<b>Interdisciplinary Studies</b>	<i>Interdisciplinary Studies</i>	M.A., M.S.
<b>Landscape Architecture</b>	<i>Landscape Architecture</i>	M.L.A.
<b>Management</b>	<i>Business Administration</i>	M.B.A.
	<i>Personnel and Human Resource Management Administration</i>	M.S. PH.D.
<b>Marketing</b>	<i>Business Administration Administration</i>	M.B.A. PH.D.
<b>Materials Science</b>	<i>Materials Science</i>	M.S., PH.D.
<b>Mathematics</b>	<i>Mathematics</i>	M.S.
	<i>Mathematical Sciences</i>	PH.D.
<b>Mathematical Sciences</b>	<i>Mathematics, Applied Mathematics</i>	PH.D.
<b>Mechanical Engineering</b>	<i>Mechanical Engineering</i>	M.S., M.ENGR., PH.D.
<b>Nursing</b>	<i>Nursing</i>	M.S.N.
<b>Physics</b>	<i>Physics</i>	M.S.
	<i>Radiological Physics</i>	M.S.
	<i>Applied Physics</i>	D.SC.
	<i>Mathematical Sciences</i>	PH.D.
<b>Political Science</b>	<i>Political Science</i>	M.A.
	<i>Humanities</i>	M.A., M.A.T., PH.D.
<b>Psychology</b>	<i>General Experimental Psychology</i>	M.S., PH.D.
	<i>Mathematical Sciences</i>	PH.D.
<b>Radiological Physics</b>	<i>Radiological Physics</i>	M.S.
<b>Social Work</b>	<i>Social Work Administration</i>	M.S.S.W., PH.D. PH.D.
<b>Sociology</b>	<i>Sociology</i>	M.A.
	<i>Humanities</i>	M.A., M.A.T., PH.D.
<b>Urban and Regional Affairs</b>	<i>Urban Affairs</i>	M.A.
	<i>City and Regional Planning Administration</i>	M.C.R.P. PH.D.

## REQUIREMENTS FOR THE MASTER'S DEGREE

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

## DEGREE OFFERINGS/REQUIREMENTS

### DEPARTMENTAL, PROGRAM, AND COLLEGE PROGRAM MANUALS FOR STUDENTS

Many departments and programs issue program manuals, procedures and policy manuals, graduate student handbooks, and other informational publications for students and faculty in graduate programs. These publications may provide detailed and useful information; however, they are not statements of official policy of The University of Texas at Arlington or of The University of Texas System. In all matters the **Rules and Regulations of the Board of Regents of The University of Texas System**, The Handbook of Operating Procedures of The University of Texas at Arlington, and the Graduate Catalog of The University of Texas at Arlington shall supersede departmental, program or college publications.

### UNDERGRADUATE PREPARATION

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

### RESIDENCE

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

### SUPERVISING COMMITTEES

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

### DEGREE PLANS AND HOURS REQUIRED

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

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

The *thesis substitute degree plan* requires a minimum of 33 semester hours of which at least 27 hours must be in coursework and three hours in an appropriate project or research course. The thesis substitute may include (1) internship reports in programs in which the internship has

## DEGREE OFFERINGS/REQUIREMENTS

been determined by the Dean to be an essential component, (2) reports prepared in certain graduate seminar, conference, or research courses, or (3) a design thesis in Architecture and Landscape Architecture. The internship substitute requires a minimum of six 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 Aerospace Engineering, Geology, Management, Radiological Physics, and Real Estate.

## APPROVAL OF PROGRAM OF WORK

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

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

## CANDIDACY

A student will be admitted to candidacy for the master's degree only when the requirements listed previously have been met. The student must file a Final Program of Work and Application for Candidacy with the Dean of the Graduate School no later than 30 days after the first day of classes of the semester in which he or she plans to receive his degree (see Graduate School calendar for specific date). A student planning to receive a degree at the end of the summer session must file the Final Program of Work and Application for Candidacy with the Dean of the Graduate School no later than 30 days after the first class day of the 11-week summer session (see Graduate School calendar for specific date).

## FINAL MASTER'S EXAMINATION

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

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

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

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

## MASTER'S THESIS AND INTERNSHIP REPORT

The final copies of the master's thesis must be prepared according to the regulations described in the current edition of the *Thesis and Dissertation Manual of Style* available from the

## DEGREE OFFERINGS/REQUIREMENTS

UT Arlington Bookstore. When an internship report is submitted in lieu of a thesis, the report must conform in all aspects to the same format specifications as are required by the Graduate School for theses. A copy of the *Manual* has been deposited in the reference section of the Library. Thesis and internship report binding fees are listed in the Tuition and Fees Section of this catalog.

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

The Assistant Dean of the Graduate School examines each thesis and determines whether or not the thesis meets Graduate School requirements for format and mechanical presentation. In order to reduce the number of last minute inconveniences for the student, the student is required to submit the master copy of the final draft of the thesis before having additional required copies prepared. The master copy must be received no later than ten working days in advance of the final deadline to allow at least three days for Graduate School examination, time for the student to make necessary corrections, and time to have the final required copies made. After the Graduate School receives the master copy of the final draft the student will be given a written format evaluation 72 hours later (excluding weekends, holidays, and graduate registration periods).

### TIME LIMIT

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

### FOREIGN LANGUAGE REQUIREMENT

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

### MASTER OF ARTS (MA)

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

Criminal Justice  
Economics  
English  
French  
German  
History  
Humanities

Interdisciplinary Studies  
Linguistics  
Political Science  
Sociology  
Spanish  
Urban Affairs

### MASTER OF SCIENCE (MS)

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

Accounting  
Aerospace Engineering  
Biology  
Biomedical Engineering  
Chemistry  
Civil Engineering  
Computer Science  
Computer Science and Engineering  
Electrical Engineering  
Engineering Mechanics  
Geology

Industrial Engineering  
Information Systems  
Interdisciplinary Studies  
Materials Science  
Mathematics  
Mechanical Engineering  
Personnel and Human Resource Management  
Physics  
Psychology  
Radiological Physics  
Real Estate  
Taxation

## **DEGREE OFFERINGS/REQUIREMENTS**

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

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

### **MASTER OF ENGINEERING DEGREE REQUIREMENTS**

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

The required distribution of course work is as follows:

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

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

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

## **CERTIFICATES**

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

Archival Administration (History)

Internship in Clinical Engineering (Biomedical Engineering)

Residency in Clinical Engineering (Biomedical Engineering)

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

## **JOINT DEGREE PROGRAMS**

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

## **REQUIREMENTS FOR THE DOCTOR OF PHILOSOPHY AND DOCTOR OF SCIENCE DEGREES**

The Doctor of Philosophy (PhD) and Doctor of Science (DSc) are the highest degrees offered by The University of Texas at Arlington. The degrees are awarded only for academic work of distinction through which the student demonstrates superior scholarship and a capacity for original work. The general requirements for the doctoral degree listed below set the minimum standards required by the Graduate School. The meeting of all of these requirements does not



## **DEGREE OFFERINGS/REQUIREMENTS**

result automatically in the awarding of the doctoral degree. All departments and programs have additional requirements for a high level of scholarly achievement that must be met by successful doctoral candidates. In all doctoral programs the basic requirements are that a student (1) attain mastery of a field of knowledge as determined by the appropriate Committee on Graduate Studies and demonstrated in a general examination and (2) give evidence of a capacity to complete a significant program of original research by preparation of a dissertation.

### **DEPARTMENTAL, PROGRAM, AND COLLEGE PROGRAM MANUALS FOR STUDENTS**

Many departments and programs issue program manuals, procedures and policy manuals, graduate student handbooks, and other informational publications for students and faculty in graduate programs. These publications may provide detailed and useful information; however, they are not statements of official policy of The University of Texas at Arlington or of The University of Texas System. In all matters the **Rules and Regulations of the Board of Regents of The University of Texas System**, The Handbook of Operating Procedures of The University of Texas at Arlington, and the Graduate Catalog of The University of Texas at Arlington shall supersede departmental, program or college publications.

### **RESIDENCE**

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

### **COURSES AND SEMESTER HOUR REQUIREMENTS**

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

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

### **FOREIGN LANGUAGE REQUIREMENT**

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

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

### **DIAGNOSTIC EVALUATION**

During the student's first year of doctoral program work, the student must demonstrate that he has the potential to pursue and successfully complete a degree program. The method of assessing the student's potential will be determined by the appropriate Committee on Gradu-

## **DEGREE OFFERINGS/REQUIREMENTS**

ate Studies and may be in the form of a written or oral examination, personal interviews with faculty members, successful completion of certain courses in the first semester of his residence, or by any combination of these methods. The result of the diagnostic evaluation may be (1) approval to continue in the doctoral program, (2) approval to continue with specified remedial work, (3) failure but with permission for assessment through a second diagnostic evaluation after a specified period, or (4) failure and termination in the program.

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

## **DOCTORAL COMMITTEES**

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

## **COMPREHENSIVE EXAMINATION**

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

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

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

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

## **ADMISSION TO CANDIDACY**

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

## **TIME LIMIT**

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

### DISSERTATION

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

The final copies of the doctoral dissertation must be prepared according to the regulations described in the current edition of the *Thesis and Dissertation Manual of Style* available from the UT Arlington Bookstore. A copy of the *Manual* has been deposited in the reference section of the Library. The catalog section on Tuition and Fees lists dissertation binding, microfilming, and copyrighting fees.

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

The Assistant Dean of the Graduate School examines each dissertation and determines whether or not the dissertation meets Graduate School requirements for format and mechanical presentation. In order to reduce the number of last minute inconveniences for the student, the student is required to submit the master copy of the final draft of the dissertation before having additional required copies prepared. The master copy must be received no later than one week in advance of the final deadline to allow at least three days for Graduate School examination, time for the student to make necessary corrections, and time to have the final required copies made. After the Graduate School receives the master copy of the final draft the student will be given a written format evaluation 72 hours later (excluding weekends, holidays, and graduate registration periods).

### DISSERTATION DEFENSE

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

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

Although the defense is concerned primarily with the dissertation research and content, the examining committee may explore the student's knowledge of areas interrelated with the core of the dissertation problem. The dissertation must be approved unanimously by the student's dissertation advisory committee.

The dissertation defense report must be filed along with three unbound copies of the final approved dissertation in the Graduate School by the date specified in the Graduate School calendar. When the final copies are deposited with the Graduate School, the student must pay the required binding and dissertation microfilming fees listed in the catalog section on Tuition and Fees.

# GENERAL GRADUATE SCHOOL REGULATIONS AND INFORMATION

## STUDENT RESPONSIBILITY

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

## ADMINISTRATION OF THE ADVANCED DEGREE PROGRAMS

### COMMITTEES ON GRADUATE STUDIES

Each graduate program is governed by a Committee on Graduate Studies. The committee is composed of all the Full Members of the graduate faculty in the program. Graduate faculty from allied fields may serve on the committee, when appropriate. In an interdepartmental program the Committee on Graduate Studies is appointed by the Dean of the Graduate School.

### GRADUATE ADVISORS

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

## REGISTRATION AND ORIENTATION FOR INTERNATIONAL STUDENTS

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

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

## RESERVATION OF COURSES FOR GRADUATE CREDIT

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

An undergraduate student may not use graduate courses (numbered 5000 and above) to fulfill undergraduate degree requirements. However, an undergraduate at The University of Texas at Arlington needing no more than 12 hours in one semester (six semester hours in one

## REGULATIONS/INFORMATION

summer session) to complete all of the requirements for a bachelor's degree may register for graduate courses for graduate credit under the following conditions:

1. All work for undergraduate credit must be completed during that semester or summer session.
2. Total registration for all work may not exceed 15 semester hours in a semester (or 12 semester hours in the summer sessions).
3. The student must submit to the Graduate Advisor a "Reservation of Courses for Graduate Credit by Undergraduate Students" (available from Graduate Advisors). The reservation must be approved by the Graduate Advisor and the Dean of the Graduate School, and the Registrar must certify that the reserved credit is not to apply to the student's undergraduate degree requirements.
4. The student must have at least a 3.00 undergraduate GPA to be eligible to enroll in a graduate course and to reserve it for graduate degree credit.
5. Credit is officially accepted for application to a graduate program only upon achievement of unconditional admission to graduate school.

A student who is enrolled as an undergraduate but who does hold a bachelor's degree and who has a 3.00 undergraduate grade point average may also reserve graduate courses for graduate credit upon approval of the Graduate Advisor and the Dean of the Graduate School. Such a student may reserve graduate courses by completing and submitting to the Graduate Advisor a "Reservation of Graduate Courses by Student Holding an Undergraduate Degree" (available from Graduate Advisors). Credit is officially accepted for application to a graduate program only upon achievement of unconditional admission to the graduate school. Some departments and colleges (i.e., the College of Business Administration) do not permit students to enroll in graduate courses unless the students have been admitted to Graduate School. Graduate courses in these departments and colleges may not be reserved for graduate credit.

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

## COURSE GRADES

### GRADES OF SCHOLARSHIP

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

- (1) The student must maintain a B average on all work in the major.
- (2) The student must maintain a B average on all work in the minor or minors.
- (3) The student must maintain a B average on all advanced work.

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

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

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

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### VALID GRADES AND "N" DESIGNATION

The types of grades (Valid Grades) which may be assigned in a course are determined generally by the policies outlined in the above paragraphs. However, Valid Grades for independent study, conference, seminar, and readings courses vary widely among departments; therefore, a statement on Valid Grades and special grading policies, if any, is given at the beginning of the course descriptions for each program in this catalog. If the student is uncertain about Valid Grades for a course in which he or she is registered, he or she should consult the instructor **at the beginning of the semester** for that information. The Valid Grades for a course are given on the instructor's copy of the class roll issued at the beginning of the semester and on the form on which the instructor reports the students' grades at the end of the semester.

If an instructor assigns a grade that does not agree with one of the valid grades for the course, the student's grade report from the Registrar will show a designation of "N", meaning that no valid grade was received from the instructor. Because "N" grades are automatically converted to F at midsemester of the next regular semester, a student receiving an "N" designation on a grade report should contact the instructor **immediately** and request that a change from "N" to a valid grade be initiated by the instructor.

### INCOMPLETE GRADE

A graduate student who has been unable to complete all the class or laboratory assignments in a regular semester or summer session may, at the discretion of the instructor, receive an X designating a temporary grade. The following deadlines for completing an incomplete grade X apply to all graduate students regardless of the level of the course in which the incomplete grade is received: an incomplete grade X must be removed no later than the official midsemester date of the following regular semester; an incomplete grade received in the Fall semester must be removed by the following Spring midsemester date; an incomplete grade received in the Spring semester or Summer sessions must be removed no later than the following Fall midsemester date. See the official Graduate School Calendar printed inside the covers of this catalog for midsemester dates. An incomplete grade not removed by the specified deadline will be changed automatically to an F. All incomplete grades must be removed from the student's record before the degree will be awarded.

### CREDIT FOR RESEARCH, INTERNSHIP, THESIS, OR DISSERTATION COURSES

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

### "R" GRADE

The grade of R (research in progress) is a permanent grade, but it is not included in any academic evaluation and does not carry any credit value. This grade may be issued to students only for research, internship, thesis, dissertation or other specifically designated courses. For these courses which carry R as the valid grade for incomplete progress (rather than the temporary grade of X), the student may receive a final grade only when completing the work within a semester in which the student is enrolled in the course. In order to receive academic credit in an R-graded course, a student must re-register for the course and successfully complete the course with a grade of P or a letter grade, whichever is the designated valid passing grade for the course. Grading policy in some courses may change during the period covered by this catalog. Grading policy for each course each semester is printed on the instructor's class roll. Students should verify grading policy with the instructor **at the beginning of each semester**.

## GRIEVANCE RELATED TO GRADES

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

## GRADE REQUIREMENTS

### GOOD STANDING

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

### ACADEMIC PROBATION

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

### GRADUATION

A student must meet all requirements specified under Grades of Scholarship on p. 35 of this Catalog in order to receive a graduate degree from The University of Texas at Arlington.

## COURSE AUDITING, CHANGES, AND LOAD

### AUDITING

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

## REGULATIONS/INFORMATION

### ADDING AND DROPPING COURSES

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

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

### WITHDRAWAL

A student who wishes to withdraw (resign) voluntarily from the University before the midsemester date must execute the proper resignation form in the Office of the Registrar. After midsemester, a graduate student is not permitted to withdraw; however, in exceptional cases, a graduate student may submit to the Dean of the Graduate School a Petition to Withdraw after midsemester. (Students should use the special Petition to Withdraw for this purpose.) If the petition is not approved, the student remains responsible for all coursework requirements. Therefore, a student should not discontinue class attendance or course assignments unless the student has been notified in writing that the Dean of the Graduate School has approved the petition to withdraw.

### COURSE LOAD

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

### COURSE DESIGNATION SYSTEM

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

#### 5342 PALEOBIOLOGY (2-3)

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

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



## COURSE AND TRANSFER CREDIT

### MAXIMUM UNDERGRADUATE CREDIT

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

### APPLICABILITY OF COURSES TO MORE THAN ONE DEGREE

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

### TRANSFER CREDIT

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

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

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

Transfer work is not accepted in doctoral programs. However, formal graduate-level coursework completed in the student's major area of doctoral study at other institutions granting doctoral degrees in the student's major may serve to establish the student's competency in those subject areas and may provide a basis for waiving some UT Arlington course requirements in those areas. Such waivers must be recommended by the student's advisory committee and approved by the Committee on Graduate Studies of the student's major and by the Dean of the Graduate School.

## EXTENSION WORK AND CORRESPONDENCE COURSES

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

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

## REGISTRATION REQUIREMENTS AND CREDIT FOR THESIS AND DISSERTATION

A student may not register for dissertation or thesis unless he or she is in good standing academically. After initial enrollment in the thesis or dissertation course, a student must maintain continuous enrollment in thesis or dissertation (summers excluded unless summer enrollment in thesis/dissertation is required by student's program) until the thesis or dissertation has

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been accepted by the Dean of the Graduate School. Failure to maintain continuous enrollment may invalidate any previous thesis or dissertation work.

Thesis and dissertation courses will be graded on a Pass/Fail basis. A grade designation of R (Research in Progress) will be given for thesis or dissertation courses prior to the semester in which the thesis or dissertation is accepted by the Dean of the Graduate School. The grade of R does not carry any credit value; therefore, since all masters programs require six credit hours of thesis and doctoral programs require nine credit hours of dissertation, the student must register for a six-semester hour course in thesis or a nine-semester hour course in dissertation for the semester in which the student expects to submit and defend the final thesis or dissertation. (See Credit for Research, Internship, Thesis, or Dissertation Courses, p. 36.)

## GRADUATION PROCEDURES

### GRADUATION

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

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

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

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

### FINAL SEMESTER REQUIREMENTS

The student must be enrolled in the Graduate School for the semester in which he expects to graduate. Enrollment in courses outside the major and minor fields will not satisfy final semester enrollment requirements. 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 calendars** published inside the covers of this catalog:

1. All graduating students must file an Application for Graduation and pay the Diploma Fee in the Office of the Dean of the Graduate School. The application is not transferable to a subsequent semester; therefore, if a student does not graduate at the time indicated in the initial application, that application will be cancelled and a new one must be filed for the semester of graduation. The Diploma Fee also is non-transferable and non-refundable.
2. **Master's program students must:**
  - enroll in
    - a. the six-hour thesis course if a thesis plan student
    - b. the master's comprehensive course or equivalent if required by the student's program
    - c. at least one graduate course in the student's program if not enrolled in a or b above;
  - file
    - a. the Application for Graduation;
    - b. the Application for Candidacy and Final Program of Work;
    - c. three unbound copies of the final approved thesis or internship program and a completed Thesis and Dissertation Data Sheet (not applicable for non-thesis degree plan);
    - d. a request for the final master's examination;

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- e. the Final Master's Examination Report;
  - f. the University Microfilm agreement;
  - g. the Copyright authorization (optional);
- pay**
- h. the thesis binding, microfilming, and (optional) copyright fees;
  - i. the Diploma fee.
- 3. Doctoral degree candidates must:**
- enroll in**
- a. the nine-hour dissertation course;
- file**
- a. the Application for Graduation
  - b. the Application for Candidacy and Final Program of Work;
  - c. three unbound copies of the final approved dissertation and a completed Thesis and Dissertation Data Sheet;
  - d. a request for the dissertation defense;
  - e. the Dissertation Defense Report;
  - f. the University Microfilm agreement;
  - g. the Copyright authorization (optional);
  - h. the National Research Council Survey of Earned Doctorates form;
- pay**
- i. the dissertation binding, microfilming, and (optional) copyright fees.
  - j. the Diploma fee.

For more information about the submission of acceptable theses, internship reports, and dissertations, consult the *Thesis and Dissertation Manual of Style* available from the UT Arlington Bookstore.

## GRADUATE SCHOOL DEADLINES

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

## IN ABSENTIA REGISTRATION

A candidate for a degree who has completed *all* requirements for graduation by the last date to qualify for *in absentia* registration (see Graduate School calendars inside the covers) and who needs to register in the University for the sole purpose of having a degree conferred may be qualified to register *in absentia* in the semester or summer session consecutive to his last enrollment in coursework and/or thesis/dissertation. A student registered *in absentia* may not enroll for courses. No refund is made for the cancellation of an *in absentia* registration. In addition to paying the cost of *in absentia* registration, the candidate must file an application for graduation and pay the diploma fee for the semester of graduation. *In Absentia* registration requires the permission of the Graduate Advisor and the Dean of the Graduate School. Students may obtain the Request to Register *In Absentia* form in the Graduate School.

## 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 UT

## REGULATIONS/INFORMATION

Arlington must initiate the change by completing the appropriate form available in the Office of the Dean of the Graduate School. Students are encouraged to consult the Graduate Advisor of the new program regarding program admission and degree requirements before requesting a program change.

## PETITIONS

Students may request exceptions to published rules by filing a proper petition to the Dean of the Graduate School explaining the basis for the request. Limited exceptions to some rules may be approved if the facts presented by the petitioner fully justify that exception, as regarded by the appropriate Committee on Graduate Studies and the Dean of the Graduate School. All petitions must be submitted on petition forms available in the Graduate School Office. Special forms for withdrawal and *in absentia* registration are available in the Graduate School and must be used by students petitioning for withdrawal or requesting *in absentia* registration.

## GRIEVANCES OTHER THAN GRADES

In attempting to resolve any student grievance, it is the obligation of the student first to make a serious effort to resolve the matter with the individual with whom the grievance originated. Grievances involving matters other than grades are appealed to the department chairman or office director, the Dean of the Graduate School (except in personnel matters unless questions regarding a Graduate Assistant or Graduate Associate are involved), then to the Vice-President for Business Affairs, Vice-President for Academic Affairs, or Vice-President for Student Affairs. If the matter remains unresolved at this level, the student may appeal to the President. (For grievances involving grades, see instructions under "Grievance Related to Grades, p. 37.")

## ACADEMIC DISHONESTY

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

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

## GRADUATE ASSISTANTSHIP/ASSOCIATESHIP POLICY

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

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

The University of Texas at Arlington supports the "Resolution Regarding Graduate Scholars,

## REGULATIONS/INFORMATION

Fellows, Trainees, and Assistants" of The Council of Graduate Schools in the United States. A copy of the resolution and list of signatory institutions is available in the Office of the Dean of the Graduate School.

### ADMISSION STATUS

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

### CONTINUATION OR RENEWAL OF APPOINTMENT

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

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

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

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

### TUITION RATES

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

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

### COURSE LOAD

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

### ADDITIONAL EMPLOYMENT

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

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

A graduate student cannot hold an assistantship or a combination of assistantships or other University positions in excess of one-half time employment (20 hours per week) without permission of the department or program in which the student is enrolled and written approval of the Dean of the Graduate School.

## **REGULATIONS/INFORMATION**

### **ASSIGNMENT OF DUTIES**

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

## **STUDENT EDUCATIONAL RECORDS POLICY**

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

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

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

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

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

# ADMISSION REQUIREMENTS AND PROCEDURES

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

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

## ADMISSION OF UNITED STATES STUDENTS

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

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

U.S. applicants who have enrolled in academic institutions outside the United States are required to pay the international application evaluation fee charge of \$50 (U.S.).

## ADMISSION OF INTERNATIONAL STUDENTS AND PERMANENT RESIDENTS

An applicant who is not a U.S. citizen or who does not hold a bachelor's degree from an accredited U.S. college or university, must provide the following at least 120 days prior to the beginning of the semester or summer session in which he plans to register: (1) a complete and accurate chronological outline of all previous college-level work; (2) authorized school or university records including transcripts, rating sheets, and certificates of degrees or diplomas showing all courses taken and all grades received; (3) a degree equivalent to a U.S. bachelor's degree from an accredited college or university, with a satisfactory grade-point average; (4) an

## ADMISSION

acceptable and current score on the aptitude tests of the Graduate Record Examination or Graduate Management Admission Test, as specified by the department or program to which application is being made; (5) if his or her native language is *not* English and he or she does *not* hold a bachelor's or master's degree from an accredited U.S. institution, an acceptable score (normally, at least 550) on the Test of English as a Foreign Language (TOEFL); (The University of Texas at Arlington subscribes to the TOEFL Examinee Identification Service); (6) acceptance into a departmental program; (7) certification on an official Graduate School Financial Statement form (available from the Dean of the Graduate School) that the student has adequate funds to finance his or her graduate studies; (8) an affidavit supporting the Financial Statement completed by parents, guardian, financial sponsor or bank and submitted with the Financial Statement; and (9) an application evaluation charge of \$50 (U.S.) submitted with the original application. The application evaluation charge must be in the form of an International Money Order made payable in U.S. dollars to The University of Texas at Arlington. This evaluation charge is required and is not refundable.

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

## READMISSION

A student previously enrolled in The University of Texas at Arlington Graduate School and wishing to resume graduate work after an absence of a fall or spring semester or longer (summer excluded) should file through the Graduate School an application for readmission at least 40 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 showing all such courses must be submitted to the Graduate School. Former students wishing to change graduate major or program upon readmission should consult the section entitled "Change of Graduate Major or Program" in this catalog.

## DOCUMENTATION AND INTERNATIONAL CHARGE REQUIRED

### GRADUATE RECORD EXAMINATION (GRE)

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

Information bulletins and test application blanks can be obtained from Educational Testing Service, Box 955, Princeton, New Jersey 08541 U.S.A. or from the Office of Counseling and Career Development of The University of Texas at Arlington. The GRE is administered several times each year (usually in January, February, April, June, October, and December) at testing centers in the United States and abroad. The University of Texas at Arlington is an approved testing center. Applications must be received by Educational Testing Service approximately one month in advance of each test; therefore an applicant should secure the information bulletin and application blank at least six weeks in advance. A minimum of six weeks should be allowed for the examination results to reach the University. ETS retains GRE scores through September 30 following the fifth anniversary of the test date. Although scores up to five years old may be available, some programs will not accept scores more than two years old.



## **GRADUATE MANAGEMENT ADMISSION TEST (GMAT)**

The Graduate Management Admission Test score is required for admission to graduate work in The College of Business Administration. An exception to this requirement is the graduate program in economics which requires the GRE. 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 and Career Development of The University of Texas at Arlington. The GMAT is administered four times a year (usually in November, January, March, and July). The University of Texas at Arlington is an approved testing center for the GMAT. The GMAT application procedures are the same as those described above for the GRE.

## **TEST OF ENGLISH AS A FOREIGN LANGUAGE (TOEFL)**

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

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

## **OTHER ADMISSION TESTS**

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

## **OFFICIAL TRANSCRIPTS, RECORDS, AND TEST SCORES**

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

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

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

Uncertified or notarized copies of transcripts or other academic records or of test score reports and copies of records or test score reports bearing the designation "student copy", "issued to student", "applicant's copy", "unofficial copy", or other similar designations are not acceptable. Hand-delivered transcripts, records, and score reports or copies received from a third party regardless of the origin are not acceptable except in rare instances in which international applicants are unable to provide official transcripts as indicated above.

## **ADMISSION**

### **RETENTION OF APPLICATION RECORDS**

All application materials upon submission become the property of The University of Texas at Arlington and cannot be returned to the applicant. Completed applications, transcripts, test scores, and all application records for applicants who do not register in the semester for which they applied are retained by the Graduate School for one year only. An applicant failing to enroll in the semester for which he applied may request a form from the Graduate School entitled "Request to Change Admission Date" for use at any time within one calendar year from the registration date for which the applicant initially applied. Please see the section below on the International Application Evaluation Charge for information on charges for re-evaluation of records of international students.

### **INTERNATIONAL APPLICATION EVALUATION CHARGE**

All international applicants and all applicants who have attended graduate or undergraduate academic institutions outside the United States are required to pay an International Application Evaluation Charge of \$50 (U.S.)

After payment of the Evaluation Charge and after the initial evaluation of an admission application an international applicant is entitled to request his or her admission records be re-evaluated one additional time for the purpose of changing the admission date or program from the date or program for which the student initially applied. A request for further changes in admission date or program will require a second payment of the Evaluation Charge of \$50 (U.S.). Each repayment of the Evaluation Charge entitles the applicant to no more than two application re-evaluations.

## **TYPES OF ADMISSION**

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

### **UNCONDITIONAL ADMISSION**

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

### **PROBATIONARY ADMISSION**

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

### **PROVISIONAL ADMISSION**

An applicant unable to supply all of the required documentation prior to the admission deadline but who otherwise appears to meet the admission requirements may upon the recommendation of the appropriate Committee on Graduate Studies and approval of the Dean of the

## ADMISSION

Graduate School be granted provisional admission. Complete and satisfactory credentials must be received by the Graduate School before the end of the semester in which the student has registered in a provisional status. *A student will not be permitted to enroll in the Graduate School with a provisional status for more than one semester.* Provisional admission does not guarantee in any way subsequent admission on an unconditional basis. A student admitted on a provisional basis may not hold an assistantship until unconditional admission status has been achieved. International students not residing in the United States at the time of application may not be admitted on a provisional basis.

## SPECIAL STUDENTS

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

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

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

## DEFERRED ADMISSION

If an applicant does not present adequate evidence of meeting the admission requirements, the admission decision may be deferred until the records are complete. The applicant will be sent an Admission Deferral Notice specifying the data that must be provided or the work that must be completed before the application will be reconsidered. The application may be reactivated within one calendar year from the date for which the original application was submitted by returning the Request to Reactivate Application sent to the applicant with the Admission Deferral Notice. International students should consult the section on International Application Evaluation Charge (p. 48) for charges for re-evaluation of application records.

## GRADUATE STUDENT ADVISEMENT

After being admitted, the student should confer (preferably in person) with the Graduate Advisor of the proposed major area in order to become acquainted with specific departmental regulations, particularly in areas that require additional examinations upon entrance. After receiving registration materials, the student should consult with the Graduate Advisor in the proposed major area at the time and place indicated in the registration instructions concerning the details of registration, course program, and other procedures. It is important that a student wishing to take courses for graduate credit consult with the appropriate Graduate Advisor be-

## **ADMISSION**

fore registering, as each student's program of work for an advanced degree must be approved eventually by the Graduate Advisor, the student's supervising committee, and the Dean of the Graduate School. Failure to consult with the Graduate Advisor could result in the student's enrolling for courses which are not applicable toward the degree.

## **REGISTRATION SCHEDULE**

Students should be familiar with all dates on the Graduate School calendars printed inside the covers of this catalog. Specific registration instructions are published by the Registrar several times each year and should be consulted for procedures, dates, and deadlines.

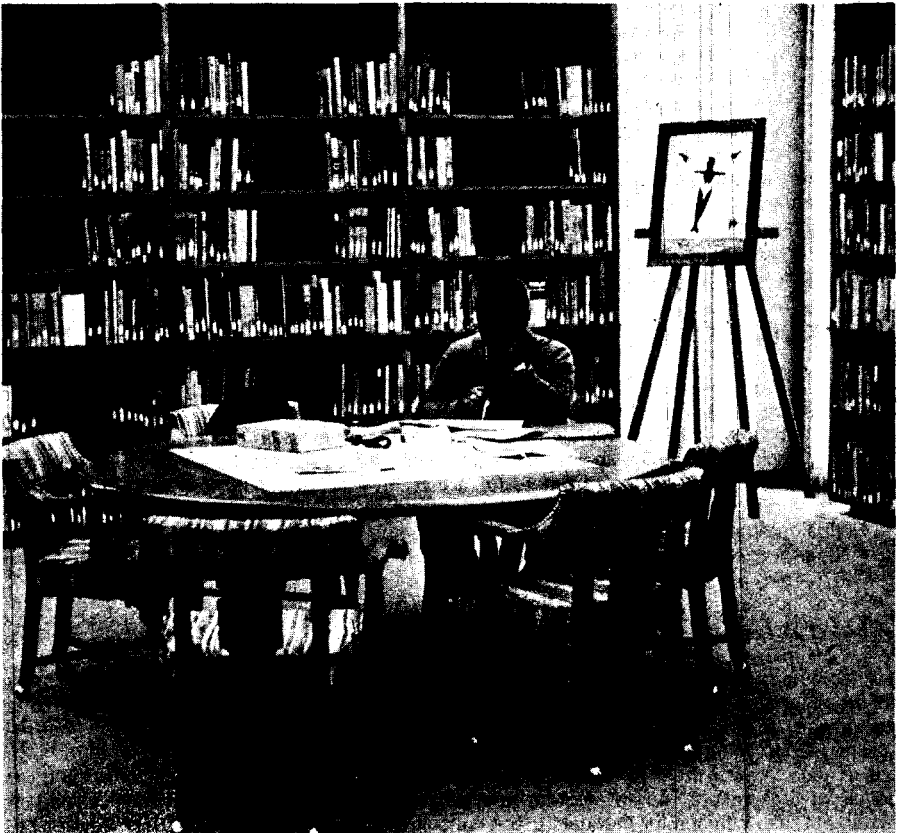
## **RESTRICTIONS ON ADMISSION**

### **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

Tuition and fees are subject to change by legislative action. Changes in tuition or fees will be effective upon date of enactment and will be reflected in fees and tuition charged.

## TUITION AND MANDATORY FEES

### REGULAR SESSIONS AND 11-WEEK SUMMER SESSION

The tuition and mandatory fees given below include \$8 per capita Building Use Fee, plus a \$6 per semester hour General Fee, a \$7 per semester hour Student Services Fee (up to a \$84 maximum), and a \$3.25 per semester hour Student Union Fee (up to a \$39 maximum).

Semester Hours	Texas Residents (Valid 88-89)	Texas Residents (Valid 89-90)	Non-Texas Residents (Valid 88-89 only*)
1	\$124.25	\$124.25	\$ 144.25
2	140.50	140.50	280.50
3	156.75	156.75	416.75
4	173.00	173.00	553.00
5	189.25	189.75	689.25
6	205.50	213.50	825.50
7	233.75	247.75	961.75
8	266.00	282.00	1098.00
9	298.25	316.25	1234.25
10	330.50	350.50	1370.50
11	362.75	384.75	1506.75
12	395.00	419.00	1643.00
13	417.00	443.00	1769.00
14	439.00	467.00	1895.00
15	461.00	491.00	2021.00
16	483.00	515.00	2147.00
17	505.00	539.00	2273.00
18	527.00	563.00	2399.00
19	549.00	587.00	2525.00
20	571.00	611.00	2651.00
Each Additional Hour	22.00	24.00	126.00

### 5-WEEK SUMMER SESSIONS

The tuition and mandatory fees given below include \$4 per capita Building Use Fee, plus a \$6 per semester hour General Fee, a \$7 per semester hour Student Services Fee (up to a \$42 maximum), and a \$3.25 per semester hour Student Union Fee (up to a \$19.50 maximum).

Semester Hours	Texas Residents (Valid 88-89)	Texas Residents (Valid 89-90)	Non-Texas Residents (Valid 88-89 only*)
1	\$ 70.25	\$ 70.25	\$140.25
2	86.50	86.50	276.50
3	102.75	106.75	412.75
4	133.00	141.00	549.00
5	165.25	175.25	685.25
6	197.50	209.50	821.50
7	219.50	233.50	947.50
8	241.50	257.50	1073.50
Each Additional Hour	22.00	24.00	126.00

\*The Coordinating Board will set by May, 1989 the schedule of non-resident tuition and fees to be valid in the 89-90 academic year.

## TUITION AND FEES

### 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 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 academic scholarships in the amount of \$200 per year or more awarded through The University of Texas at Arlington scholarship committee will be charged the same rate as a Texas resident.
3. Students eligible to pay resident tuition rates and 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 pay the hourly tuition rate (88-89: \$16 per semester hour, 89-90: \$18 per semester hour) without having to satisfy the \$100 minimum tuition amount for residents. Thesis and dissertation students are still subject to all hourly fees. Non-resident and international students will pay the same hourly rate for thesis or dissertation hours as for any other hours. To qualify for thesis-only tuition reduction the student is required to:
  - a. Have an approved Application for Candidacy and Program of Work (degree plan) on file in the Graduate School at least ten working days prior to registration for the semester in which he is applying for the reduction;
  - b. Have passed the comprehensive examination, if a doctoral student;
  - c. Be maintaining a 3.0 GPA, and have no incomplete grades on his record whether or not the courses apply to the degree plan;
  - d. Have completed all coursework on the degree plan; and
  - e. Notify the Graduate School of intention to request tuition reduction at least ten working days prior to the first day of registration.
4. Non-Texas residents may be eligible for tuition exception as described under the Academic Common Market entry in this Tuition and Fees section.
5. Texas Veterans Exemption (Hazelwood Act):

Article 2654b-1, Vernon's Texas Civil Statutes, provides an exemption from tuition and some fees. Texas veterans may qualify for this exemption provided they:

  - a. Had Texas resident status at the time they entered the service and are currently on Texas resident status for tuition assessment;
  - b. Had active military duty (for purposes other than training) for more than 180 days beginning after 1 February, 1955; or they served between 7 December, 1941 and 31 January, 1955;
  - c. Are honorably discharged from active service; and,
  - d. Are not eligible for BEOG (Basic Education Opportunity Grant), SEOG (Supplemental Education Opportunity Grant), or Veterans Educational Benefits under federal legislation.

Some types of discharges are excluded from eligibility. Application forms and instructions are available at the undergraduate admission counter.

### IN ABSENTIA REGISTRATION FEE

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

## INSTALLMENT TUITION AND FEE LOAN PROGRAM

Students may use an Installment Tuition and Fee payment system allowing for the payment of tuition and fees under one of two plans. Under the first, payment of one half of assessed tuition and fees is made at the time of registration and one half by the end of the seventh week of the semester. Under the second, payment of one fourth is made at registration and one fourth at the end of the third, seventh, and eleventh weeks of the semester. Either plan will require the payment of a \$10 processing fee and execution of a promissory note at the time of registration. No prior arrangements are required for participating in this plan. Special fee assessors will be designated to calculate tuition and fees for students opting for this plan at Registration.

A student who fails to meet the payment schedule under the plan elected will not receive grades or a transcript and will not be readmitted to the University until all debts, including any late payment fee that may be assessed, have been cleared.

Any questions regarding the Installment Tuition and Fee payment plan should be directed to the Institutional Loan Office in the Registration Center, basement of Davis Hall, 273-3089.

## CONCURRENT ENROLLMENT

### UNIVERSITY OF TEXAS COMPONENTS

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

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

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

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

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

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

### OTHER PUBLIC INSTITUTIONS OF HIGHER EDUCATION

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

1. If the minimum tuition at the first institution is the *same* or *greater* than the UT Arlington minimum, the amount charged for tuition will be the UT Arlington hourly rate.
2. If the minimum tuition at the first institution is *lower* than the UT Arlington minimum, the amount charged for tuition will include the difference in the minimum charges; in no case will the amount charged for tuition be less than the UT Arlington hourly rate.
3. All other applicable fees will be charged.

## TUITION AND FEES

### FEES

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

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

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

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

### GENERAL PROPERTY DEPOSIT

Every student registering at The University of Texas at Arlington will be required to make and maintain a property deposit of \$10. The records will be reviewed periodically, and if charges have been made against the deposit, the student will be required to bring the deposit up to \$10.

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

### PHOTO IDENTIFICATION CARD FEE

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

### PARKING FEE

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

	Automobile		Motorcycle	
	Day	Night	Day	Night
Fall Semester	\$36	\$24	\$24	\$15
Spring Semester	24	15	15	9
First Summer Session	15	9	9	6
Second Summer Session	9	6	6	4

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

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



## **TUITION AND FEES**

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, MICROSCOPE USER'S, AND COMPUTER USAGE FEES**

Laboratory fees are charged for various science and engineering lab courses. Students who are enrolled in certain biology and geology courses which require extensive use of microscopes will have a microscope user's fee assessed as part of the lab fee listed for that course. Students who are enrolled in courses that require the use of computer resources will be assessed a fee of \$5, \$10, or \$15 based on the amount of computer usage in that course. Courses for which these fees are charged and the amounts of the fees are listed in the course description section of this catalog.

### **STUDENT SERVICES FEE**

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

### **STUDENT UNION FEE**

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

### **INTERNATIONAL STUDENT HEALTH INSURANCE**

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

### **LATE REGISTRATION FEE**

There shall be a compulsory fee for late registration of \$25.

### **DIPLOMA FEE**

Upon application for graduation each student will be required to pay a \$10 Diploma Fee. If a student fails to receive the degree in the semester for which he has filed the Diploma Application and paid the Diploma Fee, the fee must be paid again in the semester in which the student does graduate.

### **BINDING FEE**

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

### **MICROFILMING FEE**

The Microfilming Fee (\$30 thesis; \$40 dissertation) includes the cost of microfilming one official copy of the thesis or dissertation by University Microfilms, Ann Arbor, Michigan, and the publication of the thesis or dissertation abstract. University Microfilms deposits one positive microform copy of the thesis or dissertation in the Library of Congress.

## TUITION AND FEES

### DISSERTATION COPYRIGHT FEE (optional)

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

## THE ACADEMIC COMMON MARKET

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

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

Further information on the Academic Common Market may be obtained from the Texas State Coordinator for the Academic Common Market: Texas Higher Education Coordinating Board, Box 12788, Capitol Station, Austin, Texas, 78711.

## RESIDENCY REGULATIONS

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

All residence determinations will be made pursuant to Sections 54.052 *et seq.* of the *Texas Education Code* and the "Rules and Regulations for Determining Resident Status" of the Coordinating Board, Texas College and University System. Generally, the following information pertains: "An individual under 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 18 years of age or over who resides out of the state or who has come from outside Texas and who registers in an educational institution before having resided in Texas for a 12-month period shall be classified as a non-resident student."

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

An exception to the payment of nonresident tuition is included in the *Texas Education Code* as follows: Usually, a member of the United States Military Forces is entitled to pay the resident tuition fee for the member and the member's dependents, providing that each semester he or she submits to the fee assessors in registration a letter from his or her commanding officer stating that he or she is currently on permanent assignment in the state. See "Tuition Exceptions" under TUITION AND FEES for additional exemptions from the payment of non-resident tuition rates.

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 classifica-

## TUITION AND FEES

tion 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.

## AUDIT OF STUDENT'S SCHEDULE

A computerized audit is made which compares a student's schedule and the tuition and fees associated with that schedule to the total tuition and fees paid by the student. Residency status and any applicable tuition exceptions are also input items to the audit. The result will be a bill for additional amounts due, a refund, or no change in the amount that the student paid originally.

## FEE AUDIT BILLS

Bills are generated approximately eight weeks into the semester. Generally, a bill is created because of a schedule change or a misassessment of the student's fees. In addition, unpaid bills from the previous semester are shown on fee audit bills. A student has 10 days from receipt of the bill to make payment. Bills are paid at the Bursar's Office, Room 130, E.E. Davis Hall.

## REFUNDS

### TOTAL WITHDRAWAL FROM SCHOOL

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

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

#### *Fall and Spring Semesters*

During class days 1 through 5	80%
During class days 6 through 10	70%
During class days 11 through 15	50%
During class days 16 through 20	25%
After 20th class day	no refund

#### *Summer Sessions*

During class days 1 through 3	80%
During class days 4 through 6	50%
After sixth class day	no refund

3. Parking Refunds must be applied for separately at the Parking Office, 106 University Police Building, and a paid receipt must be presented at the time of the refund request.

### DROPPING COURSE(S) BUT CONTINUING ENROLLMENT

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

### PAYMENT OF REFUNDS

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

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

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

# STUDENT SERVICES AND FINANCIAL AID

## HOUSING

The University owns and operates residence halls, apartments, and houses for students. Because of the demand for housing, students should make application as early as possible. Applications and information are available at Housing/University Center Office, E.H. Hereford University Center, 273-2706.

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

## STUDENT HEALTH SERVICES

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

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

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

Services not currently available are obstetrical care, dental care, and specialized diagnostic services. The Health Center will not treat those conditions which are beyond its capacity to treat efficiently and competently. Referral advice will be given in such cases.

Each student is responsible for his or her own transportation to the Health Center. In case of an emergency, the campus police should be notified at 273-3003. If warranted, the police will call an ambulance.

Prior to registration, a student will submit a Report of Medical History. A physical examination is required only if the student is medically unfit for such activities as physical education. Confidentiality of medical records will be in accordance with state and federal laws.

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

In the spirit of this educational community, it is hoped that students will also use Student Health Services as a resource for information on health related issues and preventive medicines.

## STUDENT HEALTH INSURANCE

Student Health Service is an outpatient facility, and, as such, is not equipped to perform the more extensive diagnostic procedures and services offered by a general hospital. Therefore, all students are strongly urged to have adequate medical insurance coverage.

Students on non-immigrant visas enrolled at UT Arlington are required to carry health insurance, and must show proof of coverage at the time of registration.

A health insurance plan is available through an insurance carrier by contract with the University. Students need not purchase this particular plan, but those wishing more information about it should contact Student Health Services at 273-2771. Insurance applications are available at the Student Health Center, corner of Third and West Streets, and at the Office of Student Affairs, Room 241, Davis Hall.

## **COUNSELING AND CAREER DEVELOPMENT**

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

### **COUNSELING**

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

### **TESTING**

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

### **CAREER PLACEMENT**

Approximately 300 recruiting companies and agencies schedule interviews on campus primarily during the months of October, November, February, and March. Any graduate student may take advantage of the campus interviews. After graduation the alumni have the opportunity to use the Jobs Hotline service to learn about immediate job openings for experienced graduates.

### **RESOURCES**

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

### **STUDENT EMPLOYMENT SERVICE**

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

### **INTERNATIONAL OFFICE**

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

### **MINORITY STUDENT SERVICES**

The Office of Minority Student Services facilitates the full participation of ethnic minorities at UT Arlington by helping to create an academic, social, and cultural atmosphere conducive to the presence and responsive to the needs of minority students, including Black, Mexican-American, Native American Indian, and Asian students. The office assists students in present-

## **SERVICES/FINANCIAL AID**

ing a varied program of cultural events and activities, designed to expose the university community to the history, culture, and tradition of ethnic minority groups. The Director of Minority Student Services coordinates services with other University offices and departments to assist minority students in achieving their academic objectives and long-term goals. The office is located in the Lower Level, University Center, 273-2099.

## **HANDICAPPED STUDENT SERVICES**

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

## **STUDENT CONDUCT AND DISCIPLINE**

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

## **BURSAR'S OFFICE**

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

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

## **CHECK CASHING AND PAYMENT PROCEDURES**

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

## **RETURNED CHECKS**

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

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

## **STUDENT FINANCIAL AID**

Financial Aid is generally limited to U.S. citizens or those in this country on other than temporary visa status and accepted for enrollment or enrolled and making satisfactory academic progress. The following summaries are for informational purposes only. Current information on each program is available from the Financial Aid Office, located in Suite 252 Davis Hall, 273-3561.

## **SHORT-TERM LOANS**

Loans up to \$300 are made for current expenses and are to be repaid during the semester in which the money is borrowed. Applicants with baccalaureate degrees must have a grade point average of at least 3.0 and have completed a minimum of 9 semester hours at The University of Texas at Arlington. Graduate students who have earned a baccalaureate degree at UT Arlington within the preceding academic year will be considered to have met minimum requirements for eligibility. All applicants must have demonstrable means of repayment. Priority consideration will be given to those applications completed at least one week prior to registration.

## **ASSISTANCE BASED ON NEED**

Students anticipating the use of any of the following financial aid programs should process a Financial Aid Form (FAF) or Family Financial Statement (FFS) 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.

### **Long-Term Loans (Informational Summaries Only)**

**Perkins Loan (formerly NDSL)**—This is a federally-funded need-based loan available to students who demonstrate financial need as determined by the student's Financial Aid Form (FAF) or Family Financial Statement (FFS). Graduate students may borrow up to \$18,000 including any amount borrowed for undergraduate study. Repayment of principal and interest at the rate of 5% begins six to nine months after the student ceases half-time enrollment and may extend up to 10 years with a minimum monthly payment of \$30.

**Guaranteed Student Loan (GSL)**—Under this federally-subsidized need-based loan program, eligible graduate students may borrow up to \$7,500 per year through a bank or other lending institution. A guarantee fee and an origination fee are paid by the student when the loan is advanced. Repayment of principal and interest at the rate of 9% for previous borrowers and 8% for first-time borrowers begins six months after the enrollment period and may be over a period not to exceed ten years with a minimum monthly payment of \$50.

**Supplemental Loans for Students (SLS)**—The SLS program is designed to provide funds to pay educational costs; no evidence of financial need is required, although some lenders require a credit analysis. Interest of 12% is charged on the principal, and payment of interest begins within 60 days of disbursement. Deferment of principal payments is permitted under certain circumstances. Loans may be up to \$4,000 per year, to a total of \$20,000. Although it is possible to apply for an SLS without applying for need-based financial aid, this loan should be considered a last alternative for financing an education since the terms are not as beneficial as other forms of financial aid.

### **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.

## **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.

## **SERVICES/FINANCIAL AID**

### **VETERANS' ASSISTANCE**

Contact the Registrar's Office for information concerning eligibility for and payment of VA benefits and other matters for veterans attending or planning to attend UT Arlington.

### **ASSISTANTSHIPS**

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

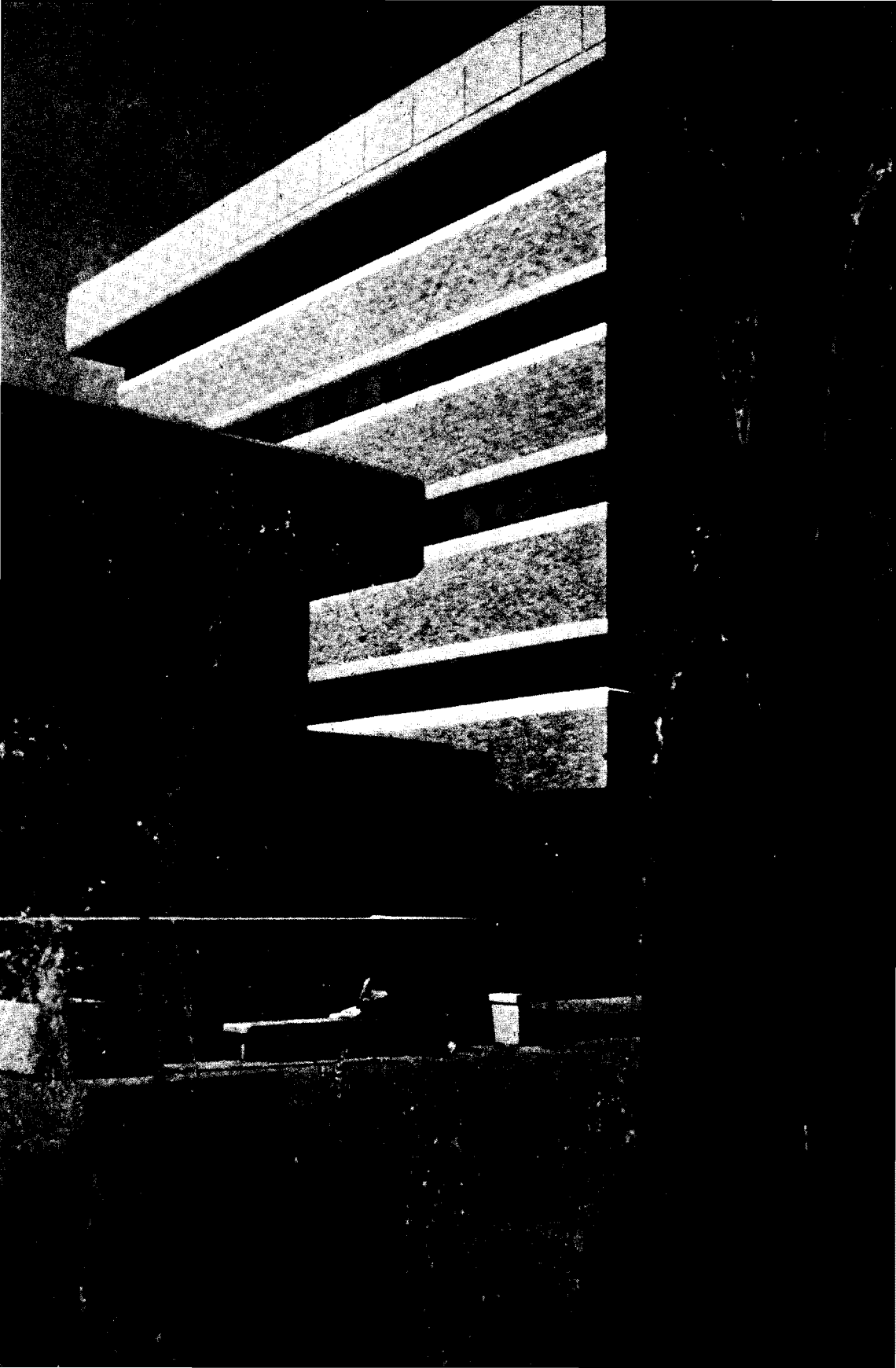




# Academic Programs and Courses of Instruction

## DEPARTMENTAL PROGRAMS

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





## **ACCOUNTING**

semester, students who have written a thesis must defend the thesis in an oral examination. The following requirements for the Accounting Graduate Degrees are in addition to the general regulations and requirements given in the introductory sections of this catalog.

### **Master of Professional Accounting Background Category I**

Students who have had no prior academic work in business administration are included in this category. These students will take the courses in the Foundation Program (30 semester hours as shown below); in addition, they must complete the requirements of the Category I MPA Program which totals 39 semester hours of work.

#### **Foundation Program**

##### **Semester I**

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)  
Accounting for Management Planning and Control (ACCT 5322)  
Survey of Accounting Systems (ACCT 5329)  
Study of Federal Income Tax Law Relative to Individuals (ACCT 5314)  
Contemporary Issues in Accounting Theory (ACCT 5327)  
Auditing Concepts and Practices (ACCT 5316)  
Law I (BUSA 3311)  
Business Policy (BUSA 5333)

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

### **Master of Professional Accounting Background Category II**

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

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

### **Master of Science in Accounting**

This program is designed for students who have an undergraduate degree in accounting or a degree in business administration with a major in accounting who wish to specialize in an area of accounting other than taxation. The student, with the assistance and consent of the Gradu-

ate Advisor, will develop a course of study designed to meet his or her educational needs in light of previous academic work and career objectives. Specialization tracks are available in accounting systems, auditing, financial accounting, and managerial accounting.

A minimum of 30 semester hours (including 18 semester hours of accounting coursework) is required if the student chooses to write a thesis. If the student chooses not to write a thesis, a minimum of 36 semester hours (including 24 semester hours of accounting coursework) is required. Of the accounting semester hours included in a student's program, a maximum of six semester hours may be represented by upper-division undergraduate courses, provided that the requirement of 15 semester hours in graduate accounting courses is met. The student must have previously studied or include in his or her program courses covering the following areas of accounting: financial accounting and accounting theory, management accounting (including cost accounting), management information and computer systems, financial and operational auditing, and taxation. At least six semester hours of non-accounting graduate level courses offered by the College of Business Administration are required, including BUSA 5333 and an appropriate graduate course in statistics or management science. BUSA 5333 is waived if the student has had a similar course before admission to the Master of Science in Accounting program.

### Background Requirements

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

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

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

### Program Requirements

The required program for an MS in Accounting consists of the following:

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

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

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

Thesis Option (Total program of 30 semester hours)

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

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

**Six semester hours:** Graduate level accounting courses.

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

### Master of Science in Taxation

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

A minimum of 36 semester hours, including a minimum of 18 semester hours in taxation courses beyond ACCT 5314, is required. The student may choose to write a thesis that will count as six semester hours towards the 36-hour requirement. Of the accounting semester

## ACCOUNTING

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

### Background Requirements

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

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

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

### Program Requirements

The required program for an MS in Taxation consists of the following:

**Eighteen semester hours:** Graduate level taxation courses beyond ACCT 5314. Taxation courses required of all candidates are ACCT 5339, 5341, 5342, and 5347.

**Three semester hours:** BUSA 5334 Real Property Law.

**Three semester hours:** BUSA 5333 (Business Policy) or an elective graduate level course offered by the College of Business Administration if the student completed a course similar to BUSA 5333 before admission to the MS in Taxation program.

**Six semester hours:** Elective graduate level course offered by the College of Business Administration.

Thesis Option (Total Program of 36 semester hours)

**Six semester hours:** Thesis on taxation topic.

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

**Six semester hours:** Elective graduate level courses offered by the College of Business Administration.

**The grade of R (research in progress) is a permanent grade. An incomplete (the grade of X) cannot be given in a course which is graded R. To receive credit for an R-graded course the student must continue to enroll in the course until a passing grade is received. Three-hour thesis and three- and six-hour dissertation courses are graded R/F only. The grade of P (required for graduation) can be received in six- or nine-hour thesis courses and nine-hour dissertation courses only. In the course listings below, R-graded courses are designated either "Graded P/F/R" or "Graded R." (See also the section entitled "R" GRADE on p. 36 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. Prerequisite: ACCT 5301 or equivalent.

**5303. SOFTWARE TOOLS FOR ACCOUNTANTS (3-0).** A study of software programs which are commonly useful to accountants in both private and public practice. Topics include spreadsheets, graphics, communications, word processing, and other computer software tools. Prerequisite: ACCT 5302 or equivalent. **\$15 computer fee.**

**5310. INTRODUCTION TO BUSINESS TAXATION (3-0).** Introduction to Internal Revenue Code, Treasury Regulations and other tax literature applicable to business entities. Includes tax

planning for sole proprietorship, partnership and corporation. Cannot be taken for credit by persons who previously have taken a course in Federal Income Taxation. Prerequisite: ACCT 5301 or equivalent.

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

**5312. FINANCIAL ACCOUNTING II (3-0).** Study of additional problems encountered in preparation of financial statements. Also an introduction to accounting for non-profit entities. Prerequisite: ACCT 5311 or equivalent. **\$5 computer fee.**

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

**5316. AUDITING CONCEPTS AND PRACTICES (3-0).** Concentrates on practice of professional accounting and auditing. Emphasizes decision making in a variety of unstructured situations where decisions demand a grasp of purpose, method, and judgment for their resolution. May not be taken for credit by students who have received credit for a course in auditing. Prerequisites: ACCT 5312 or equivalent and BUSA 5301 or equivalent. **\$5 computer fee.**

**5317. COST ACCOUNTING (3-0).** Uses and classification of costs incurred in manufacturing. Emphasis on concepts involved in assignment and reporting of costs under job order, process, standard and direct costing systems. Prerequisite: ACCT 5302 or equivalent. **\$5 computer fee.**

**5318. STUDIES IN AUDITING (3-0).** A critical analysis of advanced topics in both auditing theory and professional practice. Emphasis on: development of auditing theory, generally accepted auditing standards, professional responsibilities, auditing EDP, SEC practice and reporting, cases in audit decision making, and analyses of emerging issues and contemporary problems in auditing. Prerequisite: ACCT 5316 or equivalent.

**5319. FINANCIAL ACCOUNTING III (3-0).** Accounting for business combinations, preparation of consolidated financial statements, multi-national operations, partnerships, and estates and trusts. Prerequisite: ACCT 5312 or equivalent. **\$5 computer fee.**

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

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

**5322. ACCOUNTING FOR MANAGEMENT PLANNING AND CONTROL (3-0).** Concentrates on information needs of management for planning and control of operations. Topics include setting corporate objectives, behavioral problems, capital budgeting and profit-planning, the use of quantitative tools, divisional performance evaluation, and transfer pricing. May not be taken for credit by students who previously received credit for ACCT 4302 or equivalent. Prerequisite: ACCT 5317 or equivalent. **\$5 computer fee.**

**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. **\$10 computer fee.**

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

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

**5329. SURVEY OF ACCOUNTING SYSTEMS (3-0).** A survey and design critique of typical commercial, horizontal, accounting software systems. Functional areas include general ledger, receivables, payables, payroll, and inventory. Evaluation criteria include data capture, processing features, internal control, audit trails, and reporting capabilities. Prerequisites: nine hours of accounting. **\$15 computer fee.**

## 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 5312.

**5335. DESIGN OF ACCOUNTING SYSTEMS (3-0).** A detailed study of the data entry, storage (file design), internal control, and reporting requirements of accounting systems, followed by the development of a significant accounting sub-system using a database package. Prerequisites: ACCT 5316 and 5329 or equivalents. **\$15 computer fee.**

**5336. SELECTED TOPICS IN ACCOUNTING SYSTEMS (3-0).** The study of theoretical and practical aspects of selected issues in accounting systems; issues for study include contemporary topics such as design techniques, management and development of accounting systems, and factors affecting choice of an accounting system. Prerequisite: ACCT 5329 or equivalent. **\$10 computer fee.**

**5339. TAX PLANNING AND RESEARCH (3-0).** A study of the use of various techniques and procedures available in evaluating issues arising under federal income tax law. Emphasizes research into individual and business tax problem areas and planning alternatives. Prerequisite: ACCT 5314 or equivalent.

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

**5341. TAX PROBLEMS OF PARTNERSHIPS AND PARTNERS (3-0).** Analysis of the federal income tax rules governing partners and partnerships. Prerequisites: ACCT 5339 and 5340 or equivalents.

**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. Prerequisites: ACCT 5339 and 5340 or equivalents.

**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. Prerequisites: ACCT 5339 and 5340 and BUSA 5334 or equivalents.

**5344. TAX PROBLEMS OF THE EXTRACTIVE INDUSTRIES (3-0).** Subjects include depletion, intangible drilling and development costs, exchanges of interests in oil and gas property, studies of current practices in planning petroleum transactions. Prerequisites: ACCT 5339 and 5340 or equivalents.

**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. Prerequisites: ACCT 5339 and 5340 or equivalents.

**5346. SEMINAR IN TAXATION (3-0).** In-depth study of current matters in the operations of the federal taxation system. Subjects include employee benefit programs, Keogh and individual retirement plans, charitable and educational organizations, and other tax exempt entities. Prerequisites: ACCT 5339 and 5340 or equivalents.

**5347. FEDERAL TAXATION OF GIFTS AND ESTATES (3-0).** A comprehensive survey of the principles and procedures involved in determining the federal estate tax and the supplementary federal gift tax including taxability and valuation of property and the determination of deductions and credits. Prerequisites: ACCT 5339 and 5340 and BUSA 5334 or equivalents.

**5348. ADVANCED TAX PLANNING (3-0).** In-depth development of planning concepts in specific areas of taxation to sharpen the student's planning skills and to illustrate general planning techniques. Prerequisites: ACCT 5339, 5340, 5341, 5342, and 5347, or equivalents, and either MASI 5326 or ECON 5337.

**5352. AUDIT AND CONTROL OF EDP SYSTEMS (3-0).** A study of controls needed in EDP systems, related audit problems, and approaches to using the computer as an audit tool. Prerequisites: ACCT 5329 and 5316 or equivalents. **\$10 computer fee.**

**5353. STATISTICAL AUDITING (3-0).** A study of statistical techniques used in auditing. Topics include alternative sample selection methods, regression analysis, ratio and difference esti-



## AEROSPACE ENGINEERING

mation, mean-per-unit estimation, and dollar unit sampling. Prerequisites: ACCT 5316 and BUSA 5301 or equivalents. **\$10 computer fee.**

**5362. SEC ACCOUNTING (3-0).** A study of Securities and Exchange Commission accounting and reporting requirements. The course includes a study of the societal role of the SEC and its impact on accounting and auditing. Prerequisite: ACCT 5316 or equivalent.

**5363. FINANCIAL ACCOUNTING PROBLEMS (3-0).** A study of the accounting and reporting problems associated with changing prices, income tax allocation, leases, pensions, and other relevant contemporary topics. Prerequisite: ACCT 5319 or equivalent.

**5382. INDEPENDENT STUDIES IN ACCOUNTING.** Extensive analysis of an accounting topic. Graded R. Prerequisite: consent of faculty member and department chairman.

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

**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. THESIS.** 5398 graded R/F only; 5698 graded P/F/R. Prerequisite: permission of Graduate Advisor.

**6309. SEMINAR IN ACCOUNTING RESEARCH I (3-0).** Analysis of the theoretical and empirical literature in accounting. Prerequisite: Consent of graduate advisor. **\$10 computer fee.**

**6310. SEMINAR IN ACCOUNTING RESEARCH II (3-0).** Continuation of analysis of the theoretical and empirical literature in accounting. Prerequisites: ACCT 6309 and consent of the graduate advisor.

## ADMINISTRATION PROGRAM

*See Interdepartmental and Intercampus Programs, p. 211.*

## Department of AEROSPACE ENGINEERING (AE)

### Area of Study

Aerospace Engineering

### Degrees

M.S., Ph.D.

**Master's Degree Plan:** Thesis

**Chairman:** C. W. Jiles

511 Carlisle 273-2603

**Graduate Advisor:** Jack E. Fairchild

503 Carlisle 273-2603

### Graduate Faculty:

Professors Anderson, Fairchild, Gaines, Payne, Jiles, Seath, Wilson

Associate Professor Stanovsky

Assistant Professors Kennon, Lu, Parpia, Thompson

## 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

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is developed in the context of aerospace problems, it is applicable to the engineering of any physical system. The program is designed for a student with any of the following specific objectives:

1. A sound foundation in advanced mathematics, science, and engineering which will equip him well for research and development work or for further advanced study toward a doctoral degree in engineering.
  2. A program of advanced study which allows specialization in one of the following areas:
    - a. Atmospheric flight mechanics
    - b. Stability and control
    - c. Theoretical or applied aerodynamics
    - d. Turbulence
    - e. Aerospace propulsion
    - f. Aeroacoustics
    - g. Viscous fluid mechanics
    - h. Hydro- and aero-physics of fluid pollution
    - i. Structural mechanics
    - j. Vibrations and dynamics } see Engineering Mechanics Program for course descriptions.
  - k. Gas dynamics and MHD power generation
  - l. V/STOL aerodynamics and dynamics
  - m. Computational fluid dynamics
3. A balanced but non-specialized program of advanced study in aerodynamics, astronautics, flight dynamics, structural analysis, propulsion, and fluid mechanics, with emphasis on experimental techniques and modern mathematical analysis.

## ADMISSION REQUIREMENTS

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

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

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

## CONTINUATION

The Aerospace Engineering Graduate Program, in fulfillment of its responsibility to graduate highly qualified professional engineers, has established certain policies and procedures. In addition to the requirements of the Graduate School listed elsewhere, to continue in the program each aerospace engineering graduate student must:

- (1) Maintain at least a B (3.0) overall GPA in all course work, and
- (2) Demonstrate suitability for professional engineering practice.

At such time as questions are raised by aerospace engineering graduate faculty regarding either of the above, the student will be notified and will be provided the opportunity to respond to the Committee on Graduate Studies in Aerospace Engineering. The Committee on Graduate Studies will review the student's performance and make a recommendation concerning the student's eligibility to continue in the program. Appeal of a decision on continuation may be made through normal procedures outlined in the section of this catalog entitled "Grievances Other than Grades."

## DEGREE REQUIREMENTS

All entering students must be proficient in computer programming. No graduate credit will be granted for courses that are required in the undergraduate aerospace engineering curriculum. Normally, all master's and doctoral candidates in aerospace engineering shall enroll in the Graduate Seminar (AE 5101) a minimum of three times (see course description). The final

## AEROSPACE ENGINEERING

enrollment shall require an oral presentation of thesis/dissertation results. All candidates are encouraged to obtain an approved program of work in the second full semester or after 12 hours are completed.

### Master of Science in Aerospace Engineering

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

### Doctor of Philosophy

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

**The grade of R (research in progress) is a permanent grade. An incomplete (the grade of X) cannot be given in a course which is graded R. To receive credit for an R-graded course the student must continue to enroll in the course until a passing grade is received. Three-hour thesis and three- and six-hour dissertation courses are graded R/F only. The grade of P (required for graduation) can be received in six- or nine-hour thesis courses and nine-hour dissertation courses only. In the course listings below, R-graded courses are designated either "Graded P/F/R" or "Graded R." (See also the section entitled "R" GRADE on p. 36 of this catalog.)**

**5101. GRADUATE SEMINAR (1-0).** May be repeated as often as required. Enrollment mandatory for first semester graduate students and for students enrolled in thesis, dissertation, or research courses. Purpose is to acquaint peers and faculty with research in progress at UT Arlington. During total enrollments in this course, student is 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.

**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. **\$10 computer fee.**

**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. **\$10 computer fee.**

**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. **\$10 computer fee.**

**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. **\$10 computer fee.**

**5305. LAMINAR BOUNDARY LAYERS (3-0).** Conservation laws of a viscous fluid developed from integrated viewpoints. Prandtl's boundary-layer concepts and applications. Lie group theory provides scaling laws for solutions including jet, wake, stagnation flows. Similarities include Stokes, Heimenz, Falkner-Skan, von Karman, and Pohlhausen. Singular perturbations provide "Triple deck" modeling. Emphasis upon laminar flow. Prerequisite: a course in fluid mechanics. **\$15 computer fee.**

**5306. TURBULENT BOUNDARY LAYERS (3-0).** Flow stability and transition as precursors of turbulence introduced. The Reynolds' equations, eddy viscosity, "Law of the wall," and "Law of the wake" lead to calculational schemes exercised upon computer. Statistical measurements, correlations, spectra ("PSD"), skewness and kurtosis treated from a phenomenological, not a probabilistic view point. Emphasis upon developing insights for calculation, measurement and modeling. Prerequisite: AE 5305 or approval of instructor. **\$15 computer fee.**

**5307. HELICOPTER DYNAMICS (3-0).** Introduction to blade flapping motion. Comparisons of hub types and number of blades. Effects of in-plane and torsional deflections. Aeroelastic effects and couplings. Coupling between rotor and fuselage. Ground resonance. Fuselage vibrations.

## AEROSPACE ENGINEERING

- 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. **\$15 computer fee.**
- 5309. V/STOL STABILITY AND CONTROL (3-0).** Rotor control system kinematics and dynamics. Manual control strategies. System stability and control analysis. Stability augmentation system design. Prerequisite: AE 5312. **\$10 computer fee.**
- 5311. ADVANCED ASTRONAUTICS (3-0).** Topics include orbital mechanics, Keplerian mechanics, orbit determination, perturbations, numerical techniques, and applied optimal estimation. Course may be repeated for credit as topics change.
- 5312. ADVANCED DYNAMICS OF FLIGHT (3-0).** Matrix-tensor development of equations of motion. Laplace transform analysis of response to control and gust inputs. Stability analysis by Bode and Root Locus Methods. Stability augmentation system synthesis. **\$10 computer fee.**
- 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. **\$15 computer fee.**
- 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. 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 and a course in fluid mechanics. **\$10 computer fee.**
- 5319. MATHEMATICAL FOUNDATIONS OF 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 and a course in fluid mechanics. **\$10 computer fee.**
- 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. **\$10 computer fee.**
- 5321. LARGE-SCALE STRUCTURE OF TURBULENT SHEAR FLOWS (3-0).** The nonlinearities ("Large Eddy" and "Spectral Transfer") of "real" turbulence and their implications for design of submerged vehicles. "Second" order approaches have been successful in predicting values and variation of the "eddy viscosity" function. Prerequisite: approval of instructor. **\$10 computer fee.**
- 5323. AERODYNAMICS OF WINGS AND BODIES II (3-0).** Nonlinear phenomena in aerodynamics, including flow separation, vortex formation, vortex asymmetries, and vortex interactions with wings and bodies. Prerequisite: AE 5303 or equivalent.
- 5324. EXPERIMENTAL AERODYNAMICS I (2-3).** Similarity theory, design of experiments, uncertainty analysis, data acquisition/processing systems. Introduction to basic experimental techniques for pressure, temperature, velocity, force, moment, heat transfer measurement. Optical flow visualization/diagnostics techniques. **\$20 lab fee.**
- 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. **\$15 computer fee.**

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**5327. COMPUTATIONAL AERODYNAMICS I (3-0).** Solution of engineering problems by finite-difference methods, emphasis on aerodynamic problems characterized by single linear and non-linear equations, introduction to and application of major algorithms used in solving aerodynamics problems by computational methods. Prerequisite: consent of instructor. **\$15 computer fee.**

**5328. COMPUTATIONAL AERODYNAMICS II (3-0).** Review of fundamental equations of aerodynamics, development of methods for solving Euler, boundary-layer, Navier-Stokes, and parabolized Navier-Stokes equations, application to practical aerodynamic analysis and design problems. Prerequisite: AE 5327 or consent of instructor. **\$15 computer fee.**

**5329. GRID GENERATION METHODS IN AERODYNAMICS (3-0).** Generation of grids for numerical solution of aerodynamic analysis and design problems, generation of grids by algebraic methods, solution to differential and integral equations, application to aerodynamic flow field analysis. Prerequisites: graduate standing or consent of instructor.

