UNIVERSITY of NORTH TEXAS
HEALTH SCIENCE CENTER at Fort Worth

Graduate School of Biomedical Sciences

2000-2002 Catalog

2000-2002 Graduate Catalog

This catalog is an official bulletin of the University of North Texas Health Science Center Graduate School of Biomedical Sciences and is intended to provide general information. It contains policies, regulations, procedures and fees in effect as of January 1, 2000.

The health science center reserves the right to make changes at any time to reflect current board policies, administrative regulations and procedures, amendments by state law and fee changes. Information provided by this catalog is subject to change without notice and does not constitute a contract between the University of North Texas Health Science Center and a student or an applicant for admission. The institution is not responsible for any misrepresentation or provisions that might arise as a result of errors in preparation.

Students are responsible for observing the regulations contained herein; therefore, they are urged to read this catalog carefully. This catalog does not contain all institutional rules, regulations and policies for which a student is responsible.Students should also consult the Student Handbook. The health science center reserves the right to withdraw a student for cause at any time.

The University of North Texas Health Science Center at Fort Worth is an equal opportunity/affirmative action institution. It is the policy of the health science center not to discriminate on the basis of race, color, religion, sex, age, national origin, disability, or disabled veteran or veteran of the Vietnam era status, in its educational programs, activities, admissions or employment policies. Questions or complaints should be directed to the Equal Opportunity Office, 817-735-2357.

Graduate School of Biomedical Sciences

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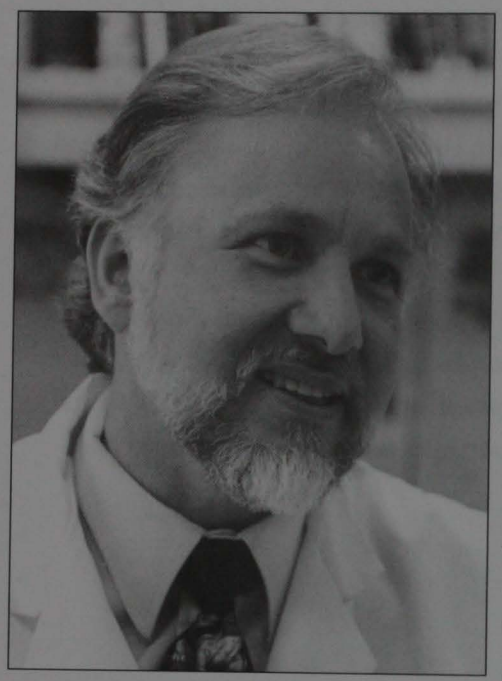
UNIVERSITY *of* NORTH TEXAS HEALTH SCIENCE CENTER *at Fort Worth*

3500 Camp Bowie Boulevard • Fort Worth, Texas 76107-2699 • 817-735-2560

www.hsc.unt.edu

Dean's Message



We are living in the most exciting time in the history of mankind. The human genome project and molecular genetics have introduced gene therapy that will change the way we treat disease. Biomedical research has transformed our understanding of the medical sciences and provided new ways to prevent, treat and cure disease. Although we have made tremendous progress, there are still many among us who suffer from Alzheimer's disease, arthritis, cancer, heart disease and diabetes. We must prepare for new challenges and future needs to preserve human health. The graduate programs at the University of North Texas Health Science Center at Fort Worth will prepare you for a career in this exciting field. It is you, the future scientist, who will find new ways to preserve health and treat disease.

The graduate faculty is a community of scholars dedicated to creating an environment that is stimulating, creative and challenging. Our faculty members are recognized both nationally and internationally for research programs that utilize state-of-the-art technology. Our centers of research excellence are providing leadership in biotechnology, biomedical and health science research. Research areas focus on national needs including cancer, heart disease, diabetes, neuroscience, vision and aging. Our institution leads the state in the increased percentage of research funding over the last five years.

The biomedical sciences program is designed with an integrated core curriculum that provides students a broad foundation of knowledge in the biomedical sciences with advanced courses that enhance specialty training in selected disciplines. Our curriculum teaches a team approach to solving complex problems and promoting the understanding of the biological principles that govern healthy lifestyles. Our goal is to provide you with the tools needed to undertake the challenges of tomorrow.

We are pleased that you have selected the University of North Texas Health Science Center at Fort Worth for your graduate training. The graduate faculty and I welcome you aboard for a most interesting expedition into the future.

Thomas Yorio

Thomas Yorio, Ph.D.
Professor and Dean

Contents

Accreditation

The University of North Texas Health Science Center at Fort Worth is accredited by the Commission on Colleges of the Southern Association of Colleges and Schools (1866 Southern Lane, Decatur, Georgia 30033-4097: Telephone number 404-679-4501) to award master's and doctoral degrees.

2000-2001 Academic Calendar

	Fall 2000	Spring 2001	Summer 1 2001	Summer 2 2001
Admissions				
U.S. application deadline. All application materials must be submitted for consideration.	June 1	Nov 1	April 3	April 3
Non-U.S. application deadline. All application materials must be submitted for consideration.	April 3	Sept 1	Feb 1	Feb 1
New Student Orientation.	July 31 – Aug 3	—	—	—
Convocation.	Aug 4	—	—	—
Registration				
Last day to submit completed Advising Clearance Form for regular registration.	July 14	Nov 17	Apr 20	Apr 20
Last day to submit completed Advising Clearance Form for late registration.	July 28	Dec 8	May 11	May 11
Important Class Days				
Classes begin.	Aug 7	Jan 2	May 29	July 2
12th class day (Fall & Spring)/4th class day (Summer I & II).	Aug 22	Jan 18	June 1	July 6
Final examinations.	Dec 11 – 15	May 14 – 18	June 29	Aug 2
Schedule Changes				
Last day to add a class.	Aug 14	Jan 9	May 30	July 5
Last day to drop a course or withdraw from the health science center with a grade of W for courses that a student is not passing. After this date, a grade of WF may be recorded.	Sept 15	Feb 2	June 8	July 13
Beginning this date, instructors may drop student with a grade of WF for non-attendance.	Sept 18	Feb 5	June 11	July 16
Last day to drop a course with consent of the instructor.	Nov 3	March 16	June 15	July 20
Last day to withdraw from the health science center. Process must be completed by 5 p.m. in the Registrar's Office.	Dec 1	May 4	June 22	July 27
Fee Payment Deadlines				
Last day to pay tuition and fees in full or pay first installment for payment plan. Summer session tuition must be 100% paid upon deadline date.	Aug 4	Dec 22	Due upon registration	Due upon registration
Second installment due.	Sept 8	Feb 5	—	—
Third installment due.	Oct 13	Mar 12	—	—
Payment deadline for tuition, fees and other charges to avoid blocks and delinquent payment fees. Late charges will be assessed.	Nov 17	April 20	—	—
Refunds				
Note: If all courses for the semester are dropped, see Withdrawal Refunds, below.				
Last day for refund of any course dropped.	Aug 22	Jan 18	June 1	July 6
Last day for any partial refund of tuition upon withdrawal.	Sept 1	Jan 26	June 5	July 10
Withdrawal Refunds				
Last day for 100% refund.	Aug 4	Dec 22	May 28	June 29
Last day for 80% refund.	Aug 11	Jan 5	May 31	July 5
Last day for 70% refund.	Aug 18	Jan 12	—	—
Last day for 50% refund.	Aug 25	Jan 19	June 5	July 10
Last day for 25% refund.	Sept 1	Jan 26	—	—

2000-2001 Academic Calendar

Graduation Deadlines	Fall 2000	Spring 2001	Summer 1 2001	Summer 2 2001
Last day for graduation applicants to complete final comprehensive examination and file original copy of thesis or dissertation in graduate dean's office to avoid registration requirement for the semester of graduation.	Aug 18	Dec 15	May 18	—
Last day to file Intent to Graduate.	Sept 29	Feb 1	June 1	—
Last day for degree candidates to: 1. file thesis or dissertation in graduate dean's office for binding; 2. pay all graduation fees; 3. remove grades of "I" in all courses required for degree (exceptions: thesis and dissertation).	Nov 17	May 11	July 27	—
Last day for departments to report to the graduate dean's office the results of final comprehensive examination for graduating students.	—	May 19	—	—
Commencement.				
Holidays/Special Events				
Classes will not be held on the following days due to holidays and/or special events. *Pending Board of Regents approval.				
Convocation.	Aug 4	—	—	—
Labor Day*	Sept 4	—	—	—
Thanksgiving*	Nov 23 – 24	—	—	—
Winter Break*	Dec 25 – Jan1	—	—	—
Martin Luther King. Jr. Holiday	—	Jan 15	—	—
Research Appreciation Day	—	Mar 23	—	—
Memorial Day*	—	—	May 28	—
Independence Day*	—	—	—	July 4

2001-2002 Academic Calendar

Admissions	Fall 2001	Spring 2002	Summer 1 2002	Summer 2 2002
U.S. application deadline. All application materials must be submitted for consideration.	June 1	Nov 1	April 1	April 1
Non-U.S. application deadline. All application materials must be submitted for consideration.	Apr 2	Sept 4	Feb 1	Feb 1
New Student Orientation (mandatory).	July 30 – Aug 2	—	—	—
Convocation.	Aug 3	—	—	—
Registration				
Last day to submit completed Advising Clearance Form for regular registration.	July 13	Nov 9	Apr 12	Apr 12
Last day to submit completed Advising Clearance Form for late registration.	July 27	Dec 7	May 10	May 10
Important Class Days				
Classes begin.	Aug 6	Jan 2	May 28	July 1
12th class day (Fall & Spring)/4th class day (Summer I & II).	Aug 21	Jan 17	May 31	July 5
Final examinations.	Dec 17 – 21	May 13 – 17	June 28	Aug 1
Schedule Changes				
Last day for change of schedule other than a drop.	Aug 13	Jan 9	May 29	July 2
Last day to drop a course or withdraw from the health science center with a grade of W for courses that a student is not passing. After this date, a grade of WF may be recorded.	Sept 14	Feb 1	June 7	July 12