**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.

**5331. INTEGRAL EQUATIONS IN ENGINEERING (3-0).** Analysis of non-linear systems in engineering using integral equations. Integration of ordinary and partial differential equations with applications to fluid systems. Prerequisite: graduate or advanced senior standing. **\$15 computer fee.**

**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 and a course in fluid mechanics. **\$30 lab fee.**

**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. **\$10 computer fee.**

**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. **\$10 computer fee.**

**5346. COMPUTATIONAL FLUID DYNAMICS I (3-0).** Introduction to finite-difference methods used in modern engineering; solution of example problems using single linear and nonlinear equations; familiarization with major algorithms used in computational fluid dynamics. Prerequisite: consent of instructor. **\$15 computer fee.**

**5347. COMPUTATIONAL FLUID DYNAMICS II (3-0).** Review of the hierarchy of equations of fluid dynamics; study of various numerical methods applied to the Euler, boundary-layer, Navier Stokes and parabolized Navier Stokes equations. Prerequisite: AE 5346 or consent of instructor. **\$15 computer fee.**

**5348. GRID GENERATION (3-0).** Generation of grids for numerical solution of PDE's governing physical systems; grids generated by algebraic means, solutions to PDE's, and integral equations in multidimensional problems and in simply and multiply connected domains. Prerequisites: graduate standing and consent of instructor. **\$15 computer fee.**

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

**5398, 5698, 5998. THESIS.** 5398 graded R/F only; 5698 and 5998 graded P/F/R. Prerequisite: graduate standing in aerospace engineering. Co-requisite: AE 5101.

**6310. ADVANCED HELICOPTER DYNAMICS (3-0).** Advanced aeroelastic analysis of flexible rotor blades in forward flight. Pitch-flap-lag motions coupled with rotor shaft support system flexibility and control system feedback. Cabin vibrations by normal mode analysis. Prerequisite: AE 5307.

**6311. HELICOPTER DESIGN (3-0).** Rotorcraft configuration definition starting from mission requirements. Importance of weight, cost, noise, handling qualities, and vibration on resulting configuration. Optimization techniques for selecting key design parameters.

**6312. ADVANCED GUIDANCE AND CONTROL (3-0).** Flight vehicle navigation, guidance, digital flight controls, modern control theory, and simulation. Prerequisite: advanced standing and consent of instructor. **\$10 computer fee.**

## ARCHITECTURE

**6197-6997. RESEARCH IN AEROSPACE ENGINEERING.** May be repeated for credit. Graded P/F/R. Co-requisite: AE 5101.

**6399, 6699, 6999. DISSERTATION.** Prerequisite: admission to candidacy for the Doctor of Philosophy degree. 6399 and 6699 graded R/F only; 6999 graded P/F/R. Co-requisite: AE 5101.

# ARCHITECTURE Program (ARCH)

*Area of Study*

Architecture

*Degree*

M. ARCH.

*Master's Degree Plans:* Thesis, Thesis Substitute (Design Thesis), and Non-Thesis (Advanced Studio)

*Dean, School of Architecture and*

*Environmental Design:* Edward M. Baum 203 ED Architecture 273-2801

*Director of Architecture:* Edward M. Baum 203 ED Architecture 273-2801

*Graduate Advisor:* Madan Mehta, 203 EA Architecture 273-2801

*Graduate Faculty:*

Professors Baum, Ferrier, Henry, McDermott, Mehta, Price, Scherr  
Associate Professors Boswell, Duncan, Gintole, Guy, Hamilton, Kuhner,  
Maruszczak, Pinno, Yardley  
Assistant Professors James, Lawson  
Dean Emeritus Wright  
Professor Emeritus Myrick

## OBJECTIVE

The purpose of the Master of Architecture degree program is to educate toward ultimate leadership positions within the profession of architecture.

The program emphasizes architectural design strongly informed by history, theory, and technology. It provides an intensive core of courses for those entering the field followed by a flexible series of options for advanced students.

## ACCREDITATION

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

## DEGREE REQUIREMENTS

The applicant must meet the general requirements of the Graduate School. A personal interview is recommended, and letters of reference are required. Applicants to the professional degree programs Paths B and C must submit a portfolio of work for evaluation by the School.

Undergraduate students must have approval of the Graduate Advisor prior to enrollment in graduate courses. All graduate students in architecture are required to consult the Graduate Advisor for course and schedule approval each semester prior to registration.

**Professional Degree Program: Path A**

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

A minimum of 104 credit hours in architectural design, theory, and practice is required of Path A candidates for the professional degree in architecture (M.Arch). Due to the rigor of the program (not unlike any other professional school—law or medicine), students entering this program are advised to discontinue outside employment.

With permission of the Committee on Graduate Studies, a thesis or design thesis may be substituted for the final semester of the studio course sequence. Advancement in Professional Degree Program Path A is predicated upon successful and timely completion of required course work as well as an annual review of the student's portfolio of design work by the Admissions Committee of the SAED.

In addition to completing an introductory curriculum beginning in the summer of the first semester of enrollment, students must also complete the Path B core curriculum of 39 credit hours. The core curriculum of this course of study is ARCH 5325, 5326, 5329, 5331, 5333, and 24 hours of advanced studio. Students approved by the Committee on Graduate Studies to substitute a design thesis for the last semester of the required studio sequence must also take ARCH 5363 prior to enrollment in ARCH 5693.

Electives must include at least one course from each of the following categories of courses offered by the SAED (a) history and theory (b) technology and practice, and (c) allied disciplines (landscape architecture, urban design, housing, and interior design).

**Suggested Course Sequence: Path A**

**First Year**

**Summer Semester**

- 5591 Design Studio
- 5301 Principles of Architecture
- 5342 Architectural Graphics I

**Fall Semester**

- 5592 Design Studio II
- 5323 Construction I
- 5343 Architectural Graphics II
- 5303 History of Architecture I

**Spring Semester**

- 5593 Design Studio III
- 5324 Architectural Structures I
- 5333 Construction II
- 5304 History of Architecture II

**Second Year**

**Summer Semester**

- 5594 Design Studio IV
- 5329 Architectural Computer Graphics

**Fall Semester**

- Advanced Studio 6 hours
- 5327 Architectural Structures II
- 5325 Environmental Controls I
- Electives 3 hours

**Spring Semester**

- Advanced Studio 6 hours
- 5328 Architectural Structure III
- 5326 Environmental Controls II
- Electives 3 hours

**Third Year**

**Fall Semester**

- Advanced Studio 6 hours
- 5331 Professional Practice
- 5363 Design Research  
(for design thesis option)
- Electives: 3 hours  
(design thesis option)  
6 hours  
Thesis or advanced studio options

**Spring Semester**

- Advanced Studio 6 hours  
or
- 5693 Design Thesis  
or
- 5698 Thesis
- Electives 6 hours

## ARCHITECTURE

### Professional Degree Program: Path B

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

A minimum of 54 credit hours is required for the thesis option or 57 for the design thesis and advanced studio options.

The core curriculum for this course of study is ARCH 5325, 5326, 5329, 5331, 5333, 18 hours of advanced studio, and either 5693, 5698 or advanced studio. Students in design thesis option must take ARCH 5363 prior to enrollment in ARCH 5693.

Electives must include at least one course from each of the following categories of courses offered by SAED: (a) history and theory (b) technology and practice and (c) allied disciplines (landscape architecture, urban design, housing, and interior design).

#### Suggested Course Sequence: Path B

<i>Fall Semester</i>		<i>First Year</i>	<i>Spring Semester</i>	
Advanced Studio 6 hours			Advanced Studio 6 hours	
5325 Environmental Controls I			5326 Environmental Controls II	
5333 Construction II			5329 Architectural Computer Graphics	
Electives: 3 hours			Electives: 3 hours	
<i>Fall Semester</i>		<i>Second Year</i>	<i>Spring Semester</i>	
Advanced Studio 6 hours		5698 Thesis		
5331 Professional Practice		or		
5363 Design Research (for design thesis option)		5693 Design Thesis		
Electives: 3 hours		or		
6 hours (advanced studio option)		Advanced Studio 6 hours		
		Electives: 6 hours		

### Post-Professional Degree Program: Path C

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

Thirty credit hours are required of students in Path C with thesis while 33 hours will be required of students with design thesis or advanced studio options.

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

#### Suggested Course Sequence: Path C

<i>Fall Semester</i>		<i>Spring Semester</i>	
History/Theory: 3 hours		History/Theory: 3 hours	
Advanced Studio 6 hours		Advanced Studio 6 hours	
5363 Design Research (for design thesis option)		or	
Electives: 3 hours		5693 Design Thesis	
		or	
		5698 Thesis	
		Electives: 9 hours (for design thesis or Advanced studio options)	
		6 hours (for thesis option)	



**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 87 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 Path A (see above) unless they have earned an undergraduate degree in architecture which will allow CIRP applicants to take Path B. Programs of study will follow both master's programs, with all of the 15 credit hours of electives in the MArch program to be taken in the MCRP program. In addition to the 36 credit hours of architectural core courses, the remainder of coursework will be in the City and Regional Planning program with a required thesis proposal and program of work to be jointly approved by the City and Regional Planning Division and the Architecture Program. A thesis supervisor should be selected from CIRP or SAED, and committee members could be selected from both faculties.

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.

**The grade of R (research in progress) is a permanent grade. An incomplete (the grade of X) cannot be given in a course which is graded R. To receive credit for an R-graded course the student must continue to enroll in the course until a passing grade is received. Three-hour thesis and three-and six-hour dissertation courses are graded R/F only. The grade of P (required for graduation) can be received in six- or nine-hour thesis courses and nine-hour dissertation courses only. In the course listings below, R-graded courses are designated either "Graded P/F/R" or "Graded R." (See also the section entitled "R" GRADE on p. 36 of this catalog.)**

- 5301. PRINCIPLES OF ARCHITECTURE (3-0).** A survey study of the interrelationships between society, culture and architecture. Concurrent enrollment in ARCH 5591 and 5342 required.
- 5303. HISTORY OF ARCHITECTURE I (3-0).** History of architecture from pre-history through the Middle Ages. Prerequisite: permission of instructor.
- 5304. HISTORY OF ARCHITECTURE II (3-0).** History of Architecture 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.
- 5310. AMERICAN ARCHITECTURE TO 1917 (3-0).** Detailed consideration of the architecture of the United States from the 17th century until World War I, with special attention to the great and little masters of the field. Prerequisites: ARCH 2303 and 2304.
- 5311. ARCHITECTURAL THEORY (3-0).** A review and analysis of the concepts, philosophy, ideology, and models that promulgated 20th Century architectural design. Prerequisite: permission of instructor. May be repeated for credit as topics change.
- 5313. HISTORIC RESTORATION AND ADAPTIVE RE-USE (3-0).** Investigation of methods and procedures used in restoration of buildings, including building diagnostics, re-fabrication of architectural details, cleaning and waterproofing, structural investigation and reinforcement; examination of office procedures and practice, production of measured drawings, photogrammetry, code investigation, working drawing techniques and problems of aesthetic integrity/design retrofit.
- 5314. HISTORIC PRESERVATION (3-0).** Concepts of historic preservation as expressed in legislation, institutions and actual projects. Lectures and case studies designed to familiarize the student with methods of architectural and bibliographic research, preservation legislation, historic certification procedures, economic strategies, and current problems in adaptive use of historic landmarks.
- 5315. TOPICS IN ARCHITECTURAL HISTORY (3-0).** Courses to explore and present selected topics in architecture and related fields of the Ancient Mediterranean, the Classical World, the Middle Ages, the Nineteenth Century, and the Non-Western Traditions. May be repeated for credit as topics change. Prerequisite: permission of instructor.

## ARCHITECTURE

- 5316. MODERN ARCHITECTURE I: 1890 TO 1945 (3-0).** Origins and development of Modern Architecture in Europe from 1890 to World War II, and its further evolution in Europe and America from 1918 to 1945. Prerequisites: ARCH 2303 and 2304.
- 5317. MODERN ARCHITECTURE II: 1945 TO PRESENT (3-0).** Architectural developments in Europe, Asia, and America since World War II. Prerequisites: ARCH 2303 and 2304.
- 5318. RENAISSANCE ARCHITECTURE (3-0).** Detailed consideration of Renaissance and Mannerist architecture in Europe of the 15th and 16th centuries. Prerequisite: 2304 or equivalent.
- 5319. HOUSING DESIGN (3-0).** Evolution of housing from the end of the 19th century to the present with particular emphasis on contemporary design methods, techniques and solutions.
- 5320. BAROQUE ARCHITECTURE (3-0).** Detailed consideration of Baroque architecture in Europe from 1600 until about 1750. Prerequisite: ARCH 2304 or equivalent.
- 5321. ADVANCED COMPUTER APPLICATIONS (3-0).** The study and application of specialized computer programs in environmental design. Prerequisite: ARCH 4329 or 5329 or the equivalent, and permission of the instructor. **\$15 computer fee.**
- 5323. CONSTRUCTION I (3-0).** Construction materials and structural concepts as used in buildings. Prerequisite: permission of instructor.
- 5324. ARCHITECTURAL STRUCTURES I (3-0).** Statics, strength of materials and simple structural systems in buildings. Prerequisite: permission of instructor.
- 5325. ENVIRONMENTAL CONTROL SYSTEMS (3-0).** Illumination, acoustics, climate controls, mechanical and electrical systems, and their significance in the total design.
- 5326. ENVIRONMENTAL CONTROL SYSTEMS (3-0).** Continuation of ARCH 5325.
- 5327. ARCHITECTURAL STRUCTURES II (3-0).** Continuation of ARCH 5324 with emphasis on structural theory and systems in wood and steel. Prerequisite: ARCH 5324.
- 5328. ARCHITECTURAL STRUCTURES III (3-0).** Continuation of ARCH 5327 with emphasis on structural theory and systems in masonry and reinforced concrete. Prerequisite: ARCH 5327.
- 5329. ARCHITECTURAL COMPUTER GRAPHICS (3-0).** Computer aided design, drafting and graphic techniques as applied to architecture. Prerequisite: permission of the instructor. **\$15 computer fee. \$10 lab fee.**
- 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. **\$5 computer fee.**
- 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 II (3-0).** Advanced construction assemblies and methods, including the principles of cost estimating and control. Prerequisites: ARCH 5323.
- 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.
- 5341. DEVELOPMENT PROCESSES (3-0).** Comprehensive study of the principles and institutions involved in the process of building development from concept to occupancy.
- 5342. ARCHITECTURAL GRAPHICS I (2-4).** Architectural drawing, perception, projections, and three dimensional representation. Concurrent enrollment in ARCH 5591 is required.
- 5343. ARCHITECTURAL GRAPHICS II (2-4).** A continuation of ARCH 5342 with emphasis on more advanced techniques: composition, tone, shades and shadows, and color. **\$2 lab fee.**
- 5344. CONCEPTUAL DRAWING (3-0).** Seminar to explore aspects of conceptual drawing for the architect and the relationship of design ideas in the drawing process.
- 5363. DESIGN RESEARCH (3-0).** Seminar directed toward the understanding of research methods and the programming of an independent design project, leading to the thesis substitute. Graded R.
- 5670. ADVANCED DESIGN STUDIO: URBAN DESIGN (3-9).** Studio course emphasizing the analysis and design of building aggregations within the urban context. May be repeated for credit. **\$13 lab fee.**
- 5671. ADVANCED DESIGN STUDIO ARCHITECTURAL PROJECTS (3-9).** Studio course in the generation and subsequent development of architectural ideas in buildings. May be repeated for credit. **\$13 lab fee.**

**5672. ADVANCED DESIGN STUDIO: SPECIAL PROJECTS (3-9).** Studio course in the generation and subsequent development of architectural ideas in selected building types. May be repeated for credit. **\$13 lab fee.**

**5591. DESIGN STUDIO I (3-9).** An intensive studio course in architectonic theory and operations. Emphasis on analytic, conceptual, and manipulation procedures. **\$13 lab fee.**

**5592. DESIGN STUDIO II (3-9).** Continuation of ARCH 5591. Studio course emphasizing the interrelationship of formal/spatial ideas, use, and the building fabric. Prerequisite: ARCH 5591. **\$13 lab fee.**

**5593. DESIGN STUDIO III (3-9).** Continuation of ARCH 5592. Studio course emphasizing the interrelationship of formal/spatial ideas, use, and the building fabric with special attention to the urban context. Prerequisite: ARCH 5592. **\$13 lab fee.**

**5594. DESIGN STUDIO IV (3-9).** Continuation of ARCH 5593. Emphasis on complex building designs in urban environments. Off campus study may be substituted. **\$13 lab fee.**

**5693. DESIGN THESIS.** Individual study project conducted by a supervising committee with program and statement of intent filed with the Graduate Advisor during the previous semester. Graded R. 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. Students may enroll in 5381 for half-time employment or 5681 for full-time employment. Students enrolled in Practicum may also participate in the Intern Development Program of the American Institute of Architects. No more than six total credit hours in Practicum are allowed for degree. Graded P/F/R.

**5191, 5291, 5391. CONFERENCE COURSE.** Special subjects and issues as arranged with individual students and faculty members. May be repeated for credit. Graded P/F/R.

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

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

## Department of ART (ART)

### Area of Study

Humanities (See Interdepartmental  
and Intercampus Programs.)

### Degrees

M.A., Ph.D.

Chairman: William Spurlock

335 Fine Arts 273-2891

### Graduate Faculty:

Professor Bruno  
Associate Professor Rascoe  
Assistant Professor Wright

### OBJECTIVE

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

**The grade of R (research in progress) is a permanent grade. An incomplete (the grade of X) cannot be given in a course which is graded R. To receive credit for an R-graded course the student must continue to enroll in the course until a passing grade is received. Three-hour thesis and three-and six-hour dissertation courses**

## BIOLOGY

are graded R/F only. The grade of P (required for graduation) can be received in six- or nine-hour thesis courses and nine-hour dissertation courses only. In the course listings below, R-graded courses are designated either "Graded P/F/R" or "Graded R." (See also the section entitled "R" GRADE on p. 36 of this catalog.)

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

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

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

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

**6391. READINGS IN ART HISTORY.**

## Department of BIOLOGY (BIOL)

### *Areas of Study*

Biology

### *Degree*

M.S.

Mathematical Sciences

Ph.D.

(See Interdepartmental and Intercampus Programs.)

### *Master's Degree Plans: Thesis and Non-Thesis*

*Chairman:* Edmund D. Brodie, Jr.                      337 Life Science      273-2871

*Graduate Advisor:* John D. Bacon                      B17A Life Science      273-2400

### *Graduate Faculty:*

Professors Arnott, Bragg, Brodie, Hall, Hellier, McCrady, McDonald, McMahon

Associate Professors Bacon, Boley, Chrzanowski, Frye, Keller, Neill, Robinson, Stewart, Whitmore

Assistant Professors Campbell, Smatresk

Professor Emeritus Pyburn

## OBJECTIVE

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

## ADMISSION

In addition to the general regulations and admission requirements stated elsewhere in this catalog, the student must present to the department a satisfactory score on the Graduate Record Examination. International students whose native language is not English must present a minimum TOEFL score of 575.

**Animal Behavior Option:** Study in the area of animal behavior is offered jointly by biology and psychology graduate programs. Students specializing in animal behavior may initially enroll in the Master of Science program in either biology or psychology. There are a number of biology and psychology courses offered within this specialization. Upon successful completion of the M.S. degree in either biology or psychology, students may enter the doctoral program in psychology provided that they meet the admission requirements for this program (see below). Students initially entering the biology master's program may substitute Animal Behavior 5335 for one of the psychology core curriculum requirements.

## DEGREE REQUIREMENTS

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

The non-thesis plan is designed to meet the needs of practicing teachers or those intending to enter the teaching profession. Students enrolled in the non-thesis option are required to take 24 hours of formal coursework in biology plus two hours of 5101, and 5391. Students enrolled in the thesis-plan program are required to take 18 hours of formal course work, two hours of 5101, 5698, and sufficient additional hours to complete degree requirements.

**The grade of R (research in progress) is a permanent grade. An incomplete (the grade of X) cannot be given in a course which is graded R. To receive credit for an R-graded course the student must continue to enroll in the course until a passing grade is received. Three-hour thesis and three- and six-hour dissertation courses are graded R/F only. The grade of P (required for graduation) can be received in six- or nine-hour thesis courses and nine-hour dissertation courses only. In the course listings below, R-graded courses are designated either "Graded P/F/R" or "Graded R." (See also the section entitled "R" GRADE on p. 36 of this catalog.)**

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

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

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

**5290. EXPERIMENTAL METHODS IN BIOLOGY (1-3).** Theory and practice of commonly used techniques in biological research. Content may be routinely changed to provide a wider scope of methods than can be offered in one semester. **\$10 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.

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

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

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

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

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

## **BIOLOGY**

- 5314. BIOMETRY (3-0).** An examination of statistical methods and procedures in relation to the design of biological experiments and the analysis of their results. Prerequisite: consent of instructor.
- 5315. COMMUNITY ECOLOGY (3-0).** An investigation of the effects of interspecific interactions on the distribution and abundance of organisms. Prerequisite: consent of the instructor.
- 5316. ADVANCED EVOLUTIONARY BIOLOGY (3-0).** An analysis of existing biological phenomena with regard to their selective advance in biological systems. Prerequisite: 5311 or consent of instructor.
- 5320. BIOGEOGRAPHY (3-0).** The role of natural and artificial transport, population pressure and limiting agencies are examined in the light of the patterns of distribution of living organisms. Prerequisite: consent of instructor.
- 5335. ANIMAL BEHAVIOR (3-0).** Phylogenetic approach to some basic problems in behavior, with special emphasis on unlearned behavior. Same as PSYC 5335.
- 5339. PHYSIOLOGICAL ECOLOGY (3-0).** Survey of the physiological adaptations of animals to their environments. Emphasizes physiological variation and acclimation and the evolution of physiological processes. Prerequisite: consent of the instructor.
- 5341. PLANT ECOLOGY (2-3).** Development and structure of; plant communities; interactions of environmental factors and of organisms within a community; literature in plant ecology. Prerequisite: consent of instructor. **\$10 lab fee.**
- 5342. ICHTHYOLOGY (2-3).** Classification, anatomy, physiology and natural history of fishes. Prerequisite: consent of instructor. **\$10 lab fee.**
- 5343. HERPETOLOGY (2-3).** Systematics, speciation and adaptive mechanisms of reptiles and amphibians. Prerequisite: consent of instructor. **\$10 lab fee.**
- 5344. MAMMALOLOGY (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. **\$10 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. **\$20 lab fee.**
- 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. **\$10 lab fee.**
- 5351. BIOLOGICAL ULTRASTRUCTURE (3-0).** Techniques of analyzing ultrastructure 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. **\$30 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. **\$30 lab fee.**
- 5354. MEDICAL MYCOLOGY (2-3).** Study of representative fungi pathogenic in men and other animals. Methods and techniques used in studying these fungi and common contaminants. Prerequisite: 12 hours of biological science including a course in microbiology and mycology or permission of instructor. **\$30 lab fee. \$10 microscope fee.**
- 5355. AQUATIC BIOLOGY (2-3).** Ecological relationships in aquatic ecosystems with emphasis on those of freshwater; laboratory concerned with the pond, stream, and reservoir habitats of the Southwest. Prerequisite: BIOL 4347 or consent of instructor. **\$30 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. **\$10 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. Graded P/F/R.

## **BUSINESS ADMINISTRATION**

**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. Prerequisite: consent of instructor. **\$30 lab fee.**

**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. **\$30 lab fee.**

**5447. PLANKTON ECOLOGY (3-3).** Overview of current theory and techniques associated with studies of phytoplankton and zooplankton ecology, including physiological adaptations, life history strategies, competition, grazing and temporal and spatial organization. Emphasis on reservoir systems. Prerequisites: BIOL 3455 or 4347; one ecology course, or instructor's permission. **\$10 lab fee.**

**5449. PARASITOLOGY (3-3).** Lecture deals with ecology of parasites, morphologic and physiologic adaptations to parasitic way of life, host adaptations to parasitism, and effects of parasites on hosts. Laboratory deals with clinical and veterinary parasitology, animal dissections, diagnosis of parasitic infections, and identification of parasites. Prerequisite: 16 hours of laboratory biology. **\$30 lab fee. \$10 microscope 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. **\$10 lab fee.**

**5398, 5698, 5998. THESIS.** 5398 graded R/F only; 5698 and 5998 graded P/F/R. 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 Graduate School Regulations.

**4312. INTRODUCTION TO VIROLOGY**

**4315. GENERAL ENDOCRINOLOGY**

**4340. PLANT PHYSIOLOGY**

**4343. PLANT ANATOMY**

**4357. RESEARCH METHODS IN CELL BIOLOGY**

**4361. METHODS OF IMMUNOLOGY**

**4392. BIOLOGICAL MATERIALS FOR TEACHERS**

**4445. ADVANCED GENERAL MICROBIOLOGY**

**4465. PHYCOLOGY**

**4680. FIELD BIOLOGY**

## **BIOMEDICAL ENGINEERING Program**

*See Interdepartmental and Intercampus programs, p. 218.*

## **BUSINESS ADMINISTRATION Program**

*See Interdepartmental and Intercampus Programs, p. 222.*

## CHEMISTRY

# Department of CHEMISTRY (CHEM)

### Areas of Study

### Degrees

Chemistry	M.S.
Applied Chemistry	D.Sc.
Mathematical Sciences (See Interdepartmental and Intercampus Programs.)	Ph.D.

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

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

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

### Graduate Faculty:

Professors Baker, Brown, Francis, Girardot, Martin, Marynick  
Pomerantz, Schelly, Ternay, Timmons  
Associate Professors Bellion, Rajeshwar  
Assistant Professors Blau, Reynolds, Shaffer, White, Wright

## OBJECTIVE: MASTER OF SCIENCE

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

## MASTER'S DEGREE REQUIREMENTS

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

### 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, 5309, 5311, 5315 and 5321. Electives may be senior or graduate division courses in a science or engineering subject selected by the candidate with the approval of the Graduate Advisor.

### Master's Degree With Thesis Substitute

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

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



## Combined BS/MS Program

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

## OBJECTIVE: DOCTOR OF SCIENCE

The program leading to the Doctor of Science in Applied Chemistry is designed primarily to prepare doctoral-level chemists for industrial research careers. The student must (1) acquire the practical knowledge of the type of research conducted in industry and of the constraints (both practical and philosophical) under which such research is conducted; and, (2) demonstrate the ability to carry out independent research. The areas of research include analytical chemistry, biochemistry, bioinorganic chemistry, colloid and surface chemistry, electrochemistry, inorganic chemistry, medicinal chemistry, organic chemistry, physical chemistry, polymer chemistry, and theoretical chemistry.

## D.SC. DEGREE REQUIREMENTS

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

Each candidate must complete the following program requirements:

(1) Core courses:

- CHEM 5301** Physical Chemistry
- CHEM 5309** Organic Chemistry I
- CHEM 5315** Inorganic Chemistry
- CHEM 5311** Analytical Chemistry
- CHEM 6200** Industrial Chemical Problems Seminar
- CHEM 6201** Unit Operations
- CHEM 6202** Principles of Industrial Chemistry
- CHEM 6203** Regulatory of Industrial Chemistry
- IE 5327** Information Systems for Engineering Management Decisions
- ECON 5309** Economic Analysis I

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

(3) A student specializing in organic chemistry will also have the following as required courses: **CHEM 5308**, **CHEM 5310**, and **CHEM 5312**.

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

After admission to the doctoral program the student must successfully complete the appropriate examination(s) required by the faculty of the student's discipline. The candidate must demonstrate proficiency in an approved computer language.

The grade of R (research in progress) is a permanent grade. An incomplete (the grade of X) cannot be given in a course which is graded R. To receive credit for an R-graded course the student must continue to enroll in the course until a passing grade is received. Three-hour thesis and three- and six-hour dissertation courses are graded R/F only. The grade of P (required for graduation) can be received in six- or nine-hour thesis courses and nine-hour dissertation courses only. In the courses listings below, R-graded courses are designated either "Graded P/F/R" or "Graded R." (See also the section entitled "R" GRADE on p. 36 of this catalog.)

## CHEMISTRY

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

**5139. SCIENCE OF GLASSBLOWING (1-3).** Structure and physical properties of glasses. Basic techniques of glassblowing: Scientific and artistic uses of glass. Graded P/F only. **\$12 lab fee.**

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

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

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

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

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

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

**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 5310, 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 2322 or equivalent.

**5309. ORGANIC CHEMISTRY I (3-0).** Bonding, structure, stereochemistry; substituent effects, kinetics, isotope effects, solvent effects, and linear free-energy relationships in determining reaction mechanisms; acids and bases, orbital symmetry, and pericyclic reactions. Prerequisites: CHEM 2322 and 3322 or equivalent.

**5310. ORGANIC CHEMISTRY II (3-0).** A survey of organic reaction mechanisms; nucleophilic and electrophilic substitution, rearrangement, addition, elimination, free-radical, and photochemical; the effects of structure and experimental conditions. Prerequisite: CHEM 5309 or permission.

**5311. ANALYTICAL CHEMISTRY (3-0).** Survey of sampling theory, practice, and data processing; optical methods of analysis; electroanalytical methodology; miscellaneous analyses including flow systems, x-ray and thermal methods, and surface-sensitive techniques; chromatographic methods. Prerequisite: CHEM 4461 or equivalent.

**5312. ADVANCED ORGANIC SYNTHESIS (3-0).** Synthetically important reactions, strategy in organic synthesis using retrosynthetic analysis and mechanistic understanding of reactions, synthons, asymmetric synthesis. Prerequisite: CHEM 5310 or permission of instructor.

**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 degradation 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. METABOLISM AND REGULATION (3-0).** Selected topics in advanced metabolism including biosynthesis of phospholipids, steroids, porphyrins and related molecules, and prostaglandins. Following a description of membranes and transport phenomena, regulation of glycogen and glucose metabolism in muscle and lipid metabolism in adipose tissue is discussed. Prerequisite: CHEM 5320 or permission of the instructor.

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

**5325. ENZYMOLOGY (3-0).** A comprehensive study of enzymes including structures, reaction mechanisms, regulation, and kinetics. Prerequisite: CHEM 5320.

**5327. BIOCHEMICAL GENETICS (3-0).** Aspects of the biochemistry of gene expression in prokaryotic and eukaryotic organisms, its regulation and control, together with genetic manipulations, and the methodology of recombinant DNA technology. Prerequisite: CHEM 5320.

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

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

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

**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.

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

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

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

**5350. ADVANCED POLYMER CHEMISTRY (3-0).** Synthesis, degradation, physical chemistry polymer characterization methods; applications and recent advances in polymer science. Prerequisite: consent of instructor.

**5461. ANALYTICAL INSTRUMENTATION (2-8).** Theory of instrumentation and chemical signal source with emphasis on industrial problems. Practical experiments utilizing atomic and

## **CITY AND REGIONAL PLANNING**

molecular absorption and emission spectroscopy, chromatographic analysis, and electrochemical techniques. Prerequisite: CHEM 3322 or equivalent. **\$5 computer fee. \$20 lab fee.**

**5191-5691. READINGS IN CHEMISTRY.** Conference course which may be repeated for credit, with credit granted according to work performed. Graded P/F/R 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. Graded P/F/R.

**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.** 5398 graded R/F only; 5698 and 5998 graded P/F/R. Prerequisite: permission of instructor.

**6200. INDUSTRIAL CHEMICAL PROBLEMS SEMINAR (2-0).** Preparation and oral presentation of technical reports dealing with typical industrial problems; discussion topics selected with the assistance of the instructor. Graded P/F only.

**6201. UNIT OPERATIONS (2-0).** Survey of measurement and control techniques, and the fundamentals of physical and chemical industrial processes. Prerequisite: CHEM 3322 or equivalent or permission of instructor.

**6202. PRINCIPLES OF INDUSTRIAL CHEMISTRY (2-0).** Survey of industrial inorganic and organic chemical processes. Prerequisite: permission of instructor.

**6203. REGULATORY ASPECTS OF THE CHEMICAL INDUSTRY (2-0).** Survey of chemical toxicology, regulatory aspects involved in the chemical industry, industrial safety, patents and patent law.

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

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

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

**6399, 6699, 6999. DISSERTATION.** 6399 and 6699 graded R/F only; 6999 graded P/F/R. Prerequisite: admission to candidacy for the degree of Doctor of Science in Applied Chemistry.

**DISSERTATION See also Mathematical Sciences.**

## **CITY AND REGIONAL PLANNING**

*See Interdepartmental and Intercampus Programs, p. 230.*

# Department of CIVIL ENGINEERING (CE)

## Area of Study

Civil Engineering

## Degrees

M.S., M.ENG.R., Ph.D.

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

*Chairman:* Clinton E. Parker 425 New Engineering 794-5055

*Graduate Advisor:* James C. Armstrong 417 New Engineering 273-2201

## Graduate Faculty:

Professors Everard, Huang, Matthys, Nedderman, Parker, Poor,  
Qasim, Yuan

Associate Professors Armstrong, Clark, Crosby, Petry,  
Spindler

Assistant Professor Williams

Senior Lecturer Argento

Professor Emeritus Haynes

## OBJECTIVE

The graduate program provides opportunities for advanced professional development in such forms as: instructional courses to enhance technical competence; guided studies under faculty supervision to comprehend special topics; and training in design, development, and research to advance the state-of-the-art of civil engineering.

A student, with the assistance of a faculty advisor, may plan a program in the following fields of specialization within civil engineering: (1) Geotechnical (Soil Mechanics and Foundations); (2) Sanitary and Environmental; (3) Structures; (4) Transportation (Traffic, Highways, Transit); (5) Urban Planning; (6) Water Resources (Hydraulics-Hydrology). It is the intent of the department to provide the student an opportunity to study topics of interest in the forefront of the specialty areas in civil engineering. Course numbers CE 5300 and CE 6300 are used to provide a formal offering of advanced and special topics. Content of courses offered under these numbers will vary depending upon the specific interest and needs of our students. Examples of topics in the specialty areas are: *Structures:* Earthquake Engineering, Advanced Mechanics of Materials, Non-linear Finite Element; *Water Resources:* Ground Water Modeling, Estuarine Hydraulics, Water-wave Mechanics; and *Sanitary and Environmental:* Advanced Dispersion Modeling, Analysis of Pollutant Characteristics, Water Quality Modeling, Determination of Trace Pollutants.

## ADMISSION

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

For applicants with no prior training in civil engineering, the same minimum criteria will apply; in addition, their records will be reviewed in relation to the intended program of study. Probationary status with specific remedial work required may be a basis for acceptance of such applicants.

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

Applicants for the PhD program must have a master's degree or its equivalent and must

## **CIVIL ENGINEERING**

meet, as well, all requirements stated above in both undergraduate and graduate work. The applicant shall also demonstrate through previous academic preparation the potential to carry out independent research in civil engineering.

### **CONTINUATION**

The Civil Engineering Graduate Program, in fulfillment of its responsibility to graduate highly qualified professional engineers, has established certain policies and procedures. In addition to the requirements of the Graduate School listed elsewhere, to continue in the program each civil engineering graduate student must:

- (1) Maintain at least a B (3.0) overall GPA in all course work, and
- (2) Demonstrate suitability for professional engineering practice.

At such time as questions are raised by civil engineering graduate faculty regarding either of the above, the student will be notified and will be provided the opportunity to respond to the Committee on Graduate Studies in Civil Engineering. The Committee on Graduate Studies will review the student's performance and make a recommendation concerning the student's eligibility to continue in the program. Appeal of a decision on continuation may be made through normal procedures outlined in the section of this catalog entitled "Grievances Other than Grades."

### **DEGREE REQUIREMENTS**

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

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

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

### **GRADE AND GRADUATION REQUIREMENTS**

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

**The grade of R (research in progress) is a permanent grade. An incomplete (the grade of X) cannot be given in a course which is graded R. To receive credit for an R-graded course the student must continue to enroll in the course until a passing grade is received. Three-hour thesis and three- and six-hour dissertation courses are graded R/F only. The grade of P (required for graduation) can be received in six- or nine-hour thesis courses and nine-hour dissertation courses only. In the course listings below, R-graded courses are designated either "Graded P/F/R" or "Graded R." (See also the section entitled "R" GRADE on p. 36 of this catalog.)**

**5300. SELECTED TOPICS IN CIVIL ENGINEERING (3-0).** Topics of current interest in the field of civil engineering. The subject title listed in class schedule and in student record. May be repeated for credit when topic changes.

**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. **\$15 computer fee.**

- 5302. 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 granted for both CE 5302 and CE 4310. Prerequisite: CE 3341. **\$10 computer fee.**
- 5303. 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 5303. Prerequisite: CE 3341. **\$10 computer fee.**
- 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 4347 and CE 4348. **\$10 computer fee.**
- 5306. PLAIN CONCRETE (3-0).** Theories used in the design of concrete, factors affecting the properties, and behavior of material and of test specimens. Behavior of plain concrete under different types of environment and loading, such as long-time, repeated, and triaxial. Critical reviews of experimental and analytical investigations. Prerequisite: CE 4347. **\$5 computer fee.**
- 5307. STRUCTURAL TIMBER DESIGN (3-0).** Covers grade 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 3341.
- 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 3341. **\$10 computer fee.**
- 5309. 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. **\$10 computer fee.**
- 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: CSE 2306 or CE 5301, and CE 3341. **\$10 computer fee.**
- 5311. STEEL DESIGN I (3-0).** A design synthesis course for metal structures. Topics include beam columns, building connections, plastic design, rigid frame, and multistory building design. Building codes and related documents. 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. **\$10 computer fee.**
- 5313. CONCRETE DESIGN II (3-0).** Structural systems such as continuous beams, arches, continuous frames, box girders, vierendeel trusses, shear walls with columns, caissons and mat foundations. Computer methods of analysis and design utilized to study building and bridge structure. Beam methods for long shells discussed. Prerequisite: CE 4347. **\$10 computer fee.**
- 5314. STEEL DESIGN II (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.
- 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. Credit not granted for both CE 4356 and CE 5316. Prerequisites: CE 3131 and 3334.
- 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. Credit not granted for both CE 4357 and CE 5317. Prerequisites: CE 3131 and 3334.
- 5318. ANALYSIS OF RECEIVING WATERS (3-0).** Ecological response of lakes, reservoirs, streams, and estuaries from municipal and industrial waste loadings and surface runoffs.

## **CIVIL ENGINEERING**

Mathematical models for water quality prediction and planning examined and developed. Prerequisites: CE 3131 and 3334.

**5319. PRINCIPLES OF ENVIRONMENTAL HEALTH ENGINEERING (3-0).** Engineering methods of controlling communicable disease vectors, epidemiology, and a survey of public health engineering. Credit not granted for both CE 4315 and CE 5319. Prerequisite: consent of instructor.

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

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

**5324. PHYSICAL AND CHEMICAL TREATMENT PROCESSES (3-0).** 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, absorption, heat transfer, gas transfer and disinfection. Laboratory scale models are used to determine design parameters. Prerequisites: CE 3131 and 3334.

**5325. BIOLOGICAL TREATMENT PROCESSES (3-0).** 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. Prerequisites: CE 3131 and 3324. **\$10 computer fee.**

**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 3334 or 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 students 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 progression 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. Credit will not be granted for both CE 4313 and CE 5331. **\$5 computer fee.**

**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. Credit will not be granted for both CE 4312 and CE 5332.

**5333. TRAFFIC SIGNAL SYSTEMS (3-0).** Traffic signal equipment development; currently available devices; corridor progression utilizing pretimed and actuated signals; delay and cycle length optimization techniques; control algorithms and optimizations for splits, offsets, and cycle lengths in large scale networks. Prerequisite: CE 5330 and CE 5331. **\$10 computer fee.**

**5334. 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. Prerequisite: CE 5330 and CE 5331 or consent of instructor.

**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 consent of instructor. **\$10 computer fee.**



## CIVIL ENGINEERING

- 5338. FLEXIBLE PAVEMENT DESIGN (3-0).** Stress analysis in layered pavement systems. Effects of loads, natural forces, and material quality on layer thicknesses. Current design practices for flexible highway and airfield pavements. Prerequisite: CE 4302.
- 5339. RIGID PAVEMENT DESIGN (3-0).** Stresses due to shrinkage, temperature, and load in pavement slabs; theory of rigid pavement design along with current design practices and methods of construction. Prerequisite: CE 4302.
- 5342. 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. Prerequisite: consent of instructor.
- 5343. 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. Credit not granted for both CE 4318 and CE 5343. Prerequisite: consent of instructor.
- 5346. OPEN CHANNEL FLOW (3-0).** Steady flow in open channels. Basic principles, velocity formulas, backwater curves, flow through transitions, obstructions, and bends. Credit not granted for both CE 4358 and CE 5346. Prerequisite: CE 3305. **\$5 computer fee.**
- 5347. 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. Prerequisite: CE 4331. **\$5 computer fee.**
- 5348. 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. Prerequisite: CE 4331. **\$5 computer fee.**
- 5349. WATER RESOURCE ENGINEERING (3-0).** Engineering, planning, design, and operation of water resource projects to include water law, dams and outlet works, economics, irrigation, flood-damage mitigation, and development planning. Credit will not be granted for both CE 4359 and CE 5349. Prerequisite: CE 4331. **\$5 computer fee.**
- 5350. SEDIMENT TRANSPORTATION (3-0).** Sediment properties and measurements; bed loads and suspended load movement; erosion, scour, transportation, and deposition of sediments by flowing water; silting of reservoirs and related topics. Prerequisite: CE 5346.
- 5351. 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. Prerequisite: CE 5346.
- 5352. ADVANCED HYDRAULIC ENGINEERING I (3-0).** Advanced concepts concerning water transmission via free and confined systems which lead to design problems for steady and unsteady flow. Includes transients and surges and topics of current interest. Prerequisite: CE 5346. **\$10 computer fee.**
- 5353. STATISTICAL HYDROLOGY (3-0).** Statistical methods and models that have been applied to hydrology and hydrologic situations, probability, random variables, distributions, hypothesis testing, regression, correlation, multivariate analysis, time series, and stochastic models. Prerequisite: CE 5347. **\$10 computer fee.**
- 5354. HYDROMETEOROLOGY (3-0).** General meteorology and climatology, atmospheric variables, cloud and precipitation physics, techniques of precipitation analysis, probable maximum precipitation, rainfall frequency and weather modification. Prerequisite: CE 5347. **\$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. Prerequisites: CE 4322, 5365, and 5366. **\$15 lab fee.**
- 5362. 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 5364. **\$15 computer fee.**
- 5363. EARTH STRUCTURES (3-0).** Study of the states of stress and analysis techniques associated with cuts, fills, and retaining structures. Stress changes due to water flow in soil along with numerical techniques. Prerequisite: CE 4321 or consent of instructor. **\$15 computer fee.**

## **CIVIL ENGINEERING**

**5364. 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 consent of instructor.

**5365. 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. Prerequisite: consent of instructor.

**5366. 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. Prerequisite: consent of instructor.

**5367. 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 5364 or consent of instructor.

**5368. SEEPAGE ANALYSIS AND EARTH DAMS (3-0).** Permeability and flow through 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. Prerequisite: consent of instructor. **\$10 computer fee.**

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

**5398, 5698, 5998. THESIS.** Reserach and preparation pertaining to the master's thesis. 5398 graded R/F only; 5698 and 5998 graded P/F/R.

**6300. ADVANCED SPECIAL TOPICS IN CIVIL ENGINEERING (3-0).** Topics of current interest in the field of civil engineering. The subject title listed in class schedule and in student record. May be repeated for credit when topic changes. Prerequisite: consent of instructor. **\$10 computer fee.**

**6301. 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. **\$10 computer fee.**

**6302. 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 5302 or consent of instructor. **\$10 computer fee.**

**6303. 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 5303. **\$10 computer fee.**

**6304. 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 5302. **\$10 computer fee.**

**6306. PUBLIC TRANSIT PLANNING AND OPERATION (3-0).** Theory and application of technologies used for transit demand analysis, routing, scheduling, evaluation, crew assignment, maintenance strategies, and management. Land-use impact on public transit policy and operation is also introduced. Prerequisite: CE 5337. **\$10 computer fee.**

**6308. PLANNING MODELS FOR TRANSPORTATION (3-0).** Analytical analysis of urban travel demand-trip generation, distribution, model split, and assignment, employing mathematical, statistical and computer techniques; principles of model development including sketch planning and state-of-the-art techniques. Prerequisite: CE 5337. **\$10 computer fee.**

**6309. TRAFFIC FLOW THEORY (3-0).** Speed, density relationships of vehicular traffic flow; statistical aspects of traffic events and queueing processes; deterministic models and simulation models of traffic flow behavior; applications of flow theory to traffic problem solutions. Prerequisite: CE 5330 and 5331.

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

**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

## CIVIL ENGINEERING

included. Problem formations, advancing tunnel headings and design of support systems. Prerequisite: consent of instructor.

**6312. 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. Prerequisite: consent of instructor.

**6314. STORMWATER MODELING (3-0).** Interpretation of hydrologic data using methods of systems analysis; hydrologic components analyzed as linear and nonlinear systems integrated into mathematical models of watershed response; optimizing model parameters with illustrative examples. Prerequisites: CE 5346 and 5347. **\$10 computer fee.**

**6315. 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. Prerequisites: CE 5346 and 5347 and three hours of Statistics-Probability. **\$10 computer fee.**

**6316. KINEMATIC WAVE THEORY (3-0).** Approximations of De Saint Venet equations by Kinematic Wave Theory applied to overland flow and stream flow; criteria for approximation and methods of linkage of infiltration, overland flow, and stream flow. Prerequisites: CE 5346 and 5347. **\$10 computer fee.**

**6323. HAZARDOUS WASTES (3-0).** Sources, chemistry, classification, and monitoring of hazardous wastes. Discussion of environmental hazards, legal aspects, transportation, detoxification, storage, and disposal and incineration. Prerequisites: CE 5324 and 5325 or consent of instructor.

**6324. DISPERSION MODELING (3-0).** Review of air pollution meteorology; pollutant dispersion calculations; utilizing Gaussian dispersion models; point, line, and area source dispersion calculations; multipoint source dispersion models utilizing computerized models; modeling results application to federal and state regulations. Prerequisite: consent of instructor. **\$10 computer fee.**

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

**6326. INDUSTRIAL WASTE TREATMENT (3-0).** Specialized physical, chemical, and biological treatment schemes required to treat specific industrial wastes. Pretreatment regulations, individual industries, and combined municipal and industrial waste treatment. Prerequisites: CE 5324 and 5325.

**6327. ADVANCED WATER QUALITY CONTROL PROCESSES (1-6).** Standard laboratory techniques for unit operations and processes in water and waste treatment. Advanced environmental engineering theories and practices, research topics, and methods. Prerequisites: CE 5324 and 5325. **\$5 computer fee. \$10 lab fee.**

**6197-6997. RESEARCH IN CIVIL ENGINEERING.** May be repeated for credit. Graded P/F/R.

**6399, 6699, 6999. DISSERTATION.** Preparation of a doctoral dissertation in civil engineering. Prerequisite: admission to candidacy for the Doctor of Philosophy degree. 6399 and 6699 graded R/F only; 6999 graded P/F/R.

A limited number (not to exceed a total of nine semester hours) of the following courses may be applicable toward the graduate degree if approved in advance by the graduate advisor.

**4312. STREET AND HIGHWAY DESIGN**

**4313. TRAFFIC ENGINEERING**

**4315. ENVIRONMENTAL HEALTH ENGINEERING**

**4318. CITY PLANNING**

**4321. FOUNDATION ENGINEERING**

**4322. SOIL STABILIZATION**

**4350. AIR POLLUTION CONTROL**

**4356. DESIGN OF MUNICIPAL WATER SUPPLY SYSTEMS**

**4357. DESIGN OF MUNICIPAL WASTE WATER TREATMENT SYSTEMS**

**4358. OPEN CONDUIT SYSTEMS**

**4359. WATER RESOURCES ENGINEERING DESIGN AND ANALYSIS**

## COMMUNICATION

# Department of COMMUNICATION (COMM)

### Areas of Study

Humanities (See Interdepartmental  
and Intercampus Programs.)  
Urban Affairs

### Degrees

M.A. Ph.D.

M.A.

Chairman: Charles Arrendell

118 Fine Arts 273-2163

### OBJECTIVE

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

### SPEECH (SPCH)

**5310. PERSUASION (3-0).** A comparison of traditional with contemporary behavioral science theories of persuasive discourse and their supporting research.

**5320. AMERICAN PUBLIC ADDRESS (3-0).** An examination of significant public discourse throughout American history considering its intellectual merit and cultural influence on American life and character.

**5330. FREEDOM OF EXPRESSION (3-0).** Reading and analysis of legal, philosophical, and rhetorical works concerned with the First Amendment, especially as applied to communication in the 20th Century.

### JOURNALISM (JOUR)

**5341. MEDIA ANALYSIS OF URBAN INDICATORS (3-0).** Analysis of media information systems for reporting social, economic, demographic, political trends in urban environment; precision reporting through use of statistical indicators, survey methodology.

**5342. SEMINAR IN COMMUNICATION LAW (3-0).** Seminar on First Amendment theoretical constructs underlying such communication concerns as libel, privacy, copyright, access to information, broadcast, advertising, information technology, obscenity, media ownership patterns.

**5343. CRITICAL ISSUES IN MEDIA PERFORMANCE (3-0).** Study of ethical, social, political issues raised in evaluating role of communication processes and institutions within society.

**5344. COMMUNICATION RESOURCES MANAGEMENT (3-0).** Impact of changing technology, societal patterns on management of communication resources, marketing patterns, information dispersement within society.

# Department of COMPUTER SCIENCE ENGINEERING (CSE)

## Areas of Study

Computer Science  
Computer Science and Engineering  
Mathematical Sciences (See Interdepartmental  
and Intercampus Programs.)

## Degrees

M.S., M.C.S., Ph.D.  
M.S., M.Engr., Ph.D.  
Ph.D.

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

*Chairman:* Bill D. Carroll 300 New Engineering 273-3785

*Graduate Advisor:* L. David Umbaugh 342 New Engineering 273-3785

## Graduate Faculty:

Professors Carroll, Hsia, Sparr, Walker  
Associate Professors Kavi, Peterson, Pierce, Stokeley, Underwood  
Assistant Professors Briggs, Banios, Grabow, Hufnagel,  
Kamangar, Lin, Raj, Umbaugh, Weems

## OBJECTIVE

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

Typical areas of concentration include artificial intelligence, architecture, CAD/CAM/CAE, database, parallel processing and networks, systems software, software engineering, microprocessor applications, graphics, image processing, formal verification and multi-level security, VLSI-based architecture.

## ADMISSION

Applicants for graduate study who have a baccalaureate degree in Computer Science or Computer Science and Engineering must meet the general requirements of the Graduate School as stated under the section entitled "Admission Requirements and Procedures."

Applicants who have limited background in Computer Science or Computer Science and Engineering but who meet all other requirements may be admitted. Such students normally must take additional courses beyond the minimums listed below. For further information, applicants may contact the Graduate Advisor.

## CONTINUATION

The Computer Science and Engineering Graduate Program, in fulfillment of its responsibility to graduate highly qualified professional engineers, has established certain policies and procedures. In addition to the requirements of the Graduate School listed elsewhere, to continue in the program each computer science and engineering graduate student must:

- (1) Maintain at least a B (3.0) overall GPA in all course work, and
- (2) Demonstrate suitability for professional engineering practice.

## **COMPUTER SCIENCE ENGINEERING**

At such time as questions are raised by computer science engineering graduate faculty regarding either of the above, the student will be notified and will be provided the opportunity to respond to the Committee on Graduate Studies in Computer Science and Engineering. The Committee on Graduate Studies will review the student's performance and make a recommendation concerning the student's eligibility to continue in the program. Appeal of a decision on continuation may be made through normal procedures outlined in the section of this catalog entitled "Grievances Other than Grades."

### **DEGREE REQUIREMENTS**

#### **Master of Science in Computer Science**

The Master of Science in Computer Science degree program is designed to develop the scholarship and research skills of the student. Thirty credit hours which include six thesis credits are required.

#### **Master of Science in Computer Science and Engineering**

The Master of Science in Computer Science and Engineering, which is intended for students with a baccalaureate degree in engineering, requires 30 credit hours of which six are thesis credits.

#### **Master of Computer Science**

The Master of Computer Science (MCS) provides professional development in computer science. The MCS requires 36 credits and includes an individual project.

#### **Master of Engineering**

The Master of Engineering in Computer Science and Engineering provides professional development in computer science and engineering to the student with a baccalaureate degree in engineering. The degree requires 36 credits and includes an individual project.

#### **PhD (Computer Science)**

The PhD in Computer Science continues the development of research and scholarship capabilities of the student. Coursework selection in each student's program is designed to support the dissertation area selected by the student.

A minimum of two semesters of full-time study is required during the dissertation phase. There is no foreign language requirement.

#### **PhD (Computer Science and Engineering)**

The PhD in Computer Science and Engineering is available to students with a prior degree in engineering. It contains essentially the same requirements as the PhD (Computer Science) degree except that it permits interdisciplinary research between Computer Science and one or more of the various engineering disciplines.

#### **PhD (Mathematical Sciences)**

See the program listing for Mathematical Sciences under "Interdepartmental and Intercampus Programs."

**The grade of R (research in progress) is a permanent grade. An incomplete (the grade of X) cannot be given in a course which is graded R. To receive credit for an R-graded course the student must continue to enroll in the course until a passing grade is received. Three-hour thesis and three- and six-hour dissertation courses are graded R/F only. The grade of P (required for graduation) can be received in six- or nine-hour thesis courses and nine-hour dissertation courses only. In the course listings below, R-graded courses are designated either "Graded P/F/R" or "Graded R." (See also the section entitled "R" GRADE on p. 36 of this catalog.**

## COMPUTER SCIENCE ENGINEERING

**5300. INTRODUCTION TO PROGRAMMING.** (3-0). Introduction to computer programming using PASCAL. Structured design and programming techniques will be emphasized. **\$15 computer fee.**

**5301. ADVANCED DATA STRUCTURES** (3-0). Analysis of algorithms for processing a variety of data structures including lists, trees, arrays, stacks, tables, files, and multilinked structures. Methods for processes such as hash coding, searching, storage allocation and management are developed. Prerequisites: CSE 5346, CSE 5345, and MATH 5355 or equivalent. **\$15 computer fee.**

**5302. COMPUTER GRAPHICS** (3-0). Input/output devices and programming techniques suitable for the visual representation of data and images. Prerequisite: MATH 1325, CSE 5301 or concurrent enrollment. **\$15 computer fee.**

**5303. DESIGN OF OPERATING SYSTEMS.** (3-0). Hardware and software techniques used in constructing operating systems for large multiprogram batch and timesharing computer systems. Includes memory management, processor scheduling, concurrent processes, job scheduling, I/O device management, and Information Management. Prerequisite: CSE 5320, 5345, and IE 5317. **\$15 computer fee.**

**5304. DESIGN AND CONSTRUCTION OF COMPILERS** (3-0). Review of programming language structures, translation, and storage allocation. Introduction to context-free grammars and their description. Design and construction of compilers including lexical analysis, parsing and code generation techniques. Error analysis and simple code optimizations will be introduced. Prerequisites: CSE 5313, CSE 5320 and 5327. **\$15 computer fee.**

**5305. THEORY OF COMPILERS** (3-0). A continuation of CSE 5304. Code-optimization techniques, error analysis. Introduction to models of programming language semantics. Issues related to the choice of intermediate languages, design of retargetable compilers, and automated compiler generators. Prerequisite: CSE 5304. **\$10 computer fee.**

**5306. ADVANCED DATABASE SYSTEMS** (3-0). Database models, data description and manipulation languages, functional dependencies and normal forms, decomposition, concurrent access and integrity. Prerequisites: CSE 5336 and 5345. **\$15 computer fee.**

**5308. COMPUTER SYSTEMS ARCHITECTURE** (3-0). A continuation of CSE 5407. Topics include parallel processors, pipelined processors, tightly coupled multiprocessors, data-flow processors, demand-driven systems, microprogrammed and nanoprogrammed computer systems. Prerequisites: CSE 5303 and 5407. **\$10 computer fee.**

**5309. ADVANCED COMPUTATIONAL METHODS FOR ENGINEERS AND SCIENTISTS I** (3-0). Selected topics from the theory and practice of using automatic digital computers for approximating arithmetic operations, approximating functions, solving systems of linear and non-linear equations, computing eigen-values and solving ordinary and partial differential equations. Prerequisite: CSE 2306 and graduate standing in engineering or science. **\$10 computer fee.**

**5313. ALGORITHMIC LANGUAGES** (3-0). Survey of higher level programming languages to solve common computational problems including numeric, character, list and data processing applications; languages such as PL/1, SNOBOL, and LISP, FORTRAN, COBOL, and PROLOG, which represent a spectrum of available languages. Prerequisites: CSE 5300 and 5319. **\$15 computer fee.**

**5315. COMPUTER NETWORKS** (3-0). Protocol and interface standards for data communication, packet switching, circuit switching, routing, traffic control, error control; data-link control, network access, transport and session protocols; local networks, Ethernet, ring topology, bus/tree topology, X.25, Arpanet, ISDN. Prerequisites: CSE 5303 (or concurrent enrollment) and CSE 5300 (or equivalent). **\$15 computer fee.**

**5316. MANAGING SYSTEM DEVELOPMENT** (3-0). Techniques for controlling the system development process; cost estimation, cost measurement, cost models, scheduling, project models, project organization, performance and cost-effectiveness models, definition of goals, risk analysis. Prerequisite: CSE 5324. **\$10 computer fee. \$10 lab fee.**

**5319. ASSEMBLY LANGUAGE** (3-0). Accelerated course for students entering the graduate computer science program. Includes a study of machine language instruction sets and assembly language programming. Prerequisite: CSE 5300 or other appropriate introductory programming course. **\$15 computer fee.**

**5320. SYSTEMS PROGRAMMING** (3-0). Program linking conventions, types of computer systems, assembler design and implementation, linkers and loaders, text editors, macro language and conditional assembly language, interrupt processing, physical I/O, and data management terminology and concepts. Prerequisite: CSE 5346 or concurrent enrollment and CSE 5319. **\$15 computer fee.**

## COMPUTER SCIENCE ENGINEERING

- 5321. SOFTWARE ENGINEERING IN ADA (3-0).** Overall objectives and philosophy of the Ada programming language; complete overview of Ada syntax and semantics; object-oriented design methods, abstract data types, high-level concurrency control and resource allocation mechanisms, interface to operating system, incremental compilation; major class project. Prerequisite: CSE 5324. **\$15 computer fee.**
- 5322. COMPUTER SIMULATION TECHNIQUES (3-0).** Study of discrete event simulation techniques for the solution of Monte Carlo processes. Survey of computer simulation languages. Prerequisites: CSE 2306 and IE 5317. **\$10 computer fee.**
- 5324. SOFTWARE ENGINEERING (3-0).** Software development issues, development life cycle, distribution of effort; techniques for specifying requirements and designs; verification and validation issues and methods; implementation issues and approaches; maintenance issues. Prerequisite: CSE 5320. **\$15 computer fee.**
- 5326. SYMBOL MANIPULATION LANGUAGES (3-0).** Study of symbol manipulation languages, including LISP and PROLOG, with application to a variety of artificial intelligence problems. Prerequisite: CSE 5313 or equivalent. **\$15 computer fee.**
- 5327. FORMAL METHODS (3-0).** Abstractions used to build correct, reliable, and efficient systems. Formal techniques for specifying abstractions and for defining hierarchies of abstractions; operational and definitional specification languages; state transition and applicative models of computation, regular expressions and context-free languages; formal logic and proof techniques as they relate to computer science. Prerequisite: MATH 3314 or equivalent. **\$15 computer fee.**
- 5329. SIGNAL PROCESSING (3-0).** Basic theoretical methods for processing digital signals are presented. Topics include: Sampling theorem, correlation and convolution, difference equations, Fourier transform, Z transform, and design of digital filters. **\$15 computer fee.**
- 5330. THE COMPUTER AND NATURAL LANGUAGE (3-0).** Survey of computer techniques and programming languages for processing natural language; provides view of current state of natural language processing as a subfield of artificial intelligence. Prerequisite: CSE 5326 or equivalent. **\$15 computer fee.**
- 5331. ARTIFICIAL INTELLIGENCE (3-0).** Survey of the methods and concepts of artificial intelligence. Prerequisites: 5326 or equivalent. **\$15 computer fee.**
- 5334. MICROCOMPUTER ORGANIZATION AND PROGRAMMING (3-0).** Study and applications of micro/mini computer systems including microprocessors and other support components which make up the microcomputer; emphasis on microcomputer programming and system design applications. Prerequisite: CSE 5407. **\$15 computer fee.**
- 5335. ADVANCED MICRO SYSTEMS DESIGN (3-0).** Advanced studies in the design and implementation of microprocessor/microcomputer based systems. Prerequisite: CSE 5334. **\$15 computer fee.**
- 5336. DATABASE SYSTEMS (3-0).** Application and implementation of file structures, including specialized structures for database management systems; database concepts, languages for data description and manipulation; hierarchical and network databases; introduction to relational databases. Prerequisites: CSE 5313 or concurrent enrollment, and CSE 5320 or concurrent enrollment. **\$15 computer fee.**
- 5337. COMPUTER SYSTEM PERFORMANCE EVALUATION (3-0).** Queueing network models and simulation for studying computer system capacity planning, hardware selection and upgrade problems, and performance evaluation. Prerequisite: CSE 5303. **\$5 computer fee.**
- 5340. ARCHITECTURE OF NON-NUMERIC PROCESSORS (3-0).** A study of non-numeric processor architectures including stack machines, associative processors, database architectures, LISP machines and inference machines. Prerequisites: CSE 5313, 5336, and 5308 or concurrent enrollment. **\$5 computer fee.**
- 5341. CONCEPTS IN CMOS VLSI DESIGN (3-0).** Analysis and design of MOS digital circuits as used in VLSI. Circuit simulation, logic simulation and timing analysis of MOS digital circuits will be presented. Techniques for subsystem design using mask geometrics manipulation systems will be covered. Prerequisite: CSE 5407 and basic knowledge of electrical circuits. **\$15 computer fee.**
- 5346. DATA STRUCTURES (3-0).** Information representations and relationship between representation and computer algorithm design, creation and manipulation of storage structures such as lists and trees; introduction to ordering techniques. Prerequisites: CSE 5300. **\$15 computer fee.**
- 5367. EXPERT SYSTEMS (3-0).** Consideration of techniques used in the construction of expert systems; examination of existing systems. Prerequisite: CSE 5331 or equivalent.
- 5407. DIGITAL LOGIC AND COMPUTER ORGANIZATION (3-3).** A design intensive course focusing on digital logic and conventional (von Neumann) computer organization; digital logic



## COMPUTER SCIENCE ENGINEERING

design, design of instruction sets, microprogrammed and hardwired control units, design of ALU, memory organizations, and design of input/output processors. Prerequisite: CSE 5319. **\$10 lab fee.**

**5191, 5291, 5391. INDIVIDUAL STUDY IN COMPUTER SCIENCE.** Topics dealing with special problems in Computer Science on an individual instruction basis. May be repeated for credit. Prerequisite: consent of the instructor. Graded P/F/R. **\$15 computer fee.**

**5392. TOPICS IN COMPUTER SCIENCE (3-0).** May be repeated for credit when the topics vary. Prerequisite: Graduate standing and consent of the instructor. **\$15 computer fee.**

**5395. MASTER'S PROJECT.** Non-thesis master's degree candidates are required to take prior to graduation. Prerequisite: consent of the graduate advisor. Graded P/F/R. **\$15 computer fee.**

**5197. GRADUATE SEMINAR (1-0).** Presentation by graduate students, faculty members, and visiting researchers. Preparation of research papers. Prerequisite: Graduate standing. Graded P/F only.

**5398 or 5698. THESIS.** Prerequisite: graduate standing in computer science. 5398 graded R/F only; 5698 graded P/F/R. **\$15 computer fee.**

**6301. ALGORITHM ANALYSIS (3-0).** Topics concerning what can and cannot be proven about computational complexity including algorithm design methodologies, techniques for analysis of space and time requirements, and P and NP completeness. Prerequisites: CSE 5303, 5304, and 5306, MATH 3318.

**6304. FORMAL LANGUAGE THEORY (3-0).** Formal grammars, finite automata, pushdown automata, Turing machines, solvable and unsolvable problems. Prerequisite: CSE 5304.

**6311. ADVANCES IN OPERATING SYSTEMS (3-0).** A formal treatment of operating system policies and algorithms. Mathematical models for determinacy, mutual exclusion, deadlock detection in both distributed and centralized operating systems will be introduced and analyzed. Prerequisites: CSE 5303 and graduate standing. **\$10 computer fee.**

**6321. DIGITAL IMAGE PROCESSING (3-0).** Digitization and coding of images, characterization and representation of digital images in spatial and frequency domain, picture restoration and enhancement, filtering of two-dimensional signals, image reconstruction. Prerequisite: CSE 5329 or equivalent. **\$15 computer fee.**

**6322. COMPUTER VISION (3-0).** This course covers various techniques for interpretation, analysis, and classification of digital images. Feature selection, Bayes decision theory, linear classifiers, syntactic algorithms, 3-d models from 2-d views, and motion detection will be discussed. Prerequisite: CSE 6321.

**6324. ADVANCED SOFTWARE ENGINEERING (3-0).** Evaluation criteria, experiment design considerations and determination of the effectiveness of techniques, tools, and methodologies in software engineering. Establishing a programming environment by integrating desired software engineering components into one unified framework. Investigating the necessary characteristics to formulate experimental software/engineering. Prerequisite: CSE 5324. **\$15 computer fee.**

**6329. KNOWLEDGE-BASED SYSTEMS (3-0).** Logic as a tool for data and query representation, deductive retrieval, and the incorporation of semantic information into databases. Prerequisites: CSE 5336 plus either CSE 5326 or knowledge of PROLOG. **\$15 computer fee.**

**6330. PARALLEL PROCESSING (3-0).** Theory and design of parallel computers. Topics include shared-memory and message-passing architectures, interconnection networks, parallel algorithms, mapping algorithms into parallel computers (including VLSI systolic array), and parallel computer programming. Prerequisite: CSE 5308. **\$15 computer fee.**

**6339. ADVANCES IN COMPUTER ARCHITECTURE (3-0).** Study of recent advances in computer architecture including language-directed, object-based, capability-based, message-based, reduced instruction set, distributed functional processor organizations. Prerequisite: CSE 5304 and 5308. **\$5 computer fee.**

**6340. DISTRIBUTED COMPUTING (3-0).** A comprehensive study of the design of distributed computing systems including architecture, operating systems, languages and databases. Prerequisites: CSE 5306, 5308, 5313, 5315 or consent of instructor. **\$10 computer fee.**

**6341. DESIGN AUTOMATION OF DIGITAL SYSTEMS (3-0).** Design automation systems for the automated synthesis of register transfer level of digital systems. Techniques for developing cell compilers, design rule checkers will be discussed. Design methods using standard cells, PLAs, gate arrays and systolic arrays will be covered. Emphasis will be on designing a digital system from a high level description. Prerequisite: CSE 5341. **\$15 computer fee.**

**6343. FAULT TOLERANT COMPUTING (3-0).** Architecture and design of fault-tolerant computing systems with emphasis on hardware and software redundancy techniques, fault-

## ECONOMICS

detection, fault-isolation, recovery, reliability and availability estimation. Prerequisite: CSE 5308. **\$5 computer fee.**

**6345. COMPUTER-AIDED-ENGINEERING SYSTEMS (3-0).** Requirements and designs of CAD and CAE systems, including both hardware and software system components. Applications of CAD and CAE will be introduced when developing system requirements. Prerequisites: CSE 5302, 5331, and 5407. **\$15 computer fee.**

**6347. DISTRIBUTED DATABASE SYSTEMS. (3-0).** Problems particular to distributed implementation of databases, including: fragmentation of relations, assignment of copies to sites, query processing, management of concurrent transactions, atomic commitment protocols, and recovery. Prerequisites: CSE 5306 and CSE 5315. **\$15 computer fee.**

**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. **\$15 computer fee.**

**6197-6997. RESEARCH IN COMPUTER SCIENCE.** Individually supervised research projects. Graded P/F/R. Prerequisite: graduate standing in computer science and approval of Graduate Advisor. **\$5-15 computer fee.**

**6399, 6699, 6999. DISSERTATION.** Preparation of dissertation in computer science or computer science engineering. See also the section on interdepartmental and intercampus programs for students in the PhD program in mathematical sciences. 6399 and 6699 graded R/F only; 6999 graded P/F/R. **\$15 computer fee.**

## CRIMINAL JUSTICE Program

*See Interdepartmental and Intercampus Programs, p. 235.*

## Department of ECONOMICS (ECON)

### Areas of Study

Economics

Business Administration (see Interdepartmental and Intercampus Programs.)

Administration (see Interdepartmental and Intercampus Programs.)

### Degrees

M.A.

M.B.A.

Ph.D.

### Master's Degree Plans: Thesis and Non-thesis

*Chairman:* John M. Trapani

309-C Business 273-3061

*Graduate Advisor:* P.M. Hayashi

319 Business 273-3257

### Graduate Faculty:

Professors Carney, Furubotn, Hayashi, Holland, Mullendore, Nelson, Trapani, Ziegler

Associate Professors Harris, McCall

Assistant Professor Himarios

## OBJECTIVE

The general purpose of the Master of Arts in economics program is to provide students an opportunity to obtain a better understanding of the economic aspects of modern society and a

greater depth of training in the discipline of economic science than is possible in a baccalaureate degree program. Specific objectives of the program are to prepare students for careers in government, business, research, and teaching and for further graduate study.

Economics is one of the areas a student may choose to study in the Doctor of Philosophy in Administration program. Additional information concerning the doctoral program is presented in the catalog under the heading Administration.

## **DEGREE REQUIREMENTS**

Applicants meeting the general admission requirements of the Graduate School, including a satisfactory score on the Graduate Record Examination, may be admitted unconditionally to the program. Other applicants may be admitted if approved by the Graduate Advisor in economics and the Graduate Dean. Applicants admitted but not having 12 semester hours of advanced courses in economics or not meeting prerequisite requirements for core courses are admitted subject to conditions assessed by the Graduate Advisor in economics.

**MASTER'S DEGREE WITH THESIS:** A minimum of 30 semester hours is required. The core requirement is ECON 5310, 5312, 5336, and the thesis (for which a six hour credit is received). Six hours of electives in economics must be chosen. The remaining nine hours of electives may be a combination of courses in economics or in a minor field. A maximum of nine hours of advanced undergraduate courses may be taken for graduate credit, with the approval of the Graduate Advisor. Not more than six hours of such courses may be in either the major or the minor field.

**MASTER'S DEGREE WITH NON-THESIS:** The non-thesis degree option is designed for students who will enter the job market upon completion of the MA degree in economics. This degree plan requires a minimum of 36 semester hours, including a core of ECON 5310, 5312, 5336 and 5329. The total may include up to nine semester hours in supporting subjects with the approval of the Graduate Advisor. A maximum of nine semester hours of advanced undergraduate work may be taken for graduate credit, with the approval of the Graduate Advisor. Successful completion of ECON 5329 satisfies the Graduate School requirement of a final master's examination.

**The grade of R (research in progress) is a permanent grade. An incomplete (the grade of X) cannot be given in a course which is graded R. To receive credit for an R-graded course the student must continue to enroll in the course until a passing grade is received. Three-hour thesis and three- and six-hour dissertation courses are graded R/F only. The grade of P (required for graduation) can be received in six- or nine-hour thesis courses and nine-hour dissertation courses only. In the course listings below, R-graded courses are designated either "Graded P/F/R" or "Graded R." (See also the section entitled "R" GRADE on p. 36 of this catalog.)**

**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.

**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.

## **ECONOMICS**

**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. **\$10 computer fee.**

**5314. INDUSTRIAL ORGANIZATION (3-0).** Relationship of pricing, advertising, research and development to market structure of an industry. Performance and objectives of firms under various forms of market organization and modes of ownership. Prerequisite: ECON 5309 or equivalent.

**5316. MATHEMATICAL ECONOMICS I (3-0).** Mathematical methods useful in economic analysis; topics include constrained and unconstrained optimization problems, comparative statics and application to economic models. Prerequisite: ECON 5309 or 5311 or the equivalent.

**5317. MATHEMATICAL ECONOMICS II (3-0).** Mathematical methods for economic dynamics and other advanced topics, including difference and differential equations, introduction to control theory, and their application to dynamic modelling. Prerequisite: ECON 5316 or equivalent.

**5318. ECONOMICS OF ENERGY (3-0).** Development of the basic economic and technical concepts needed to understand the energy issues facing business and society; the organizational structure and regulation of energy related industries, future energy technologies and the role of energy research and conservation in meeting future energy needs. Prerequisite: ECON 2306 or consent of instructor.

**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).** Study of international money and capital markets. Determination of output, balance-of-payments and exchange rates under different monetary and exchange rate regimes. Exchange rate intervention by central banks and exchange rate systems in developing countries are also discussed. Prerequisite: ECON 5311 or equivalent.

**5328. INSTITUTIONAL ORGANIZATION AND ECONOMIC BEHAVIOR (3-0).** Effects of institutional arrangements on economic behavior systematically studied; property-rights analyses applied to selected problems; consideration given to the interrelations among institutional structure, economic incentives, transactions costs, and efficiency in production and distribution. Prerequisite: ECON 5309 or equivalent.

**5329. RESEARCH METHODS IN APPLIED ECONOMICS (3-0).** Research problems and methods most commonly encountered by economists in industry and government; specific research projects required in applied areas such as corporate planning, utility rate analysis, manpower planning, micro and macro forecasting, etc.; emphasis on practical research methods and on the presentation of results in coherent written reports. Prerequisites: ECON 5310, 5312, and 5336. **\$15 computer fee.**

**5330. ADVANCED LABOR ECONOMICS (3-0).** Economics analysis of the supply of labor, the allocation of labor among alternative uses, investment in human capital, the extent and incidence of unemployment, and the determination of wages. Prerequisite: ECON 5309 or equivalent.

**5331. URBAN ECONOMICS (3-0).** Analysis of urban problems and goals with special attention given to those factors that influence the economic development of urban communities and the quality of urban life. Attention is given to policy formulation as a means for urban problem solving. Prerequisite: ECON 5309 or equivalent.

**5332. TRANSPORTATION ADMINISTRATION (3-0).** Characteristics, underlying economic principles, effective management of various transport modes. Function of transportation systems, logistics systems. Effective administration within regulated environment. Spatial element introduced to analysis. Contemporary developments, dynamic issues. Prerequisite: ECON 5309 or equivalent.