2001-2002 Academic Calendar

	Fall 2001	Spring 2002	Summer 1 2002	Summer 2 2002
Schedule Changes (continued)				
Beginning this date, instructors may drop student with a grade of WF for non-attendance.	Oct 4	Feb 25	June 16	July 28
Last day to drop a course with consent of the instructor.	Nov 2	Mar 29	June 14	July 19
Last day to withdraw from the health science center. Process must be completed by 5 p.m. in the Registrar's Office.	Nov 30	April 26	June 21	July 26
Fee Payment Deadlines				
Last day to pay tuition and fees in full or pay first installment for payment plan. Summer session tuition must be 100% paid upon deadline date.	Aug 3	Dec 21	Due upon registration	Due upon registration
Second installment due.	Sept 7	Feb 5	—	—
Third installment due.	Oct 12	Mar 12	—	—
Payment deadline for tuition, fees and other charges to avoid blocks and delinquent payment fees. Late charges will be assessed.	Nov 9	April 12	—	—
Refunds				
Note: If all courses for the semester are dropped, see Withdrawal Refunds, below.				
Last day for refund of any course dropped.	Aug 21	Jan 17	May 31	July 5
Last day for any partial refund of tuition upon withdrawal.	Sept 17	Feb 7	June 4	July 9
Withdrawal Refunds				
Last day for 100% refund.	Aug 10	Dec 21	May 27	June 28
Last day for 80% refund.	Aug 10	Jan 8	May 30	July 3
Last day for 70% refund.	Aug 17	Jan 15	—	—
Last day for 50% refund.	Aug 24	Jan 22	June 4	July 9
Last day for 25% refund.	Aug 31	Jan 29	—	—
Graduation Deadlines				
Last day for graduation applicants to complete final comprehensive examination and file original copy of thesis or dissertation in graduate dean's office to avoid registration requirement for the semester of graduation.	Aug 17	Dec 14	May 17	—
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Last day for degree candidates to: 1. file thesis or dissertation in graduate dean's office for binding; 2. pay all graduation fees; 3. remove grades of "I" in all courses required for degree (exceptions: thesis and dissertation).	Nov 16	May 10	July 26	—
Last day for departments to report to the graduate dean's office the results of final comprehensive examination for graduating students.				
Commencement.	—	May 18	—	—
Holidays/Special Events				
Classes will not be held on the following days due to holidays and/or special events. *Pending Board of Regents approval.				
Convocation and White Coat Ceremony	Aug 3	—	—	—
Labor Day*	Sept 3	—	—	—
Thanksgiving*	Nov 22 – 23	—	—	—
Winter Break*	Dec 24-Jan1	—	—	—
Martin Luther King. Jr. Holiday	—	Jan 21	—	—
Research Appreciation Day	—	Mar 22	—	—
Memorial Day*	—	—	May 27	—
Independence Day*	—	—	—	July 4

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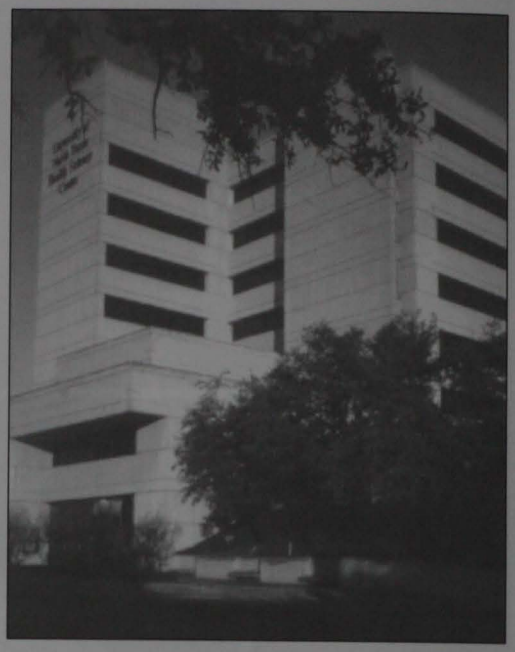
The Health Science Center

Our Mission



The University of North Texas Health Science Center at Fort Worth is committed to achieving excellence in its programs of education, research and service. The health science center maintains the mission and traditions of the Texas College of Osteopathic Medicine and a longstanding relationship with the University of North Texas. The center also shares programs with other health-related and academic institutions.

The health science center educates osteopathic physicians, biomedical scientists, public health professionals, physician assistants and other health professionals for careers in health care, teaching and research. Primary health care is central to the mission of the institution. The center has a special mission to meet the needs of individuals in the geographic areas, and within the age, ethnic and socio-economic groups, in which primary health care is most needed. Health care education and services emphasize promotion of health, prevention of disease and public health issues affecting the patient and society. The institution supports a culturally diverse environment and advocates mutual respect for all members of the health science center community as they strive for excellence.

Education

Undergraduate, graduate and postgraduate teaching programs provide strong foundations of knowledge and skills in the basic and clinical sciences. Their focus is on both individual and societal factors that affect healthful living. Health care services delivered by the institution provide a critical educational arena where faculty serve as both teachers and role models in providing care. Each student is guided along a path of learning that has as its goals the development of critical thinking, problem solving and independent lifelong learning. Particular attention is given to developing attitudes, ethical behavior and personal attributes that characterize a caring health professional sensitive to the special need for primary health care.

Research

The health science center is a community of scholars who are members of the international scientific community. As members of scientific societies and other professional groups, faculty contribute to national and international dialogues in the sciences, medicine and health care. By engaging in scholarly pursuits that contribute to further understanding of health and disease, the faculty and students serve the community, the state and the nation.

Service

The health science center serves the community, the state and the nation, contributing to the exchange of knowledge and its application. Faculty, staff and students take part in outreach programs providing health care professionals, clinical services and education throughout the community, including primary care to underserved individuals. The health science center serves as an educational resource to further the continuing education of practicing physicians and other health professionals.

UNIVERSITY *of* NORTH TEXAS
HEALTH SCIENCE CENTER *at Fort Worth*
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Education, Research,
Patient Care *and* Service

(Accepted by the UNT Health Science Center Board of Regents May 1997 and revised January 1999, and subsequently approved by the Texas Higher Educational Coordinating Board.)

Overview

The University of North Texas Health Science Center is one of the nation's distinguished academic medical centers, dedicated to the advancement of all three disciplines of medical science — education, research and patient care.

A 15-acre, $71 million medical complex, the health science center is located in the heart of Fort Worth's Cultural Arts District. Our campus sits among parks, museums and tree-lined streets rather than in the concrete world of a central hospital district.

The health science center consists of three major institutions — Texas College of Osteopathic Medicine, the Graduate School of Biomedical Sciences and the School of Public Health — with a combined faculty of more than 200, a staff of 900 and a cadre of some 300 volunteer community physicians.

TCOM is Texas' only college of osteopathic medicine, and one of only 19 in the nation. Since 1993 the graduate school has offered master's and doctoral degrees in the biomedical sciences, with specializations in anatomy and cell biology, molecular biology and immunology, pharmacology and integrative physiology. In January 1999, the institution's master of public health program received state approval to become a School of Public Health. This fall it begins offering master of public health and doctor of public health degrees. A doctor of philosophy degree in epidemiology is planned for the near future. In 1997, the health science center launched its first undergraduate program, offering a bachelor of science degree with a major in physician assistant studies.

Faculty members in the health science center's Physicians & Surgeons Medical Group practice in all medical and surgical specialties and subspecialties. More than 188,000 patient visits are logged each year at the health science center's network of 23 clinics and laboratories. A new 135,000-square-foot Patient Care Center opened on campus in 1997.

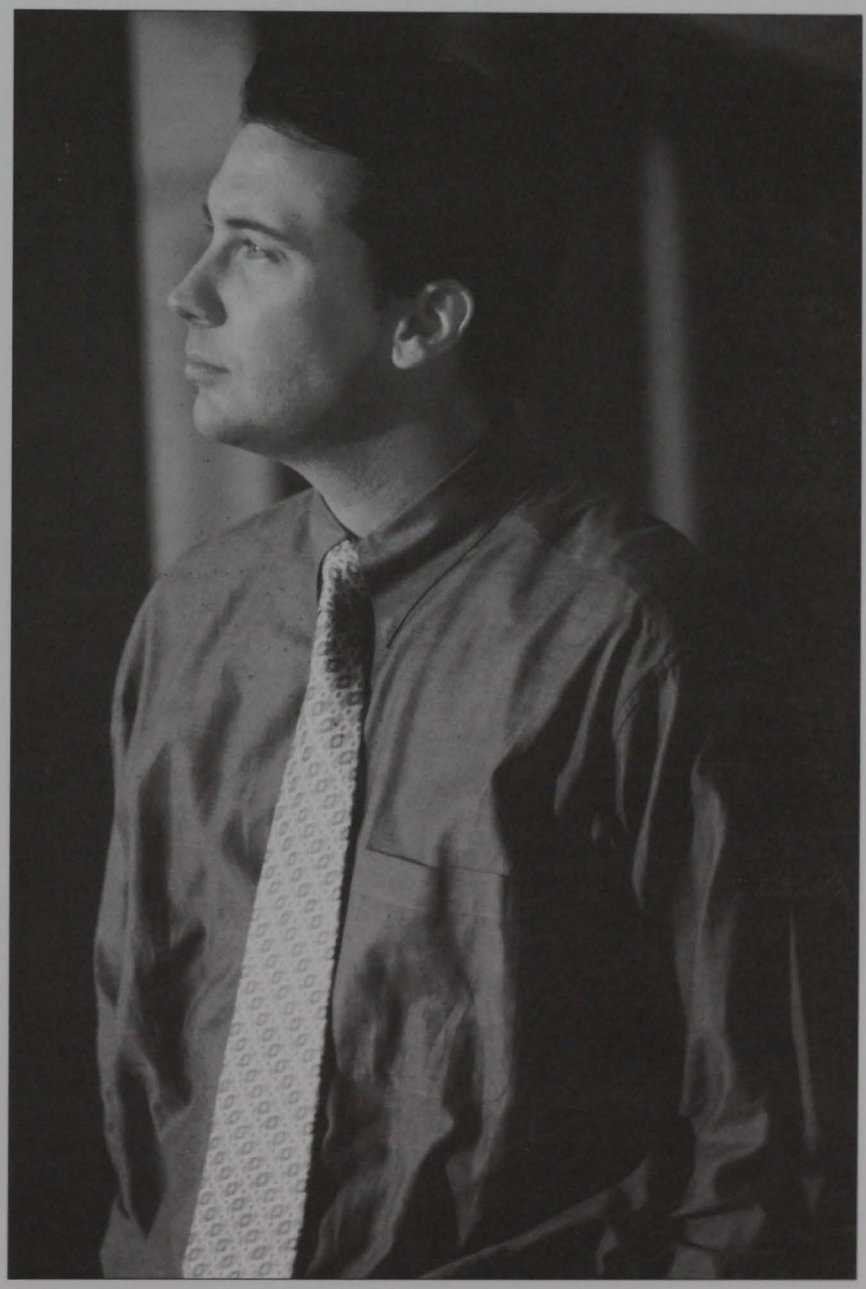
Among the health science center's physicians and scientists are nationally respected faculty members who are leaders in areas such as the biochemistry of aging, vision, heart disease, DNA and genetics, substance abuse, wound healing, osteoporosis and tuberculosis. This growing team of experts has fostered the creation of six Institutes for Discovery.