**5333. ECONOMICS OF HEALTH (3-0).** Employment of economic theory to analyze the health sector and consider problems such as rising prices and maldistribution of resources. Topics include: methods of policy evaluation, impact of national health insurance, productivity, determinants of health. Prerequisite: ECON 5309 or equivalent.

- 5335. GOVERNMENT REGULATION OF BUSINESS (3-0).** Development of a general theory to explain the origin of government regulation as a pervasive force in the American economy, affecting goods, services, and the workplace; examination of the various forms of government regulation and consideration of the costs and benefits of regulation. Prerequisite: ECON 5309 or equivalent.
- 5336. ECONOMETRICS I (3-0).** Statistical methods applied to business and economic models; topics include multiple regression, generalized linear regression, systems estimation procedures and applications. **\$15 computer fee.**
- 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. **\$15 computer fee.**
- 5338. TOPICS IN ECONOMICS. (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. Noncredit for M.A. in Economics or MBA. Prerequisite: consent of the instructor.
- 5182, 5282, 5382. INDEPENDENT STUDIES IN ECONOMICS.** Extensive analysis of an economic topic. Prerequisite: consent of instructor and department chairman.
- 5191, 5291, 5391. RESEARCH AND SPECIAL TOPICS IN ECONOMICS.** Graded P/F/R.
- 5398, 5698, or 5998. THESIS.** 5398 graded R/F only; 5698 and 5998 graded P/F/R. Prerequisite: permission of Graduate Advisor in economics.
- 6310. APPLIED MICROECONOMIC THEORY (3-0).** Applications of advanced economic theory that explain and predict the behavior of individual households, business firms, and markets, and use of which substantially improves managerial decision-making in business and government; applications such as cost-benefit analysis, transfer pricing, and utility regulation. Prerequisite: ECON 5310 and 5316 or consent of instructor.
- 6312. APPLIED MACROECONOMIC THEORY (3-0).** Applications of advanced economic theory that explain and predict the aggregate behavior of households, business firms, government, and markets, the use of which improves managerial decision-making in business and government; specific applications such as monetary and fiscal policy stimulation, forecasting, and estimation of the employment-inflation trade-off. Prerequisite: ECON 5312 and 5316 or consent of instructor.
- 6336. ECONOMETRICS II (3-0).** Advanced topics in econometrics, such as systems estimation with restrictions, time-series analysis, Bayesian econometrics, non-linear estimation and other special problems in econometrics. Prerequisite: ECON 5336 or equivalent. **\$15 computer fee.**
- 6392. RESEARCH IN ECONOMICS.** Independent research under supervision of a faculty member. Prerequisite: consent of instructor.

## EDUCATION

# Center for PROFESSIONAL TEACHER EDUCATION (EDUC)

*Director:* Charles W. Funkhouser

500 Hammond 273-2591

*Graduate Faculty:*

Professor Crow

Associate Professors Funkhouser, Leffingwell, Reinhartz

Assistant Professors Marek, Strickland, Vocke

## 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.

**5321. INTRODUCTION TO EDUCATIONAL RESEARCH (3-0).** Examination of basic concepts and procedures necessary for empirical research investigations within classroom contexts; experimental design, data collection procedures, univariate and multi-variate analysis types, computer application, data interpretation, summary report formats, and a review of research in disciplines related to classroom content/instruction. Mathematical background is not a prerequisite.

**5325. CLINICAL PRACTICES IN DIAGNOSIS AND REMEDIATION OF READING DISABILITIES (3-2).** 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.

**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)

## Area of Study

Electrical Engineering

## Degrees

M.S., M.ENGR., Ph.D.

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

Chairman: O. Robert Mitchell

523 Engineering 273-2672

Graduate Advisor: Don L. Cannon

504 Engineering 273-2671

## Graduate Faculty:

Professors Carter, Cash, M. Chen, Collins, Fitzer, Fung, Jiles, McElroy,  
Mitchell, Rao, Smith, Shoultz

Associate Professors Blanchard, Cannon, Davis, Dillon,  
Kondraske, Manry, Nunnally, Yeung

Assistant Professors Bagby, P. Chen, Chwialkowski, Lee, Magnusson,  
Shieh

## 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 Propagation, Scattering, and Microwave Systems
3. Electronics—Solid State Theory, Device and System Theory, Power Electronics
4. Energy Systems—Efficient Operation and Planning in Generation, Transmission, and Distribution, Energy Conversion
5. Information Transmission and Communication Systems
6. Digital Logic and Microprocessor Systems
7. Digital Signal Processing, Digital Image Processing, Vision Systems
8. Optics, Electro-optics and Lasers
9. Control Systems and Robotics

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 closely related disciplines may qualify for graduate study in electrical engineering after completion of a faculty-approved program of leveling courses.

Degree requirements for master's degrees are described in the general catalog section on degree offerings/requirements (pages 21-25). Master's candidates degree plan in electrical engineering may include not more than six credit hours of supporting courses in areas other than electrical engineering.

The PhD degree is a research degree. Degree requirements for the Doctoral degree are described in the general catalog section on degree offerings/requirements (pages 25-28). Specific information may be obtained by contacting the graduate advisor.

## **ELECTRICAL ENGINEERING**

### **CONTINUATION**

The Electrical Engineering Graduate Program, in fulfillment of its responsibility to graduate highly qualified professional engineers, has established certain policies and procedures. In addition to the requirements of the Graduate School listed elsewhere, to continue in the program each electrical engineering graduate student must maintain at least a B (3.0) GPA in all electrical engineering coursework and at least B (3.0) GPA in all course work.

The grade of R (research in progress) is a permanent grade. An incomplete (the grade of X) cannot be given in a course which is graded R. To receive credit for an R-graded course the student must continue to enroll in the course until a passing grade is received. Three-hour thesis and three- and six-hour dissertation courses are graded R/F only. The grade of P (required for graduation) can be received in six- or nine-hour thesis courses and nine-hour dissertation courses only. In the course listings below, R-graded courses are designated either "Graded P/F/R" or "Graded R." (See also the section entitled "R" GRADE on p. 36 of this catalog.)

**5301. ADVANCED ENGINEERING ANALYSIS (3-0).** Problems course dealing with selected analytical methods not normally included in undergraduate electrical engineering curricula. \$10 computer fee.

**5302. RANDOM SIGNALS AND NOISE (3-0).** Problems, random variables, stochastic processes in physical systems, signal detection, design of optimum filters. \$10 computer fee.

**5303. PRINCIPLES OF COMPUTER-AIDED DESIGN (3-0).** Mathematical theory and numerical techniques of problem-oriented languages and automated design. Prerequisite: consent of instructor. \$10 computer fee.

**5305. ADVANCED ELECTRONICS (3-0).** Advanced study of electronic devices, modeling, and analysis techniques. Topics include large and small device characterization, quiescent point problem, linear systems design, and nonlinear systems analysis.

**5306. 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.

**5309. SELECTED TOPICS IN ELECTRICAL ENGINEERING (3-0).** Material may vary from semester to semester. Topics are selected from current areas of electrical engineering interest. May be repeated when topic changes. \$10 computer fee.

**5310. ADVANCED LOGIC CIRCUITS (3-0).** Selected topics in switching theory and logical design, with emphasis on sequential machines and digital system implementation using integrated circuits. Prerequisite: EE 3309 or equivalent.

**5311. DIGITAL COMPUTER DESIGN (3-0).** Organization and design of digital computer systems and subsystems, using MSI and bit-slice devices. Prerequisite: EE 5310.

**5313. MICROPROCESSOR SYSTEMS (3-0).** Software developments, hardware design, and applications of 16-bit microprocessor systems. Prerequisite: EE 3310 or consent of instructor. \$10 computer fee.

**5314. ADVANCED MICROCOMPUTER SYSTEMS (3-0).** Study of advanced software development techniques and hardware design using microcomputers, 16-bit microprocessors, and modern peripheral components. Prerequisite: EE 5513 or consent of instructor.

**5317. PRINCIPLES OF INSTRUMENTATION AND MEASUREMENTS (3-0).** Design of instrumentation systems. Both digital and analog techniques are covered. Topics include signal conditioning, data acquisition, microprocessor based control, and transduction principles.

**5319. SELECTED TOPICS IN DIGITAL SYSTEMS (3-0).** Formal instructions in selected topics in digital systems and microcomputers. May be repeated when topic changes.

**5320. ROBOTICS AND AUTOMATION (3-0).** Design and analysis of control systems for robots and automation. Prerequisites: EE 4314 and EE 3310 or consent of instructor.

**5321. LINEAR SYSTEMS ENGINEERING (3-0).** Introduction to mathematical foundations of system engineering. Both continuous and discrete data systems considered.

**5323. OPTIMAL CONTROL THEORY (3-0).** Techniques in design of optimal control systems, including performance measures, dynamic programming, calculus of variations and Pontryagin's minimum principles. Prerequisite: EE 5321 or consent of instructor.

**5324. ADAPTIVE CONTROL SYSTEMS (3-0).** Adaptive theory applied to design of control systems. Prerequisite: EE 5321 or consent of instructor.



**5327. 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.

**5329. SELECTED TOPICS IN ROBOTICS (3-0).** Formal instruction in selected topics in robotics and automation. May be repeated when topic changes.

**5331. MICROWAVE SYSTEMS ENGINEERING (3-0).** Radar range equation; detection of signals in noise, radar design techniques, scattering and emission, backscatter cross section, measurement techniques, errors in radar cross section, measurements, polarimetric radar processing. Prerequisite: EE 3319 or consent of instructor.

**5332. ANTENNA SYSTEM ANALYSIS (3-0).** Fundamental parameters of antennas, potential functions and radiation integrals, wire and loop antennas, array antennas, and antenna measurements. Prerequisite: EE 4327 or consent of instructor. **\$15 computer fee.**

**5334. PROPAGATION AND SCATTERING (3-0).** Engineering techniques for propagation, absorption, and scattering calculations in the atmosphere at microwave frequencies. Engineering measurement techniques for cloud heights and rainfall rate by radar and radiometers. Atmospheric attenuation measurements in the presence of fog, rain or snow. Engineering methods of terrain scattering coefficient calculations. Prerequisite: EE 3319, EE 5306, or equivalent.

**5337. FOURIER OPTICS AND HOLOGRAPHY (3-0).** Theory of Fourier optics and holography including scalar diffraction theory, Fresnel and Fraunhofer diffraction, Fourier transforming properties of lenses, optical imaging systems, spatial filtering, and the theory and applications of holograph. Prerequisite: EE 3319 or consent of instructor. **\$15 computer fee.**

**5339. SELECTED TOPICS IN REMOTE SENSING (3-0).** Formal instruction in remote sensing. May be repeated when topic changes.

**5340. 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.

**5341. 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 5340. **\$10 computer fee.**

**5343. INTEGRATED CIRCUIT TECHNIQUES (2-3).** Fundamentals of integrated circuit processing. Prerequisite: EE 4332 or 5340. **\$10 computer fee.**

**5344. GaAs INTEGRATED CIRCUIT TECHNOLOGY (3-0).** GaAs material processing, GaAs MESFET device physics and technology, applications in both high speed digital integrated circuits and microwave integrated circuits. Development of low-noise modulation-doped FET's and heterostructure BJT's.

**5346. MICROWAVE DEVICES (3-0).** Device physics and applications of microwave semiconductors and vacuum tubes; topics include varactors, PIN diodes, avalanche devices, Gunn effect devices, transistors, traveling wave tubes, klystrons, and other active and passive devices. Prerequisite: EE 4329 or 5303 or consent of instructor. **\$10 computer fee.**

**5347. MICROWAVE CIRCUITS (3-0).** Theory of microwave circuit design; techniques include use of Kuroda identities, Richard's transformation, filters, and ABCD parameters; topics include design of couplers, transformers, filters, and resonators in coaxial lines, strip-lines, and microstrips. Prerequisite: EE 4329 or 5303 or consent of instructor.

**5349. SELECTED TOPICS IN INTEGRATED CIRCUIT TECHNOLOGY (3-0).** Formal instruction in selected topics in integrated circuit technology. May be repeated when topic changes.

**5351. DIGITAL SIGNAL PROCESSING (3-0).** Discrete linear systems; advanced design techniques for digital filters; signal flow graphs; analysis of the FFT; effects of finite wordlength on filtering operations. Prerequisite: EE 4318 or consent of instructor.

**5352. STATISTICAL SIGNAL PROCESSING (3-0).** Estimation of autocorrelations and cross-correlations; estimation of power spectral densities using the DFT; design of IIR and FIR deconvolution filters; design of Wiener filters, and robust filters; maximum likelihood estimation. Prerequisites: EE 4318 and 5302 or consent of instructor.

**5355. DISCRETE ORTHOGONAL TRANSFORMS AND THEIR APPLICATIONS (3-0).** Development of discrete orthogonal transforms such as DFT, BIFORE, Complex BIFORE, and Chirp Z-Transforms, and the application of such transforms in signal processing. Also, the development of efficient algorithms for fast computation of transforms will be discussed. Prerequisite: graduate standing or consent of instructor.

## **ELECTRICAL ENGINEERING**

**5356. 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 emphasized. Prerequisite: EE 5355 or consent of instructor.

**5359. SELECTED TOPICS IN SIGNAL PROCESSING (3-0).** Formal instruction in selected topics in signal processing. May be repeated when topic changes.

**5361. DIGITAL COMMUNICATIONS I (3-0).** Analysis and design of digital communication systems. System models, applications of convolution and correlation, matched filters, base-bound PAM systems, entropy of sequences, channel capacity, and modulation techniques such as FSK, PSK, FM-PM and AM-PM. Prerequisites: EE 4330 and knowledge of probability and random variables, or consent of instructor.

**5362. DIGITAL COMMUNICATIONS II (3-0).** Comparisons of digital modulation techniques based upon error rate performance and channel capacity. Applications of coding such as error detection and correction. Digital transmission of analog signals, sampling and reconstruction of signals, quantization of signals, PCM, and delta-modulation systems. Prerequisite: EE 5361 or consent of instructor. **\$10 computer fee.**

**5364. 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 5302.

**5369. SELECTED TOPICS IN COMMUNICATIONS (3-0).** Formal instruction in selected topics in communications. May be repeated when topic changes.

**5371. POWER SYSTEM LOAD FLOW ANALYSIS (3-0).** Solution of large sparse matrix equations and application of load flow study to power system planning and operation. Prerequisite: EE 4333 or 4303. **\$15 computer fee.**

**5372. POWER SYSTEM DYNAMICS (3-0).** Advanced theory of synchronous machines, steady-state stability, transient stability, and dynamic stability of a power system. Prerequisite: EE 4333 or 4303.

**5373. POWER SYSTEM OPERATIONS (3-0).** Economic and security methods in power system operation. Prerequisite: EE 4333 or 4303. **\$10 computer fee.**

**5374. SHORT CIRCUIT ANALYSIS AND PROTECTION OF AN ELECTRICAL POWER SYSTEM (3-0).** Power system short circuit calculations with symmetrical component models and bus impedance matrix representation. Application of system protection to faulted power system components. Prerequisite: EE 4333 or 4303 and knowledge of fundamentals of power system protection.

**5375. 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.

**5376. 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. **\$15 computer fee.**

**5379. SELECTED TOPICS IN POWER SYSTEM ENGINEERING (3-0).** Formal instruction in selected topics in power system engineering. May be repeated when topic changes.

**5380. POWER CONDITIONING (3-0).** High voltage dc, ac, and pulsed power generation techniques and circuits. Topics include dc voltage multipliers, capacitive discharge circuits, Marx generators, pulse transformers, pulse forming networks, and transmission line pulsers.

**5381. HIGH POWER PHENOMENA (3-0).** Basic principles associated with electron emission, breakdown and conduction phenomena, magnetic insulation, magnetics, and charged particle beams.

**5389. SELECTED TOPICS IN POWER CONDITIONING (3-0).** Description of operating principles and designs of high power devices such as accelerators, electromagnetic launchers, lasers, high power microwave devices, switches, and ion sources. May be repeated when topic changes.

**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.

**5191, 5391. ADVANCED STUDY IN ELECTRICAL ENGINEERING.** Individually approved research projects in electrical engineering. Graded P/F/R. **\$10 computer fee.**

**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/R. Required of all non-thesis M.S. students in the semester when they plan to graduate.

**5398, 5698. THESIS.** 5398 graded R/F only; 5698 graded P/F/R. Prerequisite: graduate standing in electrical engineering. \$10 computer fee.

**6397, 6697, 6997. RESEARCH IN ELECTRICAL ENGINEERING.** Individually approved research projects leading to a doctoral dissertation in the area of electrical engineering. Graded P/F/R.

**6399, 6699, 6999. DISSERTATION.** 6399 and 6699 graded R/F only; 6999 graded P/F/R. \$10-15 computer fee.

## ENGINEERING: INTERDISCIPLINARY

*See Interdepartmental and Intercampus Programs, p. 237.*

## ENGINEERING MECHANICS Program

*See Interdepartmental and Intercampus Programs, p. 238.*

## Department of ENGLISH (ENGL)

### *Areas of Study*

English  
Humanities (See Interdepartmental and Intercampus Programs.)

### *Degrees*

M.A.

M.A., M.A.T., Ph.D.

*Master's Degree Plan:* Thesis and Non-thesis

*Chairman:* Judith McDowell 203 Carlisle Hall 273-2692

*Graduate Advisor:* Kenneth M. Roemer 206 Carlisle Hall 273-2739

### *Graduate Faculty:*

Professors Eichelberger, Estes, Goyne, Porter,  
Roemer

Associate Professors Beaudry, Faris, Frank, Kneupper, Lacy,  
McDowell, Moffett, Reddick, Swearingen, Turbeville, Vitanza

Assistant Professors Cohen, Feehan, Ryan

## OBJECTIVES

The Department of English offers a wide variety of graduate courses to meet the needs of students with a diversity of interests and academic backgrounds who wish to enhance their awareness of their literary and cultural environment by additional formal instruction or to increase their professional competence.

Three approaches leading toward the Master of Arts in English are available: Modern Literature, Rhetoric/Composition, and Literature/Rhetoric. All programs emphasize critical reading and writing.

## ENGLISH

The Master of Arts Program with an emphasis in Modern Literature concentrates specifically on American, British, and Comparative Literature of the last three hundred years, though courses are also available in the works of earlier centuries to supplement and provide background for the study of modern literature. Emphasis on the modern period provides for great flexibility of approach. Course focus may be on broad literary movements and the transmission of ideas and techniques between national cultures and languages, on the history of dominant ideas and philosophies in (or among) the literatures in question, on the development and transformations of genres and motifs, or on single authors or works in the context of other writers and works. Courses may focus on the relationships between literature and the other arts or examine the impact on literature of other traditions of thought that form the matrix of ideas out of which literature grows. Due to the breadth and depth of its concerns, the emphasis on the modern period offers students an attractive opportunity to expand their literary horizons, to enrich their understanding of the process of human expression, and to develop techniques and methodological approaches that will enable them to deal wisely and efficiently with the literary works of art that constitute a given literature or literary tradition.

The Master of Arts Program with an emphasis in Rhetoric/Composition prepares candidates to teach in and to administer writing programs at the secondary, junior college, and university levels; it enables students to pursue research in the theory and practice of composition and rhetoric; and it provides a propaedeutic for the study of literature and other disciplines. The common core of studies in the program includes the history of the old and new rhetorics, the processes and pedagogies of reading and writing, the evaluation of student writing, the principles and theories of rhetorical invention, the methods of stylistic analysis, and the advanced principles of expository and argumentative writing. Though the emphasis is upon rhetoric/composition, complementary courses are offered in linguistics and in literary and cultural criticism—specifically in English linguistics and discourse grammar and in the classical and contemporary theories and practices of text production and analysis. Together, the courses among the complements encourage an interdisciplinary view of rhetoric and composition.

The Master of Arts Program with emphases in Literature and Rhetoric is a 36-hour, non-thesis program meeting the special needs of (1) secondary school teachers whose responsibilities include teaching both literature and writing; and, (2) students who seek the flexibility of designing a program that combines the study of literature and rhetoric. Exact selection of courses is determined in consultation with the Graduate Advisor. This program addresses the same intellectual goals of the other programs, but with greater diversity of study.

## ADMISSION OF INTERNATIONAL STUDENTS

In addition to the admission requirements set by the Graduate School, the English Department requires all International Students to have speaking, reading, and writing competence in English, to submit to the Graduate Advisor a portfolio of essays written by the applicant in English, and to complete successfully English 5392, Perspectives on Western Literature, offered annually in the Second Summer Session, before unconditional admission is granted.

## DEGREE REQUIREMENTS

The Master of Arts degree in English has thesis and non-thesis options.

The **thesis option** is a 30 hour program and requires 24 hours of coursework and at least six hours of thesis. The degree culminates with the defense of thesis. Those students who elect to write a thesis must select a topic in consultation with the supervising professor. Before the student registers for thesis, the names of the readers, the title of the thesis, a prospectus, and a bibliography of major sources must be approved by the Committee on Graduate Studies.

Within the thesis option students may elect an emphasis in either Modern Literature or Rhetoric/Composition with the following requirements:

### **Modern Literature Emphasis**

English 5335—Research and Bibliography

6 hours of Modern Literature (literature written within the last 300 years) from each literature division: American, British, and Comparative

3 hours elected from Rhetoric/Composition or Pre-18th Century Literature

6 hours thesis

**Rhetoric/Composition Emphasis**

English 5354—English Linguistics

18 hours selected from Rhetoric/Composition courses

3 hours elected from Literature, Rhetoric/Composition, or Criticism

6 hours thesis

The non-thesis option requires a 36 hour program of coursework and is culminated by a comprehensive examination on coursework. The three emphases available in the non-thesis approach are Modern Literature, Rhetoric/Composition, and Literature/Rhetoric with the following requirements:

**Modern Literature Emphasis**

9 hours of Modern Literature (literature written within the last 300 years) from each Literature division: American, British, and Comparative

9 hours elected from Pre-18th Century Literature or 6 hours of Rhetoric/Composition and 3 hours elected from any graduate course offered by the College of Liberal Arts

**Rhetoric/Composition Emphasis**

English 5354—English Linguistics

Either English 5340 or 5360

21 hours selected from Rhetoric/Composition courses

6 hours elected from Literature, Rhetoric/Composition, or Criticism

3 hours elected from any graduate course offered by the College of Liberal Arts

**Literature/Rhetoric Emphasis**

12 hours in Literature

12 hours in Rhetoric/Composition

6 hours in Criticism (either A. English 5340 and 5360 or B. English 5340 or 5360 and one other Criticism course)

6 hours elected from Literature, Rhetoric/Composition, and Criticism

Under either thesis or non-thesis options, the course work of the master's candidate must be approved in advanced by the Graduate Advisor, who should be consulted on all problems related to the student's program. Additional details concerning program requirements are available from the Graduate Advisor. Regular counseling sessions will be scheduled each year. Notification of specific time and place will be sent to all students who have been accepted into the graduate program.

Graduate standing is prerequisite for the courses listed below. Courses so designated may be repeated for credit as often as their subject matter changes. The titles are general descriptions. Students should consult the Department of English each semester for more specific information about the individual offerings.

**OTHER OPTIONS UNDER THE HUMANITIES**

Students wishing to focus on a wider range of offerings from the English Department will find available courses in linguistics, rhetoric, and literature including the pre-modern period within the framework of the Humanities MA and PhD. See the Humanities section of this catalog for further details.

The grade of R (research in progress) is a permanent grade. An incomplete (the grade of X) cannot be given in a course which is graded R. To receive credit for an R-graded course the student must continue to enroll in the course until a passing grade is received. Three-hour thesis and three- and six-hour dissertation courses are graded R/F only. The grade of P (required for graduation) can be received in six- or nine-hour thesis courses and nine-hour dissertation courses only. In the course listings below, R-graded courses are designated either "Graded P/F/R" or "Graded R." (See also the section entitled "R" GRADE on p. 36 of this catalog.)

**General**

5335. RESEARCH AND BIBLIOGRAPHY (3-0). An introduction to the methodologies and bibliographic tools necessary for the scholarly study of literature. Some attention will be paid to different critical approaches.

## ENGLISH

- 5391. GRADUATE READINGS IN LITERATURE (3-0).** Supervised individual study at the M.A. level. Prerequisite: permission of instructor and Graduate Advisor.
- 5392. PERSPECTIVES ON WESTERN LITERATURE (3-0).** Intended for international students with a non-Western background seeking graduate degrees in the Humanities.
- 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 and approval of prospectus by the Committee on Graduate Studies.
- 6335. 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 PhD level. May be repeated for credit when the content changes. Prerequisite: permission of instructor and Graduate Advisor.

### American Literature

- 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 writing, diaries, autobiography (Franklin), poetry, drama, and fiction. Cultural context stressed.
- 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.
- 5322. AMERICAN LITERATURE FROM THE CIVIL WAR TO 1910 (3-0).** Prose literature which expresses in theme and form the evolving cultural consciousness of America.
- 5323. AMERICAN LITERATURE SINCE 1910 (3-0).** Primarily fiction; typically includes representative works of multiple authors selected for the study of patterns in theme and method.
- 5324. AMERICAN POETRY (3-0).** Concentrates each semester on two or three major poets such as Taylor, Longfellow, Dickinson, Whitman, Frost, Stevens, Williams, Eliot, Pound, and Plath. Subject poets to be announced prior to registration.
- 5325. AMERICAN DRAMA (3-0).** Representative American drama from O'Neill to the present; emphasis on the contributions of culture to dramatic structure.
- 5326. MAJOR FIGURES IN NINETEENTH-CENTURY AMERICAN LITERATURE (3-0).** An intensive study of one to three major writers—such as Poe, Hawthorne, Melville, Twain, Howells, James—based on both primary and secondary materials. Subject authors to be announced prior to registration.
- 5327. MAJOR FIGURES IN TWENTIETH-CENTURY AMERICAN LITERATURE (3-0).** An intensive study of one to three major writers—such as Faulkner, Fitzgerald, Hemingway, Steinbeck, Bellow—based on both primary and secondary materials. Subject authors to be announced prior to registration.
- 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 the seminar will be announced in advance of registration. Master's candidates welcome when space is available.

### British Literature

- 5301. MEDIAEVAL 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 JACOBAN 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 IN 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.

**5313. TWENTIETH CENTURY BRITISH LITERATURE (3-0).** A study of English and Irish fiction and drama in the twentieth century; may focus on major authors, themes, or topics; may concentrate on the period before or the period after 1950.

**Comparative Literature**

**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.

**5341. INTRODUCTION TO COMPARATIVE LITERATURE (3-0).** Introduces students to the theories and methodologies of comparative literature. Includes investigation of the means of transmission of literary information, and theory and practice of translation.

**5342. TOPICS IN THE CLASSICAL INFLUENCE (3-0).** Hellenic, Alexandrian, and Latin masterpieces that have influenced Western literature; may concentrate on the epic, on tragedy and comedy, on lyric poetry, on the romance, and on other literary genres such as satire; may also include literature's relationship to the other arts or to historical, philosophical, or sociological structures; emphasis on Greek and Roman mythology and the various theories of myth. May be repeated when content changes.

**5343. MEDIEVAL COMPARATIVE LITERATURE (3-0).** Neo-Latin and vernacular literatures from the fifth century to the end of the fifteenth century; may concentrate on major figures and their milieus or focus on particular genres, themes, or topics; may also include treatment of literature's relationship with the other arts or with its historical, theological, philosophical, or sociological context.

**5344. TOPICS IN COMPARATIVE LITERATURE OF THE RENAISSANCE AND THE BAROQUE AGE (3-0).** From the fourteenth century to Rococo; in different semesters, genres, themes, authors, topics, or literary movements may be considered, such as the Petrarchan tradition, the Romantic epic of the sixteenth century, Marinism, and Gongorism; individual courses may also treat the relationship between literature and the other arts. May be repeated for credit when content changes.

**5345. COMPARATIVE LITERATURE OF THE EIGHTEENTH CENTURY (3-0).** The development of European literature during the century of literary ferment that sees the Age of Reason give way to the Age of Romanticism; early Romantics are contrasted to Enlightenment and Neoclassical writers; emphasizes, though not exclusively, the literatures of France, England, and Germany.

**5346. COMPARATIVE LITERATURE OF THE NINETEENTH CENTURY (3-0).** Poetry and prose of this rich, contradictory era; may focus on major authors, genres, themes, topics, or literary movements such as Romanticism, Realism, Naturalism, Symbolism, and Decadence; may treat the relationships between literature, philosophy, science, politics, economics, technology, and the fine arts.

**5347. COMPARATIVE LITERATURE OF THE TWENTIETH CENTURY (3-0).** Literature in a radically pluralist environment; may focus on literary movements, major genres, and the rupture of genres, critical, philosophical, and psychological schools, and the influence on literature of politics, science, technology and economics.

## ENGLISH

**5348. COMPARATIVE LITERATURE: THE SOUTH ASIAN INFLUENCE (3-0).** A study of the earlier literature—the Vedas, the Mahabharata, and the Ramayana—and of the development of later literatures in South Asia; the influence of these writings on European and American authors.

**6329. TOPICS IN MAJOR THEMES IN COMPARATIVE LITERATURE (3-0).** Themes such as "Literature and Revolution," "Psychoanalysis and Literature," "The Quest," "Alienation," or "The Initiation Experience," traced through the literatures of Western Europe, in order to illuminate cultural differences and similarities, to demonstrate intellectual, aesthetic, and social trends, and to provide a cohesive element in the formal examination of several genres; may be repeated when content changes.

**6331. TOPICS IN MAJOR FIGURES IN COMPARATIVE LITERATURE (3-0).** Writers whose work has strongly influenced individual writers and movements and had a significant and lasting effect on Western culture; may be repeated when content changes.

**6333. TOPICS IN GENRE STUDY IN COMPARATIVE LITERATURE (3-0).** Theory of literary forms or types and the conventions they embody or expectations they generate; may focus on epic, autobiography, satire, the lyric, the short story, the novel, etc.; may be repeated when content changes.

### Criticism

**5330. TOPICS IN CRITICISM (3-0).** Studies in critical topics such as textual criticism, psychoanalytic criticism, philosophy and criticism, Renaissance poetics and literature, critical movements, or focus on a major theorist in criticism. May be repeated when content changes.

**5340. CRITICAL THEORY: THE MAJOR TRADITIONAL TEXTS (3-0).** A study of literary and cultural theory and practice from the Greco-Roman period to the early 20th Century. May include such theorists as Plato, Aristotle, Horace, Longinus, Dante, Sidney, B. Jonson, Dryden, Pope, Johnson, Coleridge, Arnold, Richards, Eliot, and others.

**5360. TOPICS IN CONTEMPORARY CRITICAL THEORY (3-0).** Study of contemporary theories of interpretation, concentrating on one or more schools of critical and cultural theory; may include, e.g., New Criticism, the Neo-Aristotelians, Marxist Critical Theory, hermeneutics, psychoanalysis, Russian Formalism, semiotics, speech-act theory, phenomenology, structuralism, and post-structuralism. May be repeated when content changes.

**5380. TEXTUAL THEORIES OF CULTURE (3-0).** Study of the interpretations of culture yielded by the traditions of semiotics and hermeneutics; may include works by the following: Lyotard, Foucault, Habermas, N.O. Brown, Derrida, Pierce, Barthes, Deleuze, Gadamer, Levi-Strauss.

**5390. RHETORICAL CRITICISM (3-0).** The application of explicitly rhetorical theories to the analysis and evaluation of human discourse in rhetorical situations.

**6340. METACRITICAL THEORY (3-0).** A study of theories of literature from the point of view of their systems-theoretical character. Focuses on the writing of selected metatheorists such as Barbour, Braithwaite, Bruss, Harr, Lakotos, Popper, Rescher, and others, on questions of the genesis, nature, function, validity, and potential of literature theory.

**6360. TOPICS IN FEMINIST CRITICISM (3-0).** Studies of critical approaches patterns of thought and discourse practiced predominantly by women from the Graeco-Roman period through the 20th century. Examination of relationships among gender, language, and discourse from theorists such as Helene Cixous, Michel Foucault, Jane Gallop, Carol Gilligan, Julia Kristeva, Robin Lakoff, Walter Ong, and Virginia Woolf. May be repeated when content changes.

### Rhetoric/Composition

**5188. TOPICS IN TEACHING COLLEGE ENGLISH (1-0).** 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.

**5331. HISTORY OF THE ENGLISH LANGUAGE (3-0).** Internal history of our language. Chronological treatment of the phonological, morphological, and syntactical development from prehistoric times to the present.

**5334. TOPICS IN STYLISTICS (3-0).** A study of the stylistic features of discourse. Attention may be given to the development of English prose style, to metrical and prosodic theory, to linguistic rhetorical-computational-affective approaches as well as other, newer methods such as narratology and phenomenological analysis. Assignments include the extensive analysis of texts. May be repeated when content changes.

**5336. TOPICS CURRENT IN RHETORIC (3-0).** A seminar in historical and theoretical/metatheoretical studies of rhetoric. May include one or more topics such as irony, ethos, tropes/schemes, the rhetoric of science, the Sophists, metaphor, and rhetoric as epistemic. May be repeated when content changes.



**5351. HISTORY OF RHETORIC I: CLASSICAL/MEDIEVAL (3-0).** A study of the history of rhetoric from the Pre-socratics to the Medieval period with emphasis on the Greco-Roman tradition. Attention given to major theorists such as Plato, Aristotle, Isocrates, Cicero, Quintilian, St. Augustine, and Boethius.

**5352. TOPICS IN MAJOR FIGURES IN MODERN RHETORICAL THEORY (3-0).** Intensive study of one or more modern theorists whose interests can be interpreted as rhetorical, e.g., Burke, Weaver, Richards, Perelman, Booth, Cassirer, Ricoeur, and Derrida. May be repeated when content changes.

**5353. PRINCIPLES AND THEORIES OF RHETORICAL INVENTION (3-0).** Examination of the art, method, and theory of rhetorical invention, with special attention given to its historical development, from the classical topoi and doctrine of stasis to more contemporary approaches; assignments include the use of such methods.

**5354. ENGLISH LINGUISTICS (3-0).** Introduction to the analysis of grammatical structures in English, concentrating on the goals and methods of contemporary analysts operating according to a variety of current theories, including structuralism, tagmemics, transformationalism, and discourse grammar.

**5355. STUDIES IN ENGLISH DISCOURSE (3-0).** Analysis of English grammatical structures above the level of the clause, including the sentence, the paragraph, and the whole text; examination of the work of major discourse theorists—Dik, Harris, Halliday, Longacre, Pike, and van Dijk. Prerequisite: English Linguistics or permission of instructor.

**5356. RHETORIC OF COMPOSING (3-0).** Study of research into the composing process and of the available methods of conducting research; special attention given to such researchers as Emig, Britton, Flower and Hayes, Scardamalia, Bereiter, and Perl; intensive self-analysis of the student's own composing process.

**5357. RHETORIC OF READING (3-0).** Study of the phenomenology of reading, focusing on the literature about and research into the reading process; attention given to aesthetic response to literary texts and the relationship between reading and composing; special attention given to Iser, Kintsch, de Man, van Dijk, Barthes, Schank, Ingarden, Holland, Derrida, and others; intensive self-analysis of the reading process.

**5358. PRINCIPLES AND METHODS OF EVALUATION (3-0).** Study of the available means of evaluating writing; special attention given to evaluating individual student-writing in and out of conferences and to evaluating large groups of student-writers, with such methods as holistic and primary-trait scoring; may include peer and curriculum evaluation; evaluation of student papers.

**5359. ARGUMENTATION THEORY (3-0).** Emphasis on theories of writing that concern the rhetorical aims of "to persuade" and "to convince." Attention to forms of argumentation, claims, case construction, revision, distinction between "rhetorical" and "logical" argumentation. Attention to such theorists as Aristotle, Cicero, Perelman, and Toulmin.

**5361. HISTORY OF RHETORIC II: RENAISSANCE THROUGH NINETEENTH CENTURY (3-0).** A study of the history of rhetoric from the Renaissance through the 19th century with emphasis on the reemergence of the Neoclassical tradition. Attention given to major theorists such as Ramus, Vico, Campbell, Blair, and Whately.

**5370. SCHOLARLY ARGUMENT (3-0).** An introduction to the research for and the writing of argumentative scholarly essays. Surveys research skills, materials, forms of scholarly argument, and involves the writing of a research-based essay.

**5389. TOPICS IN TEACHING COMPOSITION (3-0).** Seminar for investigating problems of and approaches to teaching composition. Special attention given to current compositional theorists. May be repeated when content changes.

## FINANCE AND REAL ESTATE

# Department of FINANCE AND REAL ESTATE

### Areas of Study

### Degrees

Business Administration (See Interdepartmental and Intercampus Programs.)

M.B.A.

Real Estate

M.S.

Administration (See Interdepartmental and Intercampus Programs.)

Ph.D.

*M.S. Degree Plan:* Thesis

*Chairman:* Peggy Swanson

107 Business 273-3705

*Graduate Advisor:* Thomas McInish

434 Business 273-3842

### *Graduate Faculty:*

Professors Apilado, McInish, Swanson

Associate Professor Isakson

Assistant Professors Diltz, Lockwood

## OBJECTIVE

The Department of Finance and Real Estate participates in several graduate degree programs including the Ph.D. in Administration, the Master of Business Administration and the Master of Science in Real Estate. In the business track of the Ph.D. in Administration (see Interdepartmental and Intercampus Programs for degree requirements), courses in finance and real estate prepare students for careers in business, government, teaching and research. Concentrations in both finance and real estate are offered in the M.B.A. program (see Interdepartmental and Intercampus Programs for degree requirements). The M.S. in Real Estate provides students in-depth training in real estate decision making.

The general purpose of the Master of Science in Real Estate degree program is to provide students an opportunity to obtain a better understanding of the mechanics of real estate decision making in modern society and a greater depth of training in the discipline of real estate decision making than is possible at the baccalaureate level. The specific objectives of the program are to prepare the student for careers in business, government, research, and teaching and for further graduate study. In this program, students are exposed to the theory, research, and practical applications of numerous real estate content areas, including investment analysis, appraisal, real asset management, primary and secondary mortgage markets, and mortgage backed securities. The Master of Science in Real Estate degree program is a specialized degree program designed to build upon the candidate's prior background.

## ACCREDITATION: M.S. IN REAL ESTATE

The Master of Science in Real Estate is accredited by the American Assembly of Collegiate Schools of Business.

## DEGREE REQUIREMENTS: M.S. IN REAL ESTATE

Applicants meeting the general admission requirements of the Graduate School, including a satisfactory score on the Graduate Management Admission Test (GMAT), may be admitted unconditionally to the program. Other applicants may be admitted if approved by the Graduate Advisor in Real Estate and the Graduate Dean.

The program, which can be completed by part-time students who attend classes during the late afternoon and evening hours, is designed to accommodate students with divergent

## FINANCE AND REAL ESTATE

educational backgrounds and career interests. Each student's program of work must be approved by the Real Estate Graduate Advisor and it must contain a minimum of 15 semester hours in approved advanced graduate real estate courses taken at The University of Texas at Arlington.

The program consists of foundation courses, advanced courses, and thesis work. The foundation courses (33 semester hours) include all of the foundation courses for the Master of Business Administration degree plus REAE 5311, Real Estate Decision Analysis. Students may have foundation courses waived by the Graduate Advisor if they have completed equivalent courses. Advanced courses (24 semester hours) include certain required courses (nine semester hours), certain elective courses approved by the Graduate Advisor (nine semester hours), and six semester hours in a supporting field outside of the real estate area. The required advanced courses include:

- REAE 5321 Real Estate Investment
- REAE 5334 Advanced Real Estate Evaluation
- REAE 5335 Advanced Real Estate Finance

Examples of elective advanced courses (nine semester hours) include:

- REAE 5331 International Real Estate
- REAE 5336 Seminar in Real Estate Securities
- BUSA 5334 Real Property Law
- FINA 5325 Management of Financial Institutions
- FINA 5327 Risk Management and Speculative Markets
- FINA 5329 Seminar in Securities Analysis
- FINA 5328 Seminar in Portfolio Theory
- FINA 5331 Multinational Financial Management
- FINA 5332 Seminar in International Financial Markets

Examples of courses in supporting fields (six semester hours) include:

### Economics

- ECON 5331 Urban Economics
- ECON 5337 Business and Economic Forecasting

### Architecture/Construction Management

- ARCH 5333 Construction Methods and Estimating
- ARCH 5334 Construction Management

### Land Utilization

- CIRP 5305 Land Use, Management, and Development
- CIRP 5322 Urban and Regional Economic Development

### Urban and Regional Planning

- URBA 5330 Urban and Regional Planning
- URBA 5331 Urban Design

The six hours of thesis work must be conducted under the supervision of one of the members of the Graduate Studies Committee for the Master of Science in Real Estate Program.

**The grade of R (research in progress) is a permanent grade. An incomplete (the grade of X) cannot be given in a course which is graded R. To receive credit for an R-graded course the student must continue to enroll in the course until a passing grade is received. Three-hour thesis and three- and six-hour dissertation courses are graded R/F only. The grade of P (required for graduation) can be received in six- or nine-hour thesis courses and nine-hour dissertation courses only. In the course listings below, R-graded courses are designated either "Graded P/F/R" or "Graded R." (See also the section entitled "R" GRADE on p. 36 of this catalog.)**

## **FINANCE AND REAL ESTATE**

### **FINANCE (FINA)**

**5311. BUSINESS FINANCIAL MANAGEMENT (3-0).** Study of providing the organization with funds necessary for its operation and of achieving effective utilization of funds. Primary emphasis on financial decision-making within organizations, and techniques of financial analysis and forecasting. Prerequisite: ACCT 5301 and ECON 5309 or equivalents. \$5 computer fee.

**5322. ADVANCED BUSINESS FINANCIAL PROBLEMS (3-0).** Analysis of financial problems of business concerns, presented in case materials. Considers determination of capital needs, choosing among alternative capital investments, planning methods of financing new capital expenditures, and planning recapitalizations, mergers, and reorganizations. Prerequisite: FINA 5311 or equivalent.

**5323. INVESTMENT MANAGEMENT PROBLEMS (3-0).** Application of principles and techniques of investment management in solving investment problems of individuals and financial institutions. Considers apportionment of investment funds among alternatives, analysis of risk, valuation timing of security acquisitions. Prerequisite: FINA 5311 or equivalent.

**5324. SEMINAR IN FINANCIAL THEORIES (3-0).** Intensive research in selected areas of business finance, investment analysis and management, financial markets, commercial banking, and non-bank financial institutions. Prerequisite: FINA 5311 or equivalent.

**5325. MANAGEMENT OF FINANCIAL INSTITUTIONS (3-0).** General management problems and policies of financial institutions, emphasizing the role of the major financial institutions. Use of analytical techniques through case method of instruction as an aid to the solution of significant financial problems. Prerequisite: FINA 5311 or equivalent.

**5326. COMMERCIAL BANKING (3-0).** Overview of the management process and the operations in many areas of the modern commercial bank. Emphasizes the economic significance of the industry and its contribution to business development. Prerequisite: FINA 5311 or equivalent.

**5327. RISK MANAGEMENT AND SPECULATIVE MARKETS (3-0).** Nature and functions of the various futures and options markets; hedging for risk reduction, speculative trading for profit; the role of futures and options in overall portfolio strategy, along with fundamental concepts such as basis, spreading, normal and inverted markets and money management. Prerequisite: FINA 5311 or equivalent.

**5328. SEMINAR IN PORTFOLIO THEORY (3-0).** The theory and practice of optimally combining securities into portfolios. Problems in the management of institutional portfolios. Prerequisite: FINA 5311 or equivalent.

**5329. SEMINAR IN SECURITY ANALYSIS (3-0).** The use of economic and accounting data in the selection of securities. Examination of current and traditional techniques used by investment practitioners. Prerequisite: FINA 5311 or equivalent.

**5330. SEMINAR IN CAPITAL BUDGETING (3-0).** Approaches to evaluating firm capital budgeting decisions including cost of capital and risk. Techniques for making investment decisions involving physical assets of nonfinancial firms. 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.

**5332. SEMINAR IN INTERNATIONAL FINANCIAL MARKETS (3-0).** An in-depth analysis of operations of international markets as viewed by multinational financial managers. Foreign exchange risk, capital market integration, and new innovations in off-shore financial markets. Prerequisite: FINA 5311 or equivalent.

**5333. ADVANCED FINANCIAL ANALYSIS (3-0).** An examination of analytical techniques useful in financial analysis and planning. Credit scoring models, bankruptcy prediction, bond ratings, and risk-return measurement and evaluation. Prerequisite: FINA 5311 or equivalent.

**5334. SEMINAR IN FINANCIAL INSTITUTIONS AND MARKETS (3-0).** An examination of major financial institutions and markets with emphasis on trends affecting the current operations, competitive position, and overall future of the primary financial intermediaries and the financial markets. Prerequisite: FINA 5311 or equivalent.

**5182, 5282, 5382. INDEPENDENT STUDIES IN FINANCE.** Extensive analysis of a finance topic. Prerequisite: consent of faculty member and department chairman.

**5392. SELECTED TOPICS IN FINANCE.** In depth study of selected topics in finance. May be repeated when topics vary. Graded P/F/R. Prerequisite: consent of instructor and Graduate Advisor.

## FINANCE AND REAL ESTATE

**6311. SEMINAR IN THE THEORY OF CORPORATE FINANCE (3-0).** Advanced theory of corporate finance. Capital budgeting, dividend policy, and capital structure. Prerequisite: FINA 5311 or equivalent or consent of instructor.

**6312. SEMINAR IN THE THEORY OF INVESTMENTS (3-0).** Advanced theory of investments. Modern portfolio theory and the efficiency of capital markets. Prerequisite: FINA 5311 or equivalent or consent of instructor.

**6313. ADVANCED RESEARCH IN FINANCE (3-0).** Analytical methods commonly applied in the academic finance literature. Topics such as factor analysis in arbitrage pricing models and techniques for identification of nonstationarities in risk. Prerequisites: FINA 5311 and BUSA 5301 and consent of instructor.

**6314. ADVANCED RESEARCH IN FINANCE II (3-0).** Specialized and evolving techniques in financial research; topics such as identification of efficient markets, linear programming in capital budgeting, and multiple discriminant analysis in bankruptcy prediction and bond rating models. Prerequisites: FINA 5311 and BUSA 5301 and consent of instructor.

**6390. SEMINAR IN SPECIAL TOPICS IN FINANCE (3-0).** Doctoral level coverage of advanced topics in finance. May be repeated for credit when topics vary. Prerequisite: FINA 5311 or equivalent or consent of instructor.

**6392. RESEARCH IN FINANCE (3-0).** Independent study of advanced topics in finance under the direction of graduate faculty. May be repeated for credit when topics vary. Graded P/F/R. Prerequisite: FINA 5311 or equivalent or consent of instructor.

## REAL ESTATE (REAE)

**5311. REAL ESTATE DECISION MAKING (3-0).** Introduction to real estate law, appraisal and valuation, finance, market analysis, and other phases of the real estate development/management process; emphasis on the institutional context in which market-oriented real estate decisions are made. Cannot be taken for credit by students with an undergraduate major in real estate. **\$5 computer fee.**

**5321. REAL ESTATE INVESTMENT (3-0).** Introduction to analytical techniques, sources of financing, and other factors related to real estate investment. Stresses current developments and topics. Prerequisite: FINA 5311 or equivalent and REAE 5311 or equivalent.

**5331. INTERNATIONAL REAL ESTATE (3-0).** Ownership, transfer, and asset maintenance of real estate in a multinational context. Topics include risk analysis, fund repatriation, taxation, comparative legal systems, and expropriation. Prerequisite: REAE 5311 or equivalent.

**5334. ADVANCED REAL ESTATE EVALUATION (3-0).** Market, cost, and income approaches with stress on income forecasting and capitalization. Prerequisite: REAE 5311 or equivalent.

**5335. ADVANCED REAL ESTATE FINANCE (3-0).** Study of real property financing methods; analysis of cost of borrowing, sources of funds, and mortgage terms; emphasis on construction and permanent financing of commercial and industrial properties. Prerequisite: FINA 5311 and REAE 5311 or equivalent.

**5336. SEMINAR IN REAL ESTATE SECURITIES (3-0).** An in-depth analysis of the operations of secondary mortgage markets as viewed by individual and institutional investors. Mortgage pass-through securities, mortgage backed bonds, estimation of prepayment rates for mortgage securities, price and interest-rate risk, lending strategies, credit rating, and taxation. Prerequisites: FINA 5311 and REAE 5311 or equivalents.

**5398, 5698. THESIS** Prerequisite: permission of the Graduate Advisor in Real Estate.

**6390. SEMINAR IN SPECIAL TOPICS IN REAL ESTATE (3-0).** Doctoral level coverage of advanced topics in real estate. May be repeated for credit when topics vary. Prerequisite: REAE 5311 or equivalent or consent of instructor.

**6392. RESEARCH IN REAL ESTATE (3-0).** Independent study of advanced topics in real estate under the direction of graduate faculty. May be repeated for credit when topics vary. Graded P/F/R. Prerequisite: REAE 5311 or equivalent or consent of instructor.

**FOREIGN LANGUAGES AND LINGUISTICS**

**Department of  
FOREIGN LANGUAGES AND  
LINGUISTICS**

*Areas of Study*

French  
German  
Spanish  
Linguistics  
Humanities (See Interdepartmental and Intercampus  
Programs.)

*Degrees*

M.A.  
M.A.  
M.A.  
M.A.

M.A., M.A.T., Ph.D.

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

*Acting Chairman:* Donald A. Burquest 230 Hammond Hall 273-3161

*Graduate Advisor:* Virgil L. Poulter 226 Hammond Hall 273-3161

*Graduate Faculty:*

Professors, Acker, Adams, Longacre, Monostory, Stuart, Werth  
Associate Professors Burqu est, Capote, Edmondson, Feigenbaum,  
Gibson, Keilstrup, Ordo ez, Poulter, Sanchez, Studerus, Vina  
Assistant Professors Chiasson, Cowan, Evans, Holder, Koop,  
Nogueira-Martins, Rings, Weninger  
Adjunct Professors Huttar, Merrifield, K. Pike, Rensch  
Adjunct Associate Professors Franklin, Greenlee, Gregerson  
Adjunct Assistant Professors Bergen, Crowell, Deibler, Derbyshire,  
Fleming, Headland, M. Huttar, Hwang, Cent, Larson, C. McKinney, N.  
McKinney, Miehle, Morgan, Morren, Mugele, E.V. Pike, E.G. Pike, Simons,  
R. Smith, Wendell, Wheatley, L. Yost, W. Yost

**OBJECTIVES**

**Foreign Languages (French, German, Spanish)**

Graduate programs in foreign languages are designed to enhance the student's competence in the language and literature of his major language field. The specific objectives are to prepare the student for a career in teaching or in any area in private or public life in which the knowledge of a foreign language is essential, and to help him to develop the techniques of independent research necessary for work beyond the master's level.

**Linguistics**

Graduate programs in linguistics are primarily designed for those with a background in one or more foreign languages and/or a background in the linguistic aspects of the English language, but others who are willing to fulfill the listed prerequisites are invited to apply. Linguistic science has applications in language learning and teaching, literary analysis and criticism, psychology, communication, anthropology, philosophy, neurology, sociology, and some other areas.

## **DEGREE REQUIREMENTS**

In addition to the Graduate School requirements for Master's degree programs, the following requirements apply to foreign language and linguistics students:

**Thesis:** A written comprehensive examination may be given at the discretion of the student's committee.

**Thesis Substitute:** There will be a 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. At least 30 hours must be in course work.

**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 required 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 LINGUISTICS CENTER**

### **(THE SUMMER INSTITUTE OF LINGUISTICS)**

The International Linguistics 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 UT Arlington 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 UT Arlington undergraduate and graduate catalogs. ILC requirements and procedures appear in ILC catalogs, but degree requirements are those specified by UT Arlington. Participants must apply for admission to UT Arlington. 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 UT Arlington may register as auditing students by arrangement with ILC.

Registration is administered by UT Arlington on campus. Students may take the courses on either or both campuses. Refer to the semester Schedule of Classes for location of courses.

### **FRENCH (FREN)**

Students pursuing the MA degree in French are encouraged to take at least one course in each of: (1) History of the French Language; (2) French Literature through the Renaissance or Structure of the French Language; (3) Seventeenth-Century Literature; (4) Eighteenth-Century Literature; (5) Nineteenth-Century Literature; (6) Twentieth-Century Literature; (7) Contemporary French Culture.

## FOREIGN LANGUAGES AND LINGUISTICS

The grade of R (research in progress) is a permanent grade. An Incomplete (the grade of X) cannot be given in a course which is graded R. To receive credit for an R-graded course the student must continue to enroll in the course until a passing grade is received. Three-hour thesis and three- and six-hour dissertation courses are graded R/F only. The grade of P (required for graduation) can be received in six- or nine-hour thesis courses and nine-hour dissertation courses only. In the course listings below, R-graded courses are designated either "Graded P/F/R" or "Graded R." (See also the section entitled "R" GRADE on p. 36 of this catalog.)

- 4332. FRENCH FOR GRADUATE STUDENTS II. (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. Graded P/F/R.
- 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. Graded P/F/R.
- 5135. INTRODUCTION TO ROMANCE BIBLIOGRAPHY AND METHODS OF RESEARCH (1-0).** Designed to aid graduate students in preparing theses or dissertations.
- 5190. CONFERENCE COURSE IN FRENCH LANGUAGE, CULTURE, OR LITERATURE. (1-0).** Graded F/R.
- 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.
- 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.
- 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. LITERATURE OR GENRE OF THE SEVENTEENTH CENTURY (3-0).** May include drama, poetry, novel, etc. May be repeated for credit when topic changes.
- 5325. LITERATURE OR GENRE OF THE EIGHTEENTH CENTURY (3-0).** May include drama, poetry, novel, etc. May be repeated for credit when topic changes.
- 5330. LITERATURE OR GENRE OF THE NINETEENTH CENTURY (3-0).** May include drama, poetry, novel, etc. May be repeated for credit when topic changes.
- 5338. TOPICS IN FRENCH LITERATURE OR CULTURE (3-0).**
- 5331. LITERATURE OR GENRE OF THE TWENTIETH CENTURY (3-0).** May include drama, poetry, novel, etc. May be repeated for credit when topic changes.
- 5332. CONTEMPORARY FRENCH CULTURE (3-0).** Survey of contemporary France, including social and political structures, economy, education, family, daily life, and current events. Recommended for teachers.
- 5340. STUDIES IN FRENCH-CANADIAN LITERATURE OR GENRE (3-0).** May be repeated for credit when topic changes.
- 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.
- 5391. CONFERENCE COURSE IN FRENCH LINGUISTICS, CULTURE, OR LITERATURE. 5398, 5698, 5998. THESIS.** 5398 graded R/F only; 5698 and 5998 graded P/F/R. Prerequisite: permission of Graduate Advisor.



## FOREIGN LANGUAGES AND LINGUISTICS

**6310. SEMINAR IN FRENCH LITERATURE (3-0).**

**6311. SEMINAR IN FRENCH LANGUAGE (3-0).**

**6391. READINGS IN FRENCH (3-0).** Supervised individual study at the PhD level. May be repeated when content changes.

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

### GERMAN (GERM)

**4331. GERMAN FOR GRADUATE STUDENTS I (3-0).** Designed for graduate students preparing for the foreign language reading examinations. Basic elements of grammar and syntax presented with emphasis on rapid and accurate translation. May not be counted toward the fulfillment of the undergraduate language requirement. Students majoring or minoring in German may not take this course for credit.

**4332. GERMAN FOR GRADUATE STUDENTS (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. Graded P/F/R.

**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. Graded P/F/R.

**5190. CONFERENCE COURSE IN GERMAN LANGUAGE AND LITERATURE (1-0).** Graded P/F/R. Prerequisite: permission of Graduate Advisor.

**5300. HISTORY OF THE GERMAN LANGUAGE (3-0).**

**5301. HISTORY OF GERMAN LITERATURE I (3-0).** From the beginnings through 1832.

**5302. HISTORY OF GERMAN LITERATURE II (3-0).** From 1832 to the present.

**5304. STUDIES IN GERMANIC LINGUISTICS AND LITERATURES (3-0).** Transformational grammar, viking literature, and colonial and continental dialects.

**5307. THE TEACHING OF GERMAN (3-0).** Advanced methodology for high school and college teachers of German.

**5309. GERMAN LITERATURE OF THE MIDDLE AGES (3-0).**

**5310. STUDIES IN GERMAN GRAMMAR, PHONETICS, CONVERSATION I (3-0).**

**5312. STYLISTICS AND ADVANCED GERMAN GRAMMAR (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. May be repeated for credit when topics change.

**5321. GERMAN DRAMA UP TO THE NINETEENTH CENTURY (3-0).**

**5322. NINETEENTH AND TWENTIETH CENTURY GERMAN DRAMA (3-0).**

**5330. NINETEENTH AND TWENTIETH CENTURY GERMAN NOVEL AND NOVELLE (3-0).**

**5391. CONFERENCE COURSE IN GERMANIC LINGUISTICS AND LITERATURE.** Graded R.

**5398, 5698, 5998. THESIS.** 5398 graded R/F only; 5698 and 5998 graded P/F/R. Prerequisite: permission of Graduate Advisor.

**6391. READINGS IN GERMAN (3-0).** Supervised individual study at the PhD level. May be repeated when the content changes.

### SPANISH (SPAN)

All students pursuing the MA in Spanish must take SPAN 5300, 5312, 5313, and either SPAN 5302 or 5303.

**5101. TEACHING PRACTICUM I (1-0).** Required of all Teaching Assistants in Spanish in their first semester. May not be counted toward a master's degree. Graded P/F/R.

**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. Graded P/F/R.

**5190. CONFERENCE COURSE IN SPANISH LANGUAGE AND LITERATURE (1-0).** Graded P/F/R. 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.

## FOREIGN LANGUAGES AND LINGUISTICS

**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.

**5310. THEORY AND ANALYSIS OF HISPANIC TEXTS (3-0).** Analysis and application of critical theory to selected Hispanic texts. May include sociological approaches, structuralist and post-structuralist, reader oriented, and feminist theories.

**5315. MEXICAN LITERATURE AND CULTURE (3-0).** Readings in all literary genres from various critical perspectives. Particular attention given to the novel, poetry, and essay of the twentieth century and to interrelationships between text and culture.

**5318. TOPICS IN HISPANIC LITERATURE AND CULTURE (3-0).**

**5319. TWENTIETH CENTURY SPANISH-AMERICAN NOVEL AND SHORT STORY (3-0).**

**5320. MODERN SPANISH NARRATIVES (3-0).** Readings of nineteenth and twentieth century Hispanic narrative in light of current critical theory. Connections of narrative form, content, and culture will be explored.

**5330. ADVANCED STUDIES IN HISPANIC POETRY (3-0).** Close critical readings of Spanish and Spanish American poetry. Analysis of poetic currents across the centuries.

**5332. CHICANO LITERATURE AND CULTURE (3-0).** Readings of poetry, theater, and prose in relation to the specific socio-historical and political context of Chicano life. Charts changing concepts of cultural identity and the evolution of cultural coding in texts written after 1960.

**5340. CERVANTES (3-0).**

**5342. ADVANCED STUDIES IN HISPANIC DRAMA (3-0).** Readings of dramatic texts from the Golden Age to contemporary period. May include the analysis of dramatic theory and its implementation in specific texts, theater as performance and spectacle, changing concepts of the esthetic and social functions of theater.

**5350. WOMEN IN HISPANIC LITERATURE (3-0).**

**5362. TOPICS IN SECOND LANGUAGE LEARNING (3-0).**

**5391. CONFERENCE COURSE IN SPANISH LINGUISTICS AND LITERATURE.** Graded R. 5398, 5698, 5998. **THESIS.** 5398 graded R/F only; 5698 and 5998 graded P/F/R. Prerequisite: permission of Graduate Advisor.

**6300. SEMINAR IN HISPANIC LITERATURE (3-0).** Changing topics in Spanish and/or Spanish-American literature.

**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 5301 and 5304; (2) LING 5303 and one of 5306, 5312, 5313, 5323; (3) LING 5317 or 5320; (4) LING 5332 or 5333. Students interested in teaching English as a Foreign Language (EFL) or English as a Second Language (ESL) should take LING 5353, 5354, 5355, and 6353.

Further, all degree candidates must demonstrate analytical knowledge of the linguistic structure of a non-Indo European language. This requirement may be fulfilled by taking LING 5340. A student may be exempt from taking LING 5340 by successfully completing (1) a master's thesis on the linguistic structure of a non-Indo European language, or (2) a detailed examination on the structure of a non-Indo European language together with a substantial paper (in finished manuscript form) on the structure of the language examined.

**5101. TEACHING PRACTICUM I (1-0).** Required of all Teaching Assistants in Linguistics in their first semester. May not be counted toward a master's degree.

**5102. TEACHING PRACTICUM II (1-0).** Required of all Teaching Assistants in Linguistics in their second semester. May not be counted toward a master's degree.

## FOREIGN LANGUAGES AND LINGUISTICS

- 5190. CONFERENCE COURSE IN LINGUISTICS** (1-0). Graded P/F/R. Prerequisite: permission of Graduate Advisor.
- 5300. INTRODUCTION TO THE STUDY OF LANGUAGE** (3-0). Overview of the study of human language; analysis of language structures; language in society; application of linguistic information in other fields, including contrastive analysis and second-language teaching, literary studies, literacy, translation; historical and comparative linguistics. May not be used to fulfill MA degree requirements in Linguistics.
- 5301. PHONOLOGICAL THEORY I** (3-0). Explores the principles governing sound systems in human languages.
- 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 I** (3-0). Explores grammatical systems in human languages.
- 5304. PHONOLOGICAL THEORY II** (3-0). A continuation of LING 5301. Prerequisite: LING 5301.
- 5305. FIELD METHODS** (3-0).
- 5306. GRAMMATICAL THEORY II** (3-0). A continuation of LING 5303. Prerequisite: LING 5303.
- 5307. TOPICS IN LINGUISTICS AND LANGUAGE TEACHING** (3-0).
- 5308. TOPICS IN SOCIOLINGUISTICS** (3-0). Selected topics relating the scientific methodologies of linguistics to the larger concerns of society and culture including cognition, motivation, description and analysis.
- 5309. ADVANCED STRUCTURAL LINGUISTICS** (3-0). Phonological and grammatical language structures in relation to theoretical and methodological concerns (traditional and contemporary). Not open to students who have taken LING 5301 and 5303.
- 5310. ACOUSTIC PHONETICS** (3-0).
- 5311. PRINCIPLES OF TRANSLATION I** (3-0). Theory and procedures in cross-language transfer with emphasis on basic linguistic notions such as form vs. meaning, multiple senses, and types of lexical equivalences and sociolinguistic factors involved in idiomatic translation. Prerequisite: LING 5303, or permission of the instructor. May not apply toward degree requirements if LING 5336 and ANTH 3322 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 district linguistic areas.
- 5313. CASE GRAMMAR AND CLAUSE STRUCTURE** (3-0). Readings in the literature of case grammar as developed from the early 1960's to the present, along with consideration of the surface structures of clause units.
- 5314. PRINCIPLES OF TRANSLATION II** (3-0). Principles of the semantic analysis of discourse structure such as referential coherence, relational coherence, and prominence, and its use in translation; theory and practice of translation evaluation. Prerequisite: LING 5311 or consent of instructor.
- 5317. INTRODUCTION TO SOCIOLINGUISTICS** (3-0). An overview of the study of language in its social context, including topics such as linguistic variation, address and reference, speech levels, bilingualism, special vocabularies and styles, pidgins and creoles, speech acts, conversational discourse.
- 5319. HISTORY OF LINGUISTICS** (3-0). Views and theories of language throughout history, from ancient India to classical Greece and Rome to medieval Europe to the modern era.
- 5320. HISTORICAL AND COMPARATIVE LINGUISTICS** (3-0).
- 5323. THE CONSTITUENT STRUCTURE OF DISCOURSE** (3-0). This course examines constituent structure of discourse with attention to sentence, paragraph, and embedded discourse in the light of the verb/clause ranking (relative salience) appropriate to a given discourse type.
- 5327. INTRODUCTION TO PSYCHOLINGUISTICS** (3-0). Overview of the processes of first-language and second-language acquisition; similarities and differences between them; how adults and children learn and use new languages; language disorders; language perception and production; implications of psycholinguistic research for linguistic theory.
- 5330. THE COMPUTER AND NATURAL LANGUAGE** (3-0). \$10 computer fee.
- 5332. SURVEY OF LINGUISTIC THEORIES** (3-0).
- 5333. READINGS IN LINGUISTICS** (3-0).

## **FOREIGN LANGUAGES AND LINGUISTICS**

- 5336. PRINCIPLES OF LITERACY (3-0).** Principles involved in the introduction of literacy to pre-literate societies. Includes consideration of motivational factors, stimulation of indigenous authorship, orthography design, elements of reading methodology and alternative strategies for literacy programs. May not apply toward degree requirements if LING 5311 and SOCI 5342 are applied.
- 5338. READING THEORY AND LINGUISTICS (3-0).** Survey of reading theory, with practical application to the preparation of literary materials for preliterate societies. Attention given to specific linguistic and psycholinguistic factors involved. Prerequisites: LING 5301.
- 5339. SOCIOLINGUISTIC ASPECT OF LANGUAGE PROGRAMS (3-0).** Survey of the linguistic and social factors involved in the development of language 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.
- 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. Prerequisite: LING 5340 or equivalent.
- 5345. SEMANTICS (3-0).** Considerations of meaning in language with special reference to words and concepts in relation to semantic domains, componential features of meaning, and case roles, with resulting implications for cross-cultural communication.
- 5346. DISCOURSE GRAMMAR (3-0).** To acquaint the student with a representative crosssection of some of the recent writings (American and European) in the field of discourse grammar. A variety of approaches and insights are covered.
- 5348. TEXT ANALYSIS (3-0).** Methods of charting and displaying texts combined with analysis of the many kinds of pragmatic choices, communicative cues, and other structures a text may include. Prerequisite: LING 5303.
- 5353. METHODOLOGY OF TEACHING ENGLISH AS A SECOND OR FOREIGN LANGUAGE (3-0).** Presentation and critique of methodologies of teaching English to speakers of other languages; emphasis on techniques of teaching aural comprehension, speaking, reading, and writing skills; attention to testing, language laboratory, and linguistic-cultural differences. Prerequisite: introductory course in linguistics or permission of instructor.
- 5354. METHODS AND MATERIALS TO TEACH ENGLISH AS A SECOND OR FOREIGN LANGUAGE (3-0).** Systematic study of the application of linguistic theory and findings; emphasis on pedagogical strategies, materials, and tests; attention to current and past research and practices. Prerequisite: LING 5353.
- 5355. CONTRASTIVE ANALYSIS AND ERROR ANALYSIS IN THE TEACHING OF ENGLISH AS A SECOND OR FOREIGN LANGUAGE. (3-0).** A study of contrastive analysis and error analysis as means of defining student problems and progress; emphasis on current research; application to specific problems and contexts. Prerequisite: LING 5353.
- 5356. PEDAGOGICAL GRAMMAR OF ENGLISH (3-0).** Grammaticality, variation, and acceptability applied to teaching English as a second or foreign language. Problems of description; means of application; adaption to current pedagogical methods. Prerequisite: LING 5353.
- 5391. CONFERENCE COURSE IN LINGUISTICS.** Graded R.
- 5392. COMPUTER-AIDED NATURAL LANGUAGE RESEARCH** Individual 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 or equivalent, or permission of the instructor.
- 5631. LINGUISTIC WORKSHOP (6-0).**
- 5398, 5698, 5998. THESIS.** 5398 graded R/F only; 5698 and 5998 graded P/F/R. 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 or anthropologists and linguistics as they relate to language study and linguistic and cultural analysis.

**6309. PROSEMINAR IN LINGUISTICS (3-0).**

**6310. SEMINAR IN LINGUISTICS (3-0).**

**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.**

**English as a Foreign Language (EFL)**

**5341. ADVANCED ORAL ENGLISH (3-0).** A specially designed course of English for academic purposes for international graduate students. Individual and group work on identifying problems and improving accuracy in production and reception.

**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)**

<i>Area of study</i>	<i>Degree</i>
Geology	M.S.
Mathematical Sciences (see Interdepartmental and Intercampus Programs)	Ph.D.

*Master's Degree Plan:* Thesis only

*Chairman:* Charles I. Smith 107 Geoscience 273-2987

*Graduate Advisor:* Burke Burkart 107 Geoscience 273-2987

*Graduate Faculty:*

- Professors Burkart, Perkins, Smith
- Associate Professors Balsam, Crick, Ellwood, Nestell, Reaser, Self
- Assistant Professors Schieber, Wolff
- Adjunct Professor Denison
- Professor Emeritus McNulty

**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.

**ADMISSION**

Students entering the graduate program in geology must meet the general Graduate School admission requirements and also present a Graduate Record Examination Advanced Test score in geology.

## **GEOLOGY**

### **DEGREE REQUIREMENTS**

Applicants with degrees in geology are required to have had the following courses or their equivalents as a part of a bachelor's program, or to make up these deficiencies in residence: mineralogy (2445), petrology-petrography (2446), paleontology (3441), computers and statistics (3490), 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. Graduate course credit will not be allowed for undergraduate courses. Enrollment in Technical Sessions, Geology 5199, is required each semester a student is enrolled in classes. A thesis proposal, written thesis and thesis defense are required.

**The grade of R (research in progress) is a permanent grade. An Incomplete (the grade of X) cannot be given in a course which is graded R. To receive credit for an R-graded course the student must continue to enroll in the course until a passing grade is received. Three-hour thesis and three- and six-hour dissertation courses are graded R/F only. The grade of P (required for graduation) can be received in six- or nine-hour thesis courses and nine-hour dissertation courses only. In the course listings below, R-graded courses are designated either "Graded P/F/R" or "Graded R." (See also the section entitled "R" GRADE on p. 36 of this catalog.)**

**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.

**5310. GEOCHEMISTRY OF SEDIMENTS (3-0).** Geochemical controls in weathering, transport, deposition and diagenesis of sediments. Distribution of trace elements in sedimentary environments.

**5311. REGIONAL STRATIGRAPHY (3-0).** Chronologic study of the stratigraphic systems, their physical properties and gross facies, their depositional and paleogeographic implications, their correlation and nomenclature, and their biostratigraphy. Coverage given to the stratigraphy and geologic development of each major landmass and continent.

**5312. SANDSTONE PETROLOGY (2-3).** Petrologic examination of terrigenous clastic sandstones, including textural, compositional, and diagenetic aspects. Emphasis on paleogeographic, tectonic and environmental interpretation. Prerequisites: GEOL 4443 and 4345 or equivalent. **\$4 lab fee. \$10 microscope fee.**

**5313. CARBONATE PETROLOGY (2-3).** Nature and composition of carbonate sediments and rocks in terms of their genesis, depositional environments, and processes involved in transport, deposition, diagenesis, and lithification. Prerequisites: GEOL 4443 or equivalent and 4345 or concurrent enrollment. **\$4 lab fee. \$10 microscope fee.**

**5315. ORGANIC GEOCHEMISTRY (3-0).** Chemistry of carbon compounds. Nature and distribution of organic materials, including petroleum and coal, in sediments. Techniques used for studying petroleum source beds. Chemical evolution of life. Prerequisite: consent of instructor.

**5340. BIOSTRATIGRAPHY (2-3).** The separation and differentiation of rock units in time and space on the basis of the fossils they contain; emphasis on biostratigraphically significant fossil groups during each Phanerozoic epoch. Prerequisites: GEOL 3441 and 3442 or permission of instructor. **\$2 lab fee. \$5 computer fee.**

**5341. INTRODUCTION TO MICROPALAEONTOLOGY (2-3).** Survey of selected taxa with emphasis upon the foraminifers. **\$12 lab fee. \$10 microscope fee.**

**5343. PALEOECOLOGY (2-3).** Origin of fossil assemblages, definition and environmental significance of fossil associations, interpretation of ancient communities, and reconstruction of depositional environments.

**5344. DEPOSITIONAL ENVIRONMENTS: TERRIGENOUS CLASTICS (3-0).** Depositional processes, physiographic and environmental components, and facies characteristics and

relationships of alluvial, eolian, deltaic, clastic shoreline, shallow siliciclastic sea, and deep sea clastic depositional systems. Emphasis on interpretation of ancient analogues. Prerequisite: GEOL 4443 or equivalent.

**5347. PETROLEUM GEOLOGY (2-3).** Origin, migration, and entrapment of hydrocarbons.

**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.

**5350. GEOSTATISTICS (3-0).** Statistics and multivariate techniques as practical research tools in the solving of problems in the earth sciences; emphasis on techniques currently used in academic and industrial research; analysis of sequences of data; map analysis and analysis of multivariate data. Prerequisite: GEOL 3490 or equivalent, or permission of instructor. **\$5 computer fee.**

**5356. ADVANCED PHYSICAL VOLCANOLOGY (2-3).** Quantitative approach to volcanic processes. Includes physical properties of magmas, energetics of explosive eruptions, secondary processes in tuffs and lavas, rheology and mechanics of non-Newtonian fluids, magma/water interaction, and hydrothermal processes.

**5358. VOLCANICLASTIC SEDIMENTATION (3-0).** Volcaniclastic rocks and depositional processes. Primary and reworked deposits from different volcanic environments. Facies evaluation and models for selected major sequences. Prerequisites: GEOL 4353 and 2446 or equivalent.

**5359. ADVANCED IGNEOUS PETROLOGY (3-0).** Application of fluid dynamics, geochemistry, isotope chemistry, and thermodynamics to petrogenetic problems. Emphasis will be placed on current research on the topic. Prerequisite: GEOL 5446 or permission of instructor.

**5360. ANALYTICAL GEOCHEMISTRY (1-6).** Techniques in rock, mineral, soil and water analysis. **\$20 lab fee.**

**5365. TOPICS IN GEOLOGY (2-3).** Topics offered depend on student and faculty interest. Such topics might include identification of fossil fragments in thin section; magmatic processes; plate tectonics and sedimentary basin evolution; stratigraphic paleontology; sedimentary or volcanogenic ore deposition; geostatistics; geophysical archeology; and various advanced subjects in sedimentology, stratigraphy, paleontology, geophysics, geochemistry, volcanology and petrology. May be repeated for credit when topic changes.

**5407. PALEOMAGNETISM (3-3).** Application of the principles of rock magnetism and paleomagnetism as a geological tool. Topics include: magnetic minerals, magnetization of rocks, the geomagnetic field, magnetic reversals, data analysis, and polar wandering. Application of rock magnetism to a specific laboratory problem. Prerequisite: GEOL 3443 and a physics course or permission of the instructor.

**5409. APPLIED GEOPHYSICS (3-3).** Geophysical Techniques used to determine the presence and extent of deposits of minerals and the subsurface structure of selected localities from field methods. Prerequisites: GEOL 3443 and a course in physics, or permission of the instructor.

**5446. ADVANCED IGNEOUS AND METAMORPHIC PETROLOGY (3-3).** In depth treatment of the origins and characteristics of igneous and metamorphic rock associations at a quantitative level. Emphasis will be on dynamic processes in petrogenesis. Research project required as partial fulfillment of course requirements. Prerequisite: GEOL 4345 or permission of instructor. **\$4 lab fee. \$10 microscope fee.**

**5199. TECHNICAL SESSIONS (1-0).** Forum for presentation of results of graduate students and faculty research. Required each semester of all graduate students.

The following research course will be graded either PFR or ABCDFR as designated by the instructor at the beginning of the semester or session. Only three hours of research course credit may be applied to the degree.

**5181, 5281, 5381. RESEARCH IN GEOLOGY.** Independent study in various areas of research including paleontology, stratigraphy, tectonics, structural geology, sedimentology, geochemistry, petrology, geophysics, and volcanology. May be repeated for credit. Graded R.

**5398, 5698, 5998. THESIS.** 5398 graded R/F only; 5698 and 5998 graded P/F/R.

## HISTORY

# Department of HISTORY (HIST)

### Areas of Study

History  
Humanities (See Interdepartmental and  
Intercampus Programs.)  
Archival Administration

### Degrees

M.A.

M.A., Ph.D.

Certificate

### Master's Degree Plans: Thesis and Non-thesis

Chairman: Kenneth R. Philp 202 University Hall 273-2861

Graduate Advisor: Gary D. Stark 201 University Hall 273-2861

### Graduate Faculty:

Professors Chester, Green, Kerr, Lackner, Myres, Philp, Rodnitzky  
Associate Professors Goldberg, Maizlish, Palmer, Reinhartz,  
Richmond, Stark  
Assistant Professors Anders, Dulaney, Fairbanks, Kyle,  
Narrett, Reinhardt, Underwood  
Adjunct Assistant Professor Saxon

## 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, a continued exploration of the diversity of human experiences and ideas, 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, archival and/or museum administration, or further graduate study. The program is designed to be flexible and, insofar as possible, to meet students' individual interests and career objectives.

## 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 (including non-U.S.) or European history. All students are required to take the historiography course corresponding to their major field. Students may arrange 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. In special cases alternatives such as computer language or statistics may be considered on an individual basis.

The following requirements are in addition to the Graduate School requirements:

The thesis degree plan is research-oriented and is designed primarily for students intending to pursue further graduate work. A minimum of 18 hours in a major field is required. With the approval of the Graduate Advisor, a minor of as many as six hours of graduate and/or advanced undergraduate courses in a discipline other than history may be taken to satisfy the minimum requirement of 30 hours for the degree. As many as nine hours (six hours if an outside minor is selected) of advanced undergraduate history course work may be taken for graduate credit. In the event of failure of the oral defense of the thesis required for the degree, the student may petition the Graduate Studies Committee for re-examination.



The non-thesis degree plan requires a minimum of 24 hours in a major field, and a comprehensive examination, written and oral, over specific areas of concentration within the major field. These areas will be defined by students in consultation with their committees, the Graduate Advisor, and the Graduate Studies Committee. 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 of archival administration as part of the Master of Arts in History Degree must take HIST 5342 and HIST 5343, plus an additional six hours of internship (HIST 5344, 5644). HIST 5342 and HIST 5343 may be counted toward the minimum requirement for the MA Degree (30 hours/thesis, 36 hours/non-thesis); the six hours of internship may not be counted toward the minimum degree requirement.

Students already holding an MA or PhD degree in history or a related field and students enrolled in graduate programs other than history who desire a certificate in archival administration should consult the Graduate Advisor, Department of History.

### HUMANITIES

The Department of History is an integral part of the Graduate Humanities program. The department offers courses that will qualify as either a major or minor area of study (Option A) or as part of an integrated program of multi-disciplinary coursework organized by theme (Option B). History 6300, 6301, 6391 are specifically designed for Ph.D. candidates in the Humanities. See Interdepartmental and Intercampus Programs, pg. 241.

**The grade of R (research in progress) is a permanent grade. An Incomplete (the grade of X) cannot be given in a course which is graded R. To receive credit for an R-graded course the student must continue to enroll in the course until a passing grade is received. Three-hour thesis and three- and six-hour dissertation courses are graded R/F only. The grade of P (required for graduation) can be received in six- or nine-hour thesis courses and nine-hour dissertation courses only. In the course listings below, R-graded courses are designated either "Graded P/F/R" or "Graded R." (See also the section entitled "R" GRADE on p. 36 of this catalog.)**

**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 SEVENTEENTH AND EIGHTEENTH CENTURY AMERICAN HISTORY (3-0).** An examination of the historical literature and issues in seventeenth and eighteenth century American history. The specific literature and issues examined will vary with the instructor.

**5301. COLLOQUIUM IN NINETEENTH CENTURY AMERICAN HISTORY (3-0).** An examination of the historical literature and issues in nineteenth century American history. The specific literature and issues examined will vary with the instructor.

**5302. COLLOQUIUM IN TWENTIETH CENTURY AMERICAN HISTORY (3-0).** An examination of the historical literature and issues in twentieth century American history. The specific literature and issues examined will vary with the instructor.

**5303. COLLOQUIUM IN AMERICAN POLITICAL HISTORY (3-0).** An examination of the historical literature and issues in American political history. The specific literature and issues examined will vary with the instructor.

**5304. COLLOQUIUM IN REGIONAL HISTORY OF THE U.S. (3-0).** An examination of the historical literature and issues in the regional history of the U.S. The specific literature and issues examined will vary with the instructor.

**5305. COLLOQUIUM IN AMERICAN SOCIAL AND ECONOMIC HISTORY (3-0).** An examination of the historical literature and issues in American social and economic history. The specific literature and issues examined will vary with the instructor.

## **HISTORY**

**5306. COLLOQUIUM IN AMERICAN CULTURAL AND INTELLECTUAL HISTORY (3-0).** An examination of the historical literature and issues in American cultural and intellectual history. The specific literature and issues examined will vary with the instructor. Previously listed as HIST 5305.

**5307. COLLOQUIUM IN URBAN HISTORY (3-0).** An examination of the historical literature and issues in urban history. The specific literature and issues examined will vary with the instructor. Previously listed as HIST 5303.

**5308. COLLOQUIUM IN DIPLOMATIC HISTORY (3-0).** An examination of the historical literature and issues in diplomatic history. The specific literature and issues examined will vary with the instructor. Previously listed as History 5306.

**5309. COLLOQUIUM IN LATIN AMERICAN HISTORY (3-0).** An examination of the historical literature and issues in Latin American history. The specific literature and issues examined will vary with the instructor. Previously listed as HIST 5311.

**5310. COLLOQUIUM IN ANCIENT AND MEDIEVAL HISTORY (3-0).** An examination of the historical literature and issues in ancient and medieval history. The specific literature and issues examined will vary with the instructor. Previously listed as HIST 5308.

**5311. COLLOQUIUM IN EARLY MODERN EUROPEAN HISTORY (3-0).** An examination of the historical literature and issues in early modern European history. The specific literature and issues examined will vary with the instructor.

**5312. COLLOQUIUM IN MODERN EUROPEAN HISTORY (3-0).** An examination of the historical literature and issues in modern European history. The specific literature and issues examined will vary with the instructor.

**5313. COLLOQUIUM IN EUROPEAN REGIONAL HISTORY (3-0).** An examination of the historical literature and issues in European regional history. The specific literature and issues examined will vary with the instructor.

**5314. COLLOQUIUM IN EUROPEAN SOCIAL AND ECONOMIC HISTORY (3-0).** An examination of the historical literature and issues in European social and economic history. The specific literature and issues examined will vary with the instructor.

**5315. COLLOQUIUM IN EUROPEAN CULTURAL AND INTELLECTUAL HISTORY (3-0).** An examination of the historical literature and issues in European cultural and intellectual history. The specific literature and issues examined will vary with the instructor.

**5320. SEMINAR IN SEVENTEENTH AND EIGHTEENTH CENTURY AMERICAN HISTORY (3-0).** A detailed investigation of a major aspect of seventeenth and eighteenth century American history, involving original research and the use of historical resources. The particular aspect investigated will vary with the instructor.

**5321. SEMINAR IN NINETEENTH CENTURY AMERICAN HISTORY (3-0).** A detailed investigation of a major aspect of nineteenth century American history, involving original research and use of historical resources. The particular aspect investigated will vary with the instructor.

**5322. SEMINAR IN TWENTIETH CENTURY AMERICAN HISTORY (3-0).** A detailed investigation of a major aspect of twentieth century American history, involving original research and use of historical resources. The particular aspect investigated will vary with the instructor.

**5323. SEMINAR IN AMERICAN POLITICAL HISTORY (3-0).** A detailed investigation of a major aspect of American political history, involving original research and use of historical resources. The particular aspect investigated will vary with the instructor.

**5324. SEMINAR IN REGIONAL HISTORY OF THE U.S. (3-0).** A detailed investigation of a major aspect of the regional history of the U.S., involving original research and use of historical resources. The particular aspect investigated will vary with the instructor.

**5325. SEMINAR IN AMERICAN SOCIAL AND ECONOMIC HISTORY (3-0).** A detailed investigation of a major aspect of American social and economic history, involving original research and use of historical resources. The particular aspect investigated will vary with the instructor.

**5326. SEMINAR IN AMERICAN CULTURAL AND INTELLECTUAL HISTORY (3-0).** A detailed investigation of a major aspect of American cultural and intellectual history, involving original research and use of historical resources. The particular aspect investigated will vary with the instructor. Previously listed as HIST 5325.

**5327. SEMINAR IN URBAN HISTORY (3-0).** A detailed investigation of a major aspect of urban history, involving original research and use of historical resources. The particular aspect investigated will vary with the instructor.

**5328. SEMINAR IN DIPLOMATIC HISTORY (3-0).** A detailed investigation of a major aspect of diplomatic history, involving original research and use of historical resources. The particular aspect investigated will vary with the instructor. Previously listed as HIST 5326.

- 5329. SEMINAR IN LATIN AMERICAN HISTORY (3-0).** A detailed investigation of a major aspect of Latin American history, involving original research and use of historical resources. The particular aspect investigated will vary with the instructor. Previously listed as HIST 5334.
- 5330. SEMINAR IN ANCIENT AND MEDIEVAL HISTORY (3-0).** A detailed investigation of a major aspect of ancient and medieval history, involving original research and use of historical resources. The particular aspect investigated will vary with the instructor.
- 5331. SEMINAR IN EARLY MODERN EUROPEAN HISTORY (3-0).** A detailed investigation of a major aspect of early modern European history, involving original research and use of historical resources. The particular aspect investigated will vary with the instructor.
- 5332. SEMINAR IN MODERN EUROPEAN HISTORY (3-0).** A detailed investigation of a major aspect of modern European history, involving original research and use of historical resources. The particular aspect investigated will vary with the instructor. Previously listed as HIST 5330.
- 5333. SEMINAR IN EUROPEAN REGIONAL HISTORY (3-0).** A detailed investigation of a major aspect of European regional history, involving original research and use of historical resources. The particular aspect investigated will vary with the instructor.
- 5334. SEMINAR IN EUROPEAN SOCIAL AND ECONOMIC HISTORY (3-0).** A detailed investigation of a major aspect of European social and economic history, involving original research and use of historical resources. The particular aspect investigated will vary with the instructor.
- 5335. SEMINAR IN EUROPEAN CULTURAL AND INTELLECTUAL HISTORY (3-0).** A detailed investigation of a major aspect of European cultural and intellectual history, involving original research and use of historical resources. The particular aspect investigated will vary with the instructor.
- 5340. AMERICAN HISTORIOGRAPHY (3-0).** An examination of theories of history and the history of the discipline, major schools of historical interpretation in American history, various historical methodologies, and research techniques and sources relevant to American history. Required for all students who are emphasizing American history.
- 5341. EUROPEAN HISTORIOGRAPHY (3-0).** An examination of theories of history and the history of the discipline, major schools of historical interpretation in European history, various historical methodologies, and research techniques and sources relevant to European history. Required for all students who are emphasizing European history.
- 5342. PRINCIPLES OF ARCHIVES AND MUSEUMS I (3-0).** The historical evolution of archival science, emphasizing the development of the archives profession, archival principles and theories, appraisal and acquisition techniques, the laws affecting archives, programming and outreach, automation, conservation and preservation, and administration of collections. HIST 5342 is a prerequisite for HIST 5343.
- 5343. PRINCIPLES OF ARCHIVES AND MUSEUMS II (3-0).** Training in the methods and techniques of processing archives and historical manuscripts. Focuses on the day-to-day responsibilities of archivists and curators, such as appraising, accessioning, arranging, and describing collections. Prerequisite: HIST 5342.
- 5344, 5644. ARCHIVAL INTERNSHIP.** Hands-on experience working in archives, records centers, or historical manuscripts repositories. Graded R. Prerequisite: HIST 5342 and 5343.
- 5349. TOPICS ON WORLD CIVILIZATION (3-0).** Examines subjects of immediate interest relating to world civilization not covered in other existing courses.
- 5350. HISTORY OF CARTOGRAPHY (3-0).** A history of maps and their making and cartographic documentation as a source for understanding historical development. An aspect of the history of science and technology and the history of discovery and exploration.
- 5391, 5691. INDEPENDENT STUDY** For graduate students whose needs are covered by no course immediately available. Graded R.
- 5392. HISTORICAL PERSPECTIVES ON THE HUMANITIES (3-0).** An historical inquiry into problems and issues of contemporary relevance in the humanistic disciplines. The particular problems and issues investigated will vary with the instructor.
- 5398, 5698, 5998. THESIS.** 5398 graded R/F only; 5698 and 5998 graded P/F/R.
- 6300. COLLOQUIUM IN SELECTED TOPICS IN HISTORY (3-0).** An examination of the historical literature and issues relating to a select topic in history. The specific topic examined will vary with the instructor.
- 6301. SEMINAR IN SELECTED TOPICS IN HISTORY (3-0).** A detailed investigation of a major topic of history, involving original research and use of historical resources. The particular topic investigated will vary with the instructor.
- 6391. INDEPENDENT STUDY (3-0).** Graded R.

## INDUSTRIAL ENGINEERING

# HUMANITIES Program

*See Interdepartmental and Intercampus Programs, p. 241.*

## Department of INDUSTRIAL ENGINEERING (IE)

### *Area of Study*

Industrial Engineering

### *Degrees*

M.S., M.ENGR., Ph.D.

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

### *Chairman and Graduate Advisor:*

G. T. Stevens, Jr.

305 Carlisle 273-3092

### *Graduate Faculty:*

Professors Corley, Meier, Stevens

Associate Professors Khan, Liles, Pape, Priest

Assistant Professor Imrhan

## 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 doctoral degree may specialize in one of the following areas:

- 1. General Industrial Engineering**—The design, analysis and control of modern production systems.
- 2. Human Factors**—The analysis of the physiological and behavioral characteristics of man in the industrial environment.
- 3. Operations Research and Systems Analysis**—The formulation and analysis of quantitative models of engineering and management problems, and their application to complex integrated systems.
- 4. Engineering Management**—The management of resources in technological enterprises.
- 5. Manufacturing Systems**—The design and analysis of automated and computer integrated manufacturing systems.

In addition, special programs of study may be arranged.

## ADMISSION

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

For applicants with no prior training in engineering, the same minimum criteria will apply, and, in addition, their records will be reviewed in relation to the intended program of study and specific remedial work may be required.

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

### CONTINUATION

The Industrial Engineering Graduate Program, in fulfillment of its responsibility to graduate highly qualified professional engineers, has established certain policies and procedures. In addition to the requirements of the Graduate School listed elsewhere, to continue in the program each industrial engineering graduate student must:

- (1) Maintain at least a B (3.0) overall GPA in all course work, and
- (2) Demonstrate suitability for professional engineering practice.

At such time as questions are raised by industrial engineering graduate faculty regarding either of the above, the student will be notified and will be provided the opportunity to respond to the Committee on Graduate Studies in Industrial Engineering. The Committee on Graduate Studies will review the student's performance and make a recommendation concerning the student's eligibility to continue in the program. Appeal of a decision on continuation may be made through normal procedures outlined in the section of this catalog entitled "Grievances Other than Grades."

### DEGREE REQUIREMENTS

Students with degrees in other engineering disciplines may qualify for graduate study in industrial engineering after the completion of prescribed deficiency courses. Entering graduate students who are not proficient in engineering economy (IE 5316), probability and statistics (IE 5317), operations research (IE 5323), or industrial engineering design and analysis (IE 5344) may be required to take the deficiency course in parentheses to provide an appropriate background for graduate study in industrial engineering. For applicants with no prior training in engineering, the same deficiency courses will apply, and, in addition, courses in mathematics, physics, computer science, and engineering science may be required depending on the applicant's background.

Each graduate student will be required to take four courses as part of an industrial engineering core curriculum. The rest of the student's program will be elective, subject to the approval of the student's supervisory committee. The core curriculum is as follows:

- (1) Three hours of course work in probability and statistics approved by the Graduate Advisor
- (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) Three hours of industrial engineering design approved by the Graduate Advisor.

A final examination covering the coursework is required for each master's candidate. In the option involving a thesis, this final examination will be oral and will also cover the thesis. The final examination involved in the other two options will be written and/or oral.

### Master of Science

The Master of Science Degree is a research-oriented program which consists of a thesis option, thesis-substitute option, and a non-thesis option.

### Master of Engineering

The Master of Engineering Degree is an engineering practice-oriented program. The degree is a 36 credit-hour program in which a maximum of six credit hours may be earned by an acceptable design project report, internship, or additional coursework. Applicants for this degree must have a baccalaureate degree in an engineering discipline.

General degree requirements for the Master of Engineering are given under the catalog section entitled "Advanced Degrees and Requirements."

### Doctor of Philosophy

The PhD degree should normally require four years of full-time study or less after completion of the BS degree. There is no foreign language requirement for the PhD degree.

The PhD requirements are listed in the catalog section entitled "Advanced Degrees and Requirements." A student's program will consist of course work, independent study, and a dissertation in fields pertinent to his areas of interest. The program for each student will be

## **INDUSTRIAL ENGINEERING**

planned by the student and a committee of faculty members. Students with undergraduate degrees in fields other than engineering will be required to take the necessary courses to establish a background in science, mathematics, and the engineering courses equivalent to that required in the undergraduate programs.

The grade of R (research in progress) is a permanent grade. An incomplete (the grade of X) cannot be given in a course which is graded R. To receive credit for an R-graded course the student must continue to enroll in the course until a passing grade is received. Three-hour thesis and three- and six-hour dissertation courses are graded R/F only. The grade of P (required for graduation) can be received in six- or nine-hour thesis courses and nine-hour dissertation courses only. In the course listings below, R-graded courses are designated either "Graded P/F/R" or "Graded R." (See also the section entitled "R" GRADE on p. 36 of this catalog.)

**5300. TOPICS IN INDUSTRIAL ENGINEERING (3-0).** A study of selected topics in industrial engineering. May be repeated when topics vary. Prerequisite: Consent of instructor and graduate advisor.

**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 the industrial problems. Prerequisite: IE 5318. \$15 computer fee.

**5309. ANALYSIS OF STOCHASTIC PROCESS (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.

**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.

## INDUSTRIAL ENGINEERING

- 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. **\$10 computer fee.**
- 5323. OPERATIONS RESEARCH (3-0).** Introduction for graduate students to the techniques of operations research. Prerequisite: probability and statistics, calculus.
- 5326. BIOMECHANICS (3-0).** Fundamentals and objectives of biomechanics. Discussion will concern anthropometry, link system of the body, kinematic aspects of extremity joints, biomechanical aspects of injury and prosthesis.
- 5327. INFORMATION SYSTEMS FOR ENGINEERING MANAGEMENT DECISIONS (3-0).** Rigorous and quantitative treatment of financial information systems to assist engineering managers in capital and cost allocation, cost control, and performance evaluation. Prerequisite: graduate standing.
- 5328. MANUFACTURING SYSTEMS DESIGN (3-0).** Design, analysis, and modeling of advanced manufacturing systems and the development of databases for manufacturing management and operations. Prerequisites: IE 5330 or equivalent and 5322 or equivalent, and 5329 or equivalent.
- 5329. MODELING AND CONTROL OF INDUSTRIAL SYSTEMS (3-0).** Study and design of mathematical models for the effective control of industrial systems. Prerequisite: IE 5318. **\$10 computer fee.**
- 5330. INDUSTRIAL SYSTEMS (3-0).** The design, control, and specification of automated production processes in industrial systems.
- 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.
- 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.
- 5339. DESIGN FOR PRODUCIBILITY AND RELIABILITY (3-0).** Design methodology for high technology products to insure producibility, reliability, and automation; the design process, computer aided design analysis, thermal analysis, design for test, technical risk analysis, and quality production planning. Prerequisite: graduate standing.

## **INDUSTRIAL ENGINEERING**

**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. **\$2 lab fee.**

**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. **\$2 lab fee.**

**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. **\$2 lab fee.**

**5345. HUMAN ENGINEERING (2-3).** Background in industrial human factors engineering. Emphasis placed on study of human structural, physiological, and psychological limitations and their effects on design of work systems. Prerequisite: IE 5344 or consent of the instructor and IE 5318. **\$2 lab fee.**

**5349. INDUSTRIAL ROBOT APPLICATIONS (2-3).** A study of the requirements and selection criteria for the integration of robots into simple and complex industrial activities. Prerequisite: IE 5330 or equivalent. **\$2 lab fee.**

**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. Graded R.

**5392. SELECTED TOPICS IN OPTIMIZATION (3-0).** May be repeated for credit when content changes. Prerequisite: consent of instructor.

**5398, 5698, 5998. THESIS.** 5398 graded R/F only; 5698 and 5998 graded P/F/R. 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. Graded P/F/R.

**6301. ANALYSIS OF DECISION PROCESSES (3-0).** Methods of making economic decisions under the conditions of risk and uncertainty. Prerequisite: IE 5304 or equivalent.

**6302. MANUFACTURING FACILITIES PLANNING (3-0).** Advanced techniques for the selection, location, and integration of manufacturing equipment and facilities for developing or expanding manufacturing organizations; significant design project required. Prerequisites: IE 5323, 5329, and 5344 or consent of the instructor.

**6303. MODELS FOR DECISION MAKING (3-0).** Development of quantitative models to describe human decision-making and predict choices on the basis of relevant situational and subjective variables. Prerequisite: consent of instructor and graduate standing.

**6304. THE ANALYSIS AND FINANCING OF ENGINEERING PROJECTS (3-0).** Advanced techniques and methods for capital financing, planning, and evaluation of engineering projects. Prerequisites: IE 5304 and 5323 or consent of instructor.

**6390. SUPERVISED TEACHING IN INDUSTRIAL ENGINEERING (3-0).** Teaching under close supervision, attending group meetings, and individual conferences, and submitting reports as required. May be repeated for credit. Required for all teaching assistants and associates in industrial engineering; however, may not be used for degree credit. Graded P/F/R only.

**6399, 6699, 6999. DISSERTATION.** 6399 and 6699 graded R/F only; 6999 graded P/F/R.

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



# Department of INFORMATION SYSTEMS AND MANAGEMENT SCIENCES

*Areas of Study*

*Degrees*

Business Administration (See Interdepartmental and Intercampus Programs.)	M.B.A.
Information Systems Administration (See Interdepartmental and Intercampus Programs.)	M.S.
Mathematical Sciences (See Interdepartmental and Intercampus Programs.)	Ph.D.
	Ph.D.

*M.S. Degree Plan:* Thesis

*Chairman:* William E. Pinney 132 Business 273-3502

*Graduate Advisor:* Lawrence L. Schkade 541 Business 273-3502

*Graduate Faculty*

- Professors Raja, Schkade
- Associate Professors Baker, Brobst, Eakin, Pinney, Sircar, Slinkman, Whiteside
- Assistant Professors Guynes, Iyer, Mykytyn

**OBJECTIVE: M.B.A. PROGRAM**

Information Systems emphasizes the preparation required for developing and managing computer-based information systems. The comprehensive curriculum includes the study of applicable computer hardware, software, and database technology; the design of information systems; and management and control of information processing.

Management Science emphasizes the development of quantitatively-based decision-making, including problem recognition and definition, system modeling capabilities, and the determination of optimal courses of action from various decision alternatives. Management Science exposes the student to a variety of decision-making frameworks and an extensive array of quantitative modeling tools.

**OBJECTIVE: M.S. PROGRAM**

The objective of the Master of Science degree in Information Systems is to provide qualified students with both a general knowledge of business and a specialized knowledge of information systems. Students are exposed to the theory, research, and practical applications of numerous information systems areas including management information systems, systems analysis, systems design, and data base management systems; and may take electives in distributed systems, information resource management, general systems theory, expert systems, decision support systems, problem formulation, computer science, management sciences, research, and other related fields. The program is designed to prepare students for information systems careers in government and non-profit organizations as well as in business and industry.

## **INFORMATION SYSTEMS**

### **ACCREDITATION**

The Master of Science degree in Information Systems is accredited by the American Assembly of Collegiate Schools of Business (AACSB).

### **DEGREE REQUIREMENTS**

Along with meeting the admission requirements of the Graduate School, applicants must obtain a satisfactory score on the Graduate Management Admission Test (GMAT) and provide evidence of exceptional academic performance at the undergraduate level.

The program is designed primarily for students who have earned a Bachelor of Business Administration (BBA) degree (or equivalent). For this student the program consists of a minimum of 30 semester hours, including six hours of thesis work. Students who do not have a BBA may have to take additional coursework (up to 27 semester hours) to acquire sufficient general business knowledge for effective performance as an information systems professional. Foundation courses may be waived if equivalent coursework has been completed.

The minimum advanced program of 30 semester hours contains six hours of required work in research and statistical methods; 12 hours of required work in management information systems (MIS), systems analysis, systems design, and data base management systems; six hours of electives (to be selected from an approved list of elective courses, or to be approved upon selection by the student's advisors); and six hours of thesis demonstrating acceptable performance on a major systems project.

The required curriculum is as follows:

(a) Foundation Courses (27 semester hours)

- ACCT 5301 Accounting Analysis I
- ACCT 5302 Accounting Analysis II
- ECON 5309 Economic Analysis I
- MASI 5311 Decision Models and Information Systems
- BUSA 5301 Statistics
- MASI 5321 Introduction to Management Science
- MARK 5311 Marketing
- FINA 5311 Finance
- MANA 5312 Management

(b) Advanced Courses (24 semester hours)

(i) Required Research courses (6 semester hours)

- BUSA 5325 Advanced Statistical Methods in Business
- BUSA 5391 Research Colloquium

(ii) Required Information Systems courses (12 semester hours)

- INSY 5330 Introduction to Information Systems
- INSY 5335 Data Base Management
- INSY 5341 Information Systems Analysis
- INSY 5342 Information Systems Design

(iii) Approved Electives (6 semester hours)

Approved elective courses may be selected from areas such as accounting, computed science, finance, industrial engineering, information systems, management, management science, marketing, mathematical sciences, and psychology.

(c) Thesis (6 semester hours)

- BUSA 5698

**The grade of R (research in progress) is a permanent grade. An incomplete (the grade of X) cannot be given in a course which is graded R. To receive credit for an R-graded course the student must continue to enroll in the course until a passing grade is received. Three-hour thesis and three- and six-hour dissertation courses are graded R/F only. The grade of P (required for graduation) can be received in six- or nine-hour thesis courses and nine-hour dissertation courses only. In the course listings below, R-graded courses are designated either "Graded P/F/R" or "Graded R." (See also the section entitled "R" GRADE on p. 36 of this catalog.)**

**INFORMATION SYSTEMS (INSY)**

**5100. INTRODUCTION TO COMPUTING RESOURCES (3-0).** An introduction to the computing facilities available to students in the College of Business Administration, including the Personal Computer (PC) Lab, the local area network (LAN), and a text editor. Procedures for obtaining computer accounts, checking out software and in-house remote access to various computing facilities are covered. Course may be required for students deficient in computer skills. **\$15 computer fee.**

**5330. INTRODUCTION TO INFORMATION SYSTEMS (3-0).** An overview of Information Systems, their conceptual foundations, structure and development. Includes hardware and software technology, computer-based applications, management of corporate information systems, and current trends. Prerequisite: MASI 5311 or equivalent. **\$5 computer fee.**

**5335. APPLIED DATABASE MANAGEMENT (3-0).** The objectives and methods of database management are covered. Topics include objectives of database management, data models, elementary database design, data dictionaries, fourth generation programming languages, data integrity, security, and privacy. Actual use of a commercial mainframe database is required. Prerequisite: INSY 5330 or concurrent enrollment. **\$15 computer fee.**

**5341. INFORMATION SYSTEMS ANALYSIS (3-0).** Definition, analysis and documentation of information systems. Consists of contemporary tools and techniques used to develop the functional specifications of systems. Includes user liaison, system specification, feasibility and cost/benefit analysis, and project planning and control. Prerequisite: INSY 5330 and 5335. **\$5 computer fee.**

**5342. INFORMATION SYSTEMS DESIGN (3-0).** Design and development of computer-based information systems, beginning with systems specification, and comprising program design, coding, testing, documentation and implementation. Includes concepts in structured design and programming. Prerequisite: INSY 5341 and knowledge of a programming language or consent of instructor. **\$10 computer fee.**

**5343. DISTRIBUTED INFORMATION SYSTEMS AND DATA COMMUNICATIONS (3-0).** Characteristics, feasibility, configuration and design of distributed processing systems. Various business applications of distributed processing discussed. Computer programming in an interactive computer language. Prerequisite: INSY 5330. **\$5 computer fee.**

**5345. MANAGEMENT OF INFORMATION SYSTEMS (3-0).** Issues related to the administration of computer-based systems including planning and development; control and evaluation; organization and personnel. Societal and technological issues are also addressed from a managerial viewpoint. Prerequisite: INSY 5330. **\$5 computer fee.**

**5182, 5282, 5382. INDEPENDENT STUDIES IN INFORMATION SYSTEMS.** Extensive analysis of an information systems topic. Graded P/F/R. Prerequisite: consent of faculty member and department chairman.

**5192, 5292, 5392. SELECTED TOPICS IN INFORMATION SYSTEMS.** In depth study of selected topics in information systems. May be repeated when topics vary. Prerequisite: consent of instructor and Graduate Advisor. **\$10 computer fee.**

**6301. APPLIED GENERAL SYSTEMS THEORY (3-0).** General concepts of systems, including contributions to system theory from a wide variety of disciplines, applied to the analysis, design, and control of systems in industry and the public sector. Prerequisite: consent of instructor.

**6302. CONCEPTUAL ISSUES IN INFORMATION SYSTEMS (3-0).** Issues involved in the development of computer-based information systems including complexity and information, alternative approaches to system design, human information processing and decision support systems, system adaptation, and research in systems development. Prerequisite: INSY 5340. **\$5 computer fee.**

**6304. EXPERT SYSTEMS (3-0).** The theory and development of expert systems in the business environment. Organizational and management issues involved in the computerization of human problem solving and expert decision making. Prerequisite: INSY 5330. **\$10 computer fee.**

**6305. DECISION SUPPORT SYSTEMS (3-0).** An examination of the managerial decision making process and the contributions of information systems and management science models linked together in a comprehensive DSS framework. Prerequisites: proficiency in one programming language, INSY 5330, MASI 5321, BUSA 5325. **\$10 computer fee.**

**6306. PROBLEM FORMULATION AND DECISION STRUCTURING (3-0).** Explores the concepts of formulating and structuring problems arising in relatively unstructured decision environments. Techniques used for problem identification, formulation, and decision structuring

## **INFORMATION SYSTEMS**

and the uses of computer-based models and algorithms in problem solutions emphasized. Prerequisites: INSY 5330 and MASI 5321. **\$10 computer fee.**

DISSERTATION—See Mathematical Science entry for students in the PhD Program in Mathematical Sciences; see Administration entry for students in the PhD Program in Administration.

## **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. **\$10 computer fee.**

**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. **\$5 computer fee.**

**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. **\$10 computer fee.**

**5324. APPLICATIONS OF COMPUTER MODELS IN MANAGEMENT SCIENCES (3-0).** Examines the use of computer software packages for the solution of management science problems. Focuses on problem recognition and formulation and post optimality analysis, utilizing commercially available main frame and personal computer based software packages for solution of problems. Prerequisite: MASI 5321 or equivalent. **\$15 computer fee.**

**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. **\$15 computer fee.**

**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. **\$5 computer fee.**

**5330. NONPARAMETRIC STATISTICS (3-0).** A survey of statistical techniques which may be used when the normal assumptions of parametric statistics cannot be made; inclusion of procedures for cross-classified data, methods involving ranks, and Kolmogorov-Smirnov type techniques. Prerequisite: BUSA 5301 or equivalent. **\$5 computer fee.**

**5182, 5282, 5382. INDEPENDENT STUDIES IN MANAGEMENT SCIENCE.** Extensive analysis of a management science topic. Graded P/F/R. Prerequisite: consent of faculty member and department chairman.

**5392. SELECTED TOPICS IN MANAGEMENT SCIENCE.** In depth study of selected topics in management science. May be repeated when topics vary. Prerequisite: consent of instructor and Graduate Advisor.

**6301. APPLIED GENERAL SYSTEMS THEORY (3-0).** General concepts of systems, including contributions to system theory from a wide variety of disciplines, applied to the analysis, design, and control of systems in industry and the public sector. Prerequisite: consent of instructor.

**6302. APPLIED LINEAR STATISTICAL MODELS I (3-0).** The theoretical and practical aspects of regression analysis. Topics include simple and multiple linear regression, the matrix formulation of regression models, regression diagnostics and remedial measures, collinearity and ridge regression, normal correlation models, and nonlinear least squares. Practical applications of statistical software packages are emphasized.

**6303. APPLIED LINEAR STATISTICAL MODELS II (3-0).** The design and analysis of statistical linear models using analysis of variance. Topics include single and multiple factor analysis of variance, estimation of factor effects, multiple comparison procedures, and the more common experimental designs. Prerequisite: MASI 6302. **\$15 computer fee.**

## INFORMATION SYSTEMS

**6305. DECISION SUPPORT SYSTEMS (3-0).** An examination of the managerial decision making process and the contributions of information systems and management science models linked together in a comprehensive DSS framework. Prerequisites: proficiency in one programming language, INSY 5330, MASI 5321, BUSA 5325. **\$10 computer fee.**

**6306. PROBLEM FORMULATION AND DECISION STRUCTURING (3-0).** Explores the concepts of formulating and structuring problems arising in relatively unstructured decision environments. Techniques used for problem identification, formulation and decision structuring and the uses of computer-based models and algorithms in problem solutions emphasized. Prerequisites: INSY 5330 and MASI 5321. **\$10 computer fee.**

**6309. MULTIVARIATE STATISTICAL METHODS (3-0).** This course focuses on methods of analyzing mean and covariance structures. Topics include commonly applied multivariate methods such as multiple analysis of variance, repeated measures, discriminant analysis, profile analysis, canonical correlations, and factor analytic methods. The use of matrix algebra and available computer packages will be stressed. Prerequisite: BUSA 5325. **\$15 computer fee.**

**DISSERTATION—**See Mathematical Sciences entry for students in the PhD Program in Mathematical Sciences; see Administration entry for students in the PhD Program in Administration.

## INTERDISCIPLINARY STUDIES Program

*See Interdepartmental and Intercampus Programs, P. 244.*



## LANDSCAPE ARCHITECTURE

# LANDSCAPE ARCHITECTURE Program (LARC)

*Area of Study* Landscape Architecture *Degree* M.L.A.

*Master's Degree Plans:* Thesis, Thesis Substitute (Design Thesis), and Non-Thesis (Advanced Studio)

*Dean, School of Architecture and Environmental Design:*

Edward M. Baum 203 Ed Architecture 273-2801

*Director of Landscape Architecture:*

Robert D. DeJean 203B Architecture 273-2801

*Graduate Advisor:* Robert D. DeJean 203B Architecture 273-2801

*Graduate Faculty:*

Professors Baum, Henry, McDermott, Mehta

Associate Professors Guy, Gintole, McBride, Scherr, Yardley

Assistant Professors DeJean, James, Lawson

Professor Emeritus Myrick

## OBJECTIVE

The objective of the Master of Landscape Architecture program is to prepare the student for the current and evolving profession of landscape architecture. Emphasis is on design within the context of the urban landscape: the infrastructure of exterior spaces and settings which form, with buildings, the physical fabric of the city. By introducing the student to environmental analysis, development planning, and design at all scales, the M.L.A. program addresses the major issues in the profession. The program permits the graduate to take the Unified National Exam for the practice of landscape architecture.

## 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 students in the Landscape Architecture Program are required to consult the Graduate Advisor to obtain course and schedule approval each semester prior to registration. A completed degree plan must be approved during the student's initial semester of work.

There are three basic degree programs in landscape architecture (Paths A, B & C). These serve students with varying levels of prior education and professional experience.

### First Professional Degree Program: Path A

For students holding a college degree in a field other than design. Some prerequisite courses are usually required such as design, plant materials, technology, drawing, theory, and history. The extent and number of such courses will depend upon the student's previous college experience and demonstrated skills.

The First Professional Program: Path A in landscape architecture consists of 90 credit hours for thesis. 75 credit hours are required professional courses, 6 credit hours in thesis and 9 credit hours in electives. A 93 credit hours design thesis or advanced studio is also available.

## LANDSCAPE ARCHITECTURE

Electives may be concentrated in an area of specialization or may be employed to further develop abilities and approaches.

### *\*Suggested Course Sequences:*

#### FIRST PROFESSIONAL DEGREE IN LANDSCAPE ARCHITECTURE: PATH A

PATH A: Total Hours: Thesis 90  
                           Design Thesis  
                           or Advanced  
                           Studio 93

#### Year One

##### *Summer*

ARCH 5342 Architectural Graphics I

##### *Fall*

LARC 5670 DESIGN STUDIO I  
                   Site Planning & Landscape Design  
 ARCH 5343 Architectural Graphics II  
 LARC 5339 Plant Identification and Ecology  
 LARC 5312 History and Theory of Landscape  
                   Architecture I

##### *Spring*

LARC 5670 DESIGN STUDIO II  
                   Site Planning & Landscape Design  
 LARC 5336 Planting Design  
 LARC 5313 History and Theory of Landscape  
                   Architecture II  
 ARCH 5304 History of Architecture

#### Year Two

##### *Summer*

LARC 5337 Site Development

##### *Fall*

LARC 5564 DESIGN STUDIO III  
                   Advanced Site Planning and Design  
 LARC 5338 Communications for Landscape  
                   Architecture  
 LARC 5306 Urban Design  
 ARCH 5329 Architectural Computer Graphics

##### *Spring*

LARC 5565 DESIGN STUDIO IV  
                   Environmental Planning in Urban  
                   Regions  
 LARC 5353 Land Development Planning  
 LARC 5340 Landscape Technology I  
 ELECTIVE SAED

#### Year Three

##### *Summer*

LARC 5681 Practicum (approved by Graduate  
                   Advisor)

##### *Fall*

LARC 5672 DESIGN STUDIO V  
                   The Urban Landscape  
 LARC 5363 Research Methodology  
 LARC 5341 Landscape Technology II

##### *Spring*

LARC 5674 DESIGN STUDIO VI  
                   Selected Urban Topics  
                   or  
 LARC 5698 Thesis  
                   or  
 LARC 5593 Design Thesis  
                   Individual Problems  
 LARC 5194 Master's Comprehensive Exam  
 LARC 5331 Professional Practice  
 ELECTIVE SAED (Except Thesis Candidates)

### Professional Degree Program: Path B

For students holding a Bachelor of Science in Landscape Architecture (4-year) degree. Those holding degrees in other design fields such as architecture, interior design or city planning are required to take selected preparatory courses in plants, history, theory, and landscape design. A portfolio of previous work is required in addition to the general requirements of the Graduate School.

The Professional Program: Path B in landscape architecture consists of 55 credit hours for thesis. 40 credit hours are required professional courses, 6 credit hours in thesis and 9 credit hours in electives. A 58 credit hours design thesis or advanced studio is also available. Electives may be utilized to concentrate upon a special interest area such as natural resource analysis, park planning and design, urban design, history and theory, real estate, or cultural systems.

## LANDSCAPE ARCHITECTURE

### **Suggested Course Sequence:**

#### PROFESSIONAL DEGREE IN LANDSCAPE ARCHITECTURE: PATH B

Path B: Total Hours:	Thesis	55
	Design Thesis or Advanced Studio	58

#### Year One

<i>Fall</i>		<i>Spring</i>	
LARC 5564	DESIGN STUDIO III Advanced Site Planning and Design	LARC 5565	DESIGN STUDIO IV Environmental Planning in Urban Regions
LARC 5338	Communication for Landscape Architecture or Approved Elective	LARC 5353	Land Development Planning
LARC 5341	Landscape Technology II	ARCH 5306	Urban Design
ARCH 5329	Architectural Computer Graphics	ELECTIVE	SAED

#### *Summer*

LARC 5681	Practicum (approved by Graduate Advisor)
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#### Year Two

<i>Fall</i>		<i>Spring</i>	
LARC 5672	DESIGN STUDIO V The Urban Landscape	LARC 5674	DESIGN STUDIO VI Selected Urban Topics
LARC 5363	Research Methodology	LARC 5698	or Thesis
ELECTIVE	SAED	LARC 5593	or Design Thesis Individual Problems
		LARC 5194	Master's Comprehensive Exam
		LARC 5331	Professional Practice
		ELECTIVE	SAED

## Post Professional Degree Program: Path C

For students holding the Bachelor of Landscape Architecture (5 year) professional degree. Students holding other professional design degrees will require certain preparatory courses. A portfolio of previous work is required in addition to the general requirements of the Graduate School.

The Advanced Professional Program: Path C in Landscape Architecture consists of 30 to 36 credit hours, depending upon the student's choice to do a thesis, a design thesis, or advanced studio work. Electives are to be used to pursue areas of special interest.

### **\*Suggested Course Sequence**

#### ADVANCED PROFESSIONAL DEGREE IN LANDSCAPE ARCHITECTURE: PATH C

Path C: Total Hours:	Thesis	30
	Design Thesis	33
	Advanced Studio	36

#### Year One

<i>Fall</i>		<i>Spring</i>	
LARC 5672	DESIGN STUDIO V: The Urban Landscape	LARC 5674	DESIGN STUDIO VI: Selected Urban Topics
LARC 5329	Computers in Environmental Design or approved elective	LARC 5353	Land Development Planning
LARC 5363	Research Methods	CIRP 5345	Planning & Real Estate Development or approved elective
CIRP 5301	Planning Theory	ELECTIVE	SAED
ELECTIVE	SAED (Except Thesis candidates)	ELECTIVES	(3 hours for Design Thesis and 6 hours for Advanced Studio)

**\*Note: Coursework is a suggestion to meet the program focus. Each student will be counseled, based upon their interests and background, to develop an appropriate degree plan.**



## LANDSCAPE ARCHITECTURE

The grade of R (research in progress) is a permanent grade. An incomplete (the grade of X) cannot be given in a course which is graded R. To receive credit for an R-graded course the student must continue to enroll in the course until a passing grade is received. Three-hour thesis and three- and six-hour dissertation courses are graded R/F only. The grade of P (required for graduation) can be received in six- or nine-hour thesis courses and nine-hour dissertation courses only. In the course listings below, R-graded courses are designated either "Graded P/F/R" or "Graded R." (See also the section entitled "R" GRADE on p. 36 of this catalog.)

- 5194. MASTER'S COMPREHENSIVE EXAMINATION.** Directed study, consultation, and comprehensive examination over course work, leading to the design thesis Master of Landscape Architecture degree. Graded P/F/R. Required of all design thesis M.L.A. students in the semester in which they plan to graduate. Prerequisite: concurrent enrollment in LARC 5593.
- 5301. CONTEMPORARY THEORY OF LANDSCAPE ARCHITECTURE (3-0).** Investigation of issues and solutions to contemporary problems facing the landscape architect and the historical basis for such solutions.
- 5312. HISTORY AND THEORY OF LANDSCAPE ARCHITECTURE I (3-0).** Survey of the theory and design of the exterior environment as an aspect of the social, cultural, and intellectual life of various historical periods prior to the twentieth century. Prerequisite: permission of the instructor.
- 5313. HISTORY AND THEORY OF LANDSCAPE ARCHITECTURE II (3-0).** Survey of the theory and design of the exterior environment as an aspect of the social, cultural, and intellectual life of the twentieth century. Prerequisite: LARC 5312.
- 5324. NATIVE PLANT MATERIALS (3-0).** Identification of native plant materials and their relationship to ecosystems in the various Texas regions, and the potential for their use to benefit man and his environment.
- 5331. PROFESSIONAL PRACTICE IN LANDSCAPE ARCHITECTURE (3-0).** Ethical, legal, and administrative aspects of the practice of landscape architecture and the professional's relationship to the client.
- 5336. PLANTING DESIGN (2-4).** Planning and design applications of plant materials to urbanized and natural settings. **\$13 lab fee.**
- 5337. LANDSCAPE AND SITE DEVELOPMENT (3-0).** An introduction to the major issues of site and landscape planning with emphasis on topography, grading, drainage, road alignment, parking areas, site utilities, site utilization and building location, ecological planning, and land use controls. Paving materials for walks and plazas, low retaining walls, steps, and other site details also covered.
- 5339. LANDSCAPE PLANT MATERIALS (2-4).** An introduction to the ecology, growth characteristics, and design applications of landscape plant materials.
- 5340. LANDSCAPE TECHNOLOGY I (2-4).** Study of basic materials, methods of construction, and construction documents.
- 5341. LANDSCAPE TECHNOLOGY II (2-4).** Study of structural systems, grading, earthwork, and special problems of the urban landscape.
- 5342. ADVANCED ORNAMENTAL PLANTS AND PLANTING DESIGN (2-4).** Detailed study of ornamental plants, their visual and growth relationships, and their relationship to structures.
- 5353. LAND DEVELOPMENT PLANNING (3-0).** A comprehensive investigation into the process of land development planning for landscape architects. Environmental, economic, legal, and visual aspects will be featured, as will visiting development professionals and case studies.
- 5363. RESEARCH METHODOLOGY (3-0).** A course designed to provide an understanding of the theories of practical research and methods of pursuing them as they relate to the profession of landscape architecture. Comparable courses at UT Arlington may be substituted by permission of the Graduate Advisor.
- 5564. DESIGN STUDIO III: ADVANCED SITE PLANNING & DESIGN (3-9).** Studio featuring the planning and design of complicated sites, building arrangements, circulation, and planting. Advanced theories, methods, and technology will be presented. Prerequisite: permission of instructor. **\$13 lab fee.**
- 5565. DESIGN STUDIO IV: ENVIRONMENTAL PLANNING IN URBAN REGIONS (3-9).** Studio featuring the planning and open space preservation of regions within an urban growth context. Computer techniques, mapping process, air photo interpretation, and data source systems will be presented. Prerequisite: permission of instructor. **\$13 lab fee.**

## MANAGEMENT

**5593. INDIVIDUAL PROBLEMS IN LANDSCAPE ARCHITECTURE.** Required of all design thesis candidates. Individual study project conducted by a supervising committee with program and statement of intent filed with the Graduate Advisor during the previous semester. Prerequisites: ARCH 5363 and concurrent enrollment in LARC 5194. **\$13 lab fee.**

**5670. ADVANCED DESIGN STUDIO (3-9).** Studio courses emphasizing the analysis and design of building aggregations within the urban context. May be repeated for credit. **\$2 lab fee.**

**5672. DESIGN STUDIO V: THE URBAN LANDSCAPE (3-12).** Advanced design problems dealing with public and private urban outdoor space, urban systems, design guidelines, materials, theories, and professional collaboration will be presented. **\$13 lab fee.**

**5674. DESIGN STUDIO VI: SELECTED URBAN TOPICS (3-12).** Advanced professional interdisciplinary studio featuring contemporary urban landscape design issues and visiting design professionals. **\$13 lab fee.**

**5681. 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.

**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. Graded P/F/R.

**5195, 5295, 5395, 5695. SELECTED TOPICS IN LANDSCAPE ARCHITECTURE.** Studio and lecture courses to explore and present selected topics in a wide range of landscape architectural and environmental areas. These may include: urban landscape architecture, natural resource analysis, park and recreation planning, and landscape construction management. May be repeated for credit as topics change.

**5698. THESIS.** Taken in final semester to assure completion of prescribed professional courses. A problem of research in landscape architecture or related topic may be selected for the thesis. Graded P/F/R.

## Department of MANAGEMENT (MANA)

### Areas of Study

	Degrees
Personnel and Human Resource Management	M.S.
Business Administration (See Interdepartmental and Intercampus Programs.)	M.B.A.
Administration (See Interdepartmental and Intercampus Programs.)	Ph.D.

*M.S. Degree Plan: Thesis*

*Acting Chairman: David A. Gray*      209 Business      273-3166

*Graduate Advisor: Kenneth G. Wheeler*      229 Business      273-3866

*Graduate Faculty:*

Professors Dess, French, Garland, Quick, Wofford

Associate Professors Gerloff, Gray, Price, Rosenstein, Wheeler

Assistant Professors Bodensteiner, Giacobbe

### OBJECTIVE

The basic purpose of the Master of Science degree in Personnel and Human Resource Management is to provide students with both a general knowledge of management and a

specialized knowledge in personnel and human resources. Students are exposed to the theory, research, and practical applications of numerous personnel content areas, including personnel strategy and policy, human resource planning and forecasting, human resource information systems, career planning and development, personnel and employee relations law, employee selection, compensation, and training and development. The program is designed to prepare students for personnel, human resource management, and industrial relations careers in government and non-profit organizations, as well as business and industrial firms.

### ACCREDITATION

The Master of Science in Personnel and Human Resource Management is accredited by the American Assembly of Collegiate Schools of Business.

### DEGREE REQUIREMENTS

Along with meeting the admission requirements of the Graduate School, applicants must obtain a satisfactory score on the Graduate Management Admission Test (GMAT) and provide evidence of exceptional academic performance at the undergraduate level.

The program is designed primarily for students who have a bachelors degree in business administration. For this student the program consists of a minimum of 33 semester hours, including six hours of thesis. Students who do not have a bachelors degree in business administration may have to take additional coursework (up to 30 semester hours) to acquire sufficient general business knowledge for effective performance as a personnel director.

The minimum program contains six hours of required work in research and statistical methods (MANA 5329 and BUSA 5325), six hours of required work in personnel and policy (MANA 5340 and BUSA 5333), and fifteen hours of electives in personnel and human resources (to be selected from an approved list of elective courses). After the completion of the course work, the six hours of thesis will involve working closely with one or more members of the graduate faculty from the Department of Management on a research project in a specialized area of interest in personnel and human resource management.

**The grade of R (research in progress) is a permanent grade. An incomplete (the grade of X) cannot be given in a course which is graded R. To receive credit for an R-graded course the student must continue to enroll in the course until a passing grade is received. Three-hour thesis and three- and six-hour dissertation courses are graded R/F only. The grade of P (required for graduation) can be received in six- or nine-hour thesis courses and nine-hour dissertation courses only. In the course listings below, R-graded courses are designated either "Graded P/F/R" or "Graded R." (See also the section entitled "R" GRADE on p. 36 of this catalog.)**

**5311. BEHAVIORAL SCIENCES IN MANAGEMENT (3-0).** Examination of basic and applied concepts and research findings in the individual behavior areas including perception, attitudes, learning and motivation and the group behavior areas including small group behavior, leadership, conformity, and intergroup behavior.

**5312. MANAGEMENT (3-0).** Basic exploration of organizations in their environments. The elementary tools of management, which include: organizational objectives, social responsibility and ethics, policies, plans, and decision making; the design of organizations and jobs; the production and technology aspects of organization; the elements of leadership, behavior, and communication; and the elements of control and performance evaluation.

**5320. ORGANIZATIONAL BEHAVIOR (3-0).** Systematic study of behavioral problems in the complex organization. Analyzes the interaction of environmental and internal factors and their effects upon organizational behavior. The course is placed within the context of the organization process. Prerequisite: MANA 5312 or equivalent.

**5321. COMPLEX ORGANIZATIONS (3-0).** Provides the foundation for an in-depth knowledge of several important theories of management and organization. Attention to study of organizations, organizational effectiveness, comparative analysis of organizations, and the organization and its environment. Relates empirical findings and theoretical hypotheses with applied management concepts. Prerequisite: MANA 5312 or equivalent.

**5322. COMPENSATION ADMINISTRATION (3-0).** Administration of compensation systems in public and private organizations; concepts, models, and practices related to wage and salary

## MANAGEMENT

levels and structures; perceived equitable payments; individual appraisal, rewards, performance, and satisfaction; benefits and compensation controls.

**5324. GROUP AND INTERGROUP RELATIONSHIPS (3-0).** A survey of the group dynamics literature. Topics include: individual behavior within groups, group influences on individuals, group problem solving, group composition, conflict, leadership, training groups and work groups within organizations. Prerequisite: MANA 5312 or equivalent.

**5325. INDUSTRIAL RELATIONS (3-0).** Examines union-management relations and considers the structure and functioning of the economic and social forces of importance at the policy level within both the firm and the union. Also considers non-union employee relationships. Prerequisite: MANA 5312 or equivalent.

**5326. ORGANIZATION DEVELOPMENT AND CHANGE (3-0).** Examines the process of organization development, change, and renewal at the individual, group, and organization level; central topics including diagnostic and intervention procedures at the three levels of analysis. Prerequisite: MANA 5312 or equivalent.

**5327. EMPLOYEE RELATIONS LAW (3-0).** This course covers provisions of contemporary labor and employment law. Emphasis will be placed on case law precedents established under various federal statutes. Prerequisite: MANA 5340.

**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 and other similar technologies which involve one-of-a-kind products and substantial numbers of professional skills. Explores what is known about the management of professionals and professional enterprises. Should be taken during final semester of course work. Prerequisite: MANA 5312 or equivalent or consent of instructor.

**5340. PERSONNEL—HUMAN RESOURCE MANAGEMENT (3-0).** Presents modern human resources management from both theoretical and practical viewpoints. Topics include manpower planning, staffing, job design, compensation administration, employment discrimination and affirmative action, training and development, performance appraisal, and occupational health and safety. Prerequisite: MANA 5312 or equivalent.

**5341. EMPLOYEE STAFFING AND PERFORMANCE APPRAISAL (3-0).** This course will cover the areas of personnel selection, placement, and performance appraisal. Topics include: recruitment strategies, methods of selection, development and validation of appraisal instruments, and the implementation and conduct of performance appraisal.

**5342. PREVENTIVE STRESS MANAGEMENT (3-0).** Examines the organizational demands that cause stress. Identifies the psychophysiology of the stress response and the individual/organizational costs of distress. Emphasis is placed on the principles and methods of preventive stress management, such as social support, exercise, and the relaxation response. Prerequisite: MANA 5312 or equivalent or consent of instructor.

**5182, 5282, 5382. INDEPENDENT STUDIES IN MANAGEMENT.** Extensive analysis of a management topic. Graded R. Prerequisite: consent of faculty member and department chairman.

**5192, 5292, 5392. SELECTED TOPICS IN MANAGEMENT.** In-depth study of selected topics in management. May be repeated when topics vary. Prerequisite: consent of instructor and Graduate Advisor.

**5698. THESIS.** Prerequisite: permission of Graduate Advisor in Personnel and Human Resources Management. Graded P/F/R.

**6318. SEMINAR IN ORGANIZATIONAL THEORY AND LABOR RELATIONS (3-0).** Advanced study in the theory and research of the organizational theory and labor relations fields. Prerequisite: ADMN 6308 or consent of instructor.

**6328. SEMINAR IN BUSINESS POLICY (3-0).** Advanced study in the theory and research bases of business policy and strategic management. Prerequisite: ADMN 6308 or consent of instructor.

**6329. ADVANCED RESEARCH METHODS (3-0).** In-depth coverage of selected topics in the design of research and analysis of data; topics include philosophy of science, theory of measurement, complex experimental and quasi-experimental designs. Prerequisite: BUSA 5325 or equivalent.

**6338. SEMINAR IN ORGANIZATIONAL BEHAVIOR (3-0).** Advanced study in the theory and research of organizational behavior. Prerequisite: ADMN 6308 or consent of instructor.

**6348. SEMINAR IN PERSONNEL/HUMAN RESOURCES MANAGEMENT (3-0).** Advanced seminar on the theoretical and research current in human resources management. Prerequisite: ADMN 6308 or consent of instructor.

**6392. RESEARCH IN ADMINISTRATION (3-0).** Independent research under supervision of a faculty member. Graded P/F/R. Prerequisite: consent of instructor.

## MANAGEMENT SCIENCE

See Department of Information Systems & Management Sciences, p. 143.

## Department of MARKETING (MARK)

### Areas of Study

Business Administration (See Interdepartmental and Intercampus Programs.)

Administration (See Interdepartmental and Intercampus Programs.)

### Degrees

M.B.A.

Ph.D.

Chairman: Carl McDaniel

234 Business 273-2876

### Graduate Faculty:

Professors Dickinson, Gates, McDaniel

Associate Professor Jarboe

Assistant Professor Bhasin

### OBJECTIVE

The comprehensive marketing curriculum allows specialization in product management, retailing, marketing research, and promotion. Specialized courses in international marketing and physical distribution management are available also. A capstone course provides preparation for strategic marketing planning and decision making.

The grade of R (research in progress) is a permanent grade. An incomplete (the grade of X) cannot be given in a course which is graded R. To receive credit for an R-graded course the student must continue to enroll in the course until a passing grade is received. Three-hour thesis and three- and six-hour dissertation courses are graded R/F only. The grade of P (required for graduation) can be received in six- or nine-hour thesis courses and nine-hour dissertation courses only. In the course listings below, R-graded courses are designated either "Graded P/F/R" or "Graded R." (See also the section entitled "R" GRADE on p. 36 of this catalog.)

## MARKETING

**5311. MARKETING (3-0).** Survey of all the activities involved in marketing. Emphasis on developing a managerial point of view in planning and evaluating marketing decisions of the firm. Analyzes decisions with respect to products, price, channel, and promotional variables and appraises questions relating to cost efficiency, demand and regulations.

**5320. BUYER BEHAVIOR (3-0).** Examines the theoretical and empirical material on the individual and group behavior of people performing in the consumer role. Topics covered include perception, learning, attitude formation and change, personality, culture, social class, and reference groups. Behavioral science data provides a basis for the explanation of consumer behavior and the integration of these findings into current marketing practices. Prerequisite: MARK 5311 or equivalent.

**5324. SEMINAR: CONTEMPORARY MARKETING PROBLEMS (3-0).** Emphasizes projects based on a wide range of marketing developments and trends. Each student is required to write and present a research paper dealing in-depth with marketing topics of current or potential interests. Prerequisite: MARK 5311 or equivalent.

**5325. PHYSICAL DISTRIBUTION MANAGEMENT (3-0).** Study of distribution systems for firms engaged in marketing and/or manufacturing. Analyzes the logistical components of transportation, warehousing, inventory control, communications, and location theory. Explores the problems in and the development of national policy toward macro- and micro-distribution. Suggests concepts in total physical distribution system design. Prerequisite: MARK 5311 and BUSA 5301 or equivalent.

**5326. ADVERTISING AND NONPERSONAL COMMUNICATION (3-0).** Takes a managerial approach to advertising in business, audience analysis, advertising media, appeals, campaign development, cost analysis, and legal and ethical problems in advertising. Also examines communications processes, diffusion of innovation and other promotional activities: public relations and publicity, sales promotion devices, and packaging. Prerequisite: MARK 5311 or equivalent.

**5327. RESEARCH FOR MARKETING DECISIONS (3-0).** Overview of information needs of the marketing decision-maker. Primary emphasis upon the methods and techniques that may be employed for the collection and analysis of primary data. Major topics include design of research projects, generating primary data, questionnaire design, samplings for survey research, experimental design, controlling data collection, and data analysis. Prerequisite: MARK 5311 and BUSA 5301 or equivalents. **\$10 computer fee.**

**5328. PRODUCT MANAGEMENT (3-0).** Management of the firm's product or service offerings. Topics include new product development, new product screening, evaluation of existing products, product line and mix analysis, product abandonment decisions, the brand manager's role, the new product planning department, and others. Emphasis on the development of meaningful criteria for decision-making in the product area and on the development of information systems to suggest, screen, and monitor products. Prerequisite: MARK 5311 or equivalent.

**5329. SALES, SALES MANAGEMENT (3-0).** Examines the unique characteristics of both the industrial and consumer markets from the personal selling viewpoint, with emphasis upon industrial selling. Covers personal selling fundamentals as well as vital sales management topics. Uses role playing and case analysis. Prerequisite: MARK 5311 or equivalent.

**5331. INTERNATIONAL MARKETING (3-0).** Management of marketing in international business. Includes marketing research, pricing, promotion, and distribution in the international environment. Examines marketing problems arising from various degrees of foreign involvement (exports, licensing, foreign subsidiaries). Prerequisite: MARK 5311 or equivalent.

**5332. INDUSTRIAL MARKETING (3-0).** Marketing strategy examined from the standpoint of a firm's transactions with intermediate customers and industrial users. Included are frameworks for analysis of marketing opportunities. Student challenged to develop marketing programs directed toward professional buyers. Prerequisite: MARK 5311 or equivalent.

**5335. RETAIL MARKETING MANAGEMENT (3-0).** Planning, organizing, directing, and controlling retail institutions. Special emphasis on merchandise management includes quantitative research tools designed to improve the buying, handling, control, and pricing of a store's inventory. Also, concentration on sales promotion and customer services. Prerequisite: MARK 5311 or equivalent. An undergraduate retailing course cannot be substituted for MARK 5335.

**5336. ADVANCED RESEARCH ANALYSIS (3-0).** Focuses on problems of data analysis in marketing research. Considers application of multivariate statistics, including multiple regression, discriminant analysis and factor analysis to marketing research problems. Considerable time also devoted to multi-attribute preference models such as conjoint analyses. Prerequisite: MARK 5327 or equivalent. **\$15 computer fee.**

**5340. MARKETING STRATEGY (3-0).** A case course designed to give the student an opportunity to utilize the managerial and analytical tools that he has acquired. Uses case

## MATHEMATICAL SCIENCES

studies which require a realistic diagnosis of company problems, development of alternative courses of action, and the formulation of specific recommendations. Prerequisite: MARK 5311 and six hours of advanced marketing or consent of instructor. **\$5 computer fee.**

**5182, 5282, 5382. INDEPENDENT STUDIES IN MARKETING.** Extensive analysis of a marketing topic. Graded P/F/R. Prerequisite: consent of faculty member and department chairman.

**5192. SELECTED TOPICS IN MARKETING.** In-depth study of selected topics in marketing. May be repeated when topics vary. Prerequisite: consent of instructor and Department Chairman.

**6301. MARKETING THEORY (3-0).** Study of the history of marketing thought, evolution of marketing theory and latest theoretical developments.

**6302. ADVANCED CONSUMER BEHAVIOR (3-0).** Advanced study of current research underlying individual and group behavior of consumers and industrial buyers. Theories from the behavioral sciences will be applied to consumer behavior from descriptive, predictive, and normative perspectives.

**6305. MARKETING MODELS (3-0).** Study of stochastic and deterministic models of market behavior. Special attention is paid to models using LISREL and Multivariate Logit. **\$10 computer fee.**

**6390. SEMINAR IN SPECIAL TOPICS IN MARKETING (3-0).** Advanced doctoral level work in special topics in marketing. May be repeated when topics vary.

**6192, 6292, 6392. INDEPENDENT STUDY IN MARKETING (3-0).** Doctoral level analysis of marketing topic. Graded P/F/R. Prerequisite: consent of faculty member. May be repeated when topic changes.

## MATERIALS SCIENCE Program

*See Interdepartmental and Intercampus Programs, p. 245.*

## MATHEMATICAL SCIENCES Program

*See Interdepartmental and Intercampus Programs, p. 248.*





## MATHEMATICS

- (3) Those students enrolled in the thesis plan must take at least six hours of MATH 5398-5698 and, except for those in the computer science track, must take at least three other hours of electives.

Students in every degree plan must pass a preliminary and a comprehensive examination. For thesis students, these examinations are in addition to the thesis defense. Not more than six hours from MATH 5391 or 5392 will be applicable toward a graduate mathematics program.

**The grade of R (research in progress) is a permanent grade. An incomplete (the grade of X) cannot be given in a course which is graded R. To receive credit for an R-graded course the student must continue to enroll in the course until a passing grade is received. Three-hour thesis and three- and six-hour dissertation courses are graded R/F only. The grade of P (required for graduation) can be received in six- or nine-hour thesis courses and nine-hour dissertation courses only. In the course listings below, R-graded courses are designated either "Graded P/F/R" or "Graded R." (See also the section entitled "R" GRADE on p. 36 of this catalog.)**

**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.

**5300. MATHEMATICAL PROGRAMMING—COMPUTER PROGRAMMING AND APPLICATIONS (3-0).** Introduction to computing techniques utilizing an algorithmic language such as Fortran. Applications from various areas of numerical analysis. Prerequisite: consent of the instructor. **\$15 computer fee.**

**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 mathematic/statistical libraries is emphasized rather than programming of mathematic/statistical routines. Prerequisite: MATH 5300 or its equivalent. **\$15 computer fee.**

**5302. FUNDAMENTALS OF MATHEMATICAL SCIENCES I (3-0).** Matrices, linear mappings, differential and integral calculus of several variables, vector analysis, applications. Prerequisite: MATH 2326.

**5303. FUNDAMENTALS OF MATHEMATICAL SCIENCES II (3-0).** Analysis in  $\mathbb{R}^1$  including functions, continuity, differentiation, integration, sequences and series. Prerequisite: MATH 2326.

**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.

**5305. STATISTICAL METHODS (3-0).** Statistical methodologies used in various scientific investigation and experimentation; topics include probability, elements of sampling, testing hypotheses, regression, analysis of variance, and a survey of design of experiments. Prerequisite: consent of the instructor.

**5307. MATHEMATICAL ANALYSIS I (3-0).** Elements of topology, real and complex numbers, limits, continuity, and differentiation, functions of bounded variation, Riemann-Stieltjes integrals. Prerequisite: MATH 5303 or consent of graduate advisor.

**5308. MATHEMATICAL ANALYSIS II (3-0).** Analysis in  $\mathbb{R}^n$ : limits, continuity, Jacobian, extremum problems, multiple integrals, sequence and series of functions, some complex function theory. Prerequisite: MATH 5307 or consent of graduate advisor.

**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 4335.

**5310. APPROXIMATION THEORY (3-0).** Uniform approximations, best approximations, and least square approximations. Prerequisite: MATH 4335.

**5311. APPLIED PROBABILITY AND STOCHASTIC PROCESSES (3-0).** Topics include conditional expectations, law of large numbers and central limit theorem, stochastic processes, including Poisson, renewal, birth-death, and Brownian motion. Prerequisite: MATH 3313 or equivalent.

**5312. MATHEMATICAL STATISTICS I (3-0).** Basic probability theory, random variables, probability distributions, a classical approach to point estimation theory, confidence intervals, and Bayesian inference. Prerequisite: MATH 5307 or concurrent registration.

## MATHEMATICS

**5313. MATHEMATICAL STATISTICS II (3-0).** Topics include hypothesis testing, an introduction to linear models, analysis of discrete data, nonparametric statistical methods, and decision theory. Prerequisite: MATH 5312.

**5314. EXPERIMENTAL DESIGNS (3-0).** Completely randomized and randomized complete block designs with fixed and random effects, Latin Squares, factorial experiments, and analysis of covariance. Emphasis placed on development of models from underlying experimental situations and use of the appropriate analysis of variance table. Prerequisite: MATH 4313 or 5312.

**5315. GRAPH THEORY I (3-0).** Basic concepts, vector spaces, and matrices associated with graphs, trees, and arborescences, the greedy algorithm and matroids, shortest path problems, maximal flow and minimum cut, minimum cost flow, transportation and assignment problems, applications in various areas. Prerequisite: MATH 3330. **\$5 computer fee.**

**5316. GRAPH THEORY II (3-0).** Continuation of MATH 5315. Flows with multipliers, dynamic flows, distinct representatives, transversals, set covering problems, independent sets, cliques, matchings, location problems, hamiltonian circuits, the traveling salesman problem, problems on matroids, applications in various areas. Prerequisite: MATH 5315.

**5317. REAL ANALYSIS FOR THE MATHEMATICAL SCIENCES (3-0).** Integration with respect to a measure, classes of integrable functions,  $p$  spaces, approximations of functions, Fourier series and generalizations, regularizing procedures, generalized solutions to partial differential equations. Prerequisite: MATH 5308.

**5318. FUNDAMENTALS OF STOCHASTIC ANALYSIS (3-0).** General properties of stochastic processes, processes with independent increments, martingales, limit theorems including invariance principle, Markov processes, stochastic integral, stochastic differential. Prerequisites: MATH 5317 and consent of instructor.

**5319. PROBABILITY THEORY (3-0).** Probability spaces, random variables, filtrations, conditional expectations, martingales, strong law of large numbers, ergodic theorem, central limit theorem. Brownian motion and its properties. Prerequisite: MATH 5317.

**5320. APPLIED DIFFERENTIAL EQUATIONS (3-0).** Basic problems of the theory of ordinary differential equations: existence of solutions, uniqueness, dependence of solutions upon data; stability problems and applications; periodic and oscillatory solutions, with main emphasis on nonlinear oscillations. Prerequisite: MATH 3318 or 5303.

**5321. APPLIED PARTIAL DIFFERENTIAL EQUATIONS (3-0).** Analytic techniques for elliptic, parabolic, and hyperbolic equations; initial, boundary, mixed, and eigenvalue problems; applications to electrostatics, gravitation, heat transfer, wave propagation, fluid flow, and quantum mechanics. Prerequisite: MATH 3318 or 5303.

**5322. COMPLEX VARIABLES I (3-0).** Fundamental theory of analytic functions, residues, conformal mapping and applications. Prerequisite: MATH 5303.

**5323. COMPLEX VARIABLES II (3-0).** Analytic continuation. Riemann surfaces, velocity and stream functions with applications, elliptic functions. Prerequisite: MATH 5322 and 5308.

**5324. APPLIED COMPLEX VARIABLES (3-0).** Analytic functions of a complex variable; the line integral, residues, applications; conformal mappings; harmonic functions and applications to physical problems; elements of transform theory. Prerequisite: MATH 3335 or consent of the instructor.

**5325. OPERATIONAL MATHEMATICS (3-0).** Integral transformations such as the Laplace, Bilateral Laplace, and Hankel. Applications of these transforms to boundary value problems. Prerequisite: MATH 3335 or 4325.

**5326. OPERATIONAL MATHEMATICS (3-0).** Fourier Analysis: including Fourier Series, Fourier integrals, and special functions: including gamma functions, Bessel functions and other orthogonal functions. Prerequisite: MATH 3335 or 4325.

**5327. FUNCTIONAL ANALYSIS I (3-0).** Complete metric spaces. Banach spaces, linear operators, Hahn-Banach Theorem, Banach-Steinhaus Theorem, open mapping theorem, closed graph theorem, Banach algebra, spectral theory of bounded operators. Prerequisite: MATH 5308.