The health science center is also home to one of the most advanced medical libraries in the Southwest and the premier DNA identity testing laboratory in Texas.

Among the score of community endeavors the health science center is involved in is Fort Worth's medical and technology business incubator, MedTech. This singular project holds promise of creating new businesses and new jobs for the city, while taking medical discoveries from concept to development.

Graduate School of Biomedical Sciences

The Graduate School of Biomedical Sciences has its roots in the Texas College of Osteopathic Medicine, which began in 1970 as a private school. In 1972, TCOM's basic science courses were taught at North Texas State University (now the University of North Texas) in Denton. In addition to the basic sciences faculty hired by TCOM, certain additional



North Texas faculty were contracted to participate in teaching these courses. All TCOM faculty in the basic science departments received joint appointments in the university's Departments of Biomedical Sciences, Biological Sciences or Biochemistry. They also received either full or associate graduate faculty status at the university. These appointments were important because they permitted TCOM basic science faculty to mentor graduate students either in the biomedical sciences master's degree program, or Ph.D. students in biology or biochemistry

The successful collaboration of the two schools earned the confidence of state government leaders and, in 1975, TCOM became a state-supported medical school under the jurisdiction of the governor-appointed North Texas State Board of Regents.

Over the years, TCOM grew in physical facilities as well as basic and clinical sciences faculty. In addition, the number of graduate students seeking training in the health sciences also grew. Until 1993, the students still were officially registered under the University of North Texas graduate program.

In 1992, TCOM faculty were training more than 70 graduate students seeking either the M.S. degree in biomedical sciences or the Ph.D. in biological sciences or biochemistry. These students received virtually all their training at TCOM, in courses taught by TCOM faculty and in laboratories on the TCOM campus in Fort Worth. Because these students wanted doctoral training in the health sciences, it was preferable that they receive a Ph.D. in biomedical sciences with specialties in anatomy and cell biology, biochemistry and molecular biology, physiology, pharmacology and microbiology and immunology.

Because it would benefit students to have their degrees in biomedical sciences and awarded by a health science center, the university and TCOM requested the Texas Higher Education Coordinating Board to transfer the M.S. degree in biomedical sciences and degree-granting authority from the university to the medical school, which was geared to evolve into a health science center, and to establish a Ph.D. degree in biomedical sciences.

On January 25, 1993, the chancellor and TCOM's president submitted the following requests to the Texas Higher Education Coordinating Board: to transfer from UNT to the proposed UNT Health Science Center the Department of Biomedical Sciences and degree-granting authority for the M.S. degree in biomedical sciences; and to approve degree-granting authority to award the Ph.D. degree in biomedical sciences.

On July 15, 1993, the Texas Higher Education Coordinating Board approved the request to transfer the M.S. degree in biomedical sciences and the Department of Biomedical Sciences from UNT, and to establish a Graduate School of Biomedical Sciences at the proposed UNT Health Science Center.

During the summer of 1993, the Texas Legislature unanimously approved the redesignation of TCOM as the University of North Texas Health Science Center, specifying that the center would continue to be a separate and independently functioning institution, not a department or school within the University of North Texas.

The request for a Ph.D. in biomedical sciences was approved on October 28, 1993, and as of November 1, 1993, the UNT Health Science Center began offering both M.S. and Ph.D. degrees in biomedical sciences.

Recognizing the demand in the North Texas area for public health professionals, the UNT Health Science Center and University of North Texas developed a cooperative Master of Public Health program, which was approved by the Coordinating Board in July 1995.