**5328. FUNCTIONAL ANALYSIS II (3-0).** Hilbert spaces, linear operators on Hilbert spaces,  $L^p$ -spaces, Riesz-Fréchet Representation Theorem, self-adjoint operators, spectral theory for unbounded operators, Sobolev spaces with applications. Prerequisite: MATH 5317 and 5327. **\$15 computer fee.**

**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 3321.

## MATHEMATICS

- 5332. ABSTRACT ALGEBRA II (3-0).** Linear, and multilinear algebra of modules with emphasis on structure theorems. Prerequisite: MATH 5331.
- 5333. LINER ALGEBRA AND MATRICES (3-0).** Liner spaces, linear transformations, vector norms, Gaussian elimination, Jordan form, eigenvalues, quadratic forms, and related topics. Prerequisite: MATH 3330 or consent of instructor.
- 5334. DIFFERENTIAL GEOMETRY (3-0).** Introduction to the theory of curves and surfaces in three dimensional Euclidean space. Prerequisite: MATH 4334 or 4335.
- 5335. APPLIED VECTOR AND TENSOR ANALYSIS (3-0).** Vector algebra, vector and tensor calculus; applications to differential geometry, engineering sciences, and dynamics including surface theory, geodics, minimal surfaces, elasticity, particle dynamics, special relativity, and general relativity. Prerequisite: MATH 5302.
- 5336. NUMERICAL ANALYSIS I (3-0).** Solution of equations, interpolation and approximation, numerical differentiation and quadrature, and solution of ordinary differential equations. Prerequisite: MATH 3345. \$15 computer fee.
- 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. \$15 computer fee.
- 5340. ANALYSIS OF NUMERICAL METHODS (3-0).** Topics of contemporary interest selected from one or more of the following: numerical solution of algebraic and transcendental systems, finite element method, stability, and convergence analyses. Prerequisite: MATH 5339 and 5308.
- 5341. MATHEMATICS FOR TEACHERS—GEOMETRY (3-0).** Selected materials from Euclidean geometry, non-euclidean geometry, and projective geometry.
- 5342. MATHEMATICS FOR TEACHERS—ALGEBRA (3-0).** Selected materials from algebra, including some field theory and theory of equations.
- 5343. MATHEMATICS FOR TEACHERS—RESEARCH (3-0).** Investigation of key research issues associated with mathematics, including the understanding, learning, and reasoning skills used in mathematics.
- 5344. MATHEMATICS FOR TEACHERS—COMPUTER (3-0).** Selected materials from the literature on the usage of micro-computers in the classroom, including an introduction to the BASIC language. \$10 computer fee.
- 5345. MATHEMATICS FOR TEACHERS—ANALYSIS (3-0).** Selected materials from analysis, including investigations in function theory.
- 5346. MATHEMATICS FOR TEACHERS—PROBLEM SOLVING (3-0).** Instruction in the application of various heuristics or general problem-solving strategies.
- 5350. APPLIED MATHEMATICS I (3-0).** Modeling and analysis of problems arising in particle mechanics, engineering, and the sciences; development of conservation laws, application of ordinary and partial differential equations, perturbation and stability analysis, diffusion processes, and wave propagation. Prerequisite: MATH 3318 and 3330.
- 5351. APPLIED MATHEMATICS II (3-0).** Continuation of MATH 5350 including an analysis of problems that involve aspects of continuum mechanics such as thermoelasticity and fluids. Prerequisite: MATH 5350.
- 5353. STATISTICAL RELIABILITY THEORY (3-0).** Development of probability models for reliability of complex systems, estimation of reliability parameters based on test data from exponential and Weibull failure distribution, repairable systems. Prerequisite: MATH 5313 or consent of instructor.
- 5355. STATISTICAL THEORY FOR RESEARCH WORKERS (3-0).** Designed for graduate students not majoring in mathematics. Topics include basic probability theory, distributions of random variables, point estimation, interval estimation, testing hypotheses, regression, and an introduction to analysis of variance. Graduate credit not given to math majors. Prerequisite: MATH 2325.
- 5356. APPLIED MULTIVARIATE STATISTICAL ANALYSIS (3-0).** Statistical analysis for data collected in several variables, topics including sampling from multivariate normal distribution, Hotelling's  $T^2$ , multivariate analysis of variance, discriminant analysis, principal components, and factor analysis. Prerequisite: MATH 5312 or consent of instructor.
- 5357. SAMPLE SURVEYS (3-0).** A comprehensive account of sampling theory and methods, illustrations to show methodology and practice, simple random sampling, stratified random sample, ratio estimates, regression estimates, systematic sampling, cluster sampling, and nonsampling errors. Prerequisite: MATH 5312 or consent of instructor.

## MATHEMATICS

**5358. - APPLIED REGRESSION ANALYSIS (3-0).** Simple and multiple linear regression, residual analysis, weighted least squares, analysis of variance, nonlinear regression, and logistic regression. Prerequisite: MATH 3313 or consent of instructor.

**5360. SPECIAL FUNCTIONS (3-0).** Orthogonal polynomials: basic properties, generating functions and applications; differential equations in complex domain; linear equations, singular points, hypergeometric functions. Legendre functions, and spherical harmonics; Bessel functions and their applications to mathematical physics. Prerequisite: MATH 5303 or consent of instructor.

**5361. APPLIED CALCULUS OF VARIATION (3-0).** Functionals, variation, extremization, Euler's equation, direct and indirect approximation methods; applications to mechanics and control theory. Prerequisite: MATH 5302.

**5362. MATHEMATICS OF LINEAR PROGRAMMING (3-0).** Basic theory and techniques related to linear programming, the simplex method, and duality; applications made to problems in transportation, assignment, games, network flow, economic theory, and various industrial optimization problems. Prerequisite: MATH 5333. **\$5 computer fee.**

**5363. TRANSFORM METHODS IN MATHEMATICAL SCIENCES (3-0).** Fast Fourier transforms, Walsh-Hadamard transforms, and discrete orthogonal transforms; computationally efficient algorithms for these transforms; application to digital filtering, bandwidth and information compression, feedback controls, and pattern recognition. Prerequisite: MATH 5303.

**5364. INTRODUCTION TO MATHEMATICAL CONTROL THEORY (3-0).** Systems in science, engineering, and economics and their mathematical description by means of functional equations (ordinary, partial, integral, delay-type). Basic properties of various classes of systems: observability, controllability, stability, and oscillating systems; optimal control problems and applications. Prerequisite: MATH 3318 or 4320.

**5365. BIOMATHEMATICS (3-0).** Mathematical techniques used in modeling such as perturbation theory, dimensional analysis, Fourier analysis, and differential equations. Applications to morphogenetics, population dynamics, compartmental systems, and chemical kinetics. Prerequisite: consent of instructor.

**5371. NUMERICAL LINEAR ALGEBRA (3-0).** Methods and theory related to the numerical solution of linear algebraic systems and eigenvalue-eigenvector problems. Both direct and iterative techniques are developed and discussed for full and sparse systems. Convergence, convergence rates, and error analysis. Prerequisite: MATH 5333 or consent of instructor.

**5372. NUMERICAL FUNCTIONAL ANALYSIS (3-0).** Numerical implementation of abstract operator methods, including Newton's method for linear and nonlinear algebraic, transcendental, differential, integral, and functional equations. Prerequisite: MATH 5327 or consent of instructor.

**5373. NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS (3-0).** Theoretical analysis of methods for approximating solutions of initial value problems, boundary value problems, and problems with periodic solutions; existence, uniqueness, convergence, stability, and error analysis are stressed for both single equations and for systems. Prerequisite: MATH 5338 or consent of instructor. **\$5 computer fee.**

**5374. NUMERICAL SOLUTION OF PARTIAL DIFFERENTIAL EQUATIONS (3-0).** Theoretical analysis for numerical methods for approximating solutions of elliptic, parabolic, hyperbolic, mixed, and systems of partial differential equations problems; existence, uniqueness, convergence, stability, and error analysis are stressed. Prerequisite: MATH 5339 or consent of instructor.

**5380. SEMINAR (3-0).** Current topics in mathematics, may be repeated for credit twice. Prerequisite: consent of instructor.

**5391. SPECIAL TOPICS IN MATHEMATICS (3-0).** Topics in mathematics assigned individual students or small groups. Faculty members closely supervise the students in their research and study. In areas where there are only three hours offered, the special topics may be used by students to continue their study in the same area. Graded P/F/R. Prerequisite: permission of instructor.

**5392/5492. SELECTED TOPICS IN MATHEMATICS (3-0)/(3-1).** May vary from semester to semester depending upon need and interest of the students. May be repeated for credit. Prerequisite: permission of instructor.

**5393. MATHEMATICS CONFERENCE.** May be repeated for credit. Graded P/F/R. Prerequisite: permission of Graduate Advisor.

**5395, 5695. SPECIAL PROJECT.** Graded P/F/R. Prerequisite: permission of Graduate Advisor.

**5398, 5698. THESIS.** 5398 graded R/F only; 5698 graded P/F/R. Prerequisite: permission of Graduate Advisor.

## MATHEMATICS

**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 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.

**6335. TOPICS IN ANALYSIS AND APPLICATIONS (3-0).** May be repeated for credit when the content changes.

**6380. SEMINAR (3-0).** Current topics in mathematical sciences, may be repeated for credit twice. Prerequisite: consent of instructor.

**6391. SPECIAL TOPICS IN MATHEMATICS (3-0).** Faculty directed individual study and research. May be repeated for credit when the content changes. Graded P/F/R.

**DISSERTATION—**See Mathematical Sciences.

A limited number of undergraduate mathematics courses may be applicable to a graduate program in mathematics if approved by the graduate advisor. These must be chosen from the following list and shall not exceed six hours total credit.

**4303. INTRODUCTION OF TOPOLOGY**

**4311. MATHEMATICAL PROBABILITY**

**4313. APPLICATIONS OF MATHEMATICAL STATISTICS**

**4320. ADVANCED DIFFERENTIAL EQUATIONS**

**4321. INTRODUCTION TO ABSTRACT ALGEBRA II**

**4322. INTRODUCTION TO COMPLEX VARIABLES**

**4323. VECTOR ANALYSIS**

**4324. INTRODUCTION TO PARTIAL DIFFERENTIAL EQUATIONS**

**4325. OPERATIONAL MATHEMATICS**

**4331. INTRODUCTION TO LINEAR ALGEBRA**

**4334. ADVANCED MULTIVARIABLE CALCULUS**

**4335. ANALYSIS II**

**4345. NUMERICAL ANALYSIS AND COMPUTER APPLICATIONS II**

**MECHANICAL ENGINEERING**

**Department of  
MECHANICAL ENGINEERING (ME)**

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

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

*Chairman:* D.Y.S. Lou 204 Engineering 273-2561

*Graduate Advisor:* Kent L. Lawrence 204 Engineering 273-2019

*Graduate Faculty:*

Professors Barker, Blackwell, Chen, Haji-Sheikh, Johnson, Lawrence,  
Lou, Wiseman, Woolf  
Associate Professors Goolsby, Hullender, Lawley, Wang, Woods  
Assistant Professors Nomura, Tong

**OBJECTIVE**

The graduate program provides opportunities for professional development in such forms as: instructional courses to enhance technical competence in areas of mechanical engineering practice; training through a variety of experiences in design, development, research, experimentation, and/or analysis in joint efforts with faculty and peers; specialized courses of study required for entry into career fields allied to the mechanical engineering discipline; guided individual study under faculty supervision; and supportive course work for programs leading to careers that require interdisciplinary competence.

A student with aid from a faculty advisor plans a program which will be consistent with his technical interests and the available facilities and course offerings. Typically, programs are classified as:

1. Heat Transfer
2. Fluid Mechanics
3. Thermodynamics
4. Solid Mechanics and Dynamics
5. Automatic Control and Systems
6. Design
7. Manufacturing Processes

**ADMISSION REQUIREMENTS**

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

For applicants with no prior training in engineering, the same minimum criteria will apply and, in addition, their records will be reviewed in relation to the intended program of study. Probationary status with specific remedial work required may be a basis for acceptance of such applicants.

The acceptance of applicants who have already received a master's degree in engineering will be based on the above-mentioned minimum criteria and results of graduate work, including the master's thesis.

**CONTINUATION**

The Mechanical Engineering Graduate Program, in fulfillment of its responsibility to graduate highly qualified professional engineers, has established certain policies and procedures. In addition to the requirements of the Graduate School listed elsewhere, to continue in the program each mechanical engineering graduate student must:

- (1) Maintain at least a B (3.0) overall GPA in all course work, and
- (2) Demonstrate suitability for professional engineering practice.

At such time as questions are raised by mechanical engineering graduate faculty regarding either of the above, the student will be notified and will be provided the opportunity to respond to the Committee on Graduate Studies in Mechanical Engineering. The Committee on Graduate Studies will review the student's performance and make a recommendation concerning the student's eligibility to continue in the program. Appeal of a decision on continuation may be made through normal procedures outlined in the section of this catalog entitled "Grievances Other than Grades."

**DEGREE REQUIREMENTS**

The following coursework is required of all MS and MEngr candidates in Mechanical Engineering:

1. One course in each of the following areas (12 credit hours):
  - Thermal Sciences: ME 5301 Transport Processes, or ME 5321 Advanced Classical Thermodynamics, or ME 5316 Thermal Conduction
  - Fluid Science: ME 5313 Fluid Dynamics, or ME 5342 Advanced Gas Dynamics I, or ME 5344 Viscous Flows, or AE 5317 Viscous Flow Mechanics
  - Design, Mechanics & Manufacturing: ME 5339 Structural Aspects of Design, or ME 5310 Structural Statics, or ME 6315 Machine Dynamics, or ME 6314 Mechanisms, or ME 5329 Metal Forming
  - Controls & Systems: ME 5303 Classical Methods of Control Systems Analysis and Synthesis, or ME 5305 Dynamic Systems Modeling, or ME 5307 Modern Methods of Control System Analysis and Synthesis
2. Two courses (six credit hours) in Engineering Analysis (ME 5331 and ME 5332 or approved mathematics courses).

**Master of Science in Mechanical Engineering**

The Master of Science Degree is a research oriented program in which completion of a thesis is mandatory; the program consists of a minimum of six credit hours of thesis and at least 24 credit hours of coursework distributed in four general areas. In addition to the general requirements listed above, MS candidates must take two elective courses (six credit hours), selected in concert with the faculty advisor, to serve as a degree of specialization in mechanical engineering.

**Master of Engineering in Mechanical Engineering**

The Master of Engineering Degree is an engineering practice oriented program. The degree is a 36-credit-hour program in which a maximum of six credit hours may be earned by an acceptable design project report, internship, or additional coursework. Students should be able to complete all degree requirements in one year including summer session of full-time study.

Normally the course distribution should include general course requirements as listed above, four elective courses in engineering, mathematics, science, and six credit hours of design project report, internship, or additional coursework.

General degree requirements for the Master of Engineering are given on page 24.

**Doctor of Philosophy**

The PhD degree should normally require four years of full-time study or less after completion of the BS degree. There is no foreign language requirement for the PhD degree.

## **MECHANICAL ENGINEERING**

To meet the educational goal of a broad-based technical background in mechanical engineering, it is expected that each student will take sufficient coursework to obtain in-depth knowledge in at least two areas of mechanical engineering. Consequently, the Department expects all PhD candidates to complete at least the following minimum requirements:

1. The first 12 credit hours listed above for the MS and MEng degrees.
2. A second course (three credit hours) at the graduate level in one of the broad areas of mechanical engineering outside the student's major area of interest.
3. Three additional courses (nine credit hours) in the student's major area of interest in mechanical engineering.
4. Four graduate level courses (12 credit hours) in engineering analysis, mathematics, statistics, or computer science.
5. Six credit hours ME 6699 Dissertation, and three credit hours of ME 6397 Research.

Not more than 75% of the student's coursework will be mechanical engineering courses.

Students entering with a master's degree from another institution may, with the assistance of their faculty advisor, make appropriate deletions from items one and four for courses taken elsewhere.

**The grade of R (research in progress) is a permanent grade. An incomplete (the grade of X) cannot be given in a course which is graded R. To receive credit for an R-graded course the student must continue to enroll in the course until a passing grade is received. Three-hour thesis and three- and six-hour dissertation courses are graded R/F only. The grade of P (required for graduation) can be received in six- or nine-hour thesis courses and nine-hour dissertation courses only. In the course listings below, R-graded courses are designated either "Graded P/F/R" or "Graded R." (See also the section entitled "R" GRADE on p. 36 of this catalog.)**

**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. **\$5 computer fee.**

**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). **\$5 computer fee.**

**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. **\$5 computer fee.**

**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 realtime solution techniques. State-space formulations, reference trajectory, linearization, linear vector spaces, the state transition matrix and its properties; and controllability and observability concepts treated. **\$5 computer fee.**

**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. **\$5 computer fee.**

**5310. STRUCTURAL STATICS (3-0).** Finite element method in the study of the static response of complex structures and of continua; applications to field problems; analytical methods emphasized, and digital computer application undertaken. Also offered as EM 5317. **\$5 computer fee.**

**5311. STRUCTURAL DYNAMICS (3-0).** Natural frequencies; forced and random response of complex structural systems studied through the use of the finite element method; computational



## MECHANICAL ENGINEERING

aspects of these problems discussed, and digital computer applications undertaken. Also offered as EM 5318. \$5 computer fee.

**5312. CONTINUUM MECHANICS (3-0).** Study of the underlying physical and mathematical principles relating to the behavior of continuous media; interrelationships between fluid and solid mechanics. Also offered as EM 5332.

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

**5314. MHD POWER GENERATION (3-0).** Development of MHD equations and Ohm's law for electrical conduction in ionized gasses. 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. \$5 computer fee.

**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. \$5 computer fee.

**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. \$5 computer fee.

**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. \$10 computer fee.

**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 radiator protection and reactor safeguards.

**5321. ADVANCED CLASSICAL THERMODYNAMICS (3-0).** Fundamentals of thermodynamics reviewed. Different treatments of principles studied, compared and formal relationships developed and applied to chemical, magnetic, electric and elastic systems.

**5322. NUCLEAR POWER ENGINEERING (3-0).** Continuation of ME 5320. Reactor energy removal, reactor structural materials and moderator materials, reactor fuels, reactor shielding, and reactor systems and power costs. Prerequisite: ME 5320.

**5323. STATISTICAL THERMODYNAMICS (3-0).** Statistical mechanics and kinetic theory related to thermodynamics and Maxwell-Boltzmann, Bose-Einstein and Fermi-Dirac statistics introduced and applied.

**5324. THE SCIENCE AND ECONOMICS OF ENERGY SYSTEMS (3-0).** Thermodynamics of heat power and heat pump systems, sources of energy, economics of energy supply and distribution, nuclear power plants, direct conversion systems, and solar energy and future systems.

**5325. COMBUSTION (3-0).** Fundamental treatment of problems involving simultaneous occurrence of chemical reaction and transfer of heat, mass and momentum. Also offered as AE 5325. Credit may not be received for both courses.

**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. \$5 computer fee.

**5328. ADVANCED MANUFACTURING ANALYSIS I (3-0).** Technical aspects of manufacturing, emphasizing process design and equipment. Prerequisite: ME 4307 or equivalent.

**5329. FORMING OF METALS (3-0).** Theoretical studies of various metal forming processes; elastic and plastic stress-strain relations developed; the effects of strain hardening considered. Offered also as EM 5313.

**5330. MACHINING THEORY (3-0).** Theory and application of metal machining; topics include mechanics of machining, temperature generated, tool life and tool wear, lubrication, grinding process, electrical machining process, surface integrity, economics, nomenclature of cutting tools.

## **MECHANICAL ENGINEERING**

- 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. MICROPROCESSORS AND APPLICATIONS (3-0).** Microprocessor and microcomputer based systems for applications in mechanical engineering are studied. Programming, interfacing, and applications design are included.
- 5334. APPLICATIONS OF THE THEORY OF STATISTICS AND PROBABILITY TO MECHANICAL ENGINEERING SYSTEMS (3-0).** Fundamentals of probability theory and statistics as related to conventional mechanical engineering problems. These principles applied to problems in random vibrations and in the behavior of dynamic systems due to random disturbances and conditions.
- 5335. OPTIMAL LINEAR SYSTEMS (3-0).** Detailed coverage of the work to date on that type of problem. Subjects are the Kalman Regulator and others in this class, optimal parameters, non-analytic criteria and gradient techniques. Prerequisite: ME 5309. \$10 computer fee.
- 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. INTRODUCTION TO ROBOTICS (3-0).** Overview of industrial robots. Coordinate systems and homogeneous transformations, Kinematics of manipulators; motion characteristics and trajectories; dynamics and control of manipulators. Demonstration of robot programming using an industrial robot. \$5 computer fee.
- 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. \$5 computer fee.
- 5341. CONTROL SYSTEM COMPONENTS (3-0).** The components and hardware used in electronic, hydraulic, and pneumatic control systems; techniques of amplification, computation, compensation, actuation, and sensing; modeling of multiport systems as well as servo systems analysis.
- 5342. ADVANCED GASDYNAMICS I (3-0).** Review of fundamental compressible flow theory. Introduction to compressible flow with friction and heat transfer, linearized two- and three-dimensional flow theory, and method of characteristics for perfect gases. Previously listed as ME 5311. Also offered as AE 5342. Credit may be received for only one of AE 5309, AE 5342, ME 5311 or ME 5342.
- 5343. ADVANCED GASDYNAMICS II (3-0).** Survey of kinetic theory, statistical mechanics, and chemical reaction rate theory. Application to the prediction of thermo-dynamic properties of gases and the analysis of problems in high-temperature gas-dynamics. Previously listed as ME 5312. Also offered as AE 5343. Credit may be received for only one of AE 5343, ME 5312, or ME 5343.
- 5344. VISCOUS FLOWS (3-0).** Navier-Stokes equations and Prandtl's boundary layer approximations; laminar and turbulent boundary layers including internal and external flows.
- 5348. FUNDAMENTALS OF COMPOSITES (3-0).** Fundamental relationships between the mechanical behavior and the composition of multiphase media; failure criteria discussed. Also offered as EM 5333.
- 5349. APPLIED COMPOSITES (3-0).** Practical use of composite materials in the design of load carrying parts and structures.
- 5390. SPECIAL TOPICS IN MECHANICAL ENGINEERING (3-0).** Seminar to provide formal instruction in special topics pertinent from semester to semester depending on the availability of faculty. May be repeated provided topics differ.
- 5191, 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 Graded P/F.
- 5192, 5292. ADVANCED TOPICS IN HEAT TRANSFER.** May be repeated for credit as topics change. Graded P/F/R.

## MECHANICAL ENGINEERING

**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.** 5398 graded R/F only; 5698 and 5998 graded P/F/R. Prerequisite: graduate standing in mechanical engineering. \$15 computer fee.

**6301. NONLINEAR PROBLEMS IN ENGINEERING (3-0).** Survey of nonlinear problems arising in mechanical engineering systems, and the methods of characterizing such typical nonlinearities as friction, backlash, and dead zone.

**6302. FLUID LOGIC (3-0).** Theory for synthesis and design of digital control systems with emphasis on fluid controlled switching circuits. Topics include sequential machine control, synthesis of asynchronous sequential circuits, hydraulic logic components, fluidics, and timing considerations in circuit design.

**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. \$5 computer fee.

**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, and machine signature analysis.

**6319. SOLAR AND DIRECT ENERGY CONVERSION (3-0).** Energy alternatives with emphasis on solar energy. Solar radiation, energy storage, load requirements, and system design discussed in detail. Also includes economic evaluation of such systems. Prerequisite: graduate standing or instructor's permission.

**6327. JOINING MATERIALS OF MANUFACTURE (3-0).** Studies of surface bonding, welding metallurgy, effect of rate of energy input on properties, residual stress and distortion, economics and process capabilities.

**6332. ESTIMATION THEORY (3-0).** Means of treating measurements to obtain a best estimate of the quantities measured. Emphasis on application to dynamic systems. Prerequisites: ME 5303, 5307, 5334. \$15 computer fee.

**6335. FLUIDICS (3-0).** Foundations and concepts of fluidics are presented for both proportional 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. \$5 computer fee.

**6336. FRICTION AND WEAR (3-0).** Wear and other types of surface attrition considered in this course with reference to surface nature and combinations, friction, absorbed gases, contaminants and surface heating.

**6337. COMPUTER AIDED DESIGN (3-0).** Role of graphics; image representation, batch and interactive computing, methods of automated mathematical model generation, mainframe and microcomputing in engineering design. Application in mechanical, structural, thermal, controls areas of mechanical engineering are considered. \$15 computer fee.

**6339. OPTIMIZATION FOR DESIGN (3-0).** Optimization methods in computer aided design. Mathematical programming methods applied to design optimization in mechanical, structural, thermal, etc. systems. \$5 computer fee.

**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. Graded P/F/R.

**6399, 6699, 6999. DISSERTATION.** 6399 and 6699 graded R/F only; 6999 graded P/F/R. \$15 computer fee.

## NURSING

# Department of MUSIC (MUSI)

### Area of Study

Humanities (See Interdepartmental  
and Intercampus Programs.)

### Degrees

M.A., Ph.D.

*Chairman:* Gary Ebensberger

101 Fine Arts 273-3471

### Graduate Faculty:

Professor Ebensberger  
Associate Professors Baldrige, 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.

**5102, 5202, 5302. SEMINAR IN SPECIAL TOPICS IN MUSIC**. May include topics in Music History, Music Theory, and Music Education. May be repeated for credit as the topic changes.

**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

Nursing

### Degree

M.S.N.

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

*Dean:* Myrna R. Pickard

669 Nursing 273-2776

*Assistant Dean/Graduate*

*Advisor:* Susan K. Grove

659 Nursing 273-2776

### Graduate Faculty:

Professors Burns, Field, Hughes, Pickard, Wyers

Associate Professors Brillhart, Grove, Hegstad, Heusinkveld, Marks,  
Okimi, Reed, St. Clair, Thompson

Assistant Professors Busen, Courtney, Heater, Jones, McFarlin, Rice,  
Tolbert, Winslow

Specialists Barnes, Gordon, Hawley

**OBJECTIVE**

Graduate nursing education articulates with a foundation of undergraduate nursing education, and provides an opportunity for professional nurses to continue developing practice abilities that are congruent with an expanding theoretical knowledge and authority base. The graduate program in nursing is designed to assist professional nurses to prepare for specialized clinical and functional roles that demand increased accountability and leadership. The master's program facilitates the use of the research process through the course of study and prepares the graduate to be a critical, self-directed practitioner who collaborates with consumers and other health care providers.

The major areas of study are:

Adult Nursing  
Nursing Administration  
Psychosocial Nursing  
Rehabilitation Nursing  
Forensic Nursing

Nurse Practitioner Programs  
Child Health Nursing  
Family Nursing  
Gerontological Nursing

**ACCREDITATION**

The Master of Science in Nursing degree program is accredited by the National League for Nursing.

**DEGREE REQUIREMENTS**

The applicant for the Master's degree in Nursing must meet the general requirements of the Graduate School and have Bachelor of Science in Nursing degree from a program accredited by the National League for Nursing or proof of equivalent education at a foreign institution. Individual consideration may be given to applicants who hold a BSN degree from non-NLN accredited programs.

In addition to the general admission requirements of the Graduate School, applicants must have completed a basic statistics course with a satisfactory grade prior to enrolling or during the first semester of graduate study, and present evidence of inclusion of basic physical assessment content in the undergraduate program or completion of a course in physical assessment. A copy of current Texas RN license and professional liability insurance coverage must be on file. Foreign students, whose native language is not English, must take, in addition to the Test of English as a Foreign Language (minimum score of 550), the Test of Spoken English. The foreign student must possess a current Texas RN license and have professional liability insurance coverage before registering for the selected clinical nursing area courses. Students are required to have each semester's planned program approved by the Graduate Advisor prior to registration. A minimum of 43 semester hours, thesis or non-thesis, is required for the degree. Six semester hours of elective coursework that supports the selected nursing study area are required and must be approved by the Graduate Advisor prior to registration. Students selecting Family Nursing, Gerontological Nursing or Child Health Nursing and electing the thesis option are required to complete 49 semester hours for the degree. Students selecting Family Nursing, Child Health Nursing or Gerontological Nursing must select Nurse Practitioner as their functional area.

All non-thesis candidates for the degree of Master of Science in Nursing shall pass a written examination over the candidate's graduate course work as determined by the School of Nursing. All thesis candidates for the degree of Master of Science in Nursing shall present the completed thesis in a final oral examination.

**Required Courses**

	Credit Hours
NURS 5301. Fundamentals of Research	3
NURS 5205. Professional Nursing-Issues and Influences	2
NURS 5327. Theoretical Foundations of the Nursing Process I	3
NURS 5328. Theoretical Foundations of the Nursing Process II	3

## **NURSING**

### **Nursing Areas**

Each student must complete the required courses in at least one nursing area.

- Adult Nursing:* NURS 5419, 5420, 5421
- Family Nursing:* NURS 5531, 5432, 5933, 5234
- Child Health Nursing:* NURS 5542, 5443, 5944, 5234
- Gerontological Nursing:* NURS 5545, 5446, 5947, 5234
- Nursing Administration:* NURS 5311, 5439, 5340, 5382, 5383
- Psychosocial Nursing:* NURS 5424, 5425, 5426
- Rehabilitation Nursing:* NURS 5419, 5420, 5421, 5322

### **Functional Areas**

Each student must complete the required courses in at least one functional area:

- Administration:* NURS 5439, 5340
- Clinical Specialization:* NURS 5336, 5337
- Nurse Practitioner:* NURS 5323, 5335
- Teaching:* NURS 5302, 5329

### **Electives/Independent Study**

Elective courses may be taken in an area of concentration in other departments of the University. Independent study offers the student the opportunity to explore topics of special interest.

**The grade of R (research in progress) is a permanent grade. An incomplete (the grade of X) cannot be given in a course which is graded R. To receive credit for an R-graded course the student must continue to enroll in the course until a passing grade is received. Three-hour thesis and three- and six-hour dissertation courses are graded R/F only. The grade of P (required for graduation) can be received in six- or nine-hour thesis courses and nine-hour dissertation courses only. In the course listings below, R-graded courses are designated either "Graded P/F/R" or "Graded R." (See also the section entitled "R" GRADE on p. 36 of this catalog.)**

- 5205. PROFESSIONAL NURSING-ISSUES AND INFLUENCES (2-0).** Exploration and evaluation of contemporary issues and trends relevant to nursing. Prerequisite: Senior or graduate standing.
- 5234. PHARMACOTHERAPEUTICS IN NURSING (2-0).** A study of clinical pharmacological therapeutics for advanced nursing practice. Prerequisite: graduate standing.
- 5301. FUNDAMENTALS OF RESEARCH (3-0).** Introduction to the conduct of research. Emphasis is on the application of concepts and the research process in the development of a proposal. Prerequisite: graduate standing and Elementary Statistics.
- 5302. CURRICULUM DEVELOPMENT IN NURSING (3-0).** Explores the nature of nursing education; curriculum process and its application to a variety of nursing education programs. Prerequisite: NURS 5301 or permission of instructor.
- 5308. COMPUTER AUTOMATION FOR NURSING EDUCATION AND PRACTICE (2-3).** A study of the impact of computer software and hardware in managing nursing education and practice. Basic knowledge and skills for maximum use of computers. Considerations given to selection of software for specific needs and interpretation of program outputs. Prerequisite: graduate standing. **\$5 computer fee. \$2 lab fee.**
- 5309. DEVELOPMENT OF COMPUTER COMMUNICATIONS IN NURSING EDUCATION AND PRACTICE (2-3).** Methods and techniques for planning, implementing, and evaluating computer programs using standard structured and unstructured language forms. Special attention to consulting with programmers in designing software for computer communications in nursing. Prerequisite: graduate standing. **\$5 computer fee. \$2 lab fee.**
- 5311. NURSING ADMINISTRATION I: FOUNDATIONS IN ORGANIZATION AND ADMINISTRATION (3-0).** Considers development of management thought and organizational theories as applied to health care organizations and their environments. Prerequisite: NURS 5327 or may be taken concurrently.

- 5316. CONTROL TECHNIQUES FOR NURSING PRACTICE (3-0).** Explore and develop skills with non-invasive techniques that nurses may use in helping individuals gain more effective control in dealing with pain, anxiety, stress and/or hypertension. Prerequisite: graduate standing.
- 5322. REHABILITATION NURSING (3-0).** Seminar to analyze specific content pertaining to the role of the professional nurse using rehabilitation concepts. Prerequisite: to be taken concurrently with NURS 5421 or approval of the graduate advisor.
- 5323. NURSE PRACTITIONER I (2-3).** Field work and study of the nurse practitioner role in the primary health care of individuals with emphasis on theoretical foundations and clinical skills for role implementation. Prerequisite: graduate standing. **\$25 lab fee.**
- 5327. THEORETICAL FOUNDATIONS OF THE NURSING PROCESS I (2-3).** Relationship of philosophical and theoretical foundations from nursing behavioral, natural, and applied sciences to concepts and operations in the nursing process. Prerequisite: graduate standing. **\$2 lab fee.**
- 5328. THEORETICAL FOUNDATIONS OF THE NURSING PROCESS II (3-0).** Clarifies ways in which theory confronts and establishes the empirical world of nursing in research and practice; theory components and their interrelationships are emphasized.
- 5329. ROLES AND FUNCTIONS OF THE NURSE EDUCATOR (1-6).** This course is designed to investigate the roles and functions of the nurse educator. The opportunity is provided for directed teaching experiences. Prerequisite: NURS 5302. **\$4 lab fee.**
- 5335. NURSE PRACTITIONER II (2-3).** Field work and study of the nurse practitioner role in the primary health care of groups and communities with emphasis on theoretical foundations and clinical skills for role implementation. Prerequisite: NURS 5323. **\$4 lab fee.**
- 5336. CLINICAL NURSE SPECIALIZATION I (2-3).** Consider the roles and practice of advance clinical nursing positions within the health care system. Prerequisite: NURS 5327 or may be taken concurrently and enrolled in clinical major. **\$2 lab fee.**
- 5337. CLINICAL NURSE SPECIALIZATION II (1-6).** Develop and analyze the practice parameters of the clinical nurse specialist. Prerequisite: NURS 5336. **\$2 lab fee.**
- 5340. NURSING ADMINISTRATION III: LEADERSHIP AND ORGANIZATION BEHAVIOR (1-6).** Examines leadership theories and practices, and management of human resources. Prerequisite: NURS 5439. **\$2 lab fee.**
- 5371. NURSING ADMINISTRATION IN HEALTH CARE ORGANIZATIONS (3-0).** Analysis of the planning and organizational processes in health care administration. Prerequisites: NURS 5311, 5439, 5340, or equivalent.
- 5380. NURSING ADMINISTRATION IN HIGHER EDUCATION (3-0).** Examination of contemporary issues and trends affecting the planning and organizational processes in educational administration. Prerequisite: graduate standing.
- 5381. PROGRAM EVALUATION IN NURSING (3-0).** Examination of program evaluation in academic and staff development program. Prerequisite: NURS 5302 or permission of Graduate Advisor.
- 5382. NURSING AND HEALTH CARE POLICY: ISSUES AND ANALYSIS (3-0).** Focuses on historical, current, and predicted health care policies formulated at the national, state, and local levels. Emphasizes the collaboration of professional nursing in the areas of planning, economics, and delivery of health care. Provides direction for the emerging roles of professional nursing practice. Prerequisite: graduate standing.
- 5383. FINANCIAL MANAGEMENT FOR NURSE ADMINISTRATORS (3-0).** Financial management principles, budgeting, cost analysis, and nursing management systems. Prerequisite: graduate standing.
- 5384. PSYCHONEUROBIOLOGY IN NURSING (3-0).** Theory and nursing implications of neuroanatomy, neurophysiology, and pathophysiology and their relationships to psychologic and behavioral phenomena. Prerequisite: Graduate standing.
- 5385. NURSING CARE OF INDIVIDUALS/FAMILIES WITH ADDICTIVE BEHAVIORS (3-0).** Theoretical foundations for understanding the scope of the problem of addiction. Focuses on gaining expertise in the area of prevention and/or in the various modalities of therapy for the individual/family with an addictive problem. Prerequisite: Graduate standing.
- 5391. THEORY DEVELOPMENT IN NURSING (3-0).** Examination of the role of theory in nursing as a practice discipline and strategies for theory development. Prerequisite: NURS 5327 and NURS 5328.
- 5392. NURSING EDUCATION AND NURSING SERVICE: ISSUES AND ANALYSIS (3-0).** Issues and contemporary trends affecting the relationship between nursing education and nursing service. Prerequisite: Graduate standing.

## **NURSING**

- 5393. ADVANCED PRACTICE IN CRITICAL CARE NURSING I (1-6).** Development of a knowledge base in critical care concepts and practical application of these concepts. Prerequisite: Graduate standing. **\$2 lab fee.**
- 5394. ADVANCED PRACTICE IN CRITICAL CARE NURSING II (1-6).** Expanded background in critical care nursing with emphasis on analysis, clinical nursing judgement and management of critical care patients and families. Prerequisite: Graduate standing. **\$2 lab fee.**
- 5419. ADULT NURSING I (3-3).** Analysis of concepts relevant to the nursing care of the adult. Clinical application of pathophysiologic and psychosocial concepts in providing holistic nursing care to the adult. Prerequisite: NURS 5327. **\$4 lab fee.**
- 5420. ADULT NURSING II (2-6).** Analyze adults' responses to acute conditions. Implement the nursing process in clinical settings to assist patient and family to make effective health choices. Prerequisite: NURS 5419. **\$4 lab fee.**
- 5421. ADULT NURSING III (1-9).** Analyze chronic health problems in adults and the impact on the individuals, families, and communities. Implement the nursing process in clinical settings to assist clients and families to make effective health choices. Prerequisite: NURS 5420. **\$4 lab fee.**
- 5424. PSYCHOSOCIAL NURSING I (3-3).** Fundamental concepts and selected theories necessary for understanding the psychodynamics of human behavior, and the application of therapeutic interaction with individual clients, who are experiencing acute and chronic mental health problems and addictive behaviors. Prerequisite: NURS 5327 or may be taken concurrently. **\$4 lab fee.**
- 5425. PSYCHOSOCIAL NURSING II (2-6).** Knowledge and skills needed for psychotherapeutic intervention with groups and families, including those experiencing acute and chronic mental health problems and disruptions associated with addictive behaviors. Prerequisite: NURS 5424 and NURS 5328 or may be taken concurrently. **\$4 lab fee.**
- 5426. PSYCHOSOCIAL NURSING-III (2-6).** Provides students with the opportunity to gain advanced skills in psychotherapeutic intervention with individuals, families, and/or groups, including acute and chronic mental health issues and addictive behaviors. Prerequisite: NURS 5425. **\$4 lab fee.**
- 5432. FAMILY NURSING II (3-3).** A continuation of NURS 5531 with progressive analysis and clinical nursing judgment and management of families in health and illness. Prerequisite: NURS 5531. **\$10 lab fee.**
- 5439. NURSING ADMINISTRATION II: MANAGEMENT ROLES AND FUNCTIONS (2-6).** Examines management roles and functions from a nursing perspective. Prerequisite: NURS 5311 or MANA 5312 and NURS 5328 or may be taken concurrently. **\$2 lab fee.**
- 5443. CHILD HEALTH NURSING II (3-3).** Theory and clinical management of school age children and adolescents with acute minor illness, development disabilities, and social/environmental problems. Prerequisite: NURS 5542. **\$10 lab fee.**
- 5446. GERONTOLOGICAL NURSING II (3-3).** Continuation of NURS 5545 with progressive analysis and clinical nursing management of gerontological clients in health and illness. Prerequisite: NURS 5545. **\$10 lab fee.**
- 5531. FAMILY NURSING I (3-6).** Theoretical study with applied clinical nursing judgment and management of families in health and illness. Prerequisite: NURS 5323 and NURS 5327 or may be taken concurrently. **\$25 lab fee.**
- 5542. CHILD HEALTH NURSING I (3-6).** Theory and application of concepts in pediatric primary health care. Major focus: health promotion and the assessment and management of minor acute and chronic stable illness in infants and young children. Prerequisites: NURS 5323 and NURS 5327 or may be taken concurrently. **\$25 lab fee.**
- 5545. GERONTOLOGICAL NURSING I (3-6).** Theoretical study with applied clinical nursing judgment and management of gerontological clients in health and illness. Prerequisites: NURS 5323 and NURS 5327 or may be taken concurrently. **\$25 lab fee.**
- 5933. FAMILY NURSING III (0-27).** Clinical preceptorship in selected primary health practice sites with opportunities to apply knowledge and concepts in a guided, progressive context of family nursing practice. Graded P/F/R. Prerequisite: NURS 5432 and 5234. **\$2 lab fee.**
- 5944. CHILD HEALTH NURSING III (0-27).** Field study in pediatric primary health care in selected clinical settings with guidance from preceptors and faculty. Major focus is integration of theoretical concepts applied to clinical practice. Graded P/F/R. Prerequisites: NURS 5443 and NURS 5234. **\$2 lab fee.**
- 5947. GERONTOLOGICAL NURSING III (0-27).** Clinical preceptorship in selected primary health practice sites with opportunities to apply knowledge and concepts in a guided, progressive context of gerontological nursing practice. Graded P/F/R. Prerequisites: NURS 5446 and 5234. **\$2 lab fee.**



- 5170, 5270, 5370. INDEPENDENT STUDY IN NURSING.** Detailed in-depth study in a specific topic area. Topic and mode of study are agreed upon by student(s) and instructor prior to registration. May be repeated for credit when topics vary. Graded P/F/R.
- 5190, 5290, 5390, 5490. TOPICS IN NURSING.** Selected topics in advanced nursing. May be repeated for credit as topics change.
- 5398, 5698. THESIS.** 5398 graded R/F only, 5698 graded P/F/R.
- 5696, 5996. INTERNSHIP IN NURSING ADMINISTRATION.** Exploration and participation in the role of a nurse administrator in planning, organizing, and analyzing nursing education or nursing service. Graded P/F/R. Prerequisite: approval of the Graduate Advisor.

## Department of PHILOSOPHY (PHIL)

### *Area of Study*

Humanities (See Interdepartmental and Intercampus Programs.)

### *Degrees*

M.A., Ph.D.

*Chairman:* Thomas W. King

209 University Hall 273-2774

### *Graduate Faculty:*

Associate Professor Langsdorf, Reeder, Townsend

### 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.

The grade of R (research in progress) is a permanent grade. An incomplete (the grade of X) cannot be given in a course which is graded R. To receive credit for an R-graded course the student must continue to enroll in the course until a passing grade is received. Three-hour thesis and three- and six-hour dissertation courses are graded R/F only. The grade of P (required for graduation) can be received in six- or nine-hour thesis courses and nine-hour dissertation courses only. In the course listings below, R-graded courses are designated either "Graded P/F/R" or "Graded R." (See also the section entitled "R" GRADE on p. 36 of this catalog.)

**5302. PHILOSOPHICAL BASIS OF THE HUMANITIES (3-0).** Fundamental methodological problems which arise in inter-disciplinary studies. Particular attention will be given to alternate hermeneutical approaches (theories of interpretation), to techniques of logical and conceptual analysis, and to differing epistemological questions and demands which arise in the humanistic sciences.

**5303. PROBLEMS IN THE PHILOSOPHY OF THE LITERARY ARTS (3-0).** A specific problem or related group of problems in aesthetics and the philosophy of art considered. Problems may be defined in terms of a genre—e.g. philosophy of literature—or in terms of an aesthetic problem which cuts across generic distinctions—e.g., the definition of art. Graded P/F/R.

**5391. CONFERENCE COURSE IN PHILOSOPHY.** May be taken only with the permission of the instructor and the Graduate Advisor. Graded P/F/R.

**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.

**PHYSICAL EDUCATION**

**Department of  
PHYSICAL EDUCATION (PHED)**

*Areas of Study*

Nursing  
Biomedical Engineering

**Degrees**

M.S.  
M.S., Ph.D.

*Chairman:* Eugene W. Anderson

112 Physical Education 273-3288

**OBJECTIVE**

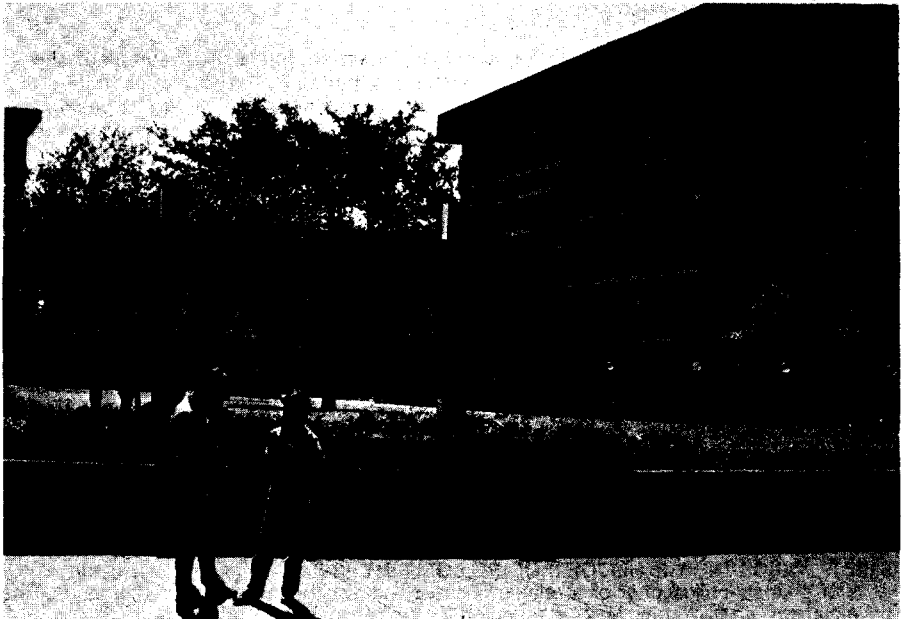
The graduate course offerings in physical education are provided to support other graduate degree programs and to meet the express needs of students. No program leading to a graduate degree in physical education exists at this time.

**5301. ANATOMICAL KINESIOLOGY (3-0).** An examination of the mechanical principles involved in the structure and function of the human body during basic movement; qualitative anatomical and mechanical analysis techniques for studying forces and motions acting in the skeletal system.

**5311. GRADED EXERCISE TESTING (2-3).** Health history, appraisal; techniques used for interviewing individuals on specific health hazards; accurately monitoring blood pressure, pulse rate and electrocardiogram during rest and exercise; conducting tests for assessing cardiovascular fitness; utilizing various modalities.

**5320. APPLICATION OF EXERCISE PHYSIOLOGY (2-2).** Basic exercise physiology as related to training for bioenergetics, circulorespiratory, and neuromuscular function; physical fitness assessment; exercise prescription and leadership; body composition techniques; special problems related to physical training.

**5192, 5292, 5392. SPECIAL TOPICS IN PHYSICAL EDUCATION.** In-depth study of selected topics in physical education and exercise science. May be repeated when topics vary. Prerequisite: consent of instructor.



# Department of PHYSICS (PHYS)

## *Areas of Study*

## *Degrees*

Physics	M.S.
Applied Physics	D.Sc.
Radiological Physics (See Interdepartmental and Programs.)	Intercampus
Mathematical Sciences (See Interdepartmental and Programs.)	M.S. Intercampus Ph.D.

## *Master's Degree Plans: Thesis and Non-Thesis*

*Chairman:* R. N. West 108 Science Hall 794-5160

### *Graduate Advisor*

*(M.S. Programs):* S. Sharma 108 Science Hall 273-2470

### *Graduate Advisor*

*(D.Sc. and Ph.D. Programs):*  
Asok K. Ray 108 Science Hall 273-2503

### *Graduate Faculty:*

Professors Black, Diana, Fry, Rayburn, Rubins, West  
Associate Professors Sharma, Thompson  
Assistant Professors Fletcher, Kaiser, Ray, Weiss  
Adjunct Professors Chuang, Schachar  
Adjunct Associate Professors Coleman, Dowdey  
Adjunct Assistant Professor Pattnaik

## OBJECTIVE

The objective of graduate work in physics is to prepare the student for continued professional and scholarly development as a physicist. The Physics MS Degree Program is designed to give the student a foundation in all fundamental areas of physics through formal courses and to give the student the experience of participating in original research in one of a variety of projects directed by the faculty.

The program leading to the Doctor of Science in Applied Physics is designed to prepare broadly trained applied physicists who would be engaged primarily in research, development, and production in industry or government laboratories. The student will acquire skills which will combine practical training in applied physics with specialized training in a appropriate area of physics. The areas of specialization are atomic scattering, laser physics, magnetic resonance, optics, positron physics, radiological physics, solid state physics, and surface physics.

## DEGREE REQUIREMENTS: MASTER OF SCIENCE

For admission to the Master of Science program in physics, the candidate must satisfy the general admission requirements of the Graduate School. In addition, the candidate must have satisfactorily completed at least 24 hours of advanced physics and supporting courses. Deficiencies must be removed.

A minimum of 30 hours is required for the Master of Science degree, of which 18 hours, including a six hour thesis (minimum registration), will be in physics, and 12 hours may be selected from physics, mathematics, chemistry, geology, biology or engineering as approved by the Graduate Advisor.

## PHYSICS

### DEGREE REQUIREMENTS: DOCTOR OF SCIENCE

To be admitted to the Doctor of Science program, an applicant must satisfy the general admission requirements of the Graduate School. Each candidate must complete the following program requirements:

- (1) Demonstration of competence in a minimum of 45 credit hours of core courses chosen under the guidance of the supervising committee from the following (or from courses approved in advance by the Graduate Studies Committee):

Traditional core courses:

PHYS 5306	Classical Mechanics
PHYS 5307, 5308	Quantum Mechanics I, II
PHYS 5309, 5313	Electromagnetic Theory I, II
PHYS 5310	Statistical Mechanics
PHYS 5311, 5312	Mathematical Methods in Physics I, II
PHYS 5315, 5316	Solid State I, II

Applied Physics core courses

PHYS 5314	Advanced Optics
PHYS 5319	Mathematical Methods in Physics III
PHYS 5349	Methods of Experimental Physics
PHYS 6301, 6302, 6303	Methods of Applied Physics I, II, III
MATH 5355	Statistical Theory for Research Workers
MANA 5312	Management
EE 5333	Advanced Electronics

Computer Science as required by the supervising committee.

- (2) Internship: PHYS 6304, 6604, 6904
- (3) Dissertation and additional research and elective courses chosen under the guidance of the supervising committee.

The grade of R (research in progress) is a permanent grade. An incomplete (the grade of X) cannot be given in a course which is graded R. To receive credit for an R-graded course the student must continue to enroll in the course until a passing grade is received. Three-hour thesis and three- and six-hour dissertation courses are graded R/F only. The grade of P (required for graduation) can be received in six- or nine-hour thesis courses and nine-hour dissertation courses only. In the course listings below, R-graded courses are designated either "Graded P/F/R" or "Graded R." (See also the section entitled "R" GRADE on p. 36 of this catalog.)

**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/R 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 transformation, 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, Bose-Einstein distribution, Einstein condensation, density matrix, quantum statistical mechanics, kinetic methods, and transport theory. Prerequisite: PHYS 4315 or permission of Graduate Advisor.

- 5311. MATHEMATICAL METHODS IN PHYSICS I (3-0).** Algebraic and analytical methods used in modern physics. Algebra: matrices, groups, and tensors, with application to quantum mechanics, the solid state, and special relativity. Analysis: vector calculus, ordinary and partial differential equations, with applications to electromagnetic and seismic wave propagation. Prerequisite: permission of Graduate Advisor.
- 5312. MATHEMATICAL METHODS IN PHYSICS II (3-0).** Continuation of PHYS 5311 with a selection from the following topics. Algebra: matrix representations of the symmetric and point groups of solid state physics, matrix representations of the continuous groups  $O(3)$ ,  $SU(2)$ ,  $SU(3)$ ,  $SL(2,C)$ , general covariance. Analysis: further study of analytic functions, Cauchy's theorem, Green's function techniques, orthogonal functions, integral equations. Prerequisite: PHYS 5311 or permission of Graduate Advisor.
- 5313. ELECTROMAGNETIC THEORY II (3-0).** Modern tensorial treatment of classical electrodynamics, force on and field of a moving charge, derivation and application of 4-vector potential, Maxwell's equations in tensor form, field momentum and radiation. Prerequisite: PHYS 5309 or PHYS 5311 or permission of Graduate Advisor.
- 5314. ADVANCED OPTICS (3-0).** Electromagnetic wave equations, theory of diffraction, radiation scattering and dispersion, coherence and laser optics. Additional advanced topics of current interest. Prerequisite: permission of Graduate Advisor.
- 5315. SOLID STATE I (3-0).** Crystal structure, lattice vibration, thermal properties, and band theory of solids. Prerequisite: permission of Graduate Advisor.
- 5316. SOLID STATE II (3-0).** Electrical and magnetic properties of crystalline solids, magnetic resonance, and optical phenomena. Prerequisite: permission of Graduate Advisor.
- 5319. MATHEMATICAL METHODS IN PHYSICS III (3-0).** Numerical methods for applied physics; computer techniques, numerical differentiation, integration, interpolation, extrapolation; differential equations, integral equations, statistical analysis; scientific computer library; artificial intelligence programming. Prerequisite: permission of instructor. **\$5 computer fee.**
- 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.
- 5325. QUANTUM FIELD THEORY (3-0).** Quantized field description of elementary particles and their interactions, developed from the principles of quantum mechanics and Lorentz invariance. Quantitative applications to electromagnetic and weak interactions. Prerequisite: PHYS 5308 or permission of Graduate Advisor.
- 5349. METHODS OF EXPERIMENTAL PHYSICS (3-0).** Selected experimental methods used in modern research in cryogenics, lasers, nuclear instrumentation, magnetic resonance, particle accelerators, positron physics, surface physics, x-rays, and statistical analysis of data. May be repeated for credit. Prerequisite: permission of Graduate Advisor.
- 5350. SPECIAL TOPICS IN PRECOLLEGE PHYSICAL SCIENCE INSTRUCTION (1-6).** For experienced teachers of precollege physical science and/or physics. Considers special problems in precollege physical science instruction and exposes teachers to new laboratory-oriented precollege curricula. May be repeated for credit as the subject matter changes. May not be used to satisfy any of the requirements for the Master of Science degree in physics. Prerequisite: a bachelor's degree, teaching experience or an intent to teach, and permission of Graduate Advisor.
- 5390. SURVEY OF INTRODUCTORY CLASSICAL AND MODERN PHYSICS (3-0).** Selected areas from mechanics, heat, sound, electricity, magnetism, light, special relativity and atomic physics will be covered. May not be used to satisfy any of the requirements for the Master of Science degree in physics. Prerequisite: permission of instructor.
- 5391. SPECIAL TOPICS IN PHYSICS (3-0).** Topics in physics, particularly from areas in which active research is being conducted, are assigned to individuals or small groups for intensive investigations. May be repeated for credit. Graded R. 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. Graded R. Prerequisite: permission of Graduate Advisor.
- 5193-5393. READINGS IN PHYSICS.** Conference course. May be repeated for credit. Graded R. Prerequisite: permission of instructor.
- 5194, 5294, 5394, 5694. RESEARCH IN PHYSICS.** Conference course with laboratory. May be repeated for credit. Graded P/F/R. Prerequisite: permission of instructor. **\$5-10 computer fee.**
- 5398, 5698. THESIS.** 5398 graded R/F only; 5698 graded P/F/R. Prerequisite: permission of Graduate Advisor. **\$5-10 computer fee.**

## POLITICAL SCIENCE

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

**6301. METHODS OF APPLIED PHYSICS I (3-0).** Survey of electromagnetic fields and circuits with emphasis on engineering applications; magnetic circuits, D.C., A.C. and transient electric circuits; wave guides, transmission lines, stubs, resonant cavities, antennas, Smith charts; approximate and computer methods for circuits. Prerequisite: permission of instructor.

**6302. METHODS OF APPLIED PHYSICS II (3-0).** Survey of electronic circuits and instruments; introduction to physical electronics; digital circuits, operational amplifiers and integrated circuits; emphasis will be placed on engineering applications. Prerequisite: permission of instructor.

**6303. METHODS OF APPLIED PHYSICS III (3-0).** Engineering applications of mechanics and thermodynamics; three-dimensional analysis of structures and dynamics of rigid bodies; machines; first and second laws of thermodynamics; heat engines; thermal properties of matter; equations of state; advanced energy systems. Prerequisite: permission of instructor.

**6304, 6604, 6904. APPLIED PHYSICS INTERNSHIP.** Applied physics and engineering research and training in industry or other science or engineering departments of UT Arlington or other institutions requiring applied physicists. Faculty supervision and submission of technical progress reports required. Graded P/F only. Prerequisite: permission of Graduate Advisor.

**6391. SELECTED TOPICS IN APPLIED PHYSICS (3-0).** Topics chosen from research areas in the Department of Physics or at one of the institutions or corporations participating in the traineeship program in applied physics; emphasis on industrial and engineering applications. May be repeated for credit. Prerequisite: permission of instructor.

**6399, 6699, 6999. DISSERTATION.** 6399 and 6699 graded R/F only; 6999 graded P/F/R. Prerequisite: admission to candidacy for the Degree of Doctor of Science in Applied Physics. \$5-15 computer fee.

**DISSERTATION**—See also Mathematical Sciences.

## Department of POLITICAL SCIENCE (POLS)

### Areas of Study

Political Science

Degrees

M.A.

Humanities (see Interdepartmental and  
Intercampus Programs.)

M.A., Ph.D.

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

Chairman: Irving O. Dawson

206 University Hall 273-2993

Graduate Advisor: Dale Story

413 University Hall 273-3994

### Graduate Faculty:

Professors Cole, Dawson, Hagard

Associate Professors Clark, Hekman, Katsikas, Knerr,

Marshall, Moon, Saxe, Story

Assistant Professors Cichock, Prehoditch, Simmons, Simowitz

## 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**

The thesis degree plan requires 24 hours of course work including 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, 5331, 5332, 5335, 5356, 5391.

Political Theory (Thoughts and Methodology)—5338, 5339, 5357, 5391.

Students should consult the Political Science Graduate Student Handbook for regulations on transfer courses, undergraduate courses, conferences, internships, and special courses.

The non-thesis degree plan requires a minimum of 36 hours, including three hours of methodology, and courses from four of the six areas.

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. Students will not be permitted more than one reexamination 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. Students must have three hours of a methods course.

**The grade of R (research in progress) is a permanent grade. An incomplete (the grade of X) cannot be given in a course which is graded R. To receive credit for an R-graded course the student must continue to enroll in the course until a passing grade is received. Three-hour thesis and three- and six-hour dissertation courses are graded R/F only. The grade of P (required for graduation) can be received in six- or nine-hour thesis courses and nine-hour dissertation courses only. In the course listings below, R-graded courses are designated either "Graded P/F/R" or "Graded R." (See also the section entitled "R" GRADE on p. 36 of this catalog.)**

**5197. MASTER'S COMPREHENSIVE EXAMINATION.** Required of all non-thesis Master of Arts students in the semester of their graduation. Graded P/F/R.

**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. Also offered as URBA 5301; credit will be granted only once.

**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. Also offered as URBA 5310; credit will be granted only once.

**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.

## **POLITICAL SCIENCE**

**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.

**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.

**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. Also offered as URBA 5321; credit will be granted only once.

**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.

**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. Also offered as URBA 5360; credit will be granted only once.

**5350. TOPICS IN POLITICAL BEHAVIOR AND PROCESSES (3-0).**

**5353. TOPICS IN COMPARATIVE POLITICS (3-0).**

**5354. TOPICS IN INTERNATIONAL POLITICS AND ORGANIZATION (3-0).**

**5355. TOPICS IN PUBLIC LAWS AND JURISPRUDENCE (3-0).**

**5356. TOPICS IN PUBLIC ADMINISTRATION AND POLICY STUDIES (3-0).**

**5375. TOPICS 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. Graded P/F/R.

**5393. INTERNSHIP.** Under faculty supervision, a non-thesis degree student may elect an internship program in the student's major area of interest; a substantial internship report applying research procedures expected. Graded P/F/R. Also offered as URBA 5350; credit will be granted only once.

**5398, 5698. THESIS.** Original research designed to augment existing studies of problems or topics related to one of the major fields of study. 5398 graded R/F only; 5698 graded P/F/R.



# Department of PSYCHOLOGY (PSYC)

*Areas of Study*

General Experimental Psychology  
Mathematical Sciences (See Interdepartmental and  
Intercampus Programs.)

*Degrees*

M.S., Ph.D.

Ph.D.

*Master's Degree Plan: Thesis*

*Chairman:* Verne C. Cox

315A Life Science 273-2281

*Graduate Advisor:* James N. Bowen

402 Life Science 273-3200

*Graduate Faculty:*

Professors Amster, Bernstein, Bowen, Cox, Erickson, Ickes, Paulus  
Associate Professors Kopp, Jackson, Nairne  
Assistant Professors Kernis, Mann  
Adjunct Associate Professor Mablil  
Professor Emeritus McCain

## OBJECTIVE

The objective of graduate work in psychology is to educate the student in the methods and basic content of the discipline and to provide 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.

**Animal Behavior Option:** Study in the area of animal behavior is offered jointly by biology and psychology graduate programs. Students specializing in animal behavior may initially enroll in the Master of Science program in either biology or psychology. There are a number of biology and psychology courses offered within this specialization. Upon successful completion of the M.S. degree in either biology or psychology, students may enter the doctoral program in psychology provided that they meet the admission requirements for this program (see below). Students initially entering the biology master's program may substitute Animal Behavior 5335 for one of the psychology core curriculum requirements.

**Deadline for Financial Aid Applications**—Students who wish to be considered for assistantships must have their applications and departmental forms sent to The University of Texas at Arlington by March 1 for the Fall Semester and November 1 for the Spring Semester. Students who do not desire financial aid may apply at any time up to one month before the semester in which they plan to enroll.

## DEGREE REQUIREMENTS

In addition to the requirements outlined elsewhere, the Department of Psychology will require undergraduate courses in statistics and in experimental methods. These courses may be taken as deficiency courses.

Degree requirements for the Department of Psychology are established by the Committee on Graduate Studies in Psychology, and supplement those established by the University (see general requirements of the Graduate School as stated under the section entitled "Admission Requirements and Procedures").

Each entering graduate student will be furnished a copy of the departmental rules which will serve as guidelines for departmental actions and recommendations.

Each student must adhere to the code of ethics of the American Psychological Association.

## **PSYCHOLOGY**

### **Master of Science Degree**

Thirty hours, including six hours of thesis, are required for the Master of Science degree. The program is designed to form the basis for the doctoral program. It is, however, open to those seeking a terminal master's degree. PSYC 5405, 5406, and 12 hours among 5412, 5413, 5422, 5433, and 5445 are required.

As soon as is feasible, a student should decide on an area for concentration and research. After discussion with and consent of the involved faculty members, the student selects a supervising professor and a thesis committee. No student may enroll in PSYC 5398 or 5698 until the thesis committee has approved a proposal for the thesis project.

### **Doctor of Philosophy**

The degree of Doctor of Philosophy in experimental psychology requires distinguished attainments both in scholarship and original research, and the deep understanding of the strategic role of thoughtful experimentation in the development of an empirical science. Although the student must meet the minimum requirements of a planned course of study, the ultimate basis for conferring the degree must be the demonstrated ability to do independent and creative work and the exhibition of a profound grasp of the subject matter of the field.

**Foreign Language**—Because of the growing importance of computers in psychology, all students who enter the program seeking a doctorate will be required to demonstrate proficiency in computer programming. This may be accomplished by a passing grade in CSE 2306 (Computer Programming and Applications) which may be taken on a pass-fail basis. The grade in this course will not be used to determine a student's grade point average. Students who have a prior background in computer programming may elect to take an equivalency examination. This computer science requirement is in lieu of a foreign language requirement.

**Mathematics**—Experimental psychology is requiring increasing sophistication in mathematics. All prospective students are encouraged to recognize this trend and prepare themselves as well as possible. Mathematics through Introductory Calculus is desirable but not required.

**Course requirements**—Entering graduate students will be required to take the following courses during their first three semesters 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 five courses:

Animal Learning (5412)

Cognitive Processes (5413)

Advanced Social Psychology (5422)

Advanced Physiological Psychology (5433)

Human Learning and Memory (5445)

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 5407).

(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 PSYC 5698 or PSYC 5600. 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 two sections of PSYC 5600. If the student does not elect to obtain the MA, one of the research courses must result in a formal thesis-equivalent paper, which will be evaluated by a committee and defended in an oral examination. In either event, a thesis or thesis equivalent must be completed before the student takes the diagnostic 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 6999. No student may enroll in a dissertation course until the dissertation committee has approved a proposal for the dissertation project.

A student has completed the core requirements when he or she has:

- (a) Received at least a B average in his or her core area courses.
- (b) Received at least a B average in all other courses.
- (c) Received a positive evaluation in the two major research courses.

The grade of R (research in progress) is a permanent grade. An incomplete (the grade of X) cannot be given in a course which is graded R. To receive credit for an R-graded course the student must continue to enroll in the course until a passing grade is received. Three-hour thesis and three- and six-hour dissertation courses are graded R/F only. The grade of P (required for graduation) can be received in six- or nine-hour thesis courses and nine-hour dissertation courses only. In the course listings below, R-graded courses are designated either "Graded P/F/R" or "Graded R." (See also the section entitled "R" GRADE on p. 36 of this catalog.)

**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: permission of graduate advisor.

**5302. LEADERSHIP (3-0).** Designed for entrants in the Women in Science program to provide training in leadership and small group dynamics. May not be applied toward advanced degrees in psychology.

**5405. ADVANCED STATISTICS I (3-2).** Preview of essential mathematical ideas and techniques, a survey of the basic concepts of probability theory, mathematical expectation, special distributions; parametric estimation theory.

**5406. ADVANCED STATISTICS II (3-2).** Statistical hypothesis testing, Bayesian inference, decision theory, linear regression and correlation; analysis of variance; distribution-free techniques. \$15 computer fee.

**5407. EXPERIMENTAL DESIGN (3-2).** Statistical aspects of complex experimental designs used in psychological research. Prerequisite: PSYC 5406. \$10 computer fee.

**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.

**5412. ANIMAL LEARNING (4-0).** Survey of contemporary problems in animal learning.

**5413. COGNITIVE PROCESSES (4-0).** Includes topics such as concept identification, problem solving, reasoning, and knowledge representation.

**5314. PSYCHOLINGUISTICS (3-0).** Investigation of language in terms of its function, content and structure, with an emphasis on learning, perception, and generation of linguistic units.

**5315. OPERANT PSYCHOLOGY (3-0).** Overview of operant theory with an emphasis upon contemporary problems. Basic concepts that are covered include: reinforcement and stimulus control, punishment, compound schedules, response topography, and chaining. Other topics include complex human operants, verbal behavior, behavior modification, and contingency management.

**5316. HISTORY AND SYSTEMS (3-0).** Consideration of the origins of psychology in the development of Western thought. Early conceptualization of problems and their modification with changes in evidence emphasized.

**5317. PSYCHOPHYSIOLOGY (3-0).** Introduction to human psychophysiological research and methodology.

**5320. BEHAVIORAL PHARMACOLOGY (3-0).** Survey of the basis of behavioral pharmacology including mechanisms and theories of drug actions, techniques and strategies of pharmacological research, common psychoactive drugs, and the uses of drugs in clinical practice.

**5321. PERSONALITY AND BEHAVIOR DYNAMICS (3-0).** Research in personality processes; particular topics include unconscious processes, anxiety, and conflict.

**5422. ADVANCED SOCIAL PSYCHOLOGY (4-0).** Problems in social psychology emphasizing integration of experimental design, research findings and theoretical formulations.

**5323. ADVANCED DEVELOPMENTAL PSYCHOLOGY (3-0).** Survey of development of behavior in both humans and sub-humans.

## PSYCHOLOGY

- 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.
- 5331. PERCEPTUAL PROCESSES (3-0).** Survey of methods and findings dealing with perception; emphasis will be upon behavioral rather than physiological considerations; particular topics include signal detection theory, form and pattern recognition, and attentional mechanisms.
- 5332. SENSORY PROCESSES (3-0).** Structure, function, and neural processes in the various sense modalities. Emphasis is placed upon the current literature and theory on vision, audition, somathesis, taste, and smell and their relationship to perception and behavior.
- 5433. ADVANCED PHYSIOLOGICAL PSYCHOLOGY (4-0).** Biological and physical processes underlying behavior. Emphasis on neurophysiological, biochemical and endocrinological mechanisms serving as a foundation for behavior. Other topics covered are the neural and chemical basis for conditioning and learning, intelligence and language, reflexes and motor performance, and abnormal behavior.
- 5335. ANIMAL BEHAVIOR (3-0).** Phylogenetic approach to some basic problems in behavior, with special emphasis on unlearned behavior. Also offered as BIOL 5335; credit will be granted for only one of these courses.
- 5338. OBJECTIVE PSYCHOLOGICAL TESTING (3-0).** Survey of major objective psychological tests. Prerequisites: PSYC 5344.
- 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.
- 5444. PSYCHOMETRIC THEORY (3-3).** Introduction to test construction. Topics include reliability theory, test validation, and item analysis.
- 5445. HUMAN LEARNING AND MEMORY (4-0).** Survey of current approaches to the study of human learning and memory.
- 5346. SOCIAL BEHAVIOR OF ANIMALS (3-0).** Survey of the research and theories related to nonhuman social behavior.
- 5347. ADVANCED ENVIRONMENTAL PSYCHOLOGY (3-0).** Survey of the current literature on the impact of various features of the physical and social environment on human behavior. Designed to be of interest to graduate students in architecture, urban studies, engineering, geology, sociology, as well as those in psychology.
- 5151, 5251, 5351. READINGS IN PSYCHOLOGY.** Independent readings under the supervision of an individual faculty member. Students wishing to conduct an experiment should sign up for PSYC 5191, 5291, or 5391. May be repeated for credit with consent of the Graduate Advisor. Graded P/F/R. Prerequisite: consent of the instructor.
- 5353. PSYCHOLOGY EDUCATION I (3-0).** Survey of the content of contemporary psychology.
- 5354. PSYCHOLOGY EDUCATION II (3-0).** Survey of the methods of contemporary psychology.
- 5355. MULTIVARIATE ANALYSIS (3-0).** Application of general linear model to special cases such as factor analysis, multiple regression, discriminant analysis. PSYC 5444 recommended.
- 5356. CLASSIFICATION PROCEDURES (3-0).** Considerations of problems involved in classification; signal detection analysis and advanced topics in discriminant analysis. Prerequisite: PSYC 5355 or consent of instructor.
- 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 behavior.
- 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

## PSYCHOLOGY

academic, verbal, and self-help skills. Prerequisite: PSYC 2310 or PSYC 3440 or PSYC 4318, or the equivalent. By consent only. May be repeated for credit with consent of Graduate Advisor. Graded P/F/R.

**5370. PROGRAM EVALUATION (3-0).** Criterion analysis, application of quantitative techniques, and communication of results.

**5373. PRACTICUM IN APPLIED PSYCHOLOGY.** Provides opportunities for experience in the application of experimental psychology in business, education, and other settings. Prerequisites: consent of instructor and approval of practicum arrangements by Graduate Advisor.

**5389. CONTEMPORARY PROBLEMS IN PSYCHOLOGY (3-0).** Topics vary; may be repeated for credit with consent of Graduate Advisor.

**5191, 5291, 5391. RESEARCH IN PSYCHOLOGY.** Independent research under the supervision of an individual faculty member; may be repeated for credit with consent of Graduate Advisor. Graded P/F/R. Prerequisite: consent of instructor. **\$10 computer fee.**

**5600. ADVANCED RESEARCH.** Supervised research. May be repeated for credit. Graded P/F/R. Prerequisite: consent of instructor.

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

**5398, 5698. THESIS.** 5398 graded R/F only; 5698 graded P/F/R. Prerequisite: 12 hours of advanced psychology and consent of Graduate Advisor. **\$10 computer fee.**

**6300. SEMINAR IN PSYCHOLOGY (3-0).** Offered each semester. Topics vary. May be repeated for credit. Prerequisite: consent of instructor.

**6399, 6699, 6999. DISSERTATION.** 6399 and 6699 graded R/F only; 6999 graded P/F/R. Prerequisite: approved dissertation proposal. For students in the PhD program in Mathematical Sciences, see Mathematical Sciences entry. **\$10 computer fee.**

## RADIOLOGICAL PHYSICS Program

*See Interdepartmental and Intercampus Programs, p. 250.*

## **SOCIAL WORK**

# **Graduate School of SOCIAL WORK (SOCW)**

### *Areas of Study*

Social Work  
Administration (See Interdepartmental and  
Intercampus Programs.)

### *Degrees*

M.S.S.W., Ph.D.

Ph.D.

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

*Dean:* Roosevelt Wright, Jr. 211 Social Work 273-3181

*M.S.S.W. Graduate Advisor:* Lila B. Hagins 211 Social Work 273-3181

*Ph.D. Graduate Advisor:* John S. McNeil 211 Social Work 273-3181

### *Graduate Faculty:*

Professors Callicutt, Duehn, Gaupp, Glasser, Hunter, Lecca,  
Mayadas, McNeil, Mindel, Sundel, Watts, Wright  
Associate Professors Barrett, Dangel, Deschner, Granvold, Hagins,  
Kail, King, Mayers, Polster, Schoech, Shannon  
Assistant Professors Jordan, Kersey  
Adjunct Associate Professor Bernstein  
Specialist Birmingham

## **OBJECTIVES**

The program leading to the Master of Science in Social Work degree focuses on developing professional leaders in the areas of direct social work practice, and administration and planning. The program of instruction includes an intensive academic component integrated with field work component allowing the student to learn and apply theory concurrently. The two areas of concentration are direct practice and human services administration and planning.

The program leading to the Doctor of Philosophy in Social Work is designed primarily for those preparing for advanced leadership positions in teaching, research, administration and planning, policy analysis and clinical practice—including clinical research and program evaluation—in the social work field. More specifically, the objectives of the program are for students to acquire (1) a broad understanding of major policy and practice trends and issues in the field of social work, (2) substantive knowledge of some field or area of practice (e.g., health, mental health, public social services, aging, settings serving families and children and minority groups) with emphasis on issues and questions in that field which require scientific or scholarly attention; and (3) a competence to conduct independent empirical research that extends the knowledge base of clinical practice with individuals, families, and small groups and/or administration and planning practice in some area of social work. The areas of specialization are administration, planning and policy, and clinical practice.

## **ACCREDITATION**

The master's program in social work is accredited by the Council on Social Work Education. The Council does not accredit doctoral programs.

## **ADMISSION REQUIREMENTS: MASTER OF SCIENCE IN SOCIAL WORK**

Admission to the Graduate School of Social Work requires: (1) a grade point average of 3.0 or above on the last 60 semester hours of undergraduate study or (2) if less than a 3.0 grade

## **SOCIAL WORK**

point average on the last 60 semester hours of undergraduate study, a Graduate Record Examination score which evidences graduate study aptitude; (3) leadership ability; (4) personal maturity; and (5) motivation for a human service profession. A personal interview may be required.

Applicants to the Graduate School of Social Work whose native language is not English must take, in addition to the Test of English as a Foreign Language, the Test of Spoken English.

Neither probationary nor provisional admission will be granted to an applicant with less than 3.0 GPA on the last 60 semester hours of undergraduate study when the required GRE score is lacking.

### **ADMISSION REQUIREMENTS: DOCTOR OF PHILOSOPHY**

To be admitted to the Doctor of Philosophy in Social Work program, an applicant must satisfy the general admission requirements of the Graduate School and his or her academic record must show preparation for advanced study in social work. The students accepted for admission are those whose academic achievements, previous experience, and aptitude for research and scholarship indicate the potential for achieving the objectives of the program. In addition, admission to the program requires: (1) a grade point average of 3.0 or above on the last 60 semester hours of undergraduate study, (2) a grade point average of 3.4 on all graduate level work, (3) a Graduate Record Examination score which evidences an ability to do satisfactory graduate work, (4) leadership ability, (5) personal and professional maturity, and (6) three satisfactory letters of recommendation. Applicants should have a master's degree in social work or in a related field and a background in social and behavioral science and research methods is desirable.

An application for admission, transcripts of previous academic work and Graduate Record Examination scores must be submitted to the Graduate School of the University. An additional, separate application and supporting materials must be sent to the Graduate Advisor, Ph.D. in Social Work Program.

### **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 thesis or completion of the integrative seminar for thesis substitute and non-thesis students.

The program leading to the degree Doctor of Philosophy in Social Work covers six semesters (three years) of full-time study and requires the completion of 54 semester hours of graduate work including class, field instruction, and a dissertation. The student and his or her faculty supervisory committee together develop a plan of study geared to the student's interests. Included in this plan are a set of required and elective courses in which students pursue their specialized interests. Additionally, all students in the clinical practice specialization and some students in the administration, planning and policy specialization, are required to spend time in an internship that will be monitored through the supervising committee.

Upon completion of coursework, which normally occurs at the end of the second year of fulltime study, the student must pass the comprehensive examinations administered by the Graduate School of Social Work. The student must demonstrate proficiency in the core curriculum and in his or her area of specialization. Successful completion of the comprehensive examinations advances the student to candidacy at which time he or she devotes time to the completion of the dissertation. The last step before the degree is awarded is the final examination, which is focused on the defense of the dissertation.

### **ADVANCED STANDING**

An applicant who has graduated from an accredited undergraduate program in social work may request admission to the graduate program with advanced standing. Such requests will be considered by the Committee on Graduate Studies on an individual basis, course by course, considering the applicant's demonstrated academic and practice competence.

## **SOCIAL WORK**

### **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: six hours of research courses, and in addition, students must complete either a six hour thesis or meet the current special six hour sequence requirements for a thesis substitute in either the Graduate School of Social Work or the Institute.

### **CONTINUATION**

In addition to the requirements of the Graduate School listed elsewhere, each graduate student in the social work program must:

- (1) Maintain at least a B (3.0) overall GPA in all course work and,
- (2) Demonstrate suitability for professional social work practice.
- (3) Demonstrate knowledge of and adherence to the code of Ethics of the National Association of Social Workers and the Code of Ethics as currently propounded by the Texas Council for Social Work Certification.

At such time as questions are raised by Social Work graduate faculty or field instructors regarding any of the above, the student will be notified and will be provided the opportunity to respond to the Committee on Graduate Studies. The Committee on Graduate Studies will review the student's performance and make a recommendation concerning the student's eligibility to continue in the program. Appeal of a decision on continuation may be made through normal procedures outlined in the section of this catalog entitled "Grievances Other than Grades."

### **PART-TIME PROGRAM (MSSW)**

The part-time program allows students to complete most, and in some instances, all, of the first year's course requirements on a part-time basis. Normally, second year requirements are completed in full-time status. The part-time program is designed to accommodate those persons who would find it more practical to attend on a part-time basis for two years.

Admission and degree requirements for part-time students are the same as those for full-time students. Likewise, part-time students must maintain the performance level required of full-time students.

### **REQUIREMENT FOR LIABILITY INSURANCE**

All social work students enrolling in Field Instruction courses will be required to show evidence of professional liability insurance coverage of a minimum amount of \$200,000 limit each claim and \$600,000 limit aggregate paid for the duration of the course as a prerequisite to enrollment. The effective date of the policy must be on or before the first regular class period of the Field Instruction course for which the student is enrolling.

**The grade of R (research in progress) is a permanent grade. An incomplete (the grade of X) cannot be given in a course which is graded R. To receive credit for an R-graded course the student must continue to enroll in the course until a passing grade is received. Three-hour thesis and three- and six-hour dissertation courses are graded R/F only. The grade of P (required for graduation) can be received in six- or nine-hour thesis courses and nine-hour dissertation courses only. In the course listings below, R-graded courses are designated either "Graded P/F/R" or "Graded R." (See also the section entitled "R" GRADE on p. 36 of this catalog.)**



**Human Behavior and the Social Environment**

**5301. HUMAN BEHAVIOR AND THE SOCIAL ENVIRONMENT I (3-0).** Examination and analysis of problems of human functioning, especially within urban environments, using stress and adaptation as a framework for analysis. Required of all first-year students.

**5308. INDIVIDUAL AND COMMUNITY PERSPECTIVES IN MENTAL HEALTH (3-0).** Examination and analysis of theories of mental health and disorders, perspectives on the etiology and epidemiology of mental disorder and the institutional response to problems in mental health (e.g. "asylums", community mental health programs).

**5309. CHILD DEVELOPMENT (3-0).** Reviews and analyzes a number of theoretical and empirical approaches to understanding the development of the child through adolescence; implications for practice and policy.

**5310. THEORIES OF THE FAMILY AND SOCIALIZATION PRACTICES (3-0).** Reviews a variety of theoretical approaches useful in understanding the family and child and adult socialization procedures. Implications for practice at the policy, community, and interpersonal levels discussed.

**5311. ADULT DEVELOPMENT (3-0).** Explores selected issues and themes associated with middle and early adulthood; major contents and purposes of counseling for this population.

**5312. AGING IN AMERICAN SOCIETY (3-0).** Explores the elderly population in American society. Includes discussion of social gerontology, a description of the aged in the United States and across cultures. Changes among the elderly such as health, finances and social roles studied.

**5313. PSYCHODYNAMICS (3-0).** Major aspects of psychodynamics theory derived from Freud and the recent ego psychologists will be used in an analysis of the life cycle. Implications for social work practice will be drawn, particularly application of the theory for practice with special groups: minorities, including women, and lower socioeconomic groups.

**5314. SOCIAL LIFE CYCLE OF WOMEN (3-0).** Overview of the social life-cycle of women, including the cultural, structural, and psychological forces shaping choices and roles. Emphasis on the impact of social structure on women at each life-cycle stage and in a variety of contexts, including family and work.

**5317. RACE, ETHNICITY, AND WOMEN (3-0).** An examination of certain theoretical concepts related to the phenomena of race, ethnicity, and gender, with the application of these concepts to personal life experiences and professional practice through structured cultural interchanges. Required of all MSSW students.

**6301. THEORIES OF PERSONALITY AND PSYCHOTHERAPY (3-0).** Study of personality theories which focuses on the commonalities and critical differences between the theories and their status in terms of current empirical research into the area of personality dynamics. Prerequisite: permission of the instructor.

**6303. ORGANIZATIONAL BEHAVIOR AND SOCIAL WORK PRACTICE (3-0).** Analysis of the influences, external and internal, on human behavior in formal organization, as well as the forms that behavior takes within organizations. Of special concern is the interaction between personality attributes and organizational imperatives. Prerequisite: permission of the instructor.

**6307. PRACTICE OF BEHAVIOR THERAPY (3-0).** Introduction to the experimental bases and clinical applications of socio-behavioral approaches relevant to social work practice; attention given to different change methods and application made directly to the wide range of behaviors of concern to the social worker. Prerequisite: SOCW 5305 or equivalent and permission of instructor. (This course may substitute for a Direct Practice Course.)

**6308. BRAIN AND BEHAVIOR (3-0).** This course explores recent knowledge suggesting a strong biological basis to simple and complex patterns of human behavior. The neurobiology of physical health, and behavioral disorders will be surveyed, and a physiological/ecological model of social work practice presented.

**6310. SEMINAR IN PROBLEMS AND ISSUES OF WOMEN AND WORK (3-0).** Course explores the relationship of women to world of work. Problems and issues affecting the lives of women, men, and children will be addressed such as women's unique career development, barriers to advancement, gender-related work styles, role conflicts.

**6320. PERSONAL RELATIONSHIPS: PSYCHOLOGICAL UNDERSTANDINGS (3-0).** Explores theoretical and empirical material on various processes and issues related to psychological intimacy relationships and to identify areas for intervention.

**6325 FACTORS IN ALCOHOLISM (3-0).** Focuses on the alcohol abuser; physiological, psychological, and social factors in the causation of and effects of alcohol abuse. Study of several very different approaches to treatment. Prerequisite: permission of instructor.

## **SOCIAL WORK**

### **Social Welfare Policy and Services**

**5303. FOUNDATIONS OF SOCIAL WELFARE POLICY AND SERVICES (3-0).** Examines how social goals are met by social welfare institutions. Conceptual schemes developed for analyzing the structure of social welfare institutions and evaluating social welfare sub-systems. Social work profession also examined in the context of the evolution and function of the contemporary American social welfare system. Required of all first-year students.

**5320. HEALTH POLICY (3-0).** Historical, current, and projected national and local health policies and roles of providers and consumers of health care examined; service demands, economic, access, and regulatory issues analyzed; relationships between governmental, voluntary, and commercial sectors studied; analytic frameworks for the understanding and development of policies developed. Prerequisite: SOCW 5303 or permission of the instructor.

**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 or permission of the instructor.

**6305 INTEGRATIVE SEMINAR (3-0).** Focuses on issues and aspects of practice 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 analyze and make presentations, both written and oral, utilizing a cross-sequence perspective. Required of all non-thesis and thesis substitute students in their final semester of course work. A grade of B or better must be earned in this seminar.

**6306 OCCUPATIONAL SOCIAL WELFARE POLICY (3-0).** The occupational social welfare system, its role and function in American society, and its interface with public welfare policies and services; role of the social work profession in the occupational social welfare system. 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 the instructor. Required of all doctoral students concentrating in human services 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. This course is an elective only; does not meet the requirements for a second year policy course.

**6334. WOMEN AND FAMILY POLICY (3-0).** Policies affecting women and the family; interaction of women with other social institutions (family, economy, policy); the unique impact of policies upon families and women of color; cross cultural comparisons and political strategies; the role of the social work profession in this policy field. Prerequisite: SOCW 5303 or permission of the instructor.

**6338. SOCIAL SERVICES AND SOCIAL WELFARE POLICY (3-0).** Broad acquaintance with, and analysis of, the social services and their role within social welfare policy. A variety of social services examined as well as modes and methods of providing these services, degree of effectiveness of various services in adequately serving clients, service gaps or duplication, and related areas. Prerequisites: SOCW 5303 and permission of the instructor.

**6349. SOCIAL WELFARE POLICY AND THE AGED (3-0).** Social welfare policies and programs serving the aged are examined, past and present, in terms of their overall impact on

## SOCIAL WORK

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. Prerequisite: SOCW 5303 or permission of the instructor.

**6354. DEVIANCE AND SOCIAL POLICY (3-0).** Examines past and present policies relating to deviant groups such as the physically and mentally handicapped, drug users, homosexuals, and juvenile delinquents. Theoretical and ideological bases of social reaction to these "problematic" individuals considered. Attention given to the influence of class, ethnicity, and gender on society's tolerance of deviant behavior. Prerequisite: SOCW 5303 or permission of the instructor. Satisfies Social Welfare Policy and Services second course requirement.

### 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 first year students.

**6302. SOCIAL WORK PRACTICE IN INDUSTRIAL SETTINGS (3-0).** Examines the social work and business bases implicit for providing social services to enhance the well-being and productivity of employees in the business/industrial setting.

**6307. PRACTICE OF BEHAVIOR THERAPY (3-0).** Introduction to the experimental bases and clinical applications of socio-behavioral approaches relevant to social work practice. Attention given to different change methods and application is made directly to the wide range of behaviors of concern to the social worker. Prerequisite: SOCW 5305 or equivalent and permission of instructor. (This course may substitute for a Human Behavior and the Social Environment Course.)

**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 the instructor.

**6311. SEMINAR IN DIRECT METHODS IN MARITAL COUNSELING (3-0).** Examination of various psychological, social and behavioral treatment approaches to the treatment of problems in marital adjustment. Emphasis placed on developing criteria for assessing the sources and patterns of imbalance and conflict, the selection and ordering of treatment strategies, and intervention techniques consistent with determined goals. Prerequisite: SOCW 5305 or equivalent and permission of instructor.

**6312. GROUP DYNAMICS I AND SOCIAL WORK PRACTICE (3-0).** Examines contemporary social-psychological concepts and small group research, with a view to testing their applicability to practice propositions and operational principles, in work with both task and personality satisfaction groups. Prerequisite: SOCW 5305 and permission of instructor.

**6313. GROUP METHODS IN COUNSELING II AND SOCIAL WORK PRACTICE (3-0).** Critical investigation of the therapeutic processes which are directed toward behavior change in persons through the structured medium of group interaction, and planful management, by the therapist, of group processes which emerge through interactional patterns between group members. Prerequisite: SOCW 6312 permission of instructor.

**6316. RESIDENTIAL CARE AND TREATMENT OF CHILDREN (3-0).** Presents major treatment models employed by residential treatment centers for children and adolescents. Issues faced by administrators including licensing, litigation, fund-raising, changing characteristics of youth in care, sexual abuse, and treatment alternatives are discussed.

**6317. DIRECT PRACTICE IN HEALTH CARE (3-0).** Explores central contribution of social work to comprehensive health care; social work interventions to assess and ameliorate the psychosocial effects of illness and disability are included along with emerging roles for social work in prevention and health maintenance.

**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

## **SOCIAL WORK**

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

**6352. SELF-REGULATION METHODS: RELAXATION, BIOFEEDBACK, AND HYPNOSIS (3-0).** Examines the clinical application of relaxation, biofeedback, and hypnosis for self-regulation of both internal and external behavior for personal growth and clinical treatment. Students will learn how to use specific instruments and techniques of self-regulation. **\$5 lab fee.**

**6353. SEMINAR IN FAMILY THERAPY (3-0).** Comparison of various approaches to working with the family as a total system; enhancement of cognitive understanding of similarities and differences in theory and goals of family treatment in many fields of practice; integration of strategies and techniques of each method into an individual style of therapy. Prerequisite: SOCW 5305 or permission of instructor.

**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.

**6370. TREATING PARENT-CHILD RELATIONSHIPS (3-0).** Treatment strategies, evaluation methods and research findings relevant to the treatment of parent-child relationships; review of existing parent training literature and commercially available parenting programs.

**6375. CLINICAL ASSESSMENT (3-0).** A critical examination of selected assessment approaches in clinical social work. Included are social treatment models, psychometric methods, DSM III assessment and review of selected family models.

**6376. ANALYSIS OF PSYCHOTHERAPY METHODS (3-0).** Seminar for clinical practitioners focusing on theoretical and empirical analysis of critical methods used in psychotherapy. Skills in analyzing practice and generating theories are emphasized.

**6377. INTERPERSONAL MANAGEMENT IN HELPING RELATIONSHIPS (3-0).** A critical analysis of the quality of outcome studies in clinical settings, in work with individuals, families, and small groups. Processes in interpersonal relationships are emphasized.

**6378. CLINICAL AND RESEARCH APPLICATIONS OF SELF-REGULATION METHODS (3-0).** Designed to advance knowledge in self-regulation methods beyond introductory level. Includes research/clinical applications of biofeedback. Prerequisite: permission of instructor. **\$10 lab fee.**

**6379. SEMINAR IN ADVANCED MARITAL/DIVORCE INTERVENTION (3-0).** Addresses cognitive and behavioral assessment and treatment methodologies as applied to the maritally distressed (intact and separated) and divorced. Prerequisite: 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 SKILLS (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 all first-year students.

**5318. SEMINAR IN ADMINISTRATION AND PLANNING FOR ADVANCED STUDENTS (3-0).** Basic and intermediary theories and methodologies, as well as philosophy, purpose, and skills of social work administration and planning. Substitutes for 5306 and 5307.

**6314. THEORY AND PRACTICE OF ADMINISTRATION (3-0).** Significant organizational variables identified to help the student identify implications for the practice of human services administration. Prerequisite: SOCW 5307. Required of students concentrating in Administration/Planning.

**6315. PRINCIPLES OF PLANNING (3-0).** Describes and analyzes theoretical and conceptual underpinnings of planning which are integrated with cognitive skills necessary for undertak-

ing independent planning projects. Particular attention devoted to social problems and needs and developing plans. Prerequisite: SOCW 5307 or permission of instructor. Required of Administration/Planning students.

**6335. ADVANCED SEMINAR IN THE THEORY AND PRACTICE OF SOCIAL WORK ADMINISTRATION (3-0).** Critical evaluation of social work administration practice conceptualizations and instances of current practice, focusing on adequacy of theoretical formulations and their fit to the requisites of practice. Prerequisite: SOCW 6316 and permission of instructor. Required of all doctoral students concentrating in human services administration.

**6339. PROGRAM EVALUATION (3-0).** Presumes basic research competence on part of student. Focus on socio-political aspects of program evaluation as a specialized use of scientific methods and community practice skills. Relationships between program evaluation and program planning or administration stressed. **\$5 computer fee.**

**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.

**6355. COMPUTER USE IN HUMAN SERVICES (3-0).** Basic terminology, knowledge, and skills to make maximum use of computer in practice. Explores computer hardware and software and its present and future use in information systems, decision-support systems, office automation, and direct practice applications. Examines the processes of decision making, systems analysis, and computer system development and implementation.

**6363. BUDGETING AND FINANCIAL MANAGEMENT (3-0).** A basic overview of financial management applied specifically to human service agencies; emphases on basic concepts and skill building in budgeting, grant writing, and fund raising; accounting principles, financial statements, and computerized financial information systems also covered.

**6364. SOCIAL WORK IN HEALTH CARE SETTINGS (3-0).** An introductory course for those students interested in medical social work practice; health settings examined from organizational, administrative, and clinical perspectives to provide an understanding of the intra/interdisciplinary practice in the health care system.

### **Research and Evaluation**

**6322. RESEARCH AND EVALUATION METHODS IN SOCIAL WORK I (3-0).** Introduction to the methods of scientific inquiry and their relevance to social work. Topics include problem formulation, single subject and group research design, elementary statistics such as chi squares, correlations, analyses of variance, and report writing. Required of all students. **\$5 computer fee.**

**6324. RESEARCH AND EVALUATION METHODS IN SOCIAL WORK II (3-0).** Advanced course in the application of research principles and techniques. Topics include regression and statistical control, analysis of variance, questionnaire construction, evaluation research, and computerized tabulation and analysis of data. Mini-projects require the student to apply these techniques in the context of social work practice. Prerequisite: SOCW 6322. Required of all students. **\$5 computer fee.**

**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. **\$5 computer fee.**

**6393. THESIS RESEARCH.** Initial research in the student's area of concentration, leading to thesis. Graded P/F/R. Prerequisite for 6398. **\$5 computer fee.**

**6395. RESEARCH PRACTICUM.** Individual or small group research project in the student's major area of concentration with emphasis on applying research principles and procedures. A substantial research report expected at the conclusion of the course. Graded P/F/R. **\$10 computer fee.**

**6398. THESIS.** Requires an individual research project in the individual's area of concentration, 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. Defense in a final oral examination is required. Graded P/F/R. Prerequisite: permission of Graduate Advisor and the instructor in charge. **\$10 computer fee.**

## **SOCIAL WORK**

**6399, 6699, 6999. DISSERTATION.** Preparation and submission of a doctoral dissertation in an area in social work. 6399 and 6699 graded R/F only; 6999 graded P/F/R. Prerequisite: admission to candidacy for the PhD in social work. **\$10 computer fee.**

### **Field Instruction**

Field Instruction is a directed educational experience in social work practice with instruction offered by agency or campus-based faculty members. Offered concurrently or subsequent to classroom instruction, the field courses offer an opportunity for a student to integrate and utilize classroom content in the context of practice. Field instruction must be taken in the student's concentration. Courses may be repeated for credit. Graded P/F/R only.

All social work students enrolling in Field Instruction courses will be required to show evidence of professional liability insurance coverage of a minimum amount of \$200,000 limit each claim and \$600,000 limit aggregate paid for the duration of the course as a prerequisite to enrollment. The effective date of the policy must be on or before the first regular class period of the Field Instruction course for which the student is enrolling.

**5251, 5351, 5451, 5551, 5651, 5851. APPLIED SOCIAL WORK PRACTICE I.** Graded P/F/R.

**6151, 6251, 6351, 6451, 6551, 6651, 6751, 6851, 6951. APPLIED SOCIAL WORK PRACTICE II.** Graded P/F/R.

### **Doctoral Program in Administration: Advanced Curriculum**

**6357. PRINCIPLES OF ADMINISTRATION: A DOCTORAL SEMINAR (3-0).** Nature of formal organizations and their management with application to the human service area.

**6359. THEORIES OF PLANNING (3-0).** Examination of planning theory in physical, social, economic, and policy aspects; differences in theoretical perspectives, methods, and processes; examination and evaluation in each aspect of the state-of-the-art and future directions.

**6360. ADVANCED RESEARCH METHODS IN HUMAN SERVICES (3-0).** Advanced course in application of research methods to human services; research design, including experimental and survey methods, measurement, introduction to computer applications, sampling, and review of basic statistical applications. Prerequisites: SOCW 6322 and 6324 or equivalent. **\$5 computer fee.**

**6361. ADVANCED STATISTICAL SERVICES IN HUMAN SERVICES (3-0).** Advanced course in statistical applications in human services; multiple regression, analysis of variance and covariance, factor analysis, discriminant analysis, path analysis, and canonical analysis. Prerequisites: SOCW 6322 and 6324 or equivalent. **\$10 computer fee.**

**6362. SEMINAR IN HUMAN SERVICES PLANNING METHODS (3-0).** Review of the history of human services planning and comparison of major methodologies; planning methods and their futures; differentiation between analytic and action orientations; examination and evaluation of major practice principles and standards.

### **Tutorials**

**6190, 6290, 6390. TUTORIAL.** Arrangements may be made for a directed and supervised tutorial in a select area of special interest to the student. Prerequisite: permission of the Graduate Advisor. May be repeated for credit.

### **Special Seminars**

**6292, 6392. SELECTED TOPICS IN SOCIAL WELFARE.** Topics vary from semester to semester depending on the needs and interest of the students. Prerequisite: permission of Graduate Advisor. May be repeated for credit.

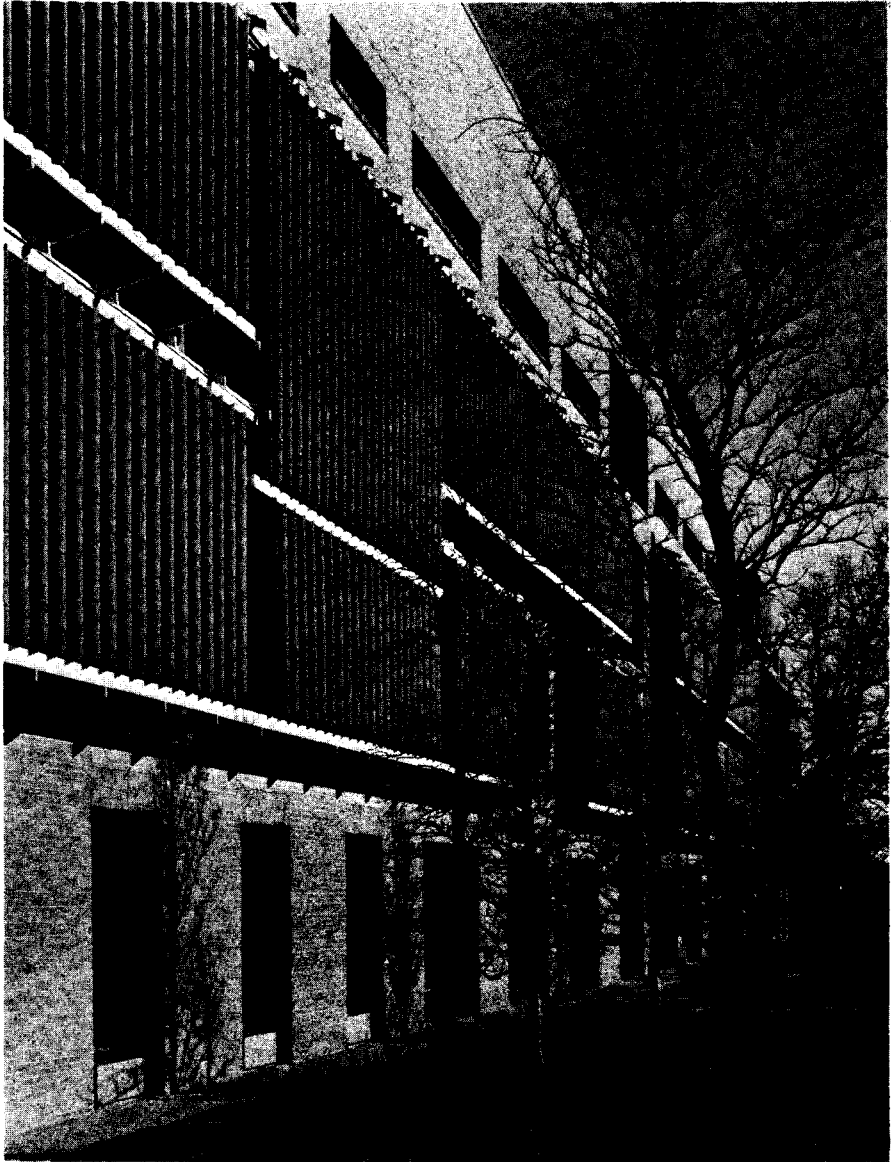
**Affiliated Field Agencies**

- ABILENE REGIONAL CENTER FOR MHMR  
 ALL CHURCH HOME FOR CHILDREN, Fort Worth  
 ALL SAINTS EPISCOPAL HOSPITAL, Fort Worth  
 ALPHA & OMEGA FAMILY CENTER, INC, Fort Worth  
 AMERICAN RED CROSS-DALLAS  
 AREA AGENCY ON AGING, El Paso  
 ARLINGTON HUMAN SERVICES PROJECT  
 ARLINGTON MEMORIAL HOSPITAL, Arlington  
 ARLINGTON WOMEN'S SHELTER, Arlington  
 BAYLOR INSTITUTE FOR REHABILITATION, Dallas  
 BAYLOR MEDICAL CENTER, Dallas  
 BEAUMONT ARMY MEDICAL HOSPITAL, El Paso  
 BIG BROTHERS & BIG SISTERS, Dallas  
 BIG SPRING STATE HOSPITAL, Big Spring  
 BROOKHAVEN PSYCHIATRIC PAVILION, Dallas  
 CASSATA LEARNING CENTER, Arlington  
 CATHOLIC COUNSELING SERVICES, Dallas  
 CATHOLIC FAMILY SERVICE, Amarillo  
 CATHOLIC SOCIAL SERVICES, Fort Worth  
 CENTER FOR PASTORAL CARE AND FAMILY COUNSELING, Dallas  
 CENTRAL TEXAS MENTAL HEALTH MENTAL RETARDATION, Brownwood  
 CHILD CARE, Dallas  
 CHILD GUIDANCE CLINIC, Dallas  
 CHILD STUDY CENTER, Fort Worth  
 CHILDREN'S HOME OF LUBBOCK  
 CHILDREN'S MEDICAL CENTER, Dallas  
 CITY OF DALLAS  
 CITY OF FORT WORTH, PLANNING DEPT.  
 COMMISSION FOR THE BLIND DISTRICT OFFICE, Amarillo  
 COMMUNITY COUNCIL OF GREATER DALLAS  
 COMMUNITY PSYCHOTHERAPY CENTER, Dallas  
 COMMUNITY SERVICE CLINIC, Arlington  
 COMMUNITY SERVICES DEVELOPMENT CENTER, Arlington  
 COOK - FORT WORTH CHILDREN'S MEDICAL CENTER, Fort Worth  
 CORSICANA RESIDENTIAL TREATMENT CENTER  
 COUNSELING SERVICES, Arlington  
 CPC MILLWOOD HOSPITAL, Arlington  
 DALLAS CHALLENGE  
 DALLAS CITY COUNCIL  
 DALLAS COUNTY DEPT. OF HUMAN SERVICES  
 DALLAS COUNTY MHMR  
 DALLAS REHABILITATION INSTITUTE  
 DEEP EAST TEXAS REGIONAL MHMR SERVICES, Lufkin  
 DENTON COUNTY FRIENDS OF FAMILY  
 DENTON COUNTY MENTAL HEALTH  
 EAST DALLAS SENIOR CITIZENS NETWORK, INC., Dallas  
 EASTER SEAL SOCIETY FOR CHILDREN & ADULTS, Fort Worth  
 ECUMENICAL CENTER FOR PASTORAL COUNSELING, Arlington  
 EL PASO CENTER FOR MHMR, El Paso  
 ELLIS COUNTY OUTREACH CENTER, Waxahachie  
 FAMILY COUNSELING AND CHILD SERVICES, Amarillo  
 FAMILY COURT SERVICES, Dallas  
 FAMILY GUIDANCE CENTER, Dallas  
 THE FAMILY PLACE, Dallas  
 FAMILY RESOURCE INC., Dallas  
 FAMILY SERVICES, Fort Worth, Arlington, Euless  
 FAMILY SERVICES, Lubbock  
 FAMILY SERVICES OF AMARILLO  
 FORT WORTH INDEPENDENT SCHOOL DISTRICT  
 FORT WORTH STATE SCHOOL  
 FOURTH STREET PROJECT, Arlington  
 GENETICS SCREENING AND COUNSELING SERVICE, TDMHMR, Denton  
 GOLDEN ACRES, Dallas  
 GOOD SHEPHERD MEDICAL CENTER, Longview  
 GREEN OAKS PSYCHIATRIC HOSPITAL, Dallas  
 HARRIS HOSPITAL, Fort Worth  
 HAZELDEN FOUNDATION, Fort Worth  
 HOPE COTTAGE CHILDREN'S BUREAU, Dallas  
 HUMAN AFFAIRS, INC., Dallas  
 INCEST RECOVERY ASSOCIATION, Dallas  
 JEWISH COMMUNITY CENTER OF DALLAS  
 JEWISH FEDERATION, Dallas  
 JEWISH SOCIAL SERVICE AGENCY, Fort Worth  
 KILGORE CHILDREN'S PSYCHIATRIC HOSPITAL, Amarillo  
 LETOT CENTER, Dallas  
 LIFE PLANNING HEALTH SERVICES, Dallas  
 LOVERS LANE UNITED METHODIST CHURCH, Dallas  
 LYONS & MABEN COUNSELING SERVICE, INC., Abilene  
 MARILLAC SOCIAL CENTER, Dallas  
 M.D. ANDERSON HOSPITAL, Houston  
 MEDICAL CENTER HOSPITAL, Tyler  
 MENTAL HEALTH ASSOCIATION OF DALLAS COUNTY  
 MENTAL HEALTH ASSOCIATION OF TARRANT COUNTY, Fort Worth  
 METHODISM BREADBASKET, Dallas  
 METHODIST HOME CHILD GUIDANCE CENTER OUTPATIENT SERVICES, Waco  
 METHODIST HOSPITALS OF DALLAS  
 METROCREST SERVICE CENTER, Carrollton  
 MHMR REG. CENTER OF EAST TEXAS, Tyler  
 MOTHER FRANCES HOSPITAL, Tyler  
 NORTH CENTRAL TEXAS COUNCIL OF GOVERNMENTS, Arlington  
 NORTH EAST TEXAS MHMR, Texarkana  
 OAKLAWN COUNSELING CENTER, Dallas  
 PARENTING GUIDANCE CENTER, Fort Worth  
 PARKLAND MEMORIAL HOSPITAL, Dallas  
 PASTORAL COUNSELING CENTER, Dallas  
 PECAN VALLEY MHMR, Granbury  
 PLANO INDEPENDENT SCHOOL DISTRICT, Plano  
 PRESBYTERIAN CHILDREN'S HOME & SERVICE AGENCY  
 PRESBYTERIAN VILLAGE, Dallas  
 RED RIVER HOSPITAL, Wichita Falls  
 RETIRED SENIOR VOLUNTEER PROGRAM, Fort Worth  
 RHO MEMORIAL HOSPITAL, Dallas  
 RICHARDSON MEDICAL CENTER, Richardson  
 RUSK STATE HOSPITAL  
 SABINE VALLEY MHMR CENTER, Longview  
 SABINE VALLEY MHMR, Henderson  
 SALESMANSHIP CLUB, Dallas  
 SALVATION ARMY SOCIAL SERVICES CENTER, Dallas  
 SENIOR CITIZENS OF GREATER DALLAS  
 SOUTHWEST FAMILY INSTITUTE, Dallas  
 SOUTHWESTERN BELL, EAP, Dallas  
 ST. JOSEPH HOSPITAL, Fort Worth  
 ST. JOSEPH'S HOSPITAL, INC., Paris  
 ST. PAUL'S HOSPITAL, Dallas  
 TARRANT BAPTIST ASSOCIATION, Fort Worth  
 TARRANT COUNTY ADULT PROBATION, Fort Worth  
 TARRANT COUNTY JUVENILE PROBATION DEPT., Fort Worth  
 TARRANT COUNTY MHMR, Fort Worth  
 TERRELL STATE HOSPITAL  
 TEXAS COALITION FOR JUVENILE JUSTICE, Dallas  
 TEXAS DEPARTMENT OF HUMAN RESOURCES, Amarillo, Arlington, Cleburne, Dallas, Denton, El Paso, Fort Worth, Longview, Lubbock, Lufkin, McKinney, Nacogdoches, Paris, Quitman, Sherman, Texarkana, Tyler  
 TEXAS YOUTH COUNCIL, Dallas  
 TEXOMA REGIONAL MHMR CENTER, Sherman  
 TIMBERLAWN PSYCHIATRIC HOSPITAL  
 UNITED COMMUNITY CENTERS, Fort Worth  
 UNITED WAY OF METROPOLITAN TARRANT COUNTY, Fort Worth  
 UNIVERSITY AFFILIATED AGENCY, Dallas  
 VETERANS ADMINISTRATION, Amarillo  
 VETERANS ADMINISTRATION, Lubbock  
 VETERANS ADMINISTRATION, Temple  
 VETERANS ADMINISTRATION, Waco

## **SOCIAL WORK**

VETERANS ADMINISTRATION MEDICAL CENTER,  
Amarillo  
VETERANS ADMINISTRATION HOSPITAL, Dallas  
VISITING NURSES ASSOCIATION, Dallas  
VOLUNTEERS OF AMERICA, Fort Worth  
WEST TEXAS AREA AGENCY ON AGING, El Paso

WICHITA FALLS STATE HOSPITAL  
WILLOW CREEK ADOLESCENT CENTER, Arlington  
WOMEN'S CENTER OF TARRANT COUNTY, Fort Worth  
WOOD PSYCHIATRIC INSTITUTE, Abilene  
YWCA - CENTRAL BRANCH, Dallas  
YOUTH & FAMILY ENRICHMENT CENTERS, Tyler





# Department of SOCIOLOGY, ANTHROPOLOGY, AND SOCIAL WORK (SOCI)

<i>Areas of Study</i>	<i>Degrees</i>
Sociology	M.A.
Humanities (See Interdepartmental and Intercampus Programs.)	M.A., Ph.D.

*Master's Degree Plan:* Thesis and Thesis Substitute

*Chairman:* Ted R. Watkins                      205 University Hall    273-3203

*Graduate Advisor:* William A. Stacey        443 University Hall    273-3781

*Graduate Faculty:*

- Professors Bastien, Ramsey, Taylor, Vidal
- Associate Professors Almore, Anderson, Colby, Eve, Greenstein, Harrold, Stacey, Watkins, Weed
- Assistant Professors Hanson, Rouse

## OBJECTIVE

The master's degree program in sociology gives students the opportunity to enhance their skills in understanding interpersonal relationships and the institutions within which they occur. The program is designed to meet the needs of:

1. Students desiring to emphasize applied skills in the areas of research and evaluation, family studies, social psychology, anthropology, and computer application to behavioral problems.
2. Working professionals who want to enhance their knowledge by learning about problems associated with the basic social institutions of their community (such as family, institutions of education and health, politics, and religion).

The master's degree program provides students with a professional understanding of sociology or anthropology while providing the opportunity to develop applicable skills.

The program is also designed to prepare those wishing to pursue a doctorate in sociology, anthropology, or related fields. The thesis plan of study requires a minimum 24 hours of course work and six hours of thesis research and writing. The thesis substitute plan requires a minimum of 36 approved hours in sociology or related disciplines. Thesis substitute students may elect, with the approval of the student's supervising committee, a maximum of six hours in internship. All students are required to take approved course work in theory, statistics, and methods.

## ADMISSION AND DEGREE REQUIREMENTS

The admission requirements of the graduate program in sociology conform with the general Graduate School requirements. A bachelor's degree in sociology or anthropology is not a prerequisite for admission. Interested students should contact the Graduate Advisor for details.

**The grade of R (research in progress) is a permanent grade. An incomplete (the grade of X) cannot be given in a course which is graded R. To receive credit for an R-graded course the student must continue to enroll in the course until a passing grade is received. Three-hour thesis and three- and six-hour dissertation courses are graded R/F only. The grade of P (required for graduation) can be received in six- or nine-hour thesis courses and nine-hour dissertation courses only. In the course listings below, R-graded courses are designated either "Graded P/F/R" or "Graded R." (See also the section entitled "R" GRADE on p. 36 of this catalog.)**

## **SOCIOLOGY**

### **SOCIOLOGY (SOCl)**

- 5301. SOCIOLOGICAL THEORY (3-0).** Development of sociological theory from 1800 to the present.
- 5302. THEORY CONSTRUCTION (3-0).** Study of modern writers as they deal with the logic of theory construction and address questions concerning the philosophy of science. Students individually utilize formal terms such as models, hypotheses, and derivation in developing various mathematical, schematic, and verbal modes of theorizing.
- 5303. RESEARCH DESIGN (2-2).** Seminar on the design, plan, structure, and strategies currently used in sociological research. The interrelatedness between theory, methods, and statistics. Includes the limitations of theory, problems of measurement error, sampling techniques, and the application of mathematical models, and the presentation of statistical data.
- 5304. SOCIAL STATISTICS I (3-0).** Descriptive statistics for survey research and selected nonparametric and parametric models utilizing computer data processing. **\$5 computer fee.**
- 5305. SOCIAL STATISTICS II (2-2).** Testing of scientific hypotheses; analysis of variance, regression analysis, pearsonian or zero-order correlation, multiple and partial techniques considered. **\$5 computer fee.**
- 5311. STRATIFICATION (3-0).** Directs attention to the origin, substance, and function of social stratification and social mobility in contemporary American society. Primary focus on the individual, group, and societal consequences of class, status, and power differentials. Attention given to current literature and methodologies in stratification study.
- 5312. OCCUPATIONS AND PROFESSIONS ANALYSIS (3-0).** An indepth examination of selected occupations at major blue collar, white collar, and professional levels for both theoretical and methodological points of view.
- 5313. POPULATION AND URBAN ECOLOGY (2-2).** Population theory and research into population trends, composition, and migration. Includes review and evaluation of census data, vital statistics, demographic surveys and their uses with emphasis on measurement methods and analytical techniques. Special emphasis on ecumenopolis trends.
- 5314. FORMAL ORGANIZATION (3-0).** Analyzes the development, structure, and operation of formal organizations in society. Emphasizes internal social processes, the effects of technology, and variations in the institutional setting.
- 5317. COMPARATIVE SOCIAL CHANGE (3-0).** Selected aspects of social change. The units of analysis will be large scale; societies, their value systems and institutions. Attention given to the various theories and attempts at measurement of social change.
- 5318. SOCIOLOGY OF THE FAMILY (3-0).** Contemporary sociological theory and research on marriage and the family as social institutions; attention given to conflict, stability, and change in different types of family structures.
- 5319. SPECIAL TOPICS IN SOCIAL ORGANIZATION (3-0).** May be repeated for credit as the topic changes.
- 5320. SOCIAL PSYCHOLOGY (3-0).** Analyzes the relationship between the individual and the group at various levels of abstraction, emphasizing integration of sociological and psychological approaches. Major areas of concern include: operant behaviorism, symbolic interactionism, causal attribution theory, attitude-behavior relations, and other contemporary trends in social psychology.
- 5321. COLLECTIVE BEHAVIOR (3-0).** Examines various forms of collective behavior. Processes which will be examined include emergent norms, contagion, convergence, and rumor. Attention also to the creation of leadership, conformity and structure within episodes of collective behavior.
- 5322. SMALL GROUPS (3-0).** Examination of special topics in the areas of exchange theory, bargaining theory, and small group dynamics. Consideration given to topics of autonomy, interdependence, dominance and conformity, cost/reward and distributive justics 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. DEVIANT BEHAVIOR (3-0).** Analysis of contemporary sociological and psychological perspectives in deviant behavior, its defining characteristics, etiology, and expression as a social-psychological phenomenon in society. Attention is given to specific deviancies, particularly those having criminal or civil law implications. Contemporary theories and practices for prevention and/or rehabilitation are also discussed.

**5325. SOCIALIZATION AND SOCIAL CONTROL (3-0).** Seminar review of major theories of the relationship between social structure and social character. Covers equally classical and contemporary theories of child socialization and of adult socialization. Special emphasis on the adequacy of socialization and socialization to deviant behavior.

**5326. SOCIOLOGY OF EDUCATION (3-0).** Social relations between the community and the school administration, the school administration and teachers, teachers and students, and between teachers and parents; relationship between characteristics of the young, the organization of the school and the class room, and learning.

**5327. SOCIOLOGY OF HEALTH (3-0).** Organization of health delivery systems, including structure of the hospital and distribution of services; etiology of disease as found in culture and society; health related careers.

**5328. SOCIOLOGY OF AGING (3-0).** Characteristics of aging persons, critical stages in aging, lifestyles of mature persons, organizations for and of the aged, and social factors affecting the welfare of older persons.

**5330. SOCIAL ISSUES (3-0).** Social issues employed as a means of analyzing socio-political structure and social policy. Ethical considerations in doing applied research, non-scientific factors in the political use of research, and research design/grant formulation among topics examined.

**5331. SOCIOLOGY OF RELIGION (3-0).** Consideration of religion and specific religious groups (cults, sects, churches, denominations), their functions and conflicts, development and activities in American society.

**5332. ADVANCED RESEARCH PRACTICUM (3-0).** Through collaboration with faculty on research projects and seminar discussions, advanced research skills stressed. Participants prepare a research proposal for submission to a funding agency and/or a report for professional dissemination. Not to be counted toward the degree requirement of thirty hours course work. **\$5 computer fee.**

**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. **\$5 computer fee.**

**5334. CRIMINOLOGY (3-0).** Covers different topics each semester in the fields of criminology, penology, and corrections. May be repeated for credit as the topic changes.

**5335. URBAN SOCIOLOGY AND PLANNING (2-2).** Descriptive study of the form and development of the urban community with respect to its demographic structure, spacial and temporal pattern, and functional organization. The sociological aspects of planned change studied.

**5336. TEACHING UNDERGRADUATE SOCIOLOGY I (3-0).** In order to learn strategies of coping with practical problems of teaching undergraduate sociology, students assist one or more professors in order to have experience in lecture preparation, grading procedures, and examination construction. Not to be counted toward the degree requirement of thirty hours course work. Graded P/F/R.

**5337. TEACHING UNDERGRADUATE SOCIOLOGY II (3-0).** Same as 5336, except that students are assigned to different professors teaching in areas different from the previous semester. May not be taken as credit toward the 30 hours of course work needed for the MA degree.

**5338. EVALUATIONS RESEARCH AND NEEDS ASSESSMENT (3-0).** Methodological issues in needs assessment and evaluating public or private programs; identification of variables, construction of indices, and developing predictive models.

**5339. SPECIAL TOPICS IN SOCIOLOGY (3-0).** May be repeated for credit as the topic changes.

**5340. SOCIAL PSYCHOLOGY OF INTERCULTURAL COMMUNICATION (3-0).** Exploration of situations in which the participants have varied cultural backgrounds, such as those frequently encountered by business people, exchange students, diplomats, missionaries, and tourists; dynamics of such situations, and techniques for coping with them.

**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. Graded P/F/R.

## URBAN AND REGIONAL AFFAIRS

5392. CONFERENCE COURSE IN SOCIOLOGY I. Graded P/F/R.  
5393. CONFERENCE COURSE IN SOCIOLOGY II. Graded P/F/R.  
5398, 5698. THESIS. 5398 graded R/F only; 5698 graded P/F/R.

### ANTHROPOLOGY (ANTH)

5342. **ADVANCED ETHNOLOGY (2-2)**. Seminar based on student reports and critiques of assigned readings. Major emphasis on the areas of ethnology and social anthropology.  
5349. **TOPICS IN ANTHROPOLOGY (3-0)**. May be repeated for credit as the topic changes.  
5350. **FOLK AND PEASANT SOCIETIES (3-0)**. Seminar on the development and patterning of folk and peasant societies in various parts of the world. Data are drawn from archaeological and historical records as well as contemporary ethnographic studies. May be repeated for credit when the content varies.  
5351. **EMERGENCE OF MANKIND (3-0)**. An intensive review of the evidence for, and main outlines of human biological and cultural evolution up to the emergence of civilization.  
5353. **MEDICAL ANTHROPOLOGY (3-0)**. An examination of anthropological concepts for understanding curing practices and attitudes toward health programs in various cultures.  
5369. **FOLKLORE AND MYTHOLOGY (3-0)**. Function, forms, and interpretation of folklore and myth in traditional societies; examination of oral literature as an expression of continuity and change; emphasis on a structural analysis of myth.  
5370. **APPLIED ANTHROPOLOGY (3-0)**. Explores the principles of cultural dynamics and the sources of cultural change in innovation and diffusion. Focuses particularly on the anthropological theories, methods, and findings relevant to problems of directed culture change, especially as illustrated by non-literate and peasant groups in contact with western civilization.

## URBAN AND REGIONAL AFFAIRS Programs Division (URBA)

### Areas of Study

Urban Affairs  
Administration (See Interdepartmental and  
Intercampus Programs.)

### Degrees

M.A.  
Ph.D.

*Master's Degree Plans: Thesis and Thesis Substitute*

*Graduate Advisor and Program Coordinator: Sherman Wyman*  
512 University Hall 273-3071

### Graduate Faculty:

Professors Cole, Cornehlis, Geisel, Taebel  
Associate Professor Wyman

### OBJECTIVES

The Master of Arts degree in urban affairs is organized around a subject matter area, city or urban phenomena, rather than one of the traditional disciplines. Emphasis is placed on issues, problems, and public policy questions related to life in urban communities. Urban problems are viewed as complex which require the understanding and skills of many disciplines. Therefore, the program is interdisciplinary in character, curriculum content, teaching staff, and enrollment of students.

Broad and intensive graduate education in urban affairs can introduce graduates to a variety of rewarding and profitable careers and positions. With the increased urbanization of Texas and the nation, new career opportunities, many of them recent in origin, are becoming available.

By educating young men and women for urban affairs careers, the program seeks to help

## URBAN AND REGIONAL AFFAIRS

provide society with the "brain power" needed to deal with increasingly complex and urgent city problems.

### DEGREE REQUIREMENTS

The Master of Arts degree in urban affairs seeks to provide students with an understanding of cities in five general and interrelated areas of knowledge:

1. Introduction to Urban Affairs and Urban Institutions (nine-12 hours)
2. Urban Policy Problems (six hours)
3. Professional Development (six-nine hours)
4. Research and Analysis (12 hours)
5. Self-development (three or more hours)

A total of 36 to 42 hours is required for completion of the program, depending on the prior academic degree of the student, prior professional experience and the specialization within the Professional Development field. In general all new students will take URBA 5300, Introduction to Urban Affairs, as their first course in the program.

In the Professional Development field, students can specialize in urban management, urban and social planning, or policy research. As an alternative, they can petition to substitute another professional field, such as criminal justice, journalism, social work, engineering, or business administration.

Students selecting Urban Journalism as a Professional Development field must complete the course requirements specified above except that they must take 12 hours of graduate courses in journalism (see the Department of Communication listing in this catalog). In addition, students must take the Project Report sequence in the Research and Analysis field, but the course requirements are reduced from 12 to 9 hours because URBA 5362 is not required.

In the Research and Analysis field, all students are required to take URBA 5360, Methods of Social Research and Analysis, URBA 5363, Applied Urban Analysis. Students then have the option of taking one or the other of the sequences listed below:

- a. URBA 5361, Professional Report Writing, and URBA 5396, Project Report;
- b. URBA 5362, Strategies for Urban Research and URBA 5397, Research Report.

A student may select URBA 5698, Thesis, in lieu of either URBA 5396, Project Report, or URBA 5397, Research Report.

### DUAL DEGREE PROGRAM

In conjunction with the Graduate School of Social Work, the Institute participates in a dual degree program whereby a student can earn a Master of Arts in Urban Affairs and a Master of Science in Social Work. To participate in the program, a student must make separate applications to both the Institute and the Graduate School of Social Work. Admission to one program does not automatically ensure admission to the other program because of both selection 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 six hours of classroom research courses and either a six-hour research practicum or thesis in the Graduate School of Social Work or a thesis in the Institute.

**The grade of R (research in progress) is a permanent grade. An incomplete (the grade of X) cannot be given in a course which is graded R. To receive credit for an R-graded course the student must continue to enroll in the course until a passing grade is received. Three-hour thesis and three- and six-hour dissertation courses are graded R/F only. The grade of P (required for graduation) can be received in six- or nine-hour thesis courses and nine-hour dissertation courses only. In the course listings below, R-graded courses are designated either "Graded P/F/R" or "Graded R." (See also the section entitled "R" GRADE on p. 36 of this catalog.)**

### INTRODUCTION TO URBAN AFFAIRS AND URBAN INSTITUTIONS

**5300. INTRODUCTION TO URBAN AFFAIRS (3-0).** Urban history; social, economic and political institutions; urban policy, such as transportation, housing and crime; professional roles in urban communities. Pass/Fail only.

## **URBAN AND REGIONAL AFFAIRS**

**5301. THE URBAN POLITICAL SYSTEM (3-0).** Examination of the city as a political system, including the impact of urbanization and fragmentation on policies; input dimensions, including voting patterns and interest group development; decision-making structures, especially types of community power structures and the impact of the reform movement on structural processes. Also offered as POLS 5305; credit will be granted only once.

**5302. THEORIES OF URBAN SOCIETY (3-0).** Several theoretical perspectives of the community and community organization examined. Special emphasis given to theories from human ecology, organization and stratification, and social welfare.

**5303. THE URBAN ECONOMY (3-0).** Internal dynamics of the growth and development of the urban system and its relation to the national economy. National and urban economic policy, urban growth and land use, market imperfections, urban financial issues, and the environmental implications of urban growth studied through lecture, game simulation and policy debates.

**5304. URBAN GEOGRAPHY (3-0).** Emphasizes areal aspects associated with urban physical environments and social, behavioral and financial processes that shape these environments.

**5305. URBAN HISTORY (3-0).** Extensive reading primarily in the history of urbanization and metropolitanization of the people of the United States. Historical methods as exemplified in the works of leading historians analyzed; examples of the scholarship of selected historians and treatises on selected cities, regions, and urban institutions studied. Also offered as HIST 5303; credit will be granted only once.

**5306. COMPARATIVE URBAN SYSTEMS (3-0).** Urbanization and the institutional processes of cities on an intracultural of intercultural basis; cities from a functional perspective, emphasizing such areas as housing, health care and transportation in a comparative framework.

**5390. TOPICS IN URBAN THEORY (3-0).** Different topics explored on an intensive basis, especially recent theoretical approaches. May be repeated for credit as topic changes.

### **URBAN POLICY**

**5310. URBAN POLICY AND INTERGOVERNMENTAL RELATIONS (3-0).** Critical analysis of federal government and selected state and local government policies and programs designed to influence the course of change and the future development of cities and urban areas. The role of "private" governments in affecting policy explored. Also offered as POLS 5310; credit will be granted only once.

**5311. SOCIAL POLICY FORMATION (3-0).** Utilization of a sociological approach in the study of policy formation in such areas as aging, social planning, and community problem solving.

**5312. ECONOMIC POLICY (3-0).** Examines the structure of the U.S. economic system and its impact on the welfare of consumers, workers and industry; public policy efforts to provide for management of critical economic variables are evaluated for their effectiveness and equity as they impact different interest groups.

**5313. COMMUNITY DEVELOPMENT (3-0).** Focuses on problems of neighborhood development and revitalization. Decline of economic opportunity in central cities and deterioration of housing and neighborhoods analyzed. Federal, state and local policies, with grass roots initiatives evaluated for effectiveness in promoting community stability.

**5314. URBAN TRANSPORTATION (3-0).** Analysis of development of transportation systems in cities, including mass transportation; review of governmental policy and fiscal strategies; impact on design of cities and other social problems. Also offered as CIRP 5315; credit will be granted only once.

**5315. URBAN EDUCATION (3-0).** Public schools in cities; financing, governance, management, enrollment, staffing, curriculum demands, issues such as race, low income, special service needs, interaction with agencies and government entities.

**5316. HUMAN SERVICES (3-0).** Social welfare institutions—private and public; needs assessment, resource allocation, procedures, city/state/federal/private policy review; highlights of current system demands and changes.

**5317. URBAN ENVIRONMENTAL MANAGEMENT AND POLICY (3-0).** Focuses on the physical environmental dimensions of urbanization including such factors as pollution, waste disposal, and land use; stresses the role of economics, social, and political institutions as these affect environmental quality of the city. Management and policy alternatives for dealing with urban environmental problems will be studied.

**5391. TOPICS IN URBAN POLICY (3-0).** Different topics and approaches in analysis of urban problems. May be repeated for credit as topic changes.

## URBAN AND REGIONAL AFFAIRS

### PROFESSIONAL DEVELOPMENT

#### Urban Management

**5320. ORGANIZATION THEORY AND DEVELOPMENT (3-0).** Historical evolution of administrative theory including classical, sociological and social-psychological dimensions; decision-making theory; implications of public interest theory for public management; basic concepts of organization development and impact on public administration paradigms; new public administration; and future of public urban organization. Also offered as CRJU 5309 and POLS 5303; credit will be granted only once.

**5321. URBAN MANAGEMENT (3-0).** Focuses through lectures, readings, and exercises on major administrative process: personnel and policy development and analysis; management styles and key contemporary management problems explored through presentations by prominent local practitioners. Also offered as POLS 5331; credit will be granted only once.

**5322. URBAN BUREAUCRACY AND THE POLICY PROCESS (3-0).** Development of theory of bureaucracy; bureaucracy as social issue; ethics and morality in public bureaucracy; mobilization of special interest support; power differentials in urban agencies; policy process in bureaucracy; new bureaucratic structures and processes for urban policy making.

**5323. PUBLIC ORGANIZATIONAL CHANGE (3-0).** Current theories and concepts of public organizational change with particular emphasis on organization development and action research; theoretical roots of contemporary change literature traced through readings and discussion of classical organization theory, public administration including New Public Administration decision making, public interest, phenomenology, learning theory and general systems. Prerequisite: basic organization theory course or permission of instructor.

**5324. URBAN PUBLIC FINANCE (3-0).** Tax, revenue, and fiscal problems of cities and local governments in metropolitan areas; problems of matching costs and benefits in providing public services among different local governments; increasingly complex dimensions of intergovernmental fiscal relations and public budgeting systems.

**5325. URBAN AND ADMINISTRATIVE LAW (3-0).** Examines scope and role of administrative regulation of and by governmental agencies; explores constitutional principles which limit administrative power and administrative law which governs classical areas of conflict between administrative agencies and their constituencies; rule-making, judicial review and informed regulatory processes of importance to public officials.

**5326. PUBLIC BUDGETING (3-0).** Rationale of public budgeting including legal, political, social, and administrative perspectives; history of budgeting techniques and such approaches as Management by Objectives, and Program and Mission Budgeting.

**5392. TOPICS IN URBAN MANAGEMENT (3-0).** Selected topics on current management problems including small city management, community-neighborhood relations, citizen involvement programs and techniques, personal and professional effectiveness as a total person, intergovernmental strategies and styles, public-private sector collaboration and coplanning, privatization, and other alternatives to economic service delivery. May be repeated as topic changes.

#### Urban and Social Planning

**5330. URBAN AND REGIONAL PLANNING (3-0).** Nature of the planning process in cities and urban regions and with concepts and techniques used by professional planners and planning organizations. Emphasis on understanding the role, limitations, and political aspects of urban planning.

**5331. URBAN DESIGN (3-0).** Seeks to provide understanding and appreciation of the concepts and skills of architects and physical design specialists; importance of design, form, and visual or aesthetic factors studied. The interdependence of physical design and aesthetic and governmental policies and social problems in urban areas emphasized.

**5332. COMMUNITY AND NEIGHBORHOOD ORGANIZATION (3-0).** Structures and processes in the analysis and development of community and neighborhood organizations; special emphasis given to poverty and minority communities and neighborhoods.

**5333. HUMAN SERVICE PLANNING (3-0).** Needs assessment, funding, agency management, priority setting, service providers, long range planning, federal, state, local, private, public, volunteer roles.

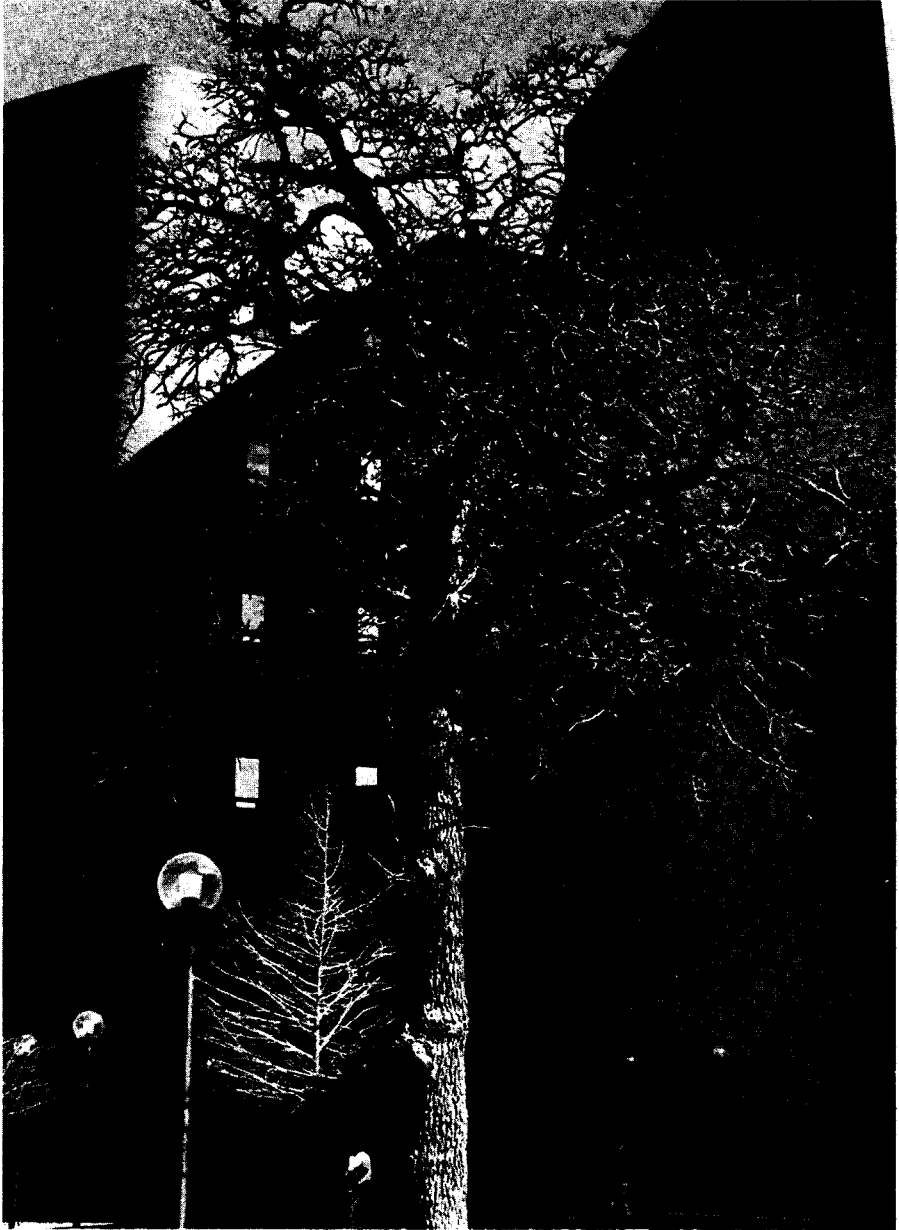
**5334. LAND USE PLANNING AND THE LAW (3-0).** Examines the relationship between land use in urban areas and the legal system; covers traditional land use planning tools of zoning, subdivision regulation, and the special permit system; assessment of some of the more exotic, modern tools for managing urban growth for their legality and scope as interpreted by the judicial system.

## **URBAN AND REGIONAL AFFAIRS**

**5393. TOPICS IN URBAN PLANNING (3-0).** Focuses on selected areas in urban and social planning. May be repeated for credit as topic changes.

### **Policy Research**

**5340. EVALUATIONS RESEARCH (3-0).** Methodological issues in evaluating public programs; identification of variables, indicators and analyses formats presented.





## URBAN AND REGIONAL AFFAIRS

**5341. ADVANCED DATA ANALYSIS (3-0).** Multivariate approaches to data analysis. **\$10 computer fee.**

**5342. DEMOGRAPHIC METHODS (3-0).** Examination of sources of data-census, vital statistics, special surveys, reports, special studies; techniques of analysis with particular emphasis on growth and projection models, interpretation of findings as a major policy area in urban analysis.

**5343. COST BENEFIT ANALYSIS (3-0).** Reviews theory of cost-benefit and cost-effective analyses; explores the research, measurement and methodological requirements for the assessments of costs and benefits. It is recommended that students have completed at least one graduate course in research and one graduate class in public finance.

**5394. SPECIAL TOPICS IN URBAN RESEARCH (3-0).** Different topics each semester concentrate on a variety of methodological techniques and research strategies, such as demographic research and survey techniques. May be repeated for credit as topic changes. **\$10 computer fee.**

### Professional Field Experience

**5350. URBAN MANAGEMENT/PLANNING INTERNSHIP (3-0).** Designed to integrate work experience and course work through a series of brief work-related assignments; presentations by local planning and management practitioners and class discussions and exercises. Enrollment is open to both pre-entry and in-career students. Formal internship placements with agency mentors will be arranged. P/F only. Also offered as POLS 5393; credit will be granted only once.

### RESEARCH AND ANALYSIS

**5360. METHODS OF SOCIAL RESEARCH AND ANALYSIS (3-0).** Research methodology and statistical techniques useful in analysis of urban trends and problems; newer concepts and procedures for use of computers in social research studied. Special problems and methods of evaluative research related to programs and policies for coping with urban problems explored. Also offered as POLS 5339; credit will be granted only once. **\$5 computer fee.**

**5361. PROFESSIONAL REPORT WRITING (3-0).** Provides students entering public sector employment with writing, management information, data retrieval skills to communicate ideas and information within and outside an agency; basic writing skills reviewed, including organization of reports and grammatical construction; assignments based on actual internship position of students in public agencies.

**5362. STRATEGIES FOR URBAN RESEARCH (3-0).** Conceptual and methodological approaches for the analysis of urban processes and the design of selected urban systems. **\$10 computer fee.**

**5363. APPLIED URBAN ANALYSIS (3-0).** Group and individual projects to develop research studies or strategies, data reports for local government, agency or citizen group; techniques appropriate to task utilized. Pass/Fail only. **\$10 computer fee.**

**5395. CONFERENCE COURSE IN URBAN AFFAIRS (3-0).** Reading and research in a specialized area of urban affairs under the direction of a member of the graduate faculty.

**5396. PROJECT REPORT (3-0).** Student prepares report focusing on specific policy or professional issue, utilizing appropriate research techniques; subject area and design of project report with consent of instructor. Graded P/F/R only. Prerequisite: URBA 5361.

**5397. RESEARCH REPORT (3-0).** Student prepares report comparable to a journal article focusing on research issue, utilizing appropriate theory and research techniques; subject area and design of research report with consent of instructor. Graded P/F/R only. Prerequisite: URBA 5362. **\$10 computer fee.**

**5698. THESIS.** A thesis conforming to University and departmental requirements may be prepared by graduate students in urban affairs. Graded P/F/R.

### ADMINISTRATION (PhD Level Courses)

**6310. MONETARY AND FISCAL POLICY: THE FEDERAL ROLE (3-0).** Examination of the role of the federal government in maintaining economic stability, ensuring full employment and controlling inflation; exploration of liberal interventionist, conservative and radical theories of state economic management to assess the various policy alternatives and the importance of interest groups.

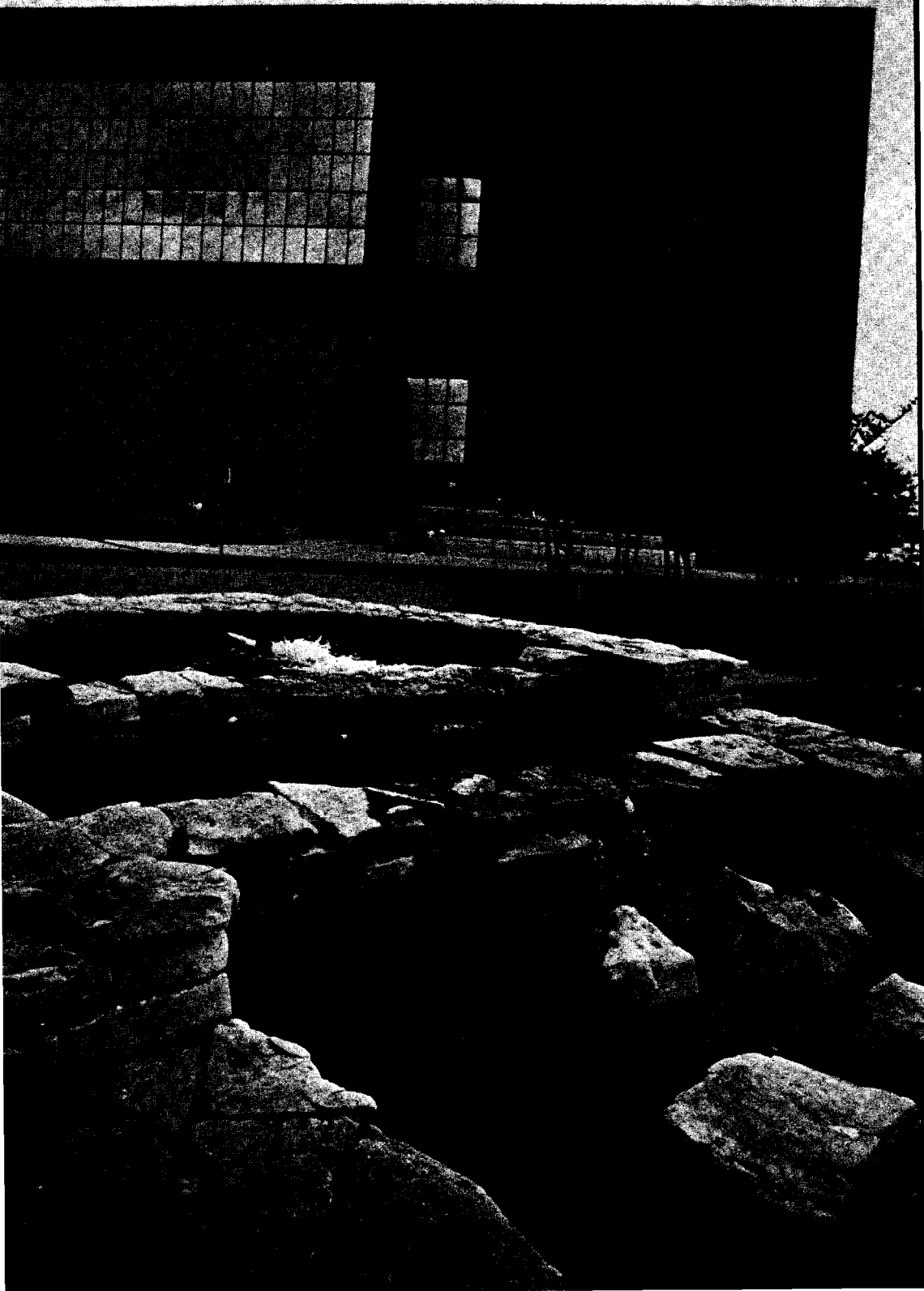
## **URBAN AND REGIONAL AFFAIRS**

**6320. STRATEGIC DECISION MAKING (3-0).** Examination of the available models of policy setting in large complex social systems; critique of the shortcomings of the "goal-oriented" policy development models; adaptation of these models to formal and informal organizational decision-making.

**6340. RESEARCH DESIGN (3-0).** Advanced course especially for PhD students; covers logic of research design and problems of structure. Emphasis on empirical and quantitative studies.

# INTERDEPARTMENTAL and INTERCAMPUS PROGRAMS

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



# ADMINISTRATION Program (ADMN)

<i>Areas of Study</i>	<i>Degrees</i>
Business Administration	Ph.D.
Social Work	Ph.D.
Urban Affairs	Ph.D.

*Graduate Advisors:*

Business Administration		
Sumit Sircar	434 Business	273-3004
Social Work		
Roosevelt Wright, Jr.	101C Social Work Complex	273-3953
Urban Affairs		
Delbert A. Taebel	528 University Hall	273-3358

*Graduate Faculty:*

Professors Anjomani, Apilado, Callicutt, Carney, Cole, Cornehlis, Courtney, Dickinson, Feldman, Furubotn, Garland, Gates, Geisel, Hayashi, Holland, Lecca, McDaniel, McInish, Mindel, Mullendore, Nelson, Quick, Raja, Ross, Schkade, Snavely, L. Solomon, Stevens, Sundel, Taebel, Trapani, Wofford, Wright, Ziegler

Associate Professors Baker, Brobst, Dunn, Eakin, French, Gerloff, Gray, Hall, Harris, Hopkins, Isakson, Mark, McConnell, Price, Rosentraub, Seidel, Sicar, Slinkman, Swanson, Tsay, Walther, Wheeler, Whiteside

## OBJECTIVE

The Doctor of Philosophy in Administration program is a unique approach to the preparation of students for a variety of academic and administration 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 coursework, independent study, research, and a dissertation in an administration area. Candidates for the degree select five areas to study from among the following: accounting, administration and planning, economics, finance, information systems, management, management science, marketing, policy processes, real estate, research in administration, urban systems and administration, and urban affairs. Upon special request and approval, a student may include an appropriate external area as one of the five fields. At some time during the program, the student 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 Requirement**—A student in the program must successfully complete a minimum of 15 semester hours in one 12 month period during his doctoral program.

## ADMINISTRATION

**Dissertation Credit**—All students must enroll for at least 18 semester hours of dissertation credit prior to graduation. Following successful completion of comprehensive examinations, a student must register for at least nine semester hours of dissertation credit each fall and spring semester and at least six semester hours in the summer.

**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 all 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 48 calendar months from the date of successful completion of the comprehensive examination.

The grade of R (research in progress) is a permanent grade. An incomplete (the grade of X) cannot be given in a course which is graded R. To receive credit for an R-graded course the student must continue to enroll in the course until a passing grade is received. Three-hour thesis and three- and six-hour dissertation courses are graded R/F only. The grade of P (required for graduation) can be received in six- or nine-hour thesis courses and nine-hour dissertation courses only. In the course listings below, R-graded courses are designated either "Graded P/F/R" or "Graded R." (See also the section entitled "R" GRADE on p. 36 of this catalog.)

## ADMINISTRATION (ADMN)

**6305. SEMINAR IN URBAN POLICY PROCESSES (3-0).** Final course for students with a primary or major field in urban affairs; may be used for the purpose of completing the comprehensive examination; focus on the political, economic, and sociological institutions in the policy process, including various theoretical approaches, and application of these multi-disciplinary perspectives in the analysis of specific policy issues.

**6306. SEMINAR IN MARKETING (3-0).** An integrative seminar; devoted to the study of marketing at the doctoral level.

**6307. SEMINAR IN SOCIAL SYSTEMS (3-0).** The study of the concepts and models of social systems theory; examination of the origins, elements, applicability, and shortcomings of the social systems approach to problem solving and organizational change. Prerequisite: SOCW 6315 and 6316 and permission of instructor.

**6308. SEMINAR IN CONTEMPORARY MANAGEMENT THEORY AND RESEARCH (3-0).** Advanced study of management history, contemporary theory and research as found in management literature.

**6309. SEMINAR IN MANAGEMENT SCIENCES (3-0).** Comprehensive and integrative study of management sciences, including epistemology, theoretical structures and considerations for application of models and methods of analysis.

**6310. SEMINAR IN URBAN ADMINISTRATION (3-0).** Urban administration and organization theories from sociological, political, economic, and planning perspectives.

**6311. SEMINAR IN INFORMATION SYSTEMS (3-0).** Comprehensive study of theory, research and advanced applications in the field of information systems.

**6390. SEMINAR IN SPECIAL TOPICS IN ADMINISTRATION (3-0).** Advanced doctoral level work in the areas of policy, administration, and research. May be repeated for credit when topic changes.