Graduate School of Biomedical Sciences Mission Statement

The Graduate School of Biomedical Sciences is committed to achieving excellence in education, research and service. The graduate school offers students opportunities to earn advanced degrees in the biomedical sciences.

The graduate school provides an innovative educational environment that encourages rigorous investigation in areas of health science research, development of exemplary teaching skills and service to the community.

The graduate school, in conjunction with the Texas College of Osteopathic Medicine, has a further goal to train students for D.O./M.S., and D.O./Ph.D. degrees for future careers as physician scientists in academic medicine. Graduates in Biomedical Sciences fill positions in health science centers, colleges and universities, community health centers, federal agencies and industry.

Institutes for Discovery

Cardiovascular Research Institute

The Cardiovascular Research Institute, established in 1995, provides advanced training for predoctoral and postdoctoral students in support of the basic and clinical science needs of the north Texas area. Special emphasis is on integrating basic molecular research into the development of new treatments for cardiovascular disease and the outcomes of those new treatments. Institute faculty members teach graduate students, medical students and clinical fellows, as well as conduct continuing medical education and community education outreach programs. The

institute sponsors monthly research forums where faculty members and students discuss the integration of basic molecular biology with organ system physiology.

A Ph.D. degree in integrative physiology is offered through the Graduate School of Biomedical Sciences, and students training within the Cardiovascular Research Institute may qualify for stipends.

Geriatric Education and Research Institute

The Geriatric Education and Research Institute, established in 1996, is committed to the promotion of health, quality of life and independence among the nation's elderly through scientific research, education and community service.

Activities to better understand the biology of aging bring together basic and clinical scientists to lead biomedical research programs that are designed to break new ground in areas such as wound healing, vision loss and memory loss.

Activities regarding health promotion and older adults will reflect the osteopathic philosophy of promoting the health and well-being of individuals. The institute is actively involved in a number of programs within the community that promote the physical, psychological and social well-being of the elderly.

Activities in clinical geriatric care go beyond the traditional research goals of solving acute care problems of the aged. Geriatricians, gerontologists, social workers, faculty and medical staff of the institute address the issue of establishing new clinical programs as well as evaluating their effectiveness.

The institute's efforts are closely linked to the health science center's Consortium on Alzheimer's Research and Education (CARE) Program. The CARE Program is involved in a number of clinical and research efforts that examine why and how Alzheimer's disease develops and works toward the discovery of a better method to detect Alzheimer's disease.

Institute for Cancer Research

The Institute for Cancer Research is a newly developed center that serves as the focus for academic leadership in all aspects of cancer research and education within the UNT Health Science Center, as well as for Fort Worth and the North Texas area. The institute serves as the focal point and coordinating organization for cancer-related educational activities at the health science center at the predoctoral, postdoctoral, undergraduate and continuing education levels.

The institute's scope includes, but is not limited to, various aspects of basic and translational research. Institute activities emphasize cancer prevention and control, molecular diagnostics, clinical investigations, and cancer diagnosis and therapy. Basic and translational research areas include cancer cell biology, biochemistry, molecular biology, gene therapy, progression, invasion, angiogenesis/vasculature, metastasis, immunology and experimental therapeutics.

The institute serves as a focal point for interactions with private-sector biotechnology and pharmaceutical companies with interests in cancer.

North Texas Eye Research Institute

The North Texas Eye Research Institute was formed in 1992 to serve as an academic and research focus for basic and clinical science activities within the visual science community of Fort Worth and North Texas.

The institute faculty consists of basic and clinical scientists who have primary appointments at the health science center, private practice or industry. They are heavily involved in the training of medical students, graduate students and postdoctoral fellows. Their research programs cover aspects of eye disease such as retinal degenerations, glaucoma, diabetic complications, aging and cataracts.

The institute sponsors a monthly Distinguished Visual Scientist Seminar Series, a journal club, continuing medical education courses for health professionals and an annual eye health fair. Institute faculty also conduct clinical trials for testing the safety and efficacy of various therapeutic drugs and devices.

Physical Medicine Institute

The Physical Medicine Institute, established in 1998, promotes basic and clinical research, education, clinical practice and community outreach programs in the prevention, diagnosis, treatment and rehabilitation of neuromusculoskeletal disease of human beings of all ages.

The institute is a multi-disciplinary organization composed of basic and clinical science professionals whose interests and work deal with neuromusculoskeletal physiology and pathophysiology. Emphasis is on education, clinical service and research in osteopathic manipulative medicine.

Objectives of the institute include: development of a broad, universally accessible literature database related to osteopathic manipulative medicine and neuromusculoskeletal medicine; education of students, physicians, researchers and the community; provision of state-of-the-art clinical services in osteopathic manipulative medicine and neuromusculoskeletal medicine; development of an international, interdisciplinary taxonomy of manual medicine techniques; and development and publication of clinical and basic science research into the mechanism of action and

clinical efficacy of osteopathic manipulative treatment of neuromusculoskeletal disease.