**6392. INDEPENDENT STUDY IN ADMINISTRATION (3-0).** Graded P/F/R.

**6399, 6699, 6999. DISSERTATION.** 6399 and 6699 graded R/F only; 6999 graded P/F/R. \$10 computer fee.

## ACCOUNTING (ACCT) See Department of Accounting for course descriptions.

**5301. ACCOUNTING ANALYSIS I—Foundation Course**

**5302. ACCOUNTING ANALYSIS II—Foundation Course**

**Advanced Elective Credit may be received from the following courses:**

**5310. INTRODUCTION TO BUSINESS TAXATION**

## ADMINISTRATION

- 5311. FINANCIAL ACCOUNTING I
- 5312. FINANCIAL ACCOUNTING II
- 5314. STUDY OF FEDERAL INCOME TAX LAW RELATIVE TO INDIVIDUALS
- 5316. AUDITING CONCEPTS AND PRACTICES
- 5317. COST ACCOUNTING
- 5318. STUDIES IN AUDITING
- 5319. FINANCIAL ACCOUNTING III
- 5320. GOVERNMENTAL AND NONPROFIT ACCOUNTING
- 5321. CASES IN FINANCIAL ACCOUNTING
- 5322. ACCOUNTING FOR MANAGEMENT PLANNING AND CONTROL
- 5323. CORPORATE MODELING
- 5324. ADVANCED STUDIES IN PLANNING AND CONTROL
- 5327. CONTEMPORARY ISSUES IN ACCOUNTING THEORY
- 5329. INFORMATION SYSTEM ANALYSIS
- 5330. INTERNATIONAL ACCOUNTING AND FINANCIAL REPORTING
- 5340. STUDY OF FEDERAL INCOME TAX FOR ENTITIES OTHER THAN INDIVIDUALS
- 5341. TAX PROBLEMS OF PARTNERSHIPS AND PARTNERS
- 5342. TAX PROBLEMS OF CORPORATE REORGANIZATIONS
- 5343. TAX PROBLEMS OF TRANSACTIONS IN REAL ESTATE
- 5344. TAX PROBLEMS OF THE EXTRACTIVE INDUSTRIES
- 5345. CONTEMPORARY ISSUES IN FEDERAL TAXATION
- 5346. SEMINAR IN TAXATION
- 5347. FEDERAL TAXATION OF GIFTS AND ESTATES
- 5348. TAX PLANNING AND RESEARCH
- 5349. ADVANCED TAX PLANNING
- 5352. AUDIT AND CONTROL OF EDP SYSTEMS
- 5353. STATISTICAL AUDITING
- 5392. SELECTED TOPICS IN ACCOUNTING
- 6309. SEMINAR IN ACCOUNTING RESEARCH I

### **ADMINISTRATION AND PLANNING (SOCW)** *See Graduate School of Social Work for course descriptions.*

- 6334. SOCIAL WORK AND THE POLITICAL PROCESS
- 6335. ADVANCED SEMINAR IN THE THEORY AND PRACTICE OF SOCIAL WORK ADMINISTRATION
- 6392. SELECTED TOPICS IN SOCIAL WELFARE: LEADERSHIP SKILLS TRAINING FOR HUMAN SERVICE ADMINISTRATORS
- 6392. SELECTED TOPICS IN SOCIAL WELFARE: ORGANIZATIONAL COMMUNICATIONS
- 6359. THEORIES OF PLANNING
- 6357. PRINCIPLES OF ADMINISTRATION: A DOCTORAL SEMINAR
- 6362. SEMINAR IN HUMAN SERVICES PLANNING METHODS
- 6358. STRESS MANAGEMENT IN THE HUMAN SERVICE ORGANIZATIONS

### **ECONOMICS (ECON)** *See Department of Economics for course descriptions.*

- 5304. ADVANCED PUBLIC FINANCE
- 5310. MICROECONOMIC THEORY
- 5312. MACROECONOMIC THEORY
- 5313. MANAGERIAL ECONOMICS
- 5314. INDUSTRIAL ORGANIZATION
- 5316. MATHEMATICAL ECONOMICS I
- 5317. MATHEMATICAL ECONOMICS II

## **ADMINISTRATION**

- 5321. INTERNATIONAL ECONOMICS
- 5324. MONETARY AND FISCAL ECONOMICS
- 5326. HISTORY OF ECONOMIC THOUGHT
- 5327. INTERNATIONAL FINANCE
- 5328. INSTITUTIONAL ORGANIZATION AND ECONOMIC BEHAVIOR
- 5329. RESEARCH METHODS IN APPLIED ECONOMICS
- 5330. ADVANCED LABOR ECONOMICS
- 5331. URBAN ECONOMICS
- 5332. TRANSPORTATION ADMINISTRATION
- 5333. ECONOMICS OF HEALTH
- 5335. GOVERNMENT REGULATION OF BUSINESS
- 5336. ECONOMETRICS
- 5337. BUSINESS AND ECONOMIC FORECASTING
- 5338. SEMINAR
- 5340. ADVANCED MANPOWER ECONOMICS
- 5182, 5282, 5382. INDEPENDENT STUDIES IN ECONOMICS
- 5191, 5291, 5391. RESEARCH AND SPECIAL TOPICS IN ECONOMICS
- 6310. APPLIED MICROECONOMIC THEORY
- 6312. APPLIED MACROECONOMIC THEORY
- 6336. ECONOMETRICS II
- 6392. RESEARCH IN ECONOMICS

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

- 5311. BUSINESS FINANCIAL MANAGEMENT—Foundation Course
- 5322. ADVANCED BUSINESS FINANCIAL PROBLEMS
- 5323. INVESTMENT MANAGEMENT PROBLEMS
- 5324. SEMINAR IN FINANCIAL THEORIES
- 5325. MANAGEMENT OF FINANCIAL INSTITUTIONS
- 5326. COMMERCIAL BANKING
- 5327. RISK MANAGEMENT AND SPECULATIVE MARKETS
- 5328. SEMINAR IN PORTFOLIO THEORY
- 5329. SEMINAR IN SECURITY ANALYSIS
- 5330. SEMINAR IN CAPITAL BUDGETING
- 5331. MULTINATIONAL FINANCIAL MANAGEMENT
- 5332. SEMINAR IN INTERNATIONAL FINANCIAL MARKETS
- 5333. ADVANCED FINANCIAL ANALYSIS
- 5334. SEMINAR IN FINANCIAL INSTITUTIONS AND MARKETS
- 5182, 5282, 5382. INDEPENDENT STUDIES IN FINANCE
- 5392. SELECTED TOPICS IN FINANCE
- 6311. SEMINAR IN THE THEORY OF CORPORATE FINANCE
- 6312. SEMINAR IN THE THEORY OF INVESTMENTS
- 6313. ADVANCED RESEARCH IN FINANCE
- 6314. ADVANCED RESEARCH IN FINANCE II
- 6390. SEMINAR IN SPECIAL TOPICS IN FINANCE
- 6392. RESEARCH IN FINANCE

## **INFORMATION SYSTEMS (INSY)** *See Department of Information Systems and Management Sciences for course descriptions.*

- 5340. INTRODUCTION TO INFORMATION SYSTEMS
- 5341. INFORMATION SYSTEMS ANALYSIS
- 5342. INFORMATION SYSTEMS DESIGN
- 5343. DISTRIBUTED INFORMATION SYSTEMS AND DATA COMMUNICATIONS



## ADMINISTRATION

- 5344. DATA BASE MANAGEMENT
- 5345. MANAGEMENT OF INFORMATION SYSTEMS
- 5182, 5282, 5382. INDEPENDENT STUDIES IN MANAGEMENT
- 5192, 5292, 5392. SELECTED TOPICS IN MANAGEMENT
- 6301. APPLIED GENERAL SYSTEMS THEORY
- 6302. CONCEPTUAL ISSUES IN INFORMATION SYSTEMS
- 6304. EXPERT SYSTEMS

### MANAGEMENT (MANA) *See Department of Management for course descriptions.*

- 5320. ORGANIZATIONAL BEHAVIOR
- 5321. COMPLEX ORGANIZATIONS
- 5322. COMPENSATION ADMINISTRATION
- 5324. GROUP AND INTERGROUP RELATIONSHIPS
- 5325. INDUSTRIAL RELATIONS
- 5326. ORGANIZATIONAL DEVELOPMENT AND CHANGE
- 5328. OPERATIONS MANAGEMENT
- 5329. METHODS OF ORGANIZATIONAL RESEARCH
- 5330. ARBITRATION AND DISPUTE SETTLEMENT
- 5331. MANAGEMENT OF INTERNATIONAL OPERATIONS
- 5333. MANAGEMENT OF TECHNOLOGY
- 5340. PERSONNEL-HUMAN RESOURCE MANAGEMENT
- 5182, 5282, 5382. INDEPENDENT STUDIES IN MANAGEMENT
- 5192, 5292, 5392. SELECTED TOPICS IN MANAGEMENT
- 6318. SEMINAR IN ORGANIZATIONAL THEORY AND LABOR RELATIONS
- 6328. SEMINAR IN BUSINESS POLICY
- 6338. SEMINAR IN ORGANIZATIONAL BEHAVIOR
- 6348. SEMINAR IN PERSONNEL/HUMAN RESOURCES MANAGEMENT
- 6392. RESEARCH IN ADMINISTRATION

### MANAGEMENT SCIENCE (MASI) *See Department of Information Systems and Management Sciences for course descriptions.*

- 5311. DECISION MODELS AND INFORMATION SYSTEMS
- 5321. INTRODUCTION TO MANAGEMENT SCIENCES
- 5323. APPLIED DECISION THEORY
- 5324. APPLICATIONS OF COMPUTER MODELS IN MANAGEMENT SCIENCES
- 5326. SIMULATION AND BUSINESS MODELS
- 5327. APPLIED MATHEMATICAL PROGRAMMING
- 5330. NONPARAMETRIC STATISTICS
- 5182, 5282, 5382. INDEPENDENT STUDIES IN MANAGEMENT SCIENCE
- 5392. SELECTED TOPICS IN MANAGEMENT SCIENCE
- 6301. APPLIED GENERAL SYSTEMS THEORY
- 6302. APPLIED LINEAR STATISTICAL MODELS I
- 6303. APPLIED LINEAR STATISTICAL MODELS II
- 6305. DECISION SUPPORT SYSTEMS
- 6306. PROBLEM FORMULATION AND DECISION STRUCTURING
- 6309. MULTIVARIATE STATISTICAL METHODS

### MARKETING (MARK) *See Department of Marketing for course descriptions.*

- 5320. BUYER BEHAVIOR
- 5324. SEMINAR: CONTEMPORARY MARKETING PROBLEMS
- 5325. PHYSICAL DISTRIBUTION MANAGEMENT

## **ADMINISTRATION**

- 5326. ADVERTISING AND NONPERSONAL COMMUNICATIONS
- 5327. RESEARCH FOR MARKETING DECISIONS
- 5328. PRODUCT MANAGEMENT
- 5329. SALES, SALES MANAGEMENT
- 5331. INTERNATIONAL MARKETING
- 5332. INDUSTRIAL MARKETING
- 5335. RETAIL MARKETING MANAGEMENT
- 5336. ADVANCED RESEARCH ANALYSIS
- 5340. MARKETING STRATEGY
- 5182, 5282, 5382. INDEPENDENT STUDIES IN MARKETING
- 5192, 5292, 5392. SELECTED TOPICS IN MARKETING
- 6301. MARKETING THEORY
- 6302. ADVANCED CONSUMER BEHAVIOR
- 6305. MARKETING MODELS
- 6390. SEMINAR IN SPECIAL TOPICS IN MARKETING
- 6192, 6292, 6392. INDEPENDENT STUDY IN MARKETING

## **POLICY PROCESSES (SOCW)** *See Graduate School of Social Work for course descriptions.*

- 5320. HEALTH POLICY
- 6304. ISSUES IN CHILD WELFARE
- 6319. ISSUES IN COMMUNITY MENTAL HEALTH
- 6328. SOCIAL POLICY RESEARCH AND ANALYSIS
- 6331. PROFESSIONAL AND INSTITUTIONAL HISTORY AND PHILOSOPHY OF SOCIAL WELFARE
- 6349. SOCIAL WELFARE POLICY AND THE AGED
- 6356. ADVANCED SEMINAR IN CONTEMPORARY POLICY ISSUES

## **REAL ESTATE (REAE)** *See Department of Finance and Real Estate for course descriptions.*

- 5311. REAL ESTATE DECISION MAKING
- 5321. REAL ESTATE INVESTMENT
- 5331. INTERNATIONAL REAL ESTATE
- 5334. ADVANCED REAL ESTATE EVALUATION
- 5335. ADVANCED REAL ESTATE FINANCE
- 5336. SEMINAR IN REAL ESTATE SECURITIES
- 6390. SEMINAR IN SPECIAL TOPICS IN REAL ESTATE
- 6392. RESEARCH IN REAL ESTATE

## **RESEARCH IN ADMINISTRATION**

*An interdisciplinary field, see individual departments for course descriptions. Requirements vary according to primary field.*

- ADMN 6309. SEMINAR IN MANAGEMENT SCIENCES
- ADMN 6311. SEMINAR IN INFORMATION SYSTEMS
- BUSA 5301. STATISTICS
- BUSA 5325. ADVANCED STATISTICAL METHODS IN BUSINESS ADMINISTRATION
- ECON 5316. MATHEMATICAL ECONOMICS I
- ECON 5317. MATHEMATICAL ECONOMICS II
- ECON 5336. ECONOMETRICS
- ECON 5337. BUSINESS & ECONOMIC FORECASTING
- ECON 6336. ECONOMETRICS II

## ADMINISTRATION

- FINA 6313. ADVANCED RESEARCH IN FINANCE
- FINA 6314. ADVANCED RESEARCH IN FINANCE II
- INSY 5382. INDEPENDENT STUDIES IN INFORMATION SYSTEMS
- INSY 6301. APPLIED GENERAL SYSTEMS THEORY
- INSY 6306. PROBLEM FORMULATION AND DECISION STRUCTURING
- MANA 6329. ADVANCED RESEARCH METHODS
- MASI 5311. DECISION MODELS & INFORMATION SYSTEMS
- MASI 5323. APPLIED DECISION THEORY
- MASI 5326. SIMULATION & BUSINESS MODELS
- MASI 5327. APPLIED MATHEMATICAL PROGRAMMING
- MASI 5330. NONPARAMETRIC STATISTICS
- MASI 5382. INDEPENDENT STUDIES IN MANAGEMENT SCIENCE
- MASI 6301. APPLIED GENERAL SYSTEMS THEORY
- MASI 6302. APPLIED LINEAR STATISTICAL MODELS I
- MASI 6303. APPLIED LINEAR STATISTICAL MODELS II
- MASI 6306. PROBLEM FORMULATION AND DECISION STRUCTURING
- MASI 6309. MULTIVARIATE STATISTICAL METHODS
- MARK 5327. RESEARCH FOR MARKETING DECISIONS
- MARK 5336. ADVANCED RESEARCH ANALYSIS
- PSYC 5308. QUANTITATIVE METHODS
- PSYC 5355. MULTIVARIATE ANALYSIS
- PSYC 5405. ADVANCED STATISTICS I
- PSYC 5406. ADVANCED STATISTICS II
- PSYC 5407. EXPERIMENTAL DESIGN
- PSYC 5444. PSYCHOMETRIC THEORY
- SOCW 6322. RESEARCH & EVALUATION METHODS IN SOCIAL WORK I
- SOCW 6324. RESEARCH & EVALUATION METHODS IN SOCIAL WORK II
- SOCW 6336. SEMINAR IN LARGE SCALE ORGANIZATIONAL AND EVALUATIVE RESEARCH
- SOCW 6360. ADVANCED RESEARCH METHODS IN HUMAN SERVICES
- SOCW 6361. ADVANCED STATISTICAL METHODS IN HUMAN SERVICES
- URBA 5340. EVALUATIONS RESEARCH
- URBA 5341. ADVANCED DATA ANALYSIS
- URBA 5360. METHODS OF SOCIAL RESEARCH AND ANALYSIS
- URBA 5362. STRATEGIES FOR URBAN RESEARCH
- URBA 6340. RESEARCH DESIGN

### **URBAN AFFAIRS (URBA)** *See Department of Urban and Regional Affairs for course descriptions.*

- 5301. THE URBAN POLITICAL SYSTEM
- 5302. THEORIES OF URBAN SOCIETY
- 5303. THE URBAN ECONOMY
- 5304. URBAN GEOGRAPHY
- 5305. URBAN HISTORY
- 5306. COMPARATIVE URBAN SYSTEMS
- 5310. URBAN POLICY AND INTERGOVERNMENTAL RELATIONS
- 5311. SOCIAL POLICY FORMATION
- 5312. ECONOMIC POLICY
- 5313. COMMUNITY DEVELOPMENT
- 5314. URBAN TRANSPORTATION
- 5315. URBAN EDUCATION
- 5316. HUMAN SERVICES
- 5317. URBAN ENVIRONMENTAL MANAGEMENT AND POLICY

## **BIOMEDICAL ENGINEERING**

- 5390. SPECIAL TOPICS IN URBAN THEORY
- 5391. SPECIAL TOPICS IN URBAN POLICY
- 6310. MONETARY AND FISCAL POLICY: THE FEDERAL ROLE

**URBAN SYSTEMS AND ADMINISTRATION (URBA)** *See Department of Urban and Regional Affairs for course descriptions.*

- 5320. ORGANIZATION THEORY AND DEVELOPMENT
- 5321. URBAN MANAGEMENT
- 5322. URBAN BUREAUCRACY AND THE POLICY PROCESS
- 5323. PUBLIC ORGANIZATIONAL CHANGE
- 5324. URBAN PUBLIC FINANCE
- 5325. URBAN AND ADMINISTRATIVE LAW
- 5392. SPECIAL TOPICS IN URBAN MANAGEMENT
- 6320. STRATEGIC DECISION MAKING

# **BIOMEDICAL ENGINEERING Program (BME)**

### *Areas of Study*

Biomedical Engineering

Clinical Engineering

### *Degrees*

M.S., Ph.D.  
*Certificates*  
Internship  
Residency

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

*Graduate Advisor:* Wolf W. von Maltzahn      229 Engineering Laboratory  
273-2249

### *Graduate Faculty:*

Professors Eberhart, Lou  
Associate Professors Behbehani, Kondraske, Stokely, von Maltzahn  
Assistant Professor Chuong  
Adjunct Associate Professor Scacci

## **OBJECTIVES**

The Biomedical Engineering Program is jointly offered by The University of Texas at Arlington and The University of Texas Southwestern Medical Center at Dallas (UT Southwestern). Research and teaching efforts of various departments in the biological, engineering, mathematical, physical, and medical sciences of both institutions are coordinated through the Committee on Graduate Studies in Biomedical Engineering. The goal of the program is to prepare students as biomedical engineers for productive research, development, and teaching careers in academic, industrial, hospital, or governmental positions.

The program includes coursework and research in medical and hospital systems, cardiopulmonary assistance, neurophysiological systems, medical image processing, biomedical instrumentation, rehabilitation, biomaterials, fluid and tissue biomechanics, simulation, bioheat transfer, and medical computer science. The master's program is based upon graduate level work in one of the engineering disciplines, biomedical engineering, and life sciences.

A six-month internship in clinical engineering after completion of the master's degree, with certification prepares a student for a professional career in clinical engineering.

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.

### ADMISSION

Application for admission should be made at either UT Arlington or UT Southwestern. Normally, the institution through which the student applies and is admitted is the student's home institution. Admission in the other institution is initiated during the student's first semester.

In addition to admission requirements of the Graduate School, the bachelor's degree held by applicants to the program may be in engineering, biological, physical, or mathematical sciences. Students required to take the TOEFL must achieve a score of at least 550 and a score of at least 350 on the verbal part of the GRE. Applicants to the doctoral program normally should have a graduate grade - point average exceeding 3.4, and a combined verbal and quantitative score of at least 1100 on the GRE. Students with unusual backgrounds and experience will be considered individually.

### CONTINUATION

The Biomedical Engineering Graduate Program has established certain policies to fulfill its responsibility to graduate highly qualified professional engineers. In addition to the requirements of the Graduate School listed elsewhere, each biomedical engineering graduate student who wants to continue in the program must:

- (1) Maintain at least a B (3.0) overall GPA in all course work, and
- (2) Demonstrate suitability for professional engineering practice.

At such time as questions are raised by biomedical engineering graduate faculty regarding either of the above, the student will be notified and will be provided the opportunity to respond to the Committee on Graduate Studies in Biomedical Engineering. The Committee on Graduate Studies will review the student's performance and make a recommendation concerning the student's eligibility to continue in the program. Appeal of a decision on continuation may be made through normal procedures outlined in the section of this catalog entitled "Grievances Other than Grades."

### DEGREE REQUIREMENTS

In degree plan descriptions course numbers followed by a D are offered at UT Southwestern. 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 5385); Anatomy (BME 5383).

**One Engineering Area:** Four courses\*.

**Biomedical Engineering:** Fundamentals of Bioinstrumentation (BME 5300); Laboratory Principles (BME 5382); Research Project or Directed Research (BME 5390 or 5396); Seminar—one year, first year (BME 5101 or 5193).

**Choose Two\*:** Clinical Engineering (BME 5320); Biological Materials, Mechanics, and Processes 5335); Biomechanics 5340; Clinical Instrumentation and Measurements (BME 5345); Hospital Internship for Biomedical Engineers (BME 6390); Special Topics in Biomedical Engineering (BME 5300 or 5096D); Thermoregulation and Bio-heat Transfer (BME 5362D); Design and Application of Artificial Organs (BME 5360D); Biomaterials and Blood Compatibility (BME 5361D); Digital Processing of Medical Images (BME 5363D); Biomedical NMR Imaging (BME 5096D).

**Free Elective:** One three hour course from Life Science, Engineering, or BME.

**Final Comprehensive Examination:** The non-thesis student will be examined in all areas related to coursework taken.

## **BIOMEDICAL ENGINEERING**

### **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 (three hours) is deleted, 2) research project or directed research (BME 5390 or BME 5396D) is replaced by thesis (BME 5698 or 5098D), and 3) an oral defense of the thesis replaces the final comprehensive examination.

### **Clinical Engineering Internship Plan**

Following the MS degree in BME, students entering this program are required to take Clinical Engineering (BME 5320), Hospital Internship for Biomedical Engineers (BME 6990), work full-time in the clinical engineering department of a major hospital for at least one semester, write weekly reports, and pass the written certification examination for clinical engineers (administered by the International Certification Commission). After successful completion students will be issued a certificate by the Graduate School.

### **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:** Human Anatomy (HCS 4408 and BME 5307), Physiology (BME 5385) and Biochemistry (HCS 3811 or CHEM 4311 and 4312). One additional graduate level life science course is required. See UT Southwestern graduate catalog and consult with advisor.

**One Engineering Area: Six Courses\***

**Mathematics, Statistics, Computer and Physical Sciences:** Choose two courses\*.

**Biomedical Engineering:** Seminar—two years, first two years (BME 5101 or 5193D); Fundamentals of Bioinstrumentation (BME 5381D); Laboratory Principles (BME 5382); Dissertation—re-enroll, approximately 30 hours (BME 6399, 6699, 6999, or 5099D).

**Choose Three\*:** from non-thesis MS degree listing of courses entitled "Choose Two."

Although qualified applicants may be accepted into the PhD program without earning the Master of Science in biomedical engineering, all students must satisfactorily pass the Diagnostic Examination (Exam I). This examination will cover all relevant coursework taken by the student. The examination may be written, oral or both and consists of three approximately equal parts: (1) one engineering discipline, (2) biomedical engineering and physical and related sciences (mathematics, computer science, statistics, chemistry, and physics), and (3) biological and medical sciences.

Proficiency in the computer sciences and experimental statistics is substituted for the foreign language requirement.

The Comprehensive Examination consists of satisfactory completion of a detailed prospectus of proposed dissertation research and an oral examination. (Exam II).

Sufficient copies of the approved thesis or dissertation must be provided to satisfy the requirements of both UT Arlington and UT Southwestern.

For additional information, applicants and students should contact the Graduate Advisor for a copy of the "Information Brochure" for related and amplified information about the graduate program.

**The grade of R (research in progress) is a permanent grade. An incomplete (the grade of X) cannot be given in a course which is graded R. To receive credit for an R-graded course the student must continue to enroll in the course until a passing grade is received. Three-hour thesis and three- and six-hour dissertation courses are graded R/F only. The grade of P (required for graduation) can be received in six- or nine-hour thesis courses and nine-hour dissertation courses only. In the course listings below, R-graded courses are designated either "Graded P/F/R" or "Graded R." (See also the section entitled "R" GRADE on p. 36 of this catalog.)**

## BIOMEDICAL ENGINEERING

**5100, 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. Topics may include: physiological systems analysis; bioinstrumentation (5381D); soft tissue biomechanics; micro-processor-based medical instrumentation. Prerequisite: permission of the instructor.

**5101, 5201. 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. **\$5 computer fee.**

**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/R only. Required of all non-thesis MS students in the semester when they plan to graduate.

**5320. CLINICAL ENGINEERING (3-0).** Electrical, mechanical, nuclear, radiological, and environmental hazards and safety programs in hospitals; hospital codes, standards, and regulations; setup and operation of clinical engineering programs in large, medium, and small sized hospitals; study of shared service programs.

**5335. BIOLOGICAL MATERIALS, MECHANICS AND PROCESSES (3-0).** Typical functional behavior of various biological materials, flow properties of blood, bioviscoelastic fluids and solids, mass transfer in biological systems. Prerequisites: BME 5385D, ME 3313, or permission of the instructor.

**5340. ORTHOPEDIC BIOMECHANICS (3-0).** Mechanical and structural properties of bone, cartilage, and ligaments; kinematics of joints; properties of implant materials; design of fracture fixation systems, joint prostheses, and artificial ligaments.

**5345. CLINICAL INSTRUMENTATION AND MEASUREMENTS (3-0).** Measurement of physiological variables and historical developments of instrumentation. Topics include: electrode applications, cardiac and pulmonary instrumentation, surgical and intensive care monitoring, computer applications in medicine, evaluation of neurological function, X-rays and nuclear medicine, and electric safety. Prerequisites: BME 5385D, BME 5381D, or permission of the instructor.

**5382. LABORATORY PRINCIPLES (0-9).** Introduction to fundamental biomedical engineering laboratory procedures including human studies and animal surgery; will include clinical laboratory projects; data collection, analysis, and interpretation emphasized. Prerequisite: permission of the instructor.

**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. Graded P/F/R. Prerequisite: permission of the instructor. **\$10 computer fee. \$5 lab fee.**

**5398, 5698, 5998. THESIS.** 5398 graded R/F only; 5698 and 5998 graded P/F/R. Prerequisite: graduate standing in biomedical engineering.

**6194. DOCTORAL DIAGNOSTIC EXAMINATION (1-0).** Individual instruction, directed study, consultation, and diagnostic examination. Graded P/F/R only. Required of all doctoral students in the semester when they take the comprehensive examination.(Exam I).

**6195. DOCTORAL COMPREHENSIVE EXAMINATION (1-0).** Individual instruction, directed study, consultation, and comprehensive examination. Graded P/F/R only. Required of all doctoral students in the semester when they take the comprehensive examination.(Exam II).

**6197, 6297, 6397, 6697, 6997. RESEARCH IN BIOMEDICAL ENGINEERING.** Individually approved research projects leading to a doctoral dissertation in the area of biomedical engineering. Graded P/F/R. **\$5 computer fee.**

**6390, 6690, 6990. HOSPITAL INTERNSHIP FOR BIOMEDICAL ENGINEERS.** Each student interns at local hospitals under the individual supervision of the course instructor and staff physicians. During the semester, the student rotates through areas such as cardiac, pulmonary, prosthetic, and neuro surgery, anesthesiology, radiology, catheterization, and emergency care. Graded P/F/R. 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. 6399 and 6699 graded R/F only; 6999 graded P/F/R. Prerequisite: admission to candidacy for the PhD in Biomedical Engineering. **\$10 computer fee.**

## **BUSINESS ADMINISTRATION**

Courses offered at  
The University of Texas  
Southwestern Medical Center at Dallas (UT Southwestern)

BME 5381D.	Biomedical Instrumentation (5300 at UT Arlington)
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 5396D.	Individual Laboratory Projects
BME 5360D.	Design and Application of Artificial Organs
BME 5361D.	Biomaterials and Blood Compatibility
BME 5362D.	Thermoregulation and Bio-Heat Transfer
BME 5363D.	Digital Processing of Medical Images
BME 5607.	Introduction to Human Anatomy
HCS 4207.	Introduction to Human Neuroanatomy
HCS 4209.	Human Anatomy Laboratory
HCS 4408.	Human Anatomy Lectures

## **BUSINESS ADMINISTRATION Program**

### *Areas of Study*

Business Administration  
Administration (See interdepartmental and  
Inter-campus Programs.)

### *Degrees*

M.B.A.

Ph.D.

*Master's Degree Plan:* Thesis and Non-Thesis

*Graduate Advisor:* Sumit Sircar

434 Business 273-3004

### *Graduate Faculty:*

Professors Apilado, Carney, Courtney, Dickinson, Dunn, French, Furubotn, Garland, Gates, T. Hall, Hayashi, Holland, McDaniel, McInish, Mullendore, Nelson, Quick, Raja, Ross, Schkade, Snavely, L. Solomon, Swanson, Trapani, Wofford, Ziegler

Associate Professors Baker, Brobst, Eakin, Gerloff, Gray, Harris, Hopkins, Isakson, Jarboe, Mark McCall, McConnell, Pinney, Price, Rosenstein, Sircar, Slinkman, Tsay, Walther, Wheeler, Whiteside, Witt

Assistant Professors Bhasin, Bodensteiner, Dodson, Giacobbe, Guynes, B. Hall, Hawks, Himarios, Lockwood, Mykytyn, Shackett

## **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.



## **ACCREDITATION**

The Master of Business Administration program is accredited by the American Assembly of Collegiate Schools of Business.

## **DEGREE REQUIREMENTS**

Admission to the Master of Business Administration program is based upon the completion of the general admission requirements of the Graduate School. For admission to the Business Administration program a satisfactory score on the Graduate Management Admission Test is required. There is no foreign language requirement for the MBA program.

Many people in business seek to enhance their career opportunities by broadening their knowledge and understanding of the overall management field. Since it is impossible for them to leave their responsibilities and return to academic work on a full-time basis, the College of Business Administration offers a complete program in the evening as a service to the community. Evening classes are taught by full-time faculty members and the same academic standards required of full-time students are maintained. It is expected that the student will progress through the program at a pace that is commensurate with the time available.

The program has been designed to accommodate students of widely divergent backgrounds. It is not necessary to have completed prior academic work in business administration. Foundation courses have been designed to prepare the student for advanced course work. These graduate courses are an integral part of the MBA program.

## **Grade and Graduation Requirements**

The MBA program follows the grade requirements for probation as specified on page 37. In addition, to graduate, students must have at least a 3.0 grade point average in all course work and area of concentration. Students will be dismissed from the MBA program if they accumulate grade deficiency points greater than allowed. Any grade of C is worth one deficiency point, any grade of D is worth two deficiency points and any grade of F is worth three deficiency points. Deficiency points may not be removed from a student's record by additional course work.

The maximum allowable deficiency points will be computed by the advisor when the degree plan is prepared or adjusted using the following guidelines:

<b>Program Length*</b>	<b>Allowable Deficiency Points</b>
12 courses	2
13-17 courses	3
18 courses or more	4

\*Note: applies only to UT Arlington coursework

## **THESIS DEGREE PLAN**

Requirements for the thesis degree plan are the same as the requirements listed below for the non-thesis degree plan with the following change. A six hour thesis can be added to the MBA program. The six hours would be beyond the 36 advanced hours required for the MBA degree. All candidates for the degree shall defend the thesis at a final oral examination.

## **NON-THESIS DEGREE PLAN: Background Category I**

Students who have had no prior academic work in business will enter the program of work listed for Semester I and continue sequentially through both the Foundation Program and the Advanced MBA Program. Students with a mathematics deficiency will be required to complete BUSA 5302.

## **NON-THESIS DEGREE PLAN: Background Category II**

Students with varying amounts of academic work in business may have the requirement waived for those equivalent Foundation Program courses completed within the last eight years at institutions accredited by the American Assembly of Collegiate Schools of Business.

## **BUSINESS ADMINISTRATION**

### **Foundation Program**

Credit for these courses will not be given in the Advanced MBA Program.

#### **Semester I**

Accounting Analysis I (ACCT 5301)  
Economic Analysis I (ECON 5309)  
Statistics (BUSA 5301)  
Decision Models and Information  
Systems (MASI 5311)  
Behavioral Science in Management  
(MANA 5311)

#### **Semester II**

Accounting Analysis II (ACCT 5302)  
Economic Analysis II (ECON 5311)  
Marketing (MARK 5311)  
Finance (FINA 5311)  
Management (MANA 5312)

With approval of the Graduate Advisor, a student may enroll in advanced courses when schedule conflicts prevent completion of all the foundation courses. A student may not apply to the MBA degree more than nine semester hours of advanced work completed prior to the completion of all foundation courses.

### **Advanced MBA Program**

The Advanced MBA Program normally consists of 36 hours of course work to be selected by the student and approved by the Graduate Advisor. However, the choice of accounting as the area of concentration will require the student to complete 39 or more hours of advanced course work. In those cases where it is necessary for the student to take nine or all of the Foundation Program courses listed above the student will be allowed to waive one or two non-concentration electives respectively.

#### **Required MBA Courses**

The following advanced MBA courses are required of all students—BUSA 5325; 5333; 5391; and either 5330 or 5337. BUSA 5325 is required of all students except those students with six hours of statistics who must take an approved advanced quantitative course.

#### **Concentration Areas**

A concentration of not more than 12 semester hours may be taken in one of the following curriculum areas: economics, finance, information systems (see Department of Information Systems and Management Sciences courses), management, management science (see Department of Information Systems and Management Sciences), marketing, and real estate (see Department of Finance and Real Estate courses). A student who wishes to take a program of courses in a wider range may choose not to take a concentration.

A concentration in accounting requires a minimum of 15 semester hours of advanced graduate accounting courses and a minimum of 39 semester hours of advanced work. The student selecting a concentration in accounting must have previously studied or include in his or her program courses covering the following areas of accounting: financial accounting and accounting theory, management information and computer systems, financial and operational auditing, and taxation.

Students who elect a concentration in information Systems are advised to take six semester hours from ACCT 5322, 5323, 5324, or 5329 and may select up to six hours of graduate electives in computer science or management science, subject to the approval of the MBA graduate advisor.

#### **Elective Areas**

An MBA student may take elective courses in any of the curriculum areas of the MBA Program. He or she may take no more than six semester hours in advanced courses in an area other than the concentration field. Any course beyond the foundation courses may be completed for advanced elective credit.

**Options**

In addition to the traditional MBA program three options are available to emphasize specific career objectives. Selection of an option does not change the required MBA courses listed above.

**International Option:** For the graduate student wishing to emphasize international business administration, a summary of the elective international business courses follows the list of marketing courses.

**Public-Institutional Management Option:** The MBA Public-Institutional option is designed around the basic disciplines and analytical techniques applicable to the management of organizations, whether business, governmental, or nonprofit. The choice of electives will emphasize public administration rather than business administration, for the student interested in management of local, state, or federal governmental organizations or nonprofit organizations. The flexible curriculum permits the MBA student to select a limited number of electives from outside the College of Business Administration. Students wishing to pursue this option should consult the Graduate Advisor for complete details.

**MBA Cooperative Education Program**

A non-credit MBA Cooperative Education Program exists for the convenience of employers and students. In the Parallel Program, students study full-time and work part-time. The work load is similar to that undertaken by other working full-time students. In the Alternating Coop Program, students study full-time one semester and work full-time the next semester. After successfully completing a coop agreement with a particular employer and upon receipt of notification by the employer of a satisfactory Student/ Employer evaluation, a Coop Certificate will be awarded by the College of Business Administration to the student.

Benefits of the Coop Program over ordinary employment are derived by the employer supplementing and complementing classroom education by providing valuable experience and training in their chosen area of expertise.

Additional information on program requirements is available in the Graduate Studies Office.

**COURSE LISTING**

**ACCOUNTING (ACCT)** *See Department of Accounting for course descriptions.*

**5301. ACCOUNTING ANALYSIS I**—Foundation Course

**5302. ACCOUNTING ANALYSIS II**—Foundation Course

Advanced Elective Credit may be received from the following courses:

**5303. SOFTWARE TOOLS FOR ACCOUNTANTS**

**5310. INTRODUCTION TO BUSINESS TAXATION**

**5311. FINANCIAL ACCOUNTING I**

**5312. FINANCIAL ACCOUNTING II**

**5314. STUDY OF FEDERAL INCOME TAX LAW RELATIVE TO INDIVIDUALS**

**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. SURVEY OF ACCOUNTING SYSTEMS**

## **BUSINESS ADMINISTRATION**

- 5330. INTERNATIONAL ACCOUNTING AND FINANCIAL REPORTING
- 5335. DESIGN OF ACCOUNTING SYSTEMS
- 5336. SELECTED TOPICS IN ACCOUNTING SYSTEMS
- 5339. TAX PLANNING AND RESEARCH
- 5340. STUDY OF FEDERAL INCOME TAX FOR ENTITIES OTHER THAN INDIVIDUALS
- 5341. TAX PROBLEMS OF PARTNERSHIPS AND PARTNERS
- 5342. TAX PROBLEMS OF CORPORATE REORGANIZATIONS
- 5343. TAX PROBLEMS OF TRANSACTIONS IN REAL ESTATE
- 5344. TAX PROBLEMS OF THE EXTRACTIVE INDUSTRIES
- 5345. CONTEMPORARY ISSUES IN FEDERAL TAXATION
- 5346. SEMINAR IN TAXATION
- 5347. FEDERAL TAXATION OF GIFTS AND ESTATES
- 5348. ADVANCED TAX PLANNING
- 5352. AUDIT AND CONTROL OF EDP SYSTEMS
- 5353. STATISTICAL AUDITING
- 5362. SEC ACCOUNTING
- 5363. FINANCIAL ACCOUNTING PROBLEMS
- 5392. SELECTED TOPICS IN ACCOUNTING

## **BUSINESS ADMINISTRATION (BUSA)**

The grade of R (research in progress) is a permanent grade. An Incomplete (the grade of X) cannot be given in a course which is graded R. To receive credit for an R-graded course the student must continue to enroll in the course until a passing grade is received. Three-hour thesis and three- and six-hour dissertation courses are graded R/F only. The grade of P (required for graduation) can be received in six- or nine-hour thesis courses and nine-hour dissertation courses only. In the course listings below, R-graded courses are designated either "Graded P/F/R" or "Graded R." (See also the section entitled "R" GRADE on p. 36 of this catalog.)

- 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. \$5 computer fee.
- 5302. **MATHEMATICS FOR MANAGEMENT SCIENCES (3-0).** Study of the quantitative techniques of use in the functional courses and operations research including matrix algebra, linear systems, differential and integral calculus, and differential equations. May not be counted as an MBA Foundation Program course or elective.
- 5325. **ADVANCED STATISTICAL METHODS IN BUSINESS ADMINISTRATION (3-0).** Advanced topics in regression, correlation, experimental design, sampling methods, and other statistical methods with emphasis on their application to problems in the administration of operations. Prerequisite: BUSA 5301 or equivalent. \$15 computer fee.
- 5330. **LEGAL ENVIRONMENT OF BUSINESS (3-0).** Study, in a conceptual framework, of the ideas and social and political forces that have led to changes in the business legal environment and legal institutions including current and historical developments affecting the business corporation. Legal framework and ethical problems of managers in serving diverse interests studied in connection with modern social legislation affecting business.
- 5331. **LAW OF INTERNATIONAL BUSINESS (3-0).** General principles of law applicable to international business including case law, statutory law, treaties, administrative law, and international agreements.
- 5332. **ENTREPRENEURSHIP AND ENTERPRISE DEVELOPMENT (3-0).** Venture formation and development process. Student-chosen entrepreneurial activities are planned including the preparation of a business plan for a proposed enterprise and, to the extent possible, execution of the business plan. Additional course activities will include guest speakers, "live" cases, entrepreneurial simulation and testing and selective 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.

## BUSINESS ADMINISTRATION

- 5334. REAL PROPERTY LAW (3-0).** Legal property theory underlying real estate transactions and relationships including estates and interests in land, conveyances, and mortgages.
- 5337. BUSINESS AND SOCIETY (3-0).** Examination of the organizations of industry and commerce, government, labor, and other institutions within our society. Emphasis is on the total environment, and the social/political/legal/ethical implications of the interface.
- 5391. RESEARCH COLLOQUIUM. (3-0).** An introduction to research methodology. Topics include: nature of scientific inquiry, sampling, experimental and quasi-experimental design, and data analysis. A research proposal is required. Prerequisite: BUSA 5325 or equivalent.
- 5398, 5698. THESIS.** 5398 graded R/F only; 5698 graded P/F/R. Prerequisites: BUSA 5325, 5391 and approval of Graduate Advisor.

## ECONOMICS (ECON) *See Department of Economics for course descriptions.*

**5309. ECONOMIC ANALYSIS I—Foundation course**

**5311. ECONOMIC ANALYSIS II—Foundation course**

Advanced elective credit may be received by the following courses:

- 5304. ADVANCED PUBLIC FINANCE**
- 5310. MICROECONOMIC THEORY**
- 5312. MACROECONOMIC THEORY**
- 5313. MANAGERIAL ECONOMICS**
- 5314. INDUSTRIAL ORGANIZATION**
- 5316. MATHEMATICAL ECONOMICS I**
- 5317. MATHEMATICAL ECONOMICS II**
- 5318. ECONOMICS OF ENERGY**
- 5321. INTERNATIONAL ECONOMICS**
- 5324. MONETARY AND FISCAL ECONOMICS**
- 5326. HISTORY OF ECONOMIC THOUGHT**
- 5327. INTERNATIONAL FINANCE**
- 5328. INSTITUTIONAL ORGANIZATION AND ECONOMIC BEHAVIOR**
- 5329. RESEARCH METHODS OF APPLIED ECONOMICS**
- 5330. ADVANCED LABOR ECONOMICS**
- 5331. URBAN ECONOMICS**
- 5332. TRANSPORTATION ADMINISTRATION**
- 5333. ECONOMICS OF HEALTH**
- 5335. GOVERNMENT REGULATION OF BUSINESS**
- 5336. ECONOMETRICS I**
- 5337. BUSINESS AND ECONOMIC FORECASTING**
- 5338. SEMINAR**
- 5340. ADVANCED MANPOWER ECONOMICS**
- 5391. RESEARCH AND SPECIAL TOPICS IN ECONOMICS**

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

- 5311. BUSINESS FINANCIAL MANAGEMENT—Foundation Course**
- 5322. ADVANCED BUSINESS FINANCIAL PROBLEMS**
- 5323. INVESTMENT MANAGEMENT PROBLEMS**
- 5324. SEMINAR IN FINANCIAL THEORIES**
- 5325. MANAGEMENT OF FINANCIAL INSTITUTIONS**
- 5326. COMMERCIAL BANKING**
- 5327. RISK MANAGEMENT AND SPECULATIVE MARKETS**
- 5328. SEMINAR IN PORTFOLIO THEORY**
- 5329. SEMINAR IN SECURITY ANALYSIS**
- 5330. SEMINAR IN CAPITAL BUDGETING**
- 5331. MULTINATIONAL FINANCIAL MANAGEMENT**
- 5332. SEMINAR IN INTERNATIONAL FINANCIAL MARKETS**
- 5333. ADVANCED FINANCIAL ANALYSIS**

## **BUSINESS ADMINISTRATION**

- 5334. SÉMINAR IN FINANCIAL INSTITUTIONS AND MARKETS
- 5182, 5282, 5382. INDEPENDENT STUDIES IN FINANCE
- 5392. SELECTED TOPICS IN FINANCE

## **INFORMATION SYSTEMS (INSY)** *See Department of Information Systems and Management Sciences for course descriptions.*

- 5330. INTRODUCTION TO INFORMATION SYSTEMS
- 5335. APPLIED DATA BASE MANAGEMENT
- 5341. INFORMATION SYSTEMS ANALYSIS
- 5342. INFORMATION SYSTEMS DESIGN
- 5343. DISTRIBUTED INFORMATION SYSTEMS AND DATA COMMUNICATIONS
- 5345. MANAGEMENT OF INFORMATION SYSTEMS
- 5182, 5282, 5382. INDEPENDENT STUDIES IN INFORMATION SYSTEMS
- 5192, 5292, 5392. SELECTED TOPICS IN INFORMATION SYSTEMS.

## **MANAGEMENT (MANA)** *See Department of Management for course descriptions.*

- 5311. BEHAVIORAL SCIENCES IN MANAGEMENT
- 5312. MANAGEMENT
- 5320. ORGANIZATIONAL BEHAVIOR
- 5321. COMPLEX ORGANIZATIONS
- 5322. COMPENSATION ADMINISTRATION
- 5324. GROUP AND INTERGROUP RELATIONSHIPS
- 5325. INDUSTRIAL RELATIONS
- 5326. ORGANIZATIONAL DEVELOPMENT AND CHANGE
- 5327. EMPLOYEE RELATIONS LAW
- 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
- 5341. EMPLOYEE STAFFING AND PERFORMANCE APPRAISAL
- 5342. PREVENTIVE STRESS MANAGEMENT
- 5182, 5282, 5382. INDEPENDENT STUDIES IN MANAGEMENT
- 5192, 5292, 5392. SELECTED TOPICS IN MANAGEMENT

## **MANAGEMENT SCIENCE (MAS)** *See Department of Information Systems and Management Sciences for course descriptions.*

- 5311. DECISION MODELS AND INFORMATION SYSTEMS
- 5321. INTRODUCTION TO MANAGEMENT SCIENCES
- 5323. APPLIED DECISION THEORY
- 5324. APPLICATIONS OF COMPUTER MODELS IN MANAGEMENT SCIENCES
- 5326. SIMULATION AND BUSINESS MODELS
- 5327. APPLIED MATHEMATICAL PROGRAMMING
- 5330. NONPARAMETRIC STATISTICS
- 5182, 5282, 5382. INDEPENDENT STUDIES IN MANAGEMENT SCIENCE
- 5392. SELECTED TOPICS IN MANAGEMENT SCIENCE

## **MARKETING (MARK)** *See Department of Marketing for course descriptions.*

- 5311. MARKETING
- 5320. BUYER BEHAVIOR
- 5324. SEMINAR: CONTEMPORARY MARKETING PROBLEMS
- 5325. PHYSICAL DISTRIBUTION MANAGEMENT
- 5326. ADVERTISING AND NONPERSONAL COMMUNICATIONS

## **BUSINESS ADMINISTRATION**

- 5327. RESEARCH FOR MARKETING DECISIONS
- 5328. PRODUCT MANAGEMENT
- 5329. SALES, SALES MANAGEMENT
- 5331. INTERNATIONAL MARKETING
- 5332. INDUSTRIAL MARKETING
- 5335. RETAIL MARKETING MANAGEMENT
- 5336. ADVANCED RESEARCH ANALYSIS
- 5340. MARKETING STRATEGY
- 5182. INDEPENDENT STUDIES IN MARKETING
- 5192. SELECTED TOPICS IN MARKETING

**REAL ESTATE (REAE)** *See Department of Finance and Real Estate for course descriptions.*

- 5311. REAL ESTATE DECISION MAKING
- 5321. REAL ESTATE INVESTMENT
- 5331. INTERNATIONAL REAL ESTATE
- 5334. ADVANCED REAL ESTATE EVALUATION
- 5335. ADVANCED REAL ESTATE FINANCE
- 5336. SEMINAR IN REAL ESTATE SECURITIES

### **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 topics for BUSA 5391, preferably conducting an area study (Latin American, Asian, European, etc.) of some type. Students should also recognize the importance of those graduate courses in political science, history, and foreign languages, which would embellish graduate study in international business administration.

- ACCT. 5330. INTERNATIONAL ACCOUNTING AND FINANCIAL REPORTING.
- BUSA 5331. LAW OF INTERNATIONAL BUSINESS
- ECON 5321. INTERNATIONAL ECONOMICS
- ECON 5327. INTERNATIONAL FINANCE
- FINA 5331. MULTINATIONAL FINANCIAL MANAGEMENT
- FINA 5332. SEMINAR IN INTERNATIONAL FINANCIAL MARKETS
- MANA 5331. MANAGEMENT OF INTERNATIONAL OPERATIONS
- MARK 5331. INTERNATIONAL MARKETING
- REAE 5331. INTERNATIONAL REAL ESTATE

## **CITY AND REGIONAL PLANNING**

# **CITY AND REGIONAL PLANNING PROGRAM (CIRP)**

### *Area of Study*

City and Regional Planning

### *Degree*

M.C.R.P.

*Master's Degree Plans:* Thesis and Thesis Substitute

*Graduate Advisor and Program Coordinator:* Ard Anjomani

513 University Hall 273-2067

Professors Cornehlis, Geisel

Associate Professors Anderson, Anjomani, Goldsteen

Assistant Professors Barreto, Wegner

### *Interdisciplinary Graduate Faculty:*

Professors Cole, Taebel

Associate Professor Wyman

And graduate faculty representatives from Architecture, Sociology,

Civil Engineering, Finance and Real Estate, Economics and Geology.

## **OBJECTIVE**

The Master of City and Regional Planning (MCRP) is an American Planning Association accredited program. The objective of the program is to educate and train competent professionals qualified for a role in guiding the development and growth of the city and region through public agencies or the private sector, including consulting, land development and real estate firms. After graduation and work experience, The University of Texas at Arlington Planning Program graduates are qualified to become key members of public agencies and private firms.

As a structured degree program, graduate students study the scope, issues and interdisciplinary relationships in city and regional planning with an emphasis in one of the following three areas: 1) Land Development Planning; 2) Economic Development Planning; 3) Urban Analysis and Regional Planning. Academically, the program equips the student with knowledge of problem-solving techniques, practical skills, and understanding of the dynamics of change, implementation methods, design controls, and the capability to evaluate implications of alternative solutions. Courses are structured to provide students with a planning education comprised of theory, method, skills, concepts, experience, practice and field orientation to the profession of planning in a number of specific planning fields and subject areas.

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, curriculum for the area of emphasis permits variation in the general structure of each degree program. Specialization in planning is obtained through specific subject areas and 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 Institute of Urban Studies. Research activities and centers with the Institute and University are equipped to investigate planning problems and planning opportunities with staff recruited from the faculty and student body. The centers are: Center for Comparative Urban Studies; Center for Criminal Justice Research and Training; Environmental Research and Design Center; Center for Social Research; and Construction Research Center. These centers were established to permit the student a work and study atmosphere where professional responsibilities in group participation can be experienced.



### DEGREE REQUIREMENTS

A 48 credit hour program is composed of:

- 21 — hours of planning core courses
- 15 — hours of area of emphasis and subject area courses
- 12 — hours of electives and the required hours for thesis or thesis substitute (professional report or final exam) which will include 6 hours for thesis or a maximum of 3 hours for professional report
  - practicum, or work experience

(The Practicum, as a working experience in an agency, center, research group or office, must be approved by the Graduate Advisor.)

**Unique Planning Emphasis and Specialization:** The MCRP Program allows for students with specific interests in areas of academic emphasis to submit their intention to the Planning Faculty Committee. While the required program of courses are established, graduate students entering the program may further specialize. Formal application to the Planning Faculty Committee should be made for area of emphasis and subject interest specialization.

**Emphasis of Program:** Substantive knowledge in planning combined with areas of emphasis, specialization, and technical and analytical focus are the bases for providing a new professional capable of innovation in guiding dynamic environment. Analytical research methods, empirical research skills and computer applications are emphases of our professional education in planning at The University of Texas at Arlington.

**Methods and Analytical Orientation:** It is our understanding that substantive planning coursework and experience, areas of emphasis, and specialization along with a methods and analytical emphasis will provide those skills necessary to guide and control the future city, region and nation.

#### Planning Core Courses

These course are **required** for all students:

- CIRP 5301 Planning Theory
- CIRP 5310 Economic Methods, Models and Simulation
- CIRP 5314 Advanced Studies in Planning Communication Skills
- CIRP 5317 Research and Forecasting Methods in City and Regional Planning
- CIRP 5318 Techniques of Planning Analysis

And two courses (one in a specialization) from CIRP 5330, CIRP 5331, CIRP 5332, and CIRP 5333

The MCRP Program permits three major areas of emphasis: Land Development Planning, Economic Development Planning, and Urban Analysis and Regional Planning. Each area of emphasis includes a number of subject areas. The subject areas, or specializations, within the three areas of emphasis allow students to develop a study plan tailored to individual interests within the broader field and profession of City and Regional Planning. Other areas of emphasis are encouraged with approval of the Graduate Advisor. This includes a generalized plan of study with no emphasis.

The Land Development Planning emphasis is focused on the planning and development of land and structures in urban areas of the United States. Specific subject areas within this emphasis are concerned with land-use planning, urban design, real estate and land development, growth management and environmental management and planning. Two physical planning courses (5304 and 5305) will be required of all students who select this area of emphasis. The student in consultation with the graduate advisor will select three additional courses for this emphasis from the following list: 5302, 5306, 5309, 5313, 5315, 5316, 5332, 5333, 5345, 5352, 5358.

The Economic Development Planning emphasis is devoted to the field of public agency planning in a number of areas. Subject areas included in this area of emphasis are: social policy, economic development, housing and community development, and transportation. Two courses (5316 and 5322) will be required of all students who select this area of emphasis. These two courses are in addition to the required planning core, the practicum, and the thesis or thesis substitute. The student in consultation with the graduate advisor will select three additional courses for this emphasis from the following list: 5302, 5305, 5306, 5307, 5313, 5315, 5319, 5332, 5333, 5341, 5345, 5352, 5353, 5354.

The Urban Analysis and Regional Planning emphasis is oriented toward information man-

## CITY AND REGIONAL PLANNING

agement and utilization of computers in all aspects of planning. This prepares interested students for data management, urban modeling, economic analysis and other quantitative careers in planning. Subject areas include: regional planning, regional science, transportation and land use modeling, computer application in planning, and international planning and regional development. Two courses (5320 and 5352) will be required of all students who select this area of emphasis. These two courses are in addition to the required planning core, the practicum, and the thesis or thesis substitute. The student in consultation with the graduate advisor will select three additional courses for this emphasis from the following list: 5303, 5309, 5315, 5321, 5322, 5332, 5333, 5342, 5361.

A study plan (listed with subject area classification) must be submitted to the Graduate Advisor. The study plan will be the student's degree plan and be placed in the student file.

## 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. 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 Path A in the architecture program unless they have earned an undergraduate degree in architecture which will allow CIRP applicants to take Path B. Programs of study will follow both master's programs, with all of the unspecified elective courses in the MArch program to be taken in the MCRP program. In addition to architectural core courses, the remainder of coursework will be in the City and Regional Planning program with a required thesis proposal to be jointly approved by the City and Regional Planning program and the Architecture Program. The thesis supervisor should be selected from CIRP or SAED, and committee members could be selected from both faculties.

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.

**The grade of R (research in progress) is a permanent grade. An incomplete (the grade of X) cannot be given in a course which is graded R. To receive credit for an R-graded course the student must continue to enroll in the course until a passing grade is received. Three-hour thesis and three- and six-hour dissertation courses are graded R/F only. The grade of P (required for graduation) can be received in six- or nine-hour thesis courses and nine-hour dissertation courses only. In the course listings below, R-graded courses are designated either "Graded P/F/R" or "Grade R." (See also the section entitled "R" GRADE on p. 36 of this catalog.)**

**5193. MASTER'S COMPREHENSIVE EXAMINATION (1-0).** Directed study, consultation and comprehensive examination over course work leading to thesis substitute for MCRP degree. Required of all thesis substitute students *not* enrolled in other courses during semester in which they plan to graduate. Graded P/F/R only.

**5301. PLANNING THEORY (3-0).** Various theories of planning. Planning as: an individual phenomenon (individual rationality, decision theory), an organizational phenomenon (the planning process, organization theory, communications theory), a social phenomenon (utopias, ideologies and systems, social planning and social reform, general systems theory), local planning in the United States (politics and policies, professional planning).

**5302. HOUSING POLICIES, PROGRAMS AND HISTORY (3-0).** Current housing programs and related policies in relation to housing history. Includes governmental and private sector and emphases and programs.

**5303. HISTORY AND CASE STUDIES IN PLANNING (3-0).** A review of planning history and selected techniques through the use of the case study approach.

**5304. PLAN IMPLEMENTATION AND LEGAL CONTROLS (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.

## CITY AND REGIONAL PLANNING

- 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.
- 5307. PLANNING FOR DEVELOPING COUNTRIES (3-0).** History, theories, methods, and process of development planning introduced on a regional and national scale; comparative international planning is the focus and case studies are analyzed for their specific planning achievement.
- 5309. TRANSPORTATION/LAND USE METHODS, MODELS, AND SIMULATION (3-0).** Overview of transportation/land use with specific transportation models and simulation methods; topics include economic theory of travel demand, land use models, UTPS framework for travel demand estimation, disaggregated travel demand models and abstract mode models.
- 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. Fiscal Impact Analysis and its application to development projects. **\$5 computer fee.**
- 5311. ELEMENTS OF URBAN DESIGN (3-0).** A study of contemporary city and urban form will emphasize visual-spatial qualities, social need, and economic linkages. Environmental design will be analyzed including street furniture, residential and commercial development, institutional development, and urban structure. Studies will include systematic processes, methods, and techniques appropriate to solving contemporary urban design problems.
- 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. Also offered as URBA 5314; credit will be granted only once.
- 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).** Context and role of data and analysis in planning; use of computer in planning; use of descriptive and inferential statistical-techniques in planning; topics include Probability and Sampling theory, hypothesis testing, table analysis, analysis of variance, bivariate and multivariate regression analysis. Emphasis on applying these techniques to real world planning problems. **\$10 computer fee.**
- 5318. TECHNIQUES OF PLANNING ANALYSIS (3-0).** Various methods form the bases for non-quantitative exercises in Regional Planning. Includes population projection, project evaluation, land use and transportation models, economic base analysis, input-output, shift, and share. Prerequisite: consent of instructor. **\$10 computer fee.**
- 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. **\$10 computer fee.**
- 5321. COMPUTER GRAPHICS AND MAPPING FOR URBAN ANALYSIS (3-0).** This laboratory course provides an introduction to the techniques and applications of computer graphics and mapping for presenting socio-economic information in graphic and spatial form. Included are bar and pie charts and methods of producing maps of social data through utilization of computer packages such as SYMAP and SASGRAPH. **\$10 computer fee.**
- 5322. URBAN AND REGIONAL ECONOMIC DEVELOPMENT (3-0).** Seminar in subnational economic development programs in the U.S. These programs and their criticisms examined in depth with emphasis on a search for viable solutions via focus on national concerns and individual case studies. Prerequisite: Regional or Urban Economics.
- 5330. PROJECT PLANNING (0-9).** Skills, practical experience, problem-solving methods and techniques in mapping, design, planning, and research projects. Studio and seminar for field studies in the practical application of city and regional planning. **\$5 lab fee.**

## **CITY AND REGIONAL PLANNING**

- 5331. PROJECT PLANNING (0-9).** Skills, practical experience, problem-solving methods and techniques in mapping, design, planning, and research projects. Studio and seminar for field studies in the practical application of city and regional planning. **\$5 lab fee.**
- 5332. PROJECT PLANNING (0-9).** Skills, practical experience, problem-solving methods and techniques in mapping, design, planning, and research projects. Studio and seminar for field studies in the practical application of city and regional planning. **\$5 lab fee.**
- 5333. PROJECT PLANNING (0-9).** Skills, practical experience, problem-solving methods and techniques in mapping, design, planning, and research projects. Studio and seminar for field studies in the practical application of city and regional planning. **\$5 lab fee.**
- 5345. PLANNING AND REAL ESTATE DEVELOPMENT (3-0).** The goals, strategies, methods, and achievements of major participants in the urban land and building markets are examined. Land owners, speculators, real estate brokers, developers, bankers, lawyers, non-profit builders, and government agencies are studied, and some selected business tools include: market and feasibility analysis, appraisal techniques, proforma analysis, and others.
- 5352. ADVANCED TECHNIQUES OF PLANNING ANALYSIS (3-0).** An introduction to selected advanced techniques of planning analysis. Subjects include land use and transportation models, advance regression analysis using simultaneous-equation models, multivariate logit analysis and projection techniques.
- 5353. HOUSING IMPACT ANALYSIS (3-0).** Planning for housing is emphasized, with study of methods for assessing the fiscal impact of private real estate development on the municipal fisc.
- 5354. HOUSING FINANCE AND PLANNING (3-0).** Intensive studies of housing policy and programs at the local, state, and federal levels are linked to housing finance. Topics will be selected from mortgage structuring, operations of financial intermediaries, forms of ownership, federal subsidy programs, tax subsidies, etc.
- 5358. NATURAL RESOURCES PLANNING (3-0).** Issues and problems in environmental planning are analyzed with an emphasis on pollution control, comparisons of management options related to equity, cost, and ease of administration. Studies include the preparation of environmental impact statements, general methodologies, and limitations.
- 5359. WATER RESOURCES PLANNING (3-0).** Water resources planning and management are examined. Federal and state water resources policies are emphasized and analytical skills are taught on how to identify environmental programs and resource distribution.
- 5360. SURVEY SAMPLING METHODS AND PROPOSAL WRITING FOR THE PLANNING PROFESSIONAL (3-0).** Survey design is reviewed including the formulation of research questions and hypotheses in relation to planning. Refining the survey instrument, questionnaire writing, sample size, and planning the analysis.
- 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. Graded P/F/R.
- 5191, 5291, 5391. CONFERENCE COURSE.** Special subjects and issues as arranged with individual students and faculty members. May be repeated for credit. Graded P/F/R.
- 5195-5695. SPECIAL TOPICS IN PLANNING.** Selected topics in City and Regional Planning. Maybe be repeated for credit.
- 5397. PROFESSIONAL REPORT.** Final report.
- 5398, 5698, 5998. PLANNING THESIS.** 5398 graded R/F only. 5698 and 5998 graded P/F/R.

# CRIMINAL JUSTICE Program (CRJU)

*Area of Study*

Criminal Justice

*Degree*

M.A.

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

*Program Director:* Ira Colby

530 University Hall 273-3519

*Graduate Advisor:* James W. Stevens

528 University Hall 273-3320

*Graduate Faculty:*

Professors (Political Science) Butcher, Hagard, Stevens; (Social Work) Mindel; (Urban Studies) Cole

Associate Professors (Sociology) Almore, Eve, Watkins, Weed; (Political Science) Clark, MacKenna; (Social Work) Wright; (Urban Studies) Wyman

Assistant Professor (Sociology) Greenstein

And others as appropriate from the graduate faculties of the departments of Sociology and Political Science, and of the Graduate School of Social Work and the institute of Urban Studies

## OBJECTIVES

The program leading to the MA degree in criminal justice is a multidisciplinary program which seeks to develop a broadly-educated professional with knowledge, skills, and perspectives appropriate for work in the criminal justice system and related areas. The program provides graduate level education in the foundations of the criminal justice field, in the tools of research and statistics, and in substantive areas of the student's choosing in order to develop specific skills necessary for careers in the criminal justice field.

## DEGREE REQUIREMENTS

The basic general admission and degree requirements are those of the Graduate School, as stated in this catalog. In addition, all students must complete a minimum of 36 semester credit hours which will include the following:

1. Foundation: CRJU 5301; SOCI 5324 or 5334; POLS 5355 or 5320; CRJU 5319 and CRJU 5332.
2. Research and Statistics: SOCI 5303 and 5304; SOCW 6322 and 6324 or URBA 5360 and 5362.
3. Electives: The Graduate Advisor will design with each student an individualized curriculum which will provide the student with either a broad research-based program appropriate to further graduate or professional education, or with a more narrow, professionally directed program appropriate to a terminal degree. For example, a student may select courses emphasizing public administration, management, corrections, counseling, infor-

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## **CRIMINAL JUSTICE**

mation systems, research and planning, law, or others with advice and approval of the Graduate Advisor.

For non-thesis students this group of courses will include a minimum of 12 hours. For thesis and thesis substitute (practicum) students, this group of courses will include a minimum of nine semester hours.

4. Thesis (CRJU 5398, 5698), or Internship (CRJU 5397, 5697), or (for non-thesis students) the Capstone Course (CRJU 5380).

**5301. THE ADMINISTRATION OF JUSTICE (3-0).** Analysis of administrative practices and procedures of criminal justice agencies. Emphasis placed on the administrative structure of various components of criminal justice process and functioning and interrelationships of these units within the total criminal justice system. Includes police administration. Students expected to select one area of administration for special study.

**5306. THE NATURE OF CRIME (3-0).** Examination of the changing perspectives regarding causes and control of crime and the criminal; major emphasis given to the theory of crime from an interdisciplinary frame of reference; consideration of the impact of ideology upon societal intervention systems.

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

**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.

**5329. CRIMINAL JUSTICE INFORMATION SYSTEMS (3-0).** Emphasizes current developments in the area of computerized criminal justice information systems. Systems at the national, state, regional, and local levels examined. Focuses on system design, purpose, utilization, file content and structure, and security and access limitations.

**5332. CORRECTIONAL THEORY AND PRACTICE (3-0).** Analysis of the theoretical basis for societal intervention in the control and disposition of offenders; contemporary responses, both intramural and extramural, are examined in the context of historical development, contemporary availability, and future needs planning.

**5341. COMMUNICATION, INTERVENTION STRATEGIES, AND INTERPERSONAL SKILLS (3-0).** Examination of basic principles of interpersonal communication with emphasis on developing skills in both crisis and long-term intervention by criminal justice personnel in corrections, law enforcement and the judiciary; exploration of current theories of counseling and their applications.

**5380. CRIMINAL JUSTICE SEMINAR (3-0).** Synthesis course required of all non-thesis students to focus the coursework on critical issues in criminal justice.

**5395. SPECIAL TOPICS IN CRIMINAL JUSTICE (3-0).** May be repeated for credit as the topic changes.

**5396. CONFERENCE COURSE IN CRIMINAL JUSTICE (3-0).** Reading and research in a specialized area of criminal justice under the direction of a member of the graduate faculty. Graded P/F/R.

**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. Graded P/F/R.

**5398, 5698. THESIS.** 5398 graded R/F only; 5698 graded P/F/R.

# ENGINEERING: INTERDISCIPLINARY Program (ENID)

*Area of Study*

Engineering: Interdisciplinary

*Degree*

Ph.D.

*Graduate Advisor:* Floyd Cash

204 Engineering 273-2571

*Graduate Faculty:* the graduate faculty of the College of Engineering

## OBJECTIVE

The Doctor of Philosophy degree in Engineering: Interdisciplinary provides opportunities for students to study and participate in research in more than one engineering area. The student's program may include courses and research in areas outside of engineering when the objective is to apply engineering concepts, analysis, synthesis or methodology to research problems.

## CONTINUATION

The Engineering (Interdisciplinary) Graduate Program, in fulfillment of its responsibility to graduate highly qualified professional engineers, has established certain policies and procedures. In addition to the requirements of the Graduate School listed elsewhere, to continue in the program each engineering (interdisciplinary) graduate student must:

- (1) Maintain at least a B (3.0) overall GPA in all course work, and
- (2) Demonstrate suitability for professional engineering practice.

At such time as questions are raised by engineering (interdisciplinary) graduate faculty regarding either of the above, the student will be notified and will be provided the opportunity to respond to the Committee of Graduate Studies in Engineering (Interdisciplinary). The Committee on Graduate Studies will review the student's performance and make a recommendation concerning the student's eligibility to continue in the program. Appeal of a decision on continuation may be made through normal procedures outlined in the section of this catalog entitled "Grievances Other than Grades."

## 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

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## **ENGINEERING MECHANICS**

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 a second language may be required as 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.

**6399, 6699, 6999. DISSERTATION.** Preparation of a doctoral dissertation in interdisciplinary engineering area. 6399 and 6699 graded R/F only; 6999 graded P/F/R. Prerequisite: admission to candidacy for the Doctor of Philosophy degree. See individual engineering programs for co-requisites and additional prerequisites.

# **ENGINEERING MECHANICS Program (EM)**

### *Area of Study*

Engineering Mechanics

### *Degrees*

M.S., Ph.D.

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

*Graduate Advisor:* J. H. Gaines

507 Carlisle 273-2603

### *Graduate Faculty:*

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

## **OBJECTIVE**

The graduate program in engineering mechanics is designed to provide students with an understanding of the fundamentals of mechanics and to prepare them for careers in technical areas where a thorough knowledge of mechanics is essential. Students desiring to study mechanics should have a high level of interest and aptitude in mathematics and analysis.

Candidates for a Master of Science degree in engineering mechanics and candidates for a Doctor of Philosophy degree in engineering mechanics may elect programs emphasizing solid mechanics, fluid mechanics, or dynamics and vibrations. The program is interdisciplinary. In addition to the engineering mechanics courses, applicable courses may be found in the areas of aerospace engineering, biomedical engineering, civil engineering, electrical engineering, mechanical engineering, materials science, and computer science.

## **ADMISSION REQUIREMENTS**

Applicants for the master's degree who hold a baccalaureate in engineering must meet the general requirements of the Graduate School as stated in the catalog section entitled "Admission Requirements and Procedures."

Applicants not meeting all criteria will be admitted on provisional or probationary basis only under exceptional circumstances.

For applicants with no prior training in engineering, the same minimum criteria will apply and, in addition, their records will be reviewed in relation to the intended program of study. Probationary status with specific remedial work required may be a basis for acceptance of such applicants.

The acceptance of applicants who have already received a master's degree in engineering will be based on the above-mentioned minimum criteria and results of graduate work, including the master's thesis.



**CONTINUATION**

The Engineering Mechanics Graduate Program, in fulfillment of its responsibility to graduate highly qualified professional engineers, has established certain policies and procedures. In addition to the requirements of the Graduate School listed elsewhere, to continue in the program each engineering mechanics graduate student must:

- (1) Maintain at least a B (3.0) overall GPA in all course work, and
- (2) Demonstrate suitability for professional engineering practice.

At such time as questions are raised by engineering mechanics graduate faculty regarding either of the above, the student will be notified and will be provided the opportunity to respond to the Committee on Graduate Studies in Engineering Mechanics. The Committee on Graduate Studies will review the student's performance and make a recommendation concerning the student's eligibility to continue in the program. Appeal of a decision on continuation may be made through normal procedures outlined in the section of this catalog entitled "Grievances Other than Grades."

**DEGREE REQUIREMENTS**

The general degree requirements for the Master of Science and Doctor of Philosophy degrees have been presented in other sections.

Prior to admission as a degree candidate, the student must have, as a minimum, credit for statics, dynamics, mechanics of materials, advanced calculus, differential equations, basic fluid mechanics, and thermodynamics. In addition, each student must consult the Graduate Advisor to plan his program of course work and research.

The following coursework is required of all M.S. candidates:

1. EM 5311 Theory of Elasticity or EM 5324 Energy Methods in Applied Mechanics
2. EM 5321 Advanced Dynamics or EM 5323 Advanced Mechanical Vibrations
3. EM 5341 Experimental Mechanics or EM 5317 Structural Statics
4. Two additional courses (six credit hours) in engineering mechanics
5. Two approved courses (six credit hours) in mathematics

**Master of Science in Engineering Mechanics**

The Master of Science Degree is ordinarily a research oriented program consisting of a minimum of six credit hours of thesis and a minimum of 24 credit hours in engineering mechanics and related areas. In some cases, with prior approval of the Engineering Mechanics Committee on Graduate Studies, it is possible to complete a master's program without thesis. For details on a non-thesis degree plan, consult the engineering mechanics graduate advisor.

**Doctor of Philosophy**

The PhD degree should normally require four years of full-time study after completion of the BS degree. Each PhD candidate is expected to take sufficient course work to obtain an indepth knowledge of theoretical and applied mechanics and mathematics. Normally this will require a minimum of 24 credit hours beyond the MS degree. In addition, a dissertation is required. The program of study will be subject to the approval of the candidate's supervisory committee.

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**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.

## ENGINEERING MECHANICS

- 5312. THEORY OF ELASTICITY II (3-0).** Continuation of Theory of Elasticity I; curvilinear coordinates, variational methods, axially symmetric stress distribution problems, and stress waves in solids. Prerequisite: EM 5311.
- 5313. THEORY OF PLASTICITY (3-0).** Stress-strain relations in three dimensions; three dimensional yield conditions and flow law; thick-walled tube and sphere; limit analysis and approximate theories. Prerequisite: permission of instructor. Offered also as ME 5329.
- 5314. THEORY OF PLATES AND SHELLS (3-0).** Stress and deformation analysis of elastic plates and shells of revolution. Composite structures considered in addition to the homogeneous and isotropic case. Prerequisite: permission of instructor.
- 5315. AEROELASTICITY (3-0).** Interaction of aerodynamic (or hydrodynamic), inertia and elastic forces acting on vehicles moving through fluids; flutter and divergence. Prerequisite: AE 4305 or equivalent; AE 3302 or equivalent, or permission of instructor.
- 5317. STRUCTURAL STATICS (3-0).** Finite element method in the study of the static response of complex structures and of continua. 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.
- 5319. STRUCTURAL OPTIMIZATION (3-0).** Application of nonlinear programming techniques to obtain optimum solutions to structural design problems while satisfying stress, displacement and natural frequency constraints; mathematical basis of constrained minimization algorithms; formulation of structural optimization problems; techniques for obtaining the gradient of the eigenvalue problem; evaluation of currently available nonlinear programming codes. Prerequisites: EM 5317 and permission 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 of cylindrical shells and shells of revolution. Prerequisites: EM 5311 and consent of instructor.
- 5321. ADVANCED DYNAMICS (3-0).** Hamilton's Principle, Lagrange's Equation and Hamilton-Jacobi Equation introduced. Dynamics of rigid body and theory of gyroscope studied. Prerequisite: permission of instructor.
- 5322. THEORY OF ELASTIC STABILITY (3-0).** Elastic stability of bars, buckling of plates and shells. Both classical and numerical solutions included. Prerequisite: permission of instructor.
- 5323. ADVANCED MECHANICAL VIBRATIONS (3-0).** Application of generalized coordinates and Lagrange equations. Free and forced vibrations of elastic systems including damping effects. Prerequisite: AE 4305 or equivalent.
- 5324. ENERGY METHODS IN APPLIED MECHANICS (3-0).** Virtual displacements, minimum potential energy, principle of complementary energy. Castigliano's Theorem, action integral, variational principles. Hamilton's principles and Lagrange's equations. Applications to solve problems in stress analysis, elastic stability, vibration and related topics. Prerequisite: permission of instructor.
- 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 4305 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 of solving linear, nonlinear, and transient vibration problems numerically utilized in connection with computer programming. Prerequisites: EM 5323 and a reasonable proficiency in computer programming and the consent of the instructor.
- 5331. SIMILITUDE AND THEORY OF MODELS (3-0).** Similitude models, dimensional analysis, nomographs and graphical aids to analysis. Prerequisite: permission of instructor.
- 5332. CONTINUUM MECHANICS (3-0).** Study of the underlying physical and mathematical principles relating to the behavior of continuous media; relationship between fluid and solid mechanics. Also offered as ME 5312.
- 5333. FUNDAMENTALS OF COMPOSITES (3-0).** Methods of analyzing the mechanical behavior of composite materials. Failure criteria discussed. Also offered as ME 5348.

**5341. EXPERIMENTAL MECHANICS (2-3).** Experimental and analytical methods in structural mechanics. Various analogies studied. Experimental methods of determining stress, strain, force, and displacement. Prerequisite: permission of instructor. **\$10 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. **\$10 lab fee.**

**5390. SELECTED TOPICS IN ENGINEERING MECHANICS (3-0).** Topics of current interest in the field of engineering mechanics; subject title listed in class schedule. May be repeated for credit when topic changes.

**5191-5991. ADVANCED STUDIES IN ENGINEERING MECHANICS.** Topics selected from various branches of engineering mechanics, particularly those in which active research is being conducted. Graded R. Prerequisite: permission of instructor or Graduate Advisor.

**5398, 5698, 5998. THESIS** 5398 graded R/F only; 5698 and 5998 grade P/F/R. Prerequisite: 12 hours of advanced engineering mechanics and approval of Graduate Advisor.

**6197-6997. RESEARCH IN ENGINEERING MECHANICS.** May be repeated for credit. Graded P/F/R.

**6390. SUPERVISED TEACHING IN ENGINEERING MECHANICS (3-0).** Teaching under close supervision, attending group meetings, and individual conferences, and submitted reports as required; may be repeated for credit. Required for all teaching assistants and associates in engineering mechanics; however, may not be used for degree credit. Graded P/F/R only.

**6399, 6699, 6999. DISSERTATION.** Preparation of a doctoral dissertation in engineering mechanics. 6399 and 6699 graded R/F only; 6999 graded P/F/R. Prerequisite: admission to candidacy for the Doctor of Philosophy degree.

## HUMANITIES Program (HUMA)

*Area of Study*

Humanities

*Degrees*

M.A., M.A.T., Ph.D.

*Master's Degree Plan:* Non-Thesis

*Associate Dean for Graduate Humanities:*

Jerold A. Edmondson

218 University Hall 273-2389

*Graduate Advisor:*

C. Jan Swearingen

218 University Hall 273-2389

*Graduate Faculty:* the graduate faculties of the departments of the College of Liberal Arts

### OBJECTIVE

Programs leading to the degrees of Master of Arts in the Humanities, Master of Arts in Teaching in the Humanities, and Doctor of Philosophy in the Humanities are offered jointly by The University of Texas at Arlington and The University of Texas at Dallas. A student enrolled in the UT Arlington program may also enroll at UT Dallas for courses or independent study approved by the Graduate Advisor and the student's Advisory Committee.

The Humanities Graduate degrees require the combination of two or more disciplines and are especially well suited for those whose graduate level objectives cannot be realized within conventional disciplinary degrees. Graduate Humanities Faculty work closely with students to formulate programs of work best suited to the students' objectives and to the cross disciplinary fields represented among the faculty.

Required core courses provide a foundation of conceptual bases shared by the disciplines in the College of Liberal Arts. Drawing on classical and contemporary approaches to grammar,

## HUMANITIES

rhetoric, and logic, the core courses provide an advanced integration of disciplines and insure a strong foundation in concepts and methods shared by the student's subject areas.

Masters and Doctoral programs combine intensive study in a disciplinary or thematic area of concentration with a core of interdisciplinary courses. These programs are designed to teach program-solving and communication skills and to enhance a student's ability to view complex issues from a variety of perspectives. Graduates can apply these skills in teaching, research, translation, ministerial, writing, and business careers. Each student's course of study is planned individually and provides excellent training in a specialization within the context of the humanities' traditional focus on human goals, needs, and values.

### DEGREE REQUIREMENTS

The basic general admission and degree requirements are those of the Graduate School, as stated in this catalog. A Student Handbook is provided each student in the Graduate Humanities Program. Students are responsible for all information regarding rules, policies, and procedures as defined in the student handbook. In addition, all students (MA, MAT, and PhD) must fulfill the following requirements:

1. Complete the Conceptual Bases of the Humanities and Foundations of Rhetoric courses (HUMA 5300 and 5301) within their first three semesters in the Program.
2. Complete two of the other four foundation courses (HUMA 5302, 5303, 5304, 5305).
3. Demonstrate reading proficiency in one foreign language.
4. To assure a multi-disciplinary study of language, literature, or cultural perspectives, coursework must be chosen from (A) or (B):

(A) at least two of the areas of study represented in the College of Liberal Arts

Anthropology	Philosophy
Art Criticism and Art History	Political Theory
Comparative Literature	Rhetoric/Composition
History	Semiotics
Linguistics	Sociology
Music History	Teaching Methodologies
Literary Theory and Criticism	

Literature (American, English, French, German, Spanish)

English for Speakers of Other Languages

(B) an integrated program of multi-disciplinary study of coursework organized by theme, such as American Studies, Art and Society, etc.

### Master of Arts in the Humanities

The MA is a 36 semester-hour, non-thesis program. Twelve of these hours are devoted to the humanities core and foundation courses; 24 hours, to courses chosen from the areas of study shown above, and organized by them, genre, chronology, or geography.

In addition to the general Graduate School and Humanities Program requirements, the MA candidate, in order to qualify for the final master's examination, submits one article-length paper for evaluation by a committee appointed by the Graduate Advisor. A positive assessment of the paper as demonstrating research competence and facility with appropriate humanities methodologies must be earned before taking the final examination.

### Master of Arts in Teaching in the Humanities

The MAT program is designed for teachers who wish to strengthen their teaching specialty or explore the pedagogical aspects or applications of areas of study within the Humanities. Students in this program fulfill the same requirements as those pursuing the MA in Humanities, with the following differences:

1. Demonstration of reading proficiency in a foreign language is not required, unless the focus of study is on the teaching of a foreign language.
2. The article-length paper submitted to qualify for the master's final examination must demonstrate pedagogical applications or aspects, as well as research competence and facility with appropriate methodologies.
3. Six to nine hours of education courses may be included in the 36 hours of course work.

## Doctor of Philosophy in the Humanities

The PhD program consists of 45 semester hours beyond the MA plus dissertation. Twelve of these hours are devoted to the humanities core and foundation courses; 33 hours, to courses chosen from the areas of study shown above, and organized by theme, genre, chronology, or geography.

Applicants with bachelor's degrees may declare an interest in pursuing a doctoral program. Upon admission, these students pursue an MA or MAT program. Upon completion of either program, or upon completion of 30 hours toward either degree, the student may apply for admission to the PhD program. A student who has completed 12 hours of core and foundation courses within the MA or MAT program chooses four courses, approved by the Graduate Advisor and Advisory Committee, to replace those 12 hours in the PhD program.

In addition to the general Graduate School admission and degree requirements for the PhD (as stated in this catalog) and the Humanities Program requirements (stated above), the doctoral student must fulfill the following requirements:

1. Pass a Diagnostic Evaluation conducted upon completion of 12–18 hours.
2. Completion of at least 24 of the required 45 semester hours, and registration for at least nine hours of dissertation work, at UT Arlington.
3. Demonstration of reading proficiency in a second foreign language approved by the Advisory Committee as appropriate to the student's dissertation research. Alternatively, demonstration of proficiency with a research tool (e.g. statistical or computer-aided analysis) approved as a language substitute by the Advisory Committee, Graduate Studies Committee, and Graduate Advisor, as part of the student's Program of Work.
4. Consultation with the Advisory Committee and Graduate Advisor concerning the form (oral, written, or both) and scheduling of the Comprehensive Examination.

**The grade of R (research in progress) is a permanent grade. An incomplete (the grade of X) cannot be given in a course which is graded R. To receive credit for an R-graded course the student must continue to enroll in the course until a passing grade is received. Three-hour theses and three- and six-hour dissertation courses are graded R/F only. The grade of P (required for graduation) can be received in six- or nine-hour thesis courses and nine-hour dissertation courses only. In the course listings below, R-graded courses are designed either "Graded P/F/R" or "Graded R." (See also the section entitled "R" GRADE on p. 36 of this catalog.)**

**5300. CONCEPTUAL BASES OF THE HUMANITIES (3–0).** Presentation and illustration of basic concepts relevant to humanities: meaning, form, expression, structure and interpretation; content areas selected from history, literature, music, and art used as models to illustrate application of concepts. Required of all MA and PhD candidates in the Humanities.

**5301. FOUNDATIONS OF RHETORIC (3–0).** Survey of classical and contemporary views of rhetoric. Discussion of such topics as the conflict between rhetoric and philosophy; the relationship between rhetoric and epistemology, ethics, and pluralism; and rhetoric as a propaedeutic, providing methodologies for the human sciences. Required of all MA and PhD candidates in the Humanities.

**5302. THEORY OF DISCOURSE (3–0).** Study of relationship of linguistic analysis to oral and written discourse; description and analysis of types of discourse; interdisciplinary perspectives—linguistic, sociological, psychological, philosophical, literary critical—on types of discourse. Fulfills foundations requirement.

**5303. TOPICS IN CULTURE AND SOCIETY (3–0).** Influence of culture, that historical embodiment in symbolic form of meaning or significance for a group of people, relationships and artifacts; anthropological or historical analysis of specific cultural elements in selected societies. Fulfills foundations requirement.

**5304. METHODS OF LOGICAL ANALYSIS (3–0).** Foundations of modern logic and logical terminology in language-centered disciplines; applications of logical method to selected problems in the humanities illustrating a diversity of philosophical approaches, e.g., analytic philosophy, hermeneutics, phenomenology. Fulfills foundations requirement.

**5305. SEMIOTICS (3–0).** Study of systems of symbols or "signs"; examination of structures underlying cultural activity from fundamental level of individual sign-creation to more complex systems. Fulfills foundations requirement.

## **INTERDISCIPLINARY STUDIES**

- 5391. CONFERENCE COURSE IN THE HUMANITIES.** Prerequisite: permission of the instructor and Graduate Advisor.
- 5392. TOPICS IN THE HUMANITIES (3-0).** Selected topics of interdisciplinary interest. May be repeated for credit when subject matter changes.
- 6330. SEMINAR IN THE HUMANITIES (3-0).** Interdisciplinary study of genres and themes. May be repeated for credit when subject matter changes.
- 6391. READINGS IN THE HUMANITIES (3-0).** Supervised individual study for students preparing for the comprehensive examination. Prerequisite: permission of the instructor and Graduate Advisor.
- 6399, 6699, 6999. DISSERTATION.** Prerequisite: admission to candidacy for the PhD in Humanities.

# **INTERDISCIPLINARY STUDIES**

## **Program (INDS)**

### *Area of Study*

Interdisciplinary Studies

### *Degrees*

M.A., M.S.

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

*Program Coordinator:* Gloria W. Eyres

333 Davis 273-2681

*Graduate Faculty:* all members of the graduate faculty of The University of Texas at Arlington

## **OBJECTION**

The purpose of the degree program is to allow individuals to pursue studies in multiple disciplines, to upgrade their formal education in their fields of specialization and to develop professional skills. The program is intended for persons having professional experience beyond the baccalaureate degree and clear, well-developed academic and professional goals.

## **ADMISSION**

An applicant to this program must satisfy the requirement for admission to the Graduate School and ordinarily have professional experience in areas related to the graduate course work proposed. The applicant should submit a tentative program of work and an academic goals statement to the program coordinator as part of the application for admission process. Applicants will ordinarily not be admitted to interdisciplinary studies until a tentative program of work has been reviewed and approved by the Committee on Graduate Studies.

## **DEGREE REQUIREMENTS**

Most programs of work in interdisciplinary studies involve courses in several departments and should be designed in consultation with the appropriate graduate faculty members of those departments. Students entering the interdisciplinary studies program must consult with the program coordinator prior to registration for the first semester and each succeeding semester in which the student plans to enroll. To be eligible to continue in the program after the first semester of enrollment, each student must submit a program of work to the Committee on Graduate Studies in Interdisciplinary Studies no later than the end of the first semester or session of study. The Committee on Graduate Studies is not responsible for selection of courses taken prior to program of work approval and cannot guarantee that such courses will apply to degree credit.

Interdisciplinary studies allows the student maximum flexibility in designing an academic program to meet specific professional and educational objections. The student must complete work in at least two departments and may take courses in more than one of the schools or

colleges of the University. The primary emphasis is on the individual needs and aspirations of the student. A supervising committee composed of members of the graduate faculty will be appointed to supervise the completion of an individual program of work and the final examination. General oversight will be provided by the Committee on Graduate Studies and the Dean of the Graduate School.

No more than 50% of the credit hours in a student's program may be taken in an area in which the University does not offer an advanced degree, or in the College of Business Administration. A maximum of nine hours of advanced (junior/senior) undergraduate courses may be applied to a program in interdisciplinary studies; for the purpose of this policy, graduate foundation courses in the college of Business Administration are considered equivalent to advanced undergraduate courses and apply toward the nine hour maximum. In addition, the Committee on Graduate Studies has adopted other policies which govern the general design and content of programs of work in interdisciplinary studies. Information about these policies should be requested from the program coordinator.

**The grade of R (research in progress) is a permanent grade. An incomplete (the grade of X) cannot be given in a course which is graded R. To receive credit for an R-graded course the student must continue to enroll in the course until a passing grade is received. Three-hour thesis and three- and six-hour dissertation courses are graded R/F only. The grade of P (required for graduation) can be received in six- or nine-hour thesis courses and nine-hour dissertation courses only. In the course listings below, R-graded courses are designated either "Graded P/F/R" or "Graded R." (See also the section entitled "R" GRADE on p. 36 of this catalog.)**

**5193. MASTER'S COMPREHENSIVE EXAMINATION.** (1-0). Directed study, consultation, and comprehensive examination over coursework, leading to the Master's degree in Interdisciplinary Studies. Graded P/F/R.

**5398, 5698. THESIS.** Research and preparation pertaining to the master's thesis. 5398 graded R/F only; 5698 graded P/F/R.

## MATERIALS SCIENCE Program (MATS)

### *Area of Study*

*Materials Science*

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

### *Degrees*

M.S., Ph.D.

*Graduate Advisor:* Carl D. Wiseman

335D Engineering 273-2028

### *Graduate Faculty:*

Professors Johnson, Wiseman  
Associate Professor Goolsby  
Assistant Professor Normura

### 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 in the fields of engineering, chemistry and physics.

## **MATERIALS SCIENCE**

### **CONTINUATION**

The Materials Science Graduate Program, in fulfillment of its responsibility to graduate highly qualified professional engineers, has established certain policies and procedures. In addition to the requirements of the Graduate School listed elsewhere, to continue in the program each materials science graduate student must:

- (1) Maintain at least a B (3.0) overall GPA in all course work, and
- (2) Demonstrate suitability for professional engineering practice.

At such time as questions are raised by materials science graduate faculty regarding either of the above, the student will be notified and will be provided the opportunity to respond to the Committee on Graduate Studies in Materials Science. The Committee on Graduate Studies will review the student's performance and make a recommendation concerning the student's eligibility to continue in the program. Appeal of a decision on continuation may be made through normal procedures outlined in the section of this catalog entitled "Grievances Other than Grades."

### **DEGREE REQUIREMENTS**

Students with Bachelor of Science degrees in none-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.

**The grade of R (research in progress) is a permanent grade. An incomplete (the grade of X) cannot be given in a course which is graded R. To receive credit for an R-graded course the student must continue to enroll in the course until a passing grade is received. Three-hour thesis and three- and six-hour dissertation courses are graded R/F only. The grade of P (required for graduation) can be received in six- or nine-hour thesis courses and nine-hour dissertation courses only. In the course listings below, R-graded courses are designated either "Graded P/F/R" or "Graded R." (See also the section entitled "R" Grade on p. 36 on this catalog.)**

**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 BEHAVIOR OF MATERIALS (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.

**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.



**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.

**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.

**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. **\$2 lab fee.**

**5345. CONTINUUM MECHANICS (3-0).** Study of the underlying physical and mathematical principles relating to the behavior of continuous media; relationship between fluid and solid mechanics. Also offered as ME 5312 and EM 5332. Prerequisite: permission of instructor.

**5347. POLYMER MATERIALS SCIENCE (3-0).** Intermolecular forces of attraction in high polymers, polymer synthesis, morphology and order in crystalline polymers, mechanics of amorphous polymers, time-dependent mechanical behavior, transitional phenomena, mechanical behavior of semicrystalline polymers. Prerequisite: permission of instructor.

**5348. FUNDAMENTALS OF COMPOSITES (3-0).** Fundamental relationships between the mechanical behavior and the composition of multiphase media; failure criteria discussed. Also offered as ME 5348 and EM 5333. Prerequisite: permission of instructor.

**5349. APPLIED COMPOSITES (3-0).** Applications of composite materials in the design of load carrying parts and structures. Also offered as ME 5349. Prerequisite: MATS 5348 or permission of instructor.

**5350. EXPERIMENTAL CHARACTERIZATION OF COMPOSITES (2-3).** Laminate processing, NDI, and physical characterization procedures; thermal analysis methods for composites; composite materials tensile, compressive, shear, flexure, thermoelastic, and interlaminar fracture characterizations. 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. **\$2 lab fee.**

**5190, 5290, 5390. SPECIAL TOPICS IN MATERIALS SCIENCE.** May be repeated for credit when topic changes. Prerequisite: Consent of instructor.

**5191, 5291, 5391. ADVANCED STUDIES IN MATERIALS SCIENCE.** Topics selected from various areas of materials science. Work performed as a thesis substitute normally will be accomplished under the course number 5391, with prior approval of the Committee on Graduate Studies. Graded R.

**5398, 5698, 5998. THESIS. 5398 graded R/F only; 5698 and 5998 graded P/F/R.** Prerequisite: approval of Graduate Advisor.

**6197, 6397. ADVANCED STUDIES IN MATERIALS SCIENCE.** May be repeated for credit. Graded R. Prerequisite: approval of Graduate Advisor.

**6399, 6699, 6999. DISSERTATION.** 6399 and 6699 graded R/F only; 6999 graded P/F/R.

**MATHEMATICAL SCIENCES**

**MATHEMATICAL SCIENCES  
Program (MSCI)**

*Area of Study* Mathematical Sciences *Degree* Ph.D.

*Graduate Advisors:*

Biology	
D. H. Whitmore	237 Life Science 273-2871
Chemistry	
Z. A. Schelly	238 Science Hall 273-3803
Computer Science	
Roger S. Walker	706 Carlisle Hall 273-3785
Geology	
Brooks B. Ellwood	235 Geosciences Bldg. 273-2339
Information Systems and Management Sciences	
R. C. Baker	116 Business 273-3549
Mathematics	
Marion E. Moore	451 Nursing Bldg. 273-3261
Physics	
Asok K. Ray	108 Science Hall 273-2503
Psychology	
J. Bowen	511 Life Science 273-2281

*Graduate Faculty:* The appropriate Graduate Faculty of the various branches of mathematical sciences including Biology, Chemistry, Computer Science, Geology, Information Systems, Mathematics, Physics, and Psychology, with the support of the appropriate Graduate Faculty of The University of Texas at Dallas.

**OBJECTIVES**

A program leading to the Doctor of Philosophy degree in the mathematical sciences is offered jointly with The University of Texas at Dallas. This joint program utilizes the faculty and courses from both institutions. The program will aim at both real and demonstrated competency on the part of the student over material ranging from various branches of mathematical sciences. The nature of the dissertation will range from research in abstract mathematics to the discovery and testing of mathematical models for analyzing given problems in sciences and in locating and developing mathematical and computational techniques for deducing the properties of these models so as to solve these problems both effectively and efficiently. Such dissertations will be concerned with research problems from such areas as abstract mathematics, applied mathematics, probability, statistics, computer science, biology, biometry, chemistry, engineering, geology, information systems, physics, management sciences, and operational sciences.

**DEGREE REQUIREMENTS**

Upon entering Graduate School, the student has the responsibility to consult with the Graduate Advisor in the appropriate department on a continuing basis.

The student must satisfactorily complete all deficiency courses.

In addition to the Graduate School requirements for the Doctor of Philosophy degree,

## MATHEMATICAL SCIENCES

students must satisfactorily demonstrate competence in 30 graduate hours of core areas as specified by the Graduate Studies Committee for Mathematical Sciences (GSCMS). Furthermore, the student must complete additional graduate course work beyond these core areas as approved by the Graduate Studies Committee for Mathematical Sciences.

Of the 30 hours of core courses, each student is expected to complete a minimum of 15 graduate hours in the Mathematics Department. However, the 30 hours of core courses will vary depending on the student's area of interest and background and will be determined on an individual basis by the student's supervisory committee subject to approval by the Committee on Graduate Studies for Mathematical Sciences.

Normally each candidate is required to be in a residence as a full-time student for one year or three consecutive semesters including summer term. Exceptions to this requirement may be approved if the student has demonstrated continuous degree progress while working as a part-time student.

In addition to meeting the specific requirements listed above, each student's program of work must be approved by the Dean of the Graduate School.

Ordinarily, after 40 semester hours of graduate work and with the approval of the Committee on Graduate Studies for Mathematical Sciences, a comprehensive examination (usually oral) will be administered. To pass, the student must exhibit outstanding intellectual capacity and sufficient knowledge to continue doctoral studies and a program of research. A student who has failed the comprehensive examination may be allowed a single re-examination by the Committee on Graduate Studies for Mathematical Sciences on the recommendation of the examining committee. The student must be enrolled in the Graduate School at the time of the comprehensive examination.

If more than five years have elapsed since the date of the comprehensive examination taken by the candidate, the student may be required to take another comprehensive examination before admission to the final examination.

The PhD program in the mathematical sciences, although demanding a strong mathematical orientation, does not fall within the traditional boundaries of a single department, and furthermore, the scope of this program is quite broad. Consequently, every course in a student's program of work will be evaluated as to not only course content but also the way in which each course complements other courses in the program of work as well as the ways in which each course broadens and furnishes depth to the program. Courses from a variety of departments (e.g., biology, business administration, chemistry, computer science, engineering sciences, geology, management sciences, statistics) will be counted toward the PhD degree if taken with the prior approval of the appropriate Graduate Advisor. One should refer to the list of departmental courses elsewhere in this catalog for specific descriptions.

**The grade of R (research in progress) is a permanent grade. An incomplete (the grade of X) cannot be given in a course which is graded R. To receive credit for an R-graded course the student must continue to enroll in the course until a passing grade is received. Three-hour thesis and three- and six-hour dissertation courses are graded R/F only. The grade of P (required for graduation) can be received in six- or nine-hour thesis courses and nine-hour dissertation courses only. In the course listings below, R-graded courses are designed either "Graded P/F/R" or "Graded R." (See also the section entitled "R" Grade on p. 36 on this catalog.)**

**6399, 6699, 6999. DISSERTATION.** 6399 and 6699 graded R/F only; 6999 graded P/F/R. Prerequisite: admission to candidacy for the Doctor of Philosophy degree in mathematical science.

## **RADIOLOGICAL PHYSICS**

# **RADIOLOGICAL PHYSICS Program (RADP)**

*Area of Study*

Radiological Physics

*Degree*

M.S.

*Master's Degree Plan:* Thesis only

*Graduate Advisor:* S. C. Sharma

108 Science Hall 273-2470

*Graduate Faculty:* The graduate faculty of the Department of Physics and the graduate faculty of the Department of Radiology of The University of Texas Southwestern Medical 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 The University of Texas Southwestern Medical 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 UT Arlington and UT Southwestern. 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 UT 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 UT Southwestern 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

Hans Mark, Ph.D., *Chancellor*  
James P. Duncan, Ed.D., *Executive Vice Chancellor for Academic Affairs*  
Charles B. Mullins, M.D., *Executive Vice Chancellor for Health Affairs*  
Michael E. Patrick, M.B.A., *Executive Vice Chancellor for Asset Management*

## 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*  
Peter E. Van't Slot, M.B.A., *Vice President for Development and University Relations*  
Elwood J. Preiss, M.A., *Executive Assistant to the President*  
R. Zack Prince, M.A., *Registrar and Director of Admissions*  
Charles B. Lowry, Ph.D., *Director of Libraries*

### DEANS OF THE COLLEGES AND INSTITUTE

Walter E. Mullendore, Ph.D., *Dean of the College of Business Administration*  
John H. McElroy, 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*  
Roosevelt Wright Jr., Ph.D., *Dean of the Graduate School of Social Work*  
Edward M. Baum, M. Arch., *Dean of the School of Architecture and Environmental Design*  
Myrna Pickard, D.Ed., *Dean of the School of Nursing*  
Richard L. Cole, Ph.D., *Dean of the Institute of Urban Studies*  
Charles W. Funkhouser, Ed.D., *Director of the Center for Professional Teacher Education*

### THE GRADUATE SCHOOL

Bob F. Perkins, Ph.D., *Associate Vice President for Research and Dean of the Graduate School*  
Robert M. Johnson, Ph.D., *Associate Dean*  
Gloria W. Eyres, M.A., *Assistant Dean*

# GRADUATE FACULTY

(Year in parentheses indicates year of initial employment.)

- ACKER, BERTIE N., *Professor of Foreign Languages* (1965). B.A., *Texas Woman's University*, 1943; M.A., *Southern Methodist University*, 1957; Ph.D., *University of Texas at Austin*, 1971.
- ADAMS, DUANE A., *Professor of Foreign Languages* (1960). B.A., *University of Nebraska*, 1947; M.A., 1949; Ph.D., *Louisiana State University*, 1963.
- ALLISON, ROBERT D., *Adjunct Associate Professor in Biomedical Engineering Program* (1976). B.A., *Hardwick College*, 1954; M.S., *Wayne State University College of Medicine*, 1960; Ph.D., 1962.
- AMSTER, HARRIETT, *Professor of Psychology* (1973). A.B., *Bryn Mawr College*, 1950; M.A., *Clark University*, 1954; Ph.D., 1957.
- ANDERS, EVAN MARCUS, *Assistant Professor of History* (1979). B.A., *University of Texas at Austin*, 1968; M.A., 1970; Ph.D., 1978.
- ANDERSON, DALE A., *Professor of Aerospace Engineering* (1984). B.S., *St. Louis University*, 1957; M.S., *Iowa State University*, 1959; Ph.D., 1964. *Registered Professional Engineer*.
- ANDERSON, FRANK W., *Associate Professor of City and Regional Planning and Assistant Director of Research and Service Programs Division* (1973). B.A., *Western Reserve University*, 1949; M.A., *University of Washington*, 1953; Ph.D., 1958.
- ANDERSON, R. BRUCE W., *Associate Professor of Sociology* (1973). A.B., *Stanford University*, 1961; M.A., *Northwestern University*, 1965; Ph.D., *Duke University*, 1970.
- ANJOMANI, ARDESHIR, *Associate Professor of Architecture and City and Regional planning* (1979). M. Arch., *University of Tehran*, 1968; M.Pl., *University of Southern California*, 1976; Ph.D., 1979.
- APILADO, VINCENT PAUL, *Professor of Finance and Real Estate* (1980). B.S., *University of Portland*, 1959; M.B.A., *University of Oregon*, 1966; Ph.D., *University of Michigan*, 1970.
- ARGENTO, VITTORIO K., *Senior Lecturer of Civil Engineering* (1978). B.S., *San Diego State College*, 1964; M.S., *University of Texas at Dallas*, 1976. *Professional Engineer*.
- ARMSTRONG, J. CLYDE, *Associate Professor of Civil Engineering* (1972). B.S., *Texas A&M University*, 1955; B.S., 1961; M.S., 1962; Ph.D., 1967. *Professional Engineer*.
- ARNOTT, HOWARD J., *Professor of Biology and Dean of the College of Science* (1974). A.B., *University of Southern California*, 1952; M.S., 1953; Ph.D., *University of California at Berkeley*, 1958.
- BACON, JOHN D., *Associate 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.
- BAGBY, JONATHAN S., *Assistant Professor in Electrical Engineering Department* (1984). B.S., *Michigan State University*, 1980; M.S., *Ohio State University*, 1981; Ph.D., *Michigan State University*, 1984.
- BAKER, R. C., *Associate Professor of Information Systems and Management Sciences* (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 of Academic Affairs* (1971). B.S., *Texas A&I University*, 1955; Ph.D., *University of Texas at Austin*, 1959.
- BALDRIDGE, WILLIAM R. II, *Assistant Professor of Music* (1981). B.M.Ed., *East Texas State University*, 1970; M.M., 1972; Ph.D., *North Texas State University*, 1981.
- BALSAM, WILLIAM L., *Associate Professor of Geology* (1984). B.S., *St. Lawrence University*, 1967; M.S., *Brown University*, 1969; Ph.D., 1973.
- BANIOS, Edward W., *Assistant Professor in Computer Science Engineering Department* (1987). B.S., *Drexel University*, 1950; M.S., *University of Texas at Arlington*, 1984; Ph.D., 1986.



## FACULTY

- BARKER, CALVIN L. R., *Professor of Mechanical Engineering (1960)*. B.S., *University of Texas at Austin, 1953*; M.S., *California Institute of Technology, 1954*; Ph.D., 1958. *Professional Engineer.*
- BARNES, SUE M., *Assistant Professor of Nursing (1976)*. B.S., *University of Missouri, 1960*; M.Ed., *Louisiana State University in New Orleans, 1972.*
- BARRETO, FELIX R., *Assistant Professor of City and Regional Planning (1984)*. B.A., *Rutgers University, 1978*; M.C.R.P., 1980.
- BARRETT, MARJIE C., *Associate 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.*
- BASTIEN, JOSEPH W., *Professor of Anthropology (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.
- BAUM, EDWARD M., *Professor and Dean of the School of Architecture and Environmental Design (1987)*. A.B., *Harvard, 1960*; M.Arch., 1964.
- BEAUDRY, HARRY R., *Associate Professor of English (1966)*. A.B., *Rice University, 1952*; M.A., *Boston University, 1956*; Ph.D., *Duke University, 1968.*
- BEHBEHANI, KHOSROW, *Associate Professor in Biomedical Engineering Program (1985)*. B.S., *Louisiana State University, 1973*; M.S., *Georgia Institute of Technology, 1975*; Ph.D., *University of Toledo, 1979.*
- BELLION, EDWARD, *Associate Professor of Chemistry (1970)*. B.Sc., *University of Leeds, 1965*; Ph.D., 1968.
- BERGEN, ROBERT DALE, *Adjunct Assistant Professor of Linguistics (1982)*. B.A., *HardinSimmons University, 1976*; M.Div., *Southwestern Baptist Theological Seminar, 1980.*
- BERNFELD, STEPHEN R., *Professor of Mathematics (1975)*. B.S., *Rensselaer Polytechnic Institute, 1965*; Ph.D., *University of Maryland, 1969.*
- BERNSTEIN, BARTON E., *Adjunct Associate Professor of Social Work (1974)*. B.A., *Drake University, 1951*; J.D., *Boston University, 1953*; M.L.A., *Southern Methodist University, 1971.*
- BERNSTEIN, IRA H., *Professor of Psychology (1964)*. B.A., *University of Michigan, 1959*; M.A., *Vanderbilt University, 1961*; Ph.D., 1963.
- BHASIN, AJAY, *Assistant Professor of Marketing (1984)*. B.A., *University of New Delhi, 1977*; M.B.A., *Indian Institute of Management*; Ph.D., *Northwestern University, 1985.*
- BIRMINGHAM, JUDITH ANN, *Specialist and Assistant to Dean in the Graduate School of Social Work (1979)*. B.S., *Lamar State University, 1965*; M.S.W., *The University of Texas at Arlington, 1974.*
- BLACK, TRUMAN D., *Professor of Physics (1965)*. B.S., *University of Houston, 1959*; M.A., *Rice University, 1962*; Ph.D., 1964.
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- BOLEY, ROBERT B., *Associate Professor of Biology (1965)*. B.S., *Sam Houston State University, 1949*; M.S., *Texas A&M University, 1960*; Ph.D., *Ohio State University, 1963.*
- BOMBA, PAUL C., *Assistant Professor of Psychology (1982)*. A.B., *Franklin and Marshall College, 1978*; M.S., *Brown University, 1981*; Ph.D., 1982.
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## FACULTY

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- BRUNO, VINCENT J., *Professor of Art (1976)*. B.A., Kenyon College, 1951; M.A., Columbia University, 1962; Ph.D., 1969.
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- LONGACRE, ROBERT E., *Professor of Linguistics (1972)*. B.A., Houghton College, 1943; M.A., University of Pennsylvania, 1953; Ph.D., 1955.
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## FACULTY

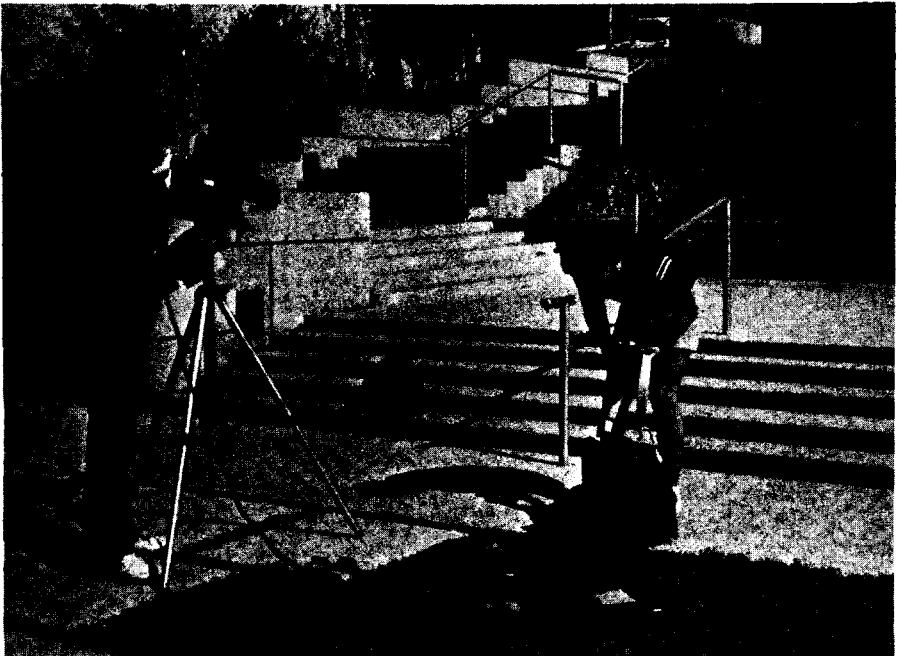
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- PAYNE, FRED R., *Professor of Aerospace Engineering (1969)*. B.S., *University of Kentucky, 1952*; M.S., *Pennsylvania State University, 1964*; Ph.D., 1966. *Professional Engineer*.
- PECK, CHARLES WHITMAN, *Adjunct Associate Professor of Foreign Languages and Linguistics (1974)*. B.S.E.E., *University of Idaho, 1949*; B.D., *Fuller Theological Seminary, 1954*; Ph.D., *University of Michigan, 1969*.
- PERKINS, BOB F., *Professor of Geology and Associate Vice President for Research and Dean of the Graduate School (1975)*. B.S., *Southern Methodist University, 1949*; M.S., 1950; Ph.D., *University of Michigan, 1956*.
- PETERSON, LYNN L., *Associate Professor in Computer Science and Engineering Department (1982)*. B.A., *Wittenberg University, 1962*; M.A., *Duke University, 1963*; M.S., *University of Michigan, 1966*; Ph.D., *University of Texas Health Science Center, 1978*.



## FACULTY

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- PHILLIPS, HERBERT M., Associate Professor of Biology (1981). B.A., Reed College, 1962; Ph.D., Johns Hopkins University, 1969.
- PHILP, KENNETH ROY, Professor and Chairman of the Department of History (1968). B.A., Michigan State University, 1963; M.A., University of Michigan, 1964; Ph.D., Michigan State University, 1968.
- PICKARD, MYRNA R., Professor and Dean of the School of Nursing (1976). B.S., Texas Wesleyan College, 1957; M.Ed., 1964; M.S., Texas Woman's University, 1974; Ed.D., Nova University, 1976. Registered Nurse.
- PIERCE, MELVIN L., Associate Professor of Computer Science and Engineering Department (1961). B.A., Bethany Nazarene College, 1952; M.S., Texas A&M University, 1954.
- PIKE, EUNICE V., Adjunct Assistant Professor of Foreign Languages and Linguistics (1982). R.N., Massachusetts General Hospital (Boston), 1936; D.Litt., Biola University, 1983.
- PIKE, EVELYN, Adjunct Assistant Professor of Foreign Languages and Linguistics (1980). A.B., University of California, 1937; M.A., University of Michigan, 1962.
- PIKE, KENNETH L., Adjunct Professor of Foreign Languages and Linguistics (1979). Th.B., Gordon College of Theology and Missions, 1933; Ph.D., University of Michigan, 1942.
- PINNEY, WILLIAM E., Associate Professor and Chairman of the Department of Information Systems and Management Sciences (1969). B.S., University of Florida, 1964; M.B.A., 1965; Ph.D., 1967. Professional Engineer.
- PINNO, ANDRZEJ, Associate Professor of Architecture (1976). M.Arch., Warsaw Polytechnic, 1952; M.Interior Design, Warsaw Academy of Fine Arts, 1963; M.Arch., Harvard University, 1966.
- POLSTER, RICHARD ALAN, Associate Professor of Social Work (1977). B.A., Southern Illinois University, 1970; A.M., University of Chicago, 1974; Ph.D., 1977.
- POMERANTZ, MARTIN, Professor of Chemistry (1976). B.S., City College of New York, 1959; M.S., Yale University, 1961; Ph.D., 1964.
- POOR, ARTHUR R., Professor of Civil Engineering (1970). B.S., University of Utah, 1950; M.S., Texas A&M University, 1960; Ph.D., University of Texas at Austin, 1965. Professional Engineer.
- PORTER, THOMAS E., Professor of English and Dean of the College of Liberal Arts (1978). A.B., Loyola University of Chicago, 1949; Ph.L., West Baden Pontifical Institute, 1952; M.A., Loyola University of Chicago, 1954; Th.L., West Baden Pontifical Institute, 1959; M.A., Catholic University of America, 1960; Ph.D., University of North Carolina.
- POULTER, VIRGIL L., Associate Professor of Foreign Languages and Linguistics (1961). B.A., Oklahoma State University, 1954; M.A., University of New Mexico, 1960; Ph.D., Louisiana State University, 1973.
- POWELL, LINTON, Professor of Music (1976). B.M., Florida State University, 1966; M.F.A., University of Georgia, 1969; Ph.D., University of North Carolina, 1974.
- PREHODITCH, TOM, Assistant Professor of Political Science (1983). B.A., University of Texas at Arlington, 1974; M.A., University of Oregon, 1977; Ph.D., 1985.
- PRICE, KENNETH H., Associate Professor of Management (1973). B.A., Fairleigh Dickinson University, 1966; M.A., Michigan State University, 1969; Ph.D., 1973.
- PRICE, MARTIN, Professor of Architecture (1977). B.Arch., University of Pennsylvania, 1955. Registered Architect.
- PRIEST, JOHN W., Associate Professor of Industrial Engineering (1982). B.S., General Motors Institute, 1973; M.S., The University of Texas at Arlington, 1975; Ph.D., 1980. Professional Engineer.
- PYBURN, WILLIAM F., Professor Emeritus—Biology (1956). B.A., University of Texas at Austin, 1951; M.A., 1953; Ph.D., 1956.
- QASIM, SYED R., Professor of Civil Engineering (1973). B.S., Muslim University, Aligarh, India, 1957; M.S., 1962; Ph.D., West Virginia University, 1965. Professional Engineer.



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- RAJ, VIJAY KUMAR, *Assistant Professor in Computer Science Engineering Department (1986)*. B.E., University of Mysore, India, 1972; Ph.D., University of Illinois, Urbana, 1985.
- RAJA, M.K., *Professor of Information Systems and Management Sciences (1981)*. B.E., University of Madras, 1966; M.Tech., Indian Institute of Technology, 1968; M.S., University of Houston, 1978; Ph.D., Texas Tech University, 1971.
- RAJESHWAR, KRISHNAN, *Associate Professor of Chemistry (1983)*. B.S., University College, Trivandrum, India, 1969; M.S., Indian Institute of Technology, 1971; Ph.D., Indian Institute of Science, 1974.
- RAMSEY, CHARLES EUGENE, *Professor and Chairman of the Department of Sociology (1977)*. B.S., Indiana State Teachers College, 1947; M.S., University of Wisconsin, 1950; Ph.D., 1952.
- RAO, K. R., *Professor in Electrical Engineering Department (1966)*. B.E., University of Madras, 1952; M.S., University of Florida, 1959; M.S., 1960; Ph.D., University of New Mexico, 1966.
- RASCOE, STEPHEN T., *Associate Professor of Art (1964)*. B.F.A., Art Institute of Chicago, 1949; M.F.A., 1951.
- RAY, ASOK K., *Assistant Professor of Physics (1982)*. B.Sc., Calcutta University, 1967; B.Tech., 1969; M.S., Oklahoma State University, 1973; M.S., Texas Tech University, 1975; Ph.D., 1977.
- RAYBURN, LOUIS A., *Professor of Physics and Associate Dean of the College of Science (1970)*. B.S., University of Kentucky, 1948; M.S., 1950; Ph.D., 1954.
- REASER, DONALD F., *Associate Professor of Geology (1961)*. B.S., Southern Methodist University, 1953; M.S., 1958; Ph.D., University of Texas at Austin, 1974.
- REDDICK, ROBERT J., *Associate Professor of English (1975)*. B.S., University of Minnesota, 1966; M.A., 1969; Ph.D., 1975.
- REED, JOHN C., *Associate Professor of Nursing (1980)*. B.S., Stephen F. Austin State University, 1966; M.S., East Texas State University, 1967; Ed.D., North Texas State University, 1971.
- REEDER, HARRY PAUL, *Associate of Philosophy (1982)*. B.A., University of Illinois at Urbana, 1968; M.A., University of Waterloo, 1974; Ph.D., 1977.
- REHER, WILLIAM C., *Professor of Economics (1965)*. B.S.C., St. Louis University, 1941; M.S.C., 1948; Ph.D., University of Michigan, 1957.
- REINHARTZ, DENNIS, *Associate Professor of History (1973)*. A.B., Rutgers University, 1966; A.M., 1967; Ph.D., New York University, 1970.
- REINHARTZ, JUDY, *Associate Professor of Education (1973)*. A.B., Rutgers University, 1966; M.A., Seton Hall University, 1970; Ph.D., University of New Mexico, 1977.
- REITMAN, SANFORD, *Adjunct Associate Professor in Biomedical Engineering Program (1975)*. B.S., University of Pennsylvania, 1954; M.S., Rutgers University, 1955; M.D., University of Alabama, 1959.
- RENSCH, CALVIN R., *Adjunct Professor of Linguistics (1975)*. B.A., Wheaton College, 1954; M.A., University of Pennsylvania, 1963; Ph.D., 1966.
- REUTER, D. DAYTON, *Assistant Professor of Architecture (1985)*. B.S., University of Wisconsin-Madison, 1976; M.S., 1985.
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- ROBINSON, JAMES VINCENT, *Associate Professor of Biology (1978)*. B.S., *Polytechnic Institute of Brooklyn, 1967*; M.S., 1971; Ph.D., *Utah State University, 1979*.
- RODNITZKY, JEROME L., *Professor of History (1966)*. B.A., *University of Chicago, 1959*; M.A.T., 1962; Ph.D., *University of Illinois, 1967*.
- ROEMER, KENNETH M., *Professor of English (1971)*. B.A., *Harvard University, 1967*; M.A., *University of Pennsylvania, 1968*; Ph.D., 1971.
- ROSENSTEIN, JOSEPH, *Associate Professor of Management (1979)*. A.B., *University of Chicago, 1939*; M.A., 1941; Ph.D., 1950.
- ROSS, WILBUR R., *Professor of Accounting (1974)*. B.B.A., *Texas A&I University, 1956*; M.B.A., *University of Texas at Austin, 1962*; Ph.D., 1965. CPA.
- ROUSE, LINDA P., *Assistant Professor of Sociology (1985)*. B.S., *Cornell University, 1968*; M.A., *Adelphi University, 1972*; Ph.D., *Florida State University, 1979*.
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- RYAN, THOMAS A., *Assistant Professor of English (1970)*. A.B., *University of Notre Dame, 1966*; A.M., *Brown University, 1968*; Ph.D., 1971.
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- SCHWENDIMAN, CARL J., *Assistant Professor of Finance and Real Estate (1976)*. B.S., *Brigham Young University, 1963*; M.S., 1965; Ph.D., *University of Missouri, 1975*.
- SEATH, DONALD D., *Professor of Aerospace Engineering (1965)*. B.S., *Iowa State University, 1954*; M.S., 1959; Ph.D., 1963. Professional Engineer.
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- SHANNON, MARY COLEEN, *Associate Professor of Social Work (1970)*. B.A., *Texas Christian University, 1962*; M.S.W., *Tulane University, 1965*.
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- SIMONS, GARY F., *Adjunct Assistant Professor of Linguistics (1985)*. B.A., *Seattle Pacific College, 1974*; M.A., *Cornell University, 1976*; Ph.D., 1979.
- SIMOWITZ, ROSLYN, *Assistant Professor of Political Science (1986)*. B.A., *Brooklyn College, 1971*; M.A., *Indiana University, 1973*; Ph.D., 1979.
- SIRCAR, SUMIT, *Associate Professor of Information and Management Sciences (1980)*. B.M.E., *Jadavpur University, 1967*; M.B.A., *Kent State University, 1973*; D.B.A., *Harvard Business School, 1976*.
- SLINKMAN, CRAIG W., *Associate Professor of Information Systems and Management Sciences (1979)*. B.S., *Bowling Green University, 1974*; M.B.A., 1975; Ph.D., *Minnesota, 1982*.
- SMATRESK, NEAL J., *Assistant Professor of Biology (1982)*. B.A., *Bettysburg College, 1973*; M.A., *State University of New York at Buffalo, 1978*; Ph.D., *University of Texas at Austin, 1980*.
- SMITH, CHARLES I., *Professor and Chairman of the Department of Geology (1977)*. B.S., *Baylor University, 1952*; M.S., *Louisiana State University, 1955*; Ph.D., *University of Michigan, 1966*.
- SMITH, CHARLES V., JR., *Professor of Electrical Engineering (1969)*. B.S., *University of Texas at Arlington, 1962*; M.S., *Oklahoma State University, 1964*; Ph.D., *Massachusetts Institute of Technology, 1968*. *Professional Engineer*.
- SMITH, RONDAL BRUCE, *Adjunct Assistant Professor of Linguistics (1982)*. A.B., *Lincoln Christian College, 1961*; M.A., 1965; Ph.D., *Indiana University, 1972*.
- SNAVELY, HOWARD J., *Professor of Accounting (1965)*. B.B.A., *University of Oklahoma, 1956*; M.B.A., *University of Denver, 1964*; D.B.A., *University of Colorado, 1968*. *CPA*.
- SOLOMON, LANNY M., *Professor of Accounting (1978)*. B.S., *Miami University, 1968*; M.B.A., *Case Western Reserve University, 1970*; Ph.D., 1973.
- SPARR, TED M., *Professor in Computer Science and Engineering Department (1974)*. B.S., *Ohio Wesleyan University, 1963*; M.S., *Texas A&M University, 1969*; Ph.D., 1972.
- SPINDLER, MAX, *Associate Professor of Civil Engineering (1970)*. B.S., *Cooper Union, 1961*; M.S., *Northwestern University, 1963*; Ph.D., 1968. *Professional Engineer*.
- STACEY, WILLIAM A., *Associate Professor of Sociology (1970)*. B.A., *Mississippi State University, 1960*; M.A., 1961; Ph.D., *Florida State University, 1970*.
- STANOVSKY, JOSEPH J., *Associate Professor of Aerospace Engineering and Engineering Mechanics (1966)*. B.S., *Southern Methodist University, 1948*; M.S., *University of Texas at Austin, 1951*; Ph.D., *Pennsylvania State University, 1966*. *Professional Engineer*.
- STARK, GARY DUANE, *Associate Professor of History (1975)*. B.A., *Hamline University, 1970*; Ph.D., *Johns Hopkins University, 1974*.
- STARKS, SCOTT A., *Associate Professor in Computer Science and Engineering Department (1981)*. B.S., *University of Houston, 1973*; Ph.D., *Rice University, 1978*.
- STEVENS, GLADSTONE T., JR., *Professor and Chairman of the Department of Industrial Engineering (1975)*. B.S., *University of Oklahoma, 1956*; M.S., *Case Institute of Technology, 1962*; Ph.D., *Oklahoma State University, 1966*. *Professional Engineer*.
- STEVENS, JAMES W., *Professor of Urban Studies (1969)*. B.A., *Florida State University, 1962*; M.A., 1964; Ph.D., 1966.
- STEWART GEORGE L., *Associate Professor of Biology (1977)*. B.S., *Tulane University, 1969*; Ph.D., *Rice University, 1973*.
- STOKELY, ERNEST M., *Adjunct Associate Professor in Biomedical Engineering (1974)*. B.S., *Mississippi State University, 1959*; M.S., *Southern Methodist University, 1964*; Ph.D., *University of Texas of Texas Southwestern Medical School and Southern Methodist University, 1972*.

## FACULTY

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- STRICKLAND, ERIC VERNON, Assistant Professor of Education (1979). B.S., Auburn University at Montgomery, 1973; M.Ed., 1975; Ph.D., University of Texas at Austin, 1979.
- STRICKLAND, S. SUE, Lecturer in Accounting (1971). B.S., Southwestern State College, 1966; M.B.A., University of Arkansas, 1967. CPA.
- STRINGER, PAMELA S., Lecturer in Accounting (1979). B.S., Texas Wesleyan College, 1975; M.B.A., North Texas State University, 1978. CPA.
- STUART, JOHN A., Professor of Foreign Languages (1965). M.A., University of Montreal, 1953; Ph.D., 1959; Docteur (Lettres), University of Paris, 1970.
- STUDERUS, LENARD H., Associate Professor of Foreign Languages (1974). B.A., University of Washington, 1964; M.A., San Diego State College, 1967; Ph.D., University of Colorado, 1974.
- SUNDEL, MARTIN, Professor of Social Work (1980). B.A., St. Mary's University, 1961; M.S.W., Our Lady of the Lake College, 1963; M.A., University of Michigan, 1968; Ph.D., 1968.
- SWANSON, PEGGY E., Professor of Finance and Real Estate (1978). B.B.A., North Texas State University, 1957; M.B.E., 1965; Southern Methodist University, 1967; Ph.D., 1978.
- SWEARINGEN, C. JAN, Associate Professor of English (1986). B.A., University of Texas at Austin, 1971; M.A., 1974; Ph.D., 1978.
- TAEBEL, DELBERT A., Professor of Urban Studies (1970). B.A., Ripon College, 1956; M.A., San Jose State College, 1965; Ph.D., University of Texas at Austin, 1971.
- TAYLOR, LEE, Professor of Sociology (1972). B.S., California State University at San Jose, 1952; M.A., Louisiana State University, 1956; Ph.D., 1958.
- TAYLOR, MARTIN E., Professor and Chairman of the Department of Accounting (1988). B.Comm., University of Capetown, 1966; M.B.A., University of Texas at Austin, 1970; Ph.D., 1974. CPA.
- TERNAY, ANDREW L., JR., Professor of Chemistry (1969). B.S., College of the City of the New York, 1959; M.S., New York University, 1962; Ph.D., 1963.
- THOMPSON, B. CECIL, Associate Professor of Physics (1975). B.A., North Texas State University, 1957; M.A., 1958; Ph.D., University of Texas at Austin, 1965.
- THOMPSON, DAVID S., Assistant Professor in Aerospace Engineering Department (1987). B.S., Mississippi State University, 1979; M.S., 1980; Ph.D., Iowa State University, 1986.
- THOMPSON, WANDA J., Associate Professor of Nursing (1975). B.S.N., Texas Christian University, 1969; M.S.N., Texas Woman's University, 1971; Ed.D., Nova University, 1980. Registered Nurse.
- THURMOND, MARGARET ANN, Lecturer in Accounting (1981). B.B.A., The University of Texas at Arlington, 1977; M.P.A., 1978.
- TIMMONS, RICHARD B., Professor and Chairman of the Department of Chemistry (1977). B.S., St. Francis Xavier University, Canada, 1958; Ph.D., The Catholic University of America, 1962.
- TOLBERT, ROSALYN B., Assistant Professor of Nursing (1977). B.S., Texas Christian University, 1951; M.S., Texas Woman's University, 1974. Registered Nurse.
- TONG, ALBERT Y., Assistant Professor in Mechanical Engineering Department (1983). B.S., University of Hawaii, 1977; M.S., California Institute of Technology, 1978; Ph.D., Carnegie-Mellon University, 1983.
- TRAPANI, JOHN M. III, Professor and Chairman of the Department of Economics (1981). B.A., University of Texas at Arlington, 1968; M.A., 1969; Ph.D., Tulane University, 1972.
- TRUAX, TERRY D., Assistant Professor of Information Systems and Management Sciences (1984). B.A., University of Kansas, 1965; M.A., Louisiana State University, 1967; M.S., University of Michigan, 1980.
- TSAY, JEFFREY JING-HUEI, Associate Professor of Accounting (1974). B.B.A., National Chengchi University, 1966; M.A., University of Missouri, 1969; Ph.D., 1973.
- TURBEVILLE, SIMONE F., Associate Professor of English (1961). Ph.D., Bocconi University, Milan, Italy, 1951; Ph.D., Indiana University, 1960.

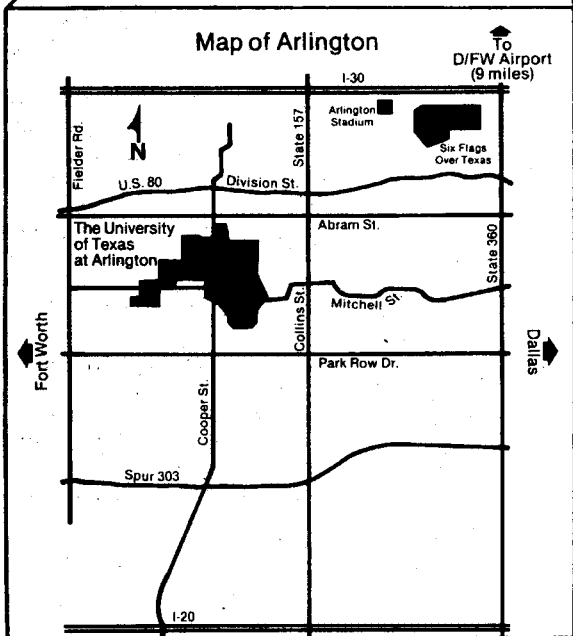
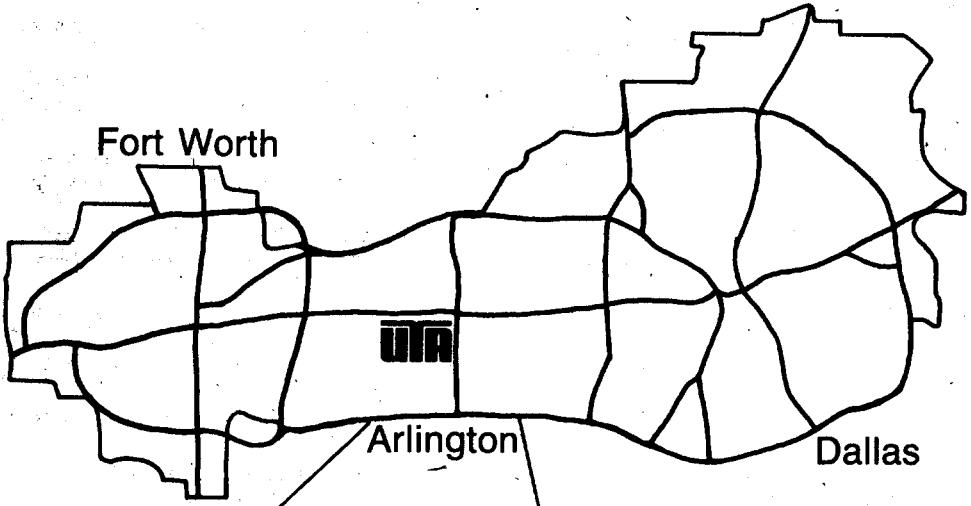
## FACULTY

- TURNER, WILLIAM E., *Professor of Art (1959)*. B.A., *Southern Methodist University, 1952; M.A., Louisiana State University, 1954.*
- UMBAUGH, L. DAVID, *Assistant Professor in Computer Science and Engineering Department (1983)*. B.S., *United States Military Academy, 1958; M.S., Ohio State University, 1979; Ph.D., 1983.*
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- UNDERWOOD, STEPHEN A., *Associate Professor of Computer Science and Engineering (1975)*. B.S., *University of Nebraska, 1958; M.S., Southern Methodist University, 1966; Ph.D., University of Texas at Austin, 1972. Professional Engineer.*
- VIDAL, FEDERICO S., *Professor of Anthropology (1976)*. B.A., *University of Barcelona, 1939; M.A., Harvard University, 1950; Ph.D., 1954.*
- VINA, FREDERICK, *Associate Professor of Foreign Languages (1963)*. B.A., *Colorado State College, 1957; M.A., University of New Mexico, 1960.*
- VITANZA, VICTOR J., *Associate Professor of English (1981)*. B.A., *University of Houston, 1967; M.A., 1970; Ph.D., Northern Illinois University, 1975.*
- VOCKE, DAVID, *Assistant Professor of Education (1986)*. B.S., *Miami University, 1977; M.A., 1982; Ph.D., University of Iowa, 1985.*
- VON MALTZAHN, WOLF-WERNER, *Associate Professor in Biomedical Engineering Program (1979)*. *Arbitur, Staatliches Gymnasiumkiel, 1966; M.S., Ohio State University, 1971; Diplom-Ingenieur, University of Stuttgart, 1974; Ph.D., University of Hannover, 1979.*
- VUILLERMOT, PIERRE, *Associate Professor of Mathematics (1983)*. M.S., *Swiss Institute of Technology, 1971; Ph.D., University of Neuchatel, 1974.*
- WALKER, ROGER S., *Professor of Computer Science and Engineering (1973)*. B.S., *University of Texas at Austin, 1963; M.S., 1970; Ph.D., 1972. Professional Engineer.*
- WALTHER, LARRY M., *Associate Professor of Accounting (1980)*. B.B.A., *University of Texas at Arlington, 1976; M.P.A., 1977; Ph.D., Oklahoma State University, 1980. CPA.*
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- WATTS, THOMAS D., *Professor of Social Work (1974)*. B.A., *Wichita State University, 1963; M.S.W., Arizona State University, 1970; D.S.W., Tulane University, 1976.*
- WEED, FRANK, *Associate Professor of Sociology (1975)*. B.A., *Hanover College, 1965; M.A., University of Illinois, 1967; Ph.D., University of Missouri, 1974.*
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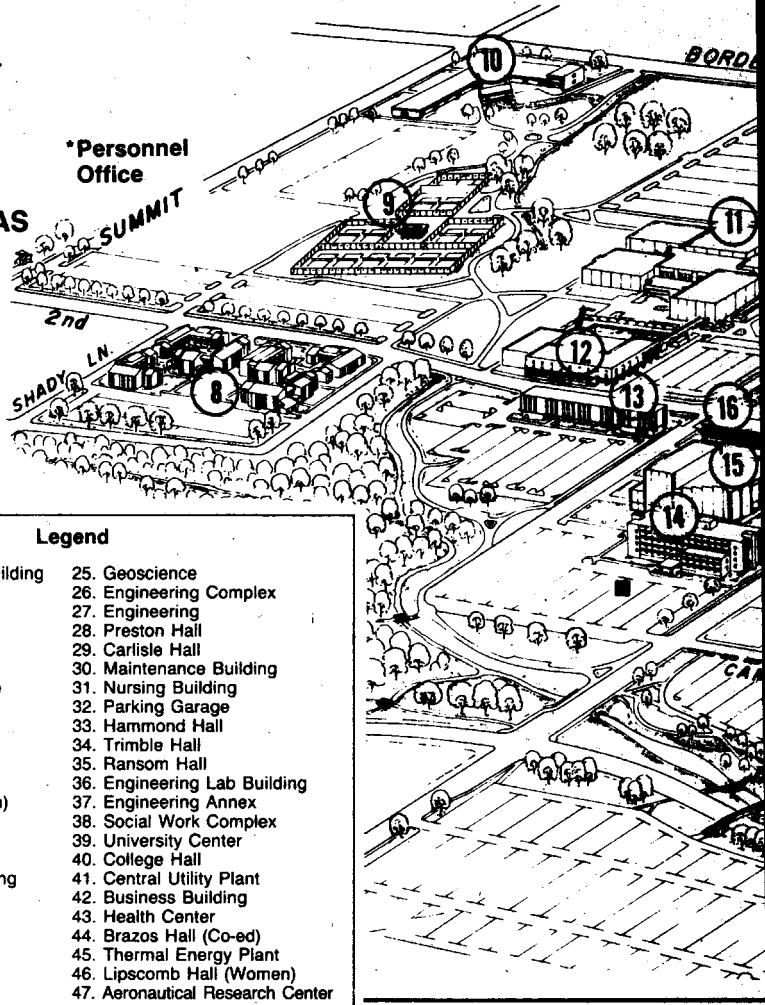
## FACULTY

- WHITESIDE, MARY M., *Associate Professor of Information Systems and Management Sciences (1985)*. B.A., University of Texas at Austin, 1964; M.S., Texas Tech University, 1965; Ph.D., 1974.
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- WITT, TERRY J., *Associate Professor of Accounting (1968)*. B.B.A., University of Texas at Austin, 1962; M.A., University of Oklahoma, 1968. CPA.
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- WOLFF, JOHN A., *Assistant Professor of Geology (1983)*. B.Sc., University of Leeds, 1976; Ph.D., University of London, 1983.
- WOODS, ROBERT L., *Associate Professor in Mechanical Engineering Department (1974)*. B.S., Southern Methodist University, 1968; M.S., Oklahoma State University, 1970; Ph.D., 1971.
- WOOLF, JACK R., *Professor of Engineering and Higher Education and President Emeritus (1957)*. B.S., Texas A&M University, 1948; M.S., 1948; Ph.D., Purdue University, 1951. *Professional Engineer*.
- WRIGHT, GEORGE S., *Dean Emeritus of the School of Architecture and Environmental Design (1971)*. B.A., Williams College, 1940; M.Arch., Harvard University, 1949; M.Arch., 1952. *Registered Architect*.
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- WYMAN, SHERMAN M., *Associate Professor of Urban Studies (1972)*. A.B., Stanford University, 1957; M.P.A., Syracuse University, 1959; Ph.D., University of Southern California, 1969.
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- YUAN, ROBERT L., *Professor of Civil Engineering and Engineering Mechanics (1968)*. B.S., National Chen-Kung University, 1960; M.S., University of Illinois, 1964; Ph.D., 1968. *Professional Engineer*.
- ZACHA, RICHARD B., *Associate Professor of English (1966)*. B.S., Columbia University, 1949; M.S., California Institute of Technology, 1949; M.A., Catholic University of America, 1951; Ph.D., 1962.
- ZIEGLER, LAWRENCE F., *Professor of Economics (1969)*. B.S., University of North Dakota, 1959; M.S., 1960; Ph.D., University of Iowa, 1969.

# METROPLEX

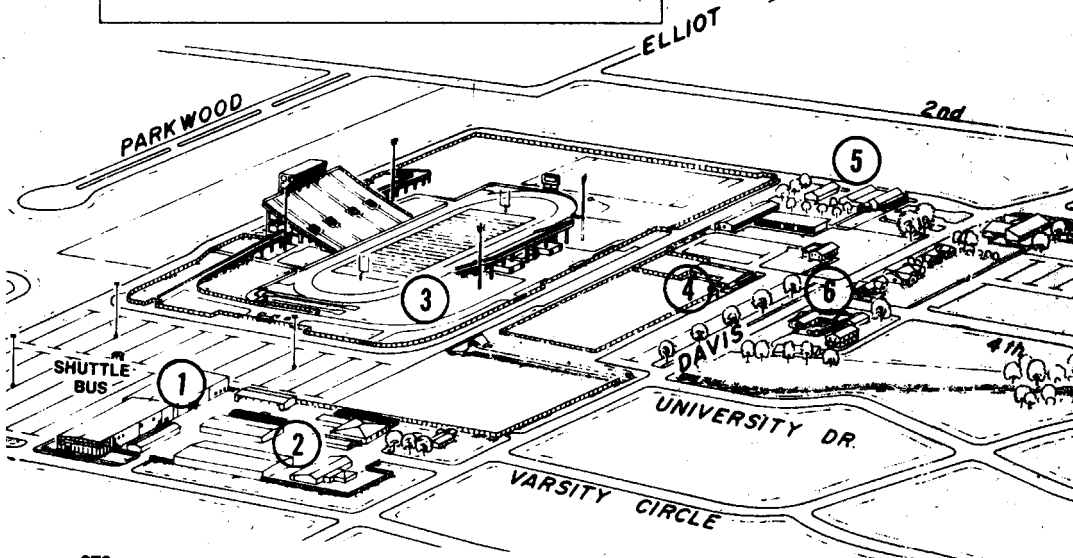


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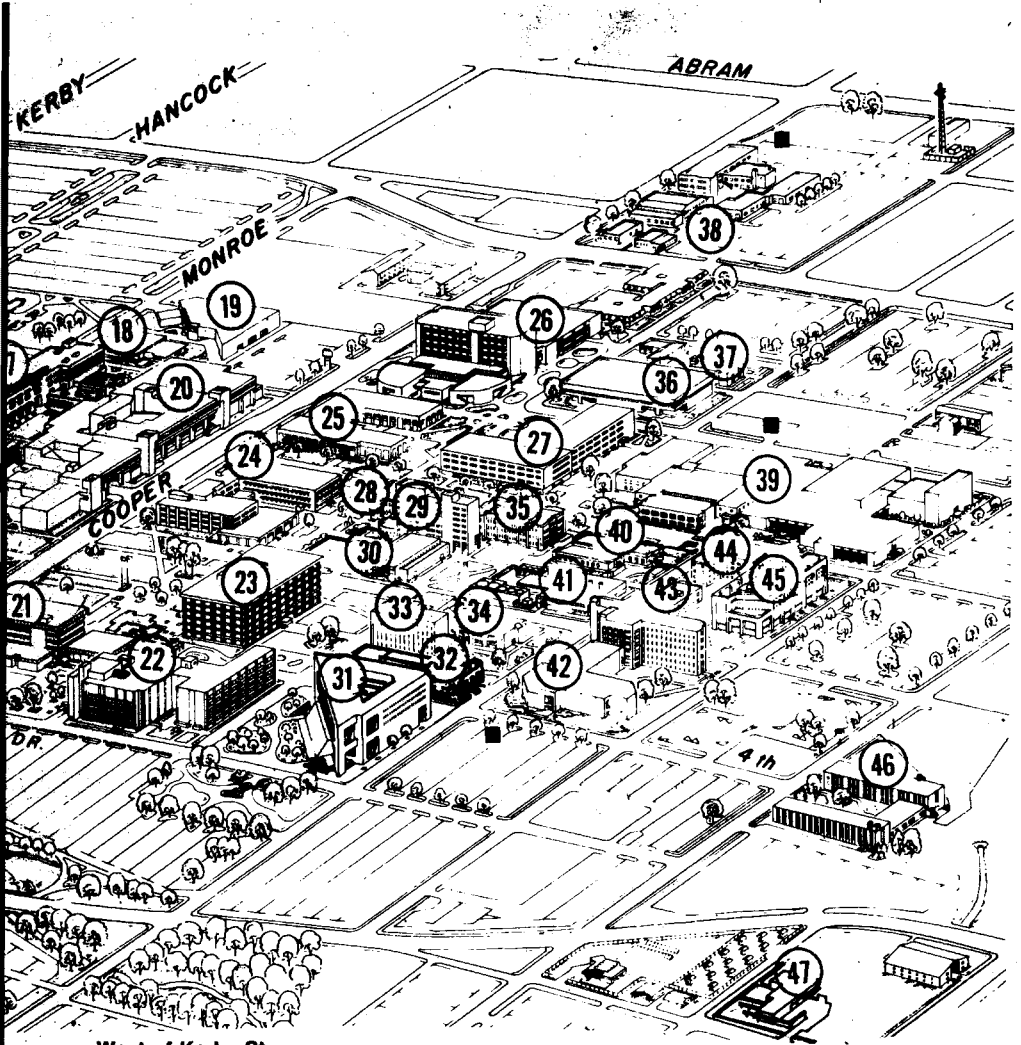


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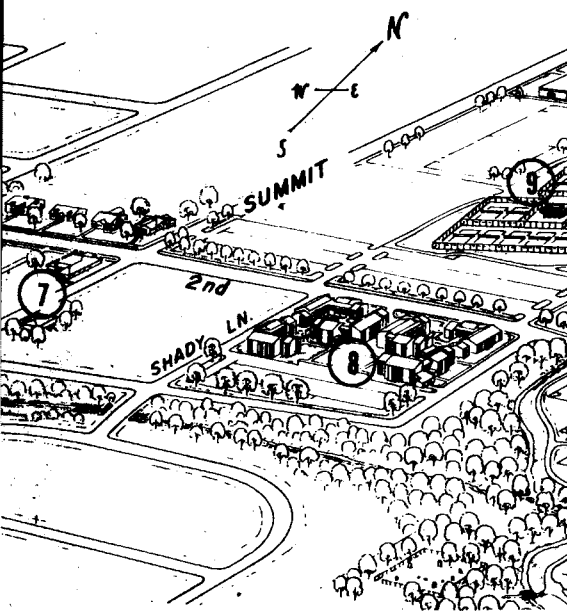
- |                             |                                  |
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| 2. Maintenance Shop         | 26. Engineering Complex          |
| 3. Maverick Stadium         | 27. Engineering                  |
| 4. Maverick Building        | 28. Preston Hall                 |
| 5. Police Building          | 29. Carlisle Hall                |
| 6. Housing Office           | 30. Maintenance Building         |
| 7. International Office     | 31. Nursing Building             |
| 8. University Village       | 32. Parking Garage               |
| 9. Tennis Center            | 33. Hammond Hall                 |
| 10. Swift Center            | 34. Trimble Hall                 |
| 11. Activities Building     | 35. Ransom Hall                  |
| 12. PE Building             | 36. Engineering Lab Building     |
| 13. Trinity House (Men)     | 37. Engineering Annex            |
| 14. Davis Hall              | 38. Social Work Complex          |
| 15. Texas Hall              | 39. University Center            |
| 16. Pacht Hall (Men)        | 40. College Hall                 |
| 17. Architecture Building   | 41. Central Utility Plant        |
| 18. Campus Center           | 42. Business Building            |
| 19. Bookstore               | 43. Health Center                |
| 20. Fine Arts Building      | 44. Brazos Hall (Co-ed)          |
| 21. University Hall         | 45. Thermal Energy Plant         |
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West of Kerby St.



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\* 500 S. Summit

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# NOTES

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## CAMPUS AND GRADUATE SCHOOL CALENDAR, 1989-1990

**Dates of particular importance to graduate students are shown in boldface type.** Graduating students should see p. 40 for the final semester checklist. All Graduate School deadlines, unless otherwise stated, are final at 5:00 p.m. of the date specified (p. 41)

		<b>SUMMER SESSIONS 1990</b>				
		<b>FALL</b>	<b>SPRING</b>			
		1989	1990	1st 5 Weeks	2nd 5 Weeks	11 Weeks
<b>Application Deadlines</b>	Application and Readmission Deadline for <b>International Students</b>	April 21	Sept. 8	Jan. 26	Jan. 26	Jan. 26
	Application Deadline for <b>U.S. Students</b>	June 30	Oct. 27	April 6	April 6	April 6
	Readmission Application Deadline for <b>U.S. Students</b>	July 28	Dec. 1	April 27	April 27	April 27
	Application for Thesis/Dissertation Tuition Reduction	<b>Should be filed no less than one week prior to student's planned registration</b>				
	<b>NEW STUDENT REGISTRATION</b>	Aug. 22-25	Jan. 9-12	Check Summer/Fall Class Schedule		
	First Day of Classes	Aug. 28	Jan. 15	June 4	July 16	June 4
Late Registration	Aug. 28, 29	Jan 15, 16	June 4, 5	July 16, 17	June 4, 5	
Census Date: Final Date to Reserve Graduate Courses for Graduate Credit	Sept 11	Jan. 29	June 7	July 19	June 7	
Completion of "X" Grade from Previous Semester:						
Last date to submit work to instructor	<b>Oct. 6</b>	<b>Feb. 23</b>				
Last date to submit grade change to Dean of the Graduate School	<b>Oct. 20</b>	<b>March 9</b>				
Midsemester: Last Date to Drop or Withdraw (p. 35)	Oct. 20	March 9	June 20	Aug. 1	July 11	
<b>Graduation Deadlines</b>	Deadline For <b>GRADUATION</b> : Last Date to File Application for Graduation, Pay Diploma Fee, and File Final Program of Work	<b>Sept. 27</b>	<b>Feb. 14</b>	<b>July 5</b>	<b>July 5</b>	<b>July 5</b>
	Final Date for <b>Requesting Master's Exam/Dissertation Defense</b> , and Submitting Copy to <b>Examining Committee</b>	<b>Nov. 13</b>	<b>March 30</b>	<b>July 13</b>	<b>July 13</b>	<b>July 13</b>
	Final Date to <b>Hold Master's Examination/Dissertation Defense</b> and to Submit Copy of Thesis/Dissertation to Graduate School for <b>Mechanical Check</b>	<b>Nov. 27</b>	<b>April 13</b>	<b>July 27</b>	<b>July 27</b>	<b>July 27</b>
	Final Date to Submit <b>Approved Thesis/Dissertation</b> to the Graduate School, and to Submit <b>Report of Final Master's Examination/Dissertation Defense</b>	<b>Dec. 4</b>	<b>April 20</b>	<b>Aug. 3</b>	<b>Aug. 3</b>	<b>Aug. 3</b>
	Final Exams	Dec. 11-15	May 5-10	July 10, 11	Aug. 20, 21	Aug. 15, 16
	<b>End of Semester Deadline</b> (see <i>in Absentia</i> Registration, p. 41)	<b>Dec. 18</b>	<b>May 14</b>	<b>Aug. 24</b>	<b>Aug. 24</b>	<b>Aug. 24</b>
	Graduation Exercises:	Winter: December 16, 1989		Spring: May 19, 1990		
	<b>HOLIDAYS:</b> Labor Day—Sept. 4	Thanksgiving—Nov. 23-26		Spring Vacation—March 19-25		Easter—April 13-15