Substance Abuse Institute of North Texas

The Substance Abuse Institute of North Texas is housed in the Department of Pharmacology and the Department of Psychiatry and Human Behavior. The institute is a consortium of professionals actively involved in research and education related to substance abuse.

The institute promotes strong interactions between its members to develop and extend research programs. Members conduct research into the physiological basis of addiction and substance abuse as well as in development of new drug therapies that will aid in the withdrawal and abstinence from substances of abuse. Research grants from the National Institute on Alcohol Abuse and Alcoholism focus on the treatment of alcohol withdrawal as well as interactions between ethanol and nicotine. Contracts from the National Institute on Drug Abuse concentrate on developing an antagonist to block the reinforcing effects of cocaine. Other current projects include investigations of genetic factors on the consumption of cocaine and the use of genetically-modified (knock-out) animals to determine the underlying neurochemical processes involved in cocaine self-administration.

Educational activities of institute members include graduate and postgraduate training of research professionals, and the training of physicians and other health care professionals. The institute hosts research conferences and cosponsors seminars with area groups. International speakers and visiting scientists are attracted to the health science center campus to interact and perform research with institute members.

Institutional Support Services

Biomedical Communications

The Department of Biomedical Communications is an educational service unit that supports development and implementation of health science center programs. Composed of medical arts/photography, print services, audio-visual/television and electronic engineering, the department's primary functions are the design and production of various forms of learning materials and the repair of equipment used by faculty and students.

Videotaping of procedures, patients or lectures, as well as production of specialized educational or promotional programs, is available both in the studio and on location. New video teleconferencing technology links the health science center and the University of North Texas in Denton to teach courses and conduct meetings. The department also receives programs on a variety of medical and policy issues via satellite.

Classroom playback of instructional videos, setup of audio-visual equipment for classroom use, student equipment checkout, maintenance of biomedical and electronic equipment, audio-visual systems design, and duplicating and offset printing are additional services offered by the department.

Medical arts personnel create charts, graphs, illustrations, posters, brochures, newsletters and magazines for the various educational, research and community service endeavors of the institution. Medical photographers provide the prints and slides to complete these instructional and promotional materials, as well as on-site photography of patients, procedures and important events.

Gibson D. Lewis Health Science Library

The health science center's library supports the educational, patient-care, research and community-service missions of the institution by meeting the information needs of faculty, students, staff and the local health sciences community.

Featuring the latest information technology, this spacious and attractive facility provides the physical and intellectual resources needed for study, instruction and research. The library collection contains over 150,000 volumes and 2,280 serial titles in the basic biomedical sciences, clinical medicine and affiliated fields. Special Collections preserves historically significant materials, including over 2,400 volumes of osteopathic and nineteenth century medicine, The William G. Sutherland Collection, and institutional archives, photographs and oral histories.

The library uses the Library Information System (LIS) to provide access to the library's collections and to the National Library of Medicine's MEDLINE database. LIS may be accessed in the library, via telephone modem or through the Internet. Library instruction on LIS, MEDLINE and other library services, as well as reference services and mediated computer searches, are readily available.

Materials not owned by the library may be obtained through interlibrary loan from many sources. The library has been a resource library in the National Network of Libraries of Medicine since 1991. In addition, the library is a member of the South Central Academic Medical Libraries Consortium, which provides access to all 14 academic medical/health science center libraries in Texas, Arkansas, Louisiana, Oklahoma and New Mexico.

The library's Media Resources Center houses an

audio-visual collection of over 5,800 titles, including 340 computer software programs and some 124 anatomical models. The collection includes titles with a broad appeal to both medical/scientific users and the general public. Sixteen viewing rooms are equipped with video playback and slide-tape projectors.

Three networked computer labs, with Macintosh and Windows computers, are available for student, staff and faculty use. Monthly computer classes are also offered. The Internet can be accessed in all three labs. Portable computers are also available for overnight and weekend checkout.

All health science center students receive the full range of library services, including borrowing privileges, individual and group study areas, photocopying, computer searches, reference help, document delivery services, print indexes, personal instruction in the use of the library and access to the library's collections. Students must have I.D. badges to borrow materials and gain access to the library's various study rooms. Students are cautioned to be careful with food and drink in the library. Food and drink are not allowed in the computer labs.

Copy cards are available for purchase. The library is a member in the Copyright Clearinghouse Center to ensure compliance with the copyright law.

Information Technology Services

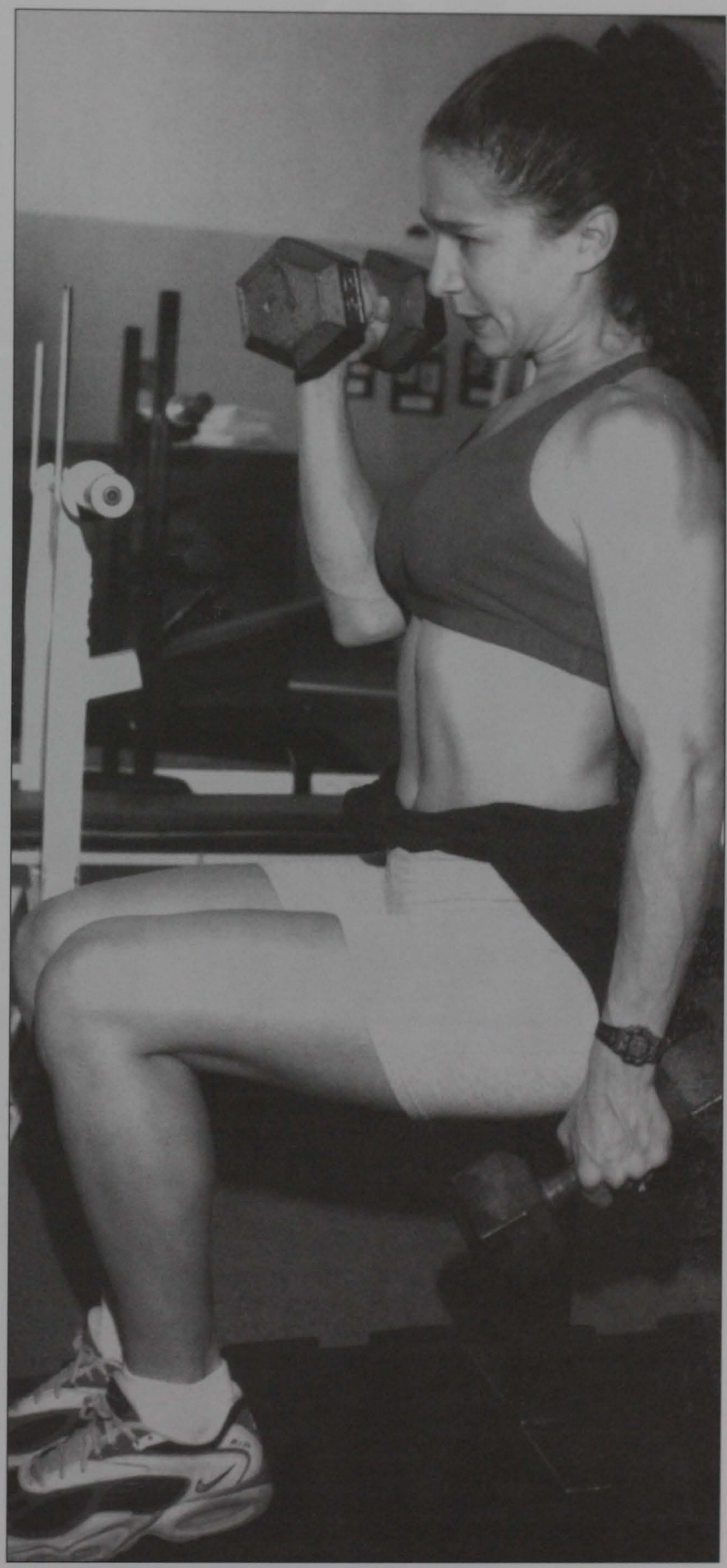
Information Technology Services provides quality computer and telecommunication services to all academic, academic administrative and fiscal administrative areas of the health science center.

Systems and Programming Services designs and implements computer systems and programs for fiscal and academic administrative areas of the institution.

Network and Microcomputer Services is responsible for the design, installation and maintenance of academic and administrative local-area networks (LANs) on campus. Computer users connected to the LAN have access to a variety of software programs and are able to exchange data and electronic mail with users across the institution and off campus. Dial-in access is available for both IBM and Macintosh platforms.

The division provides consultation and user assistance to computer users relative to hardware and software use, communications, printing and planning a computer purchase.

Telecommunication Services operates and maintains the campus-wide telephone system with state-of-the-art equipment and software, and maintains and produces an in-house telephone directory for faculty and staff. This division also manages the telephone voice mail system, as well as



all pagers and answering services, and advises users about cellular telephones. The division is responsible for submitting the Yellow Pages and White Pages information to appropriate telephone companies.

Records Management maintains a program for the economical and efficient management of institutional records. The division is responsible for the preparation and maintenance of the records-retention schedule and approves all requests for the disposal of state records.

Office of Research and Biotechnology

The Office of Research and Biotechnology develops policies and administers programs to enhance research and scholarly activity and to assure institutional compliance with all mandated requirements related to research. The office assists in proposal development, identification of and negotiations with potential sources of support, and post-award management of research funds. The office manages intellectual property (patents and copyrights), institutional policies and research contractual matters.

The office coordinates all basic and applied research, clinical trials and biomedical technology programs, including the Institutes for Discovery. Programs that promote these activities include seminars and workshops, faculty research programs, collaborative and community outreach activities and a variety of programs to encourage students to enter careers in research.

The office also plays a leadership role in establishing and nurturing new research partnerships, technology transfer, and commercialization with industry and the private sector.

Special Programs for Undergraduates

Summer Multicultural Advanced Research Training

Each summer, the Graduate School of Biomedical Sciences hosts the Summer Multicultural Advanced Research Training (SMART) program. Designed to familiarize undergraduate students with the varied disciplines and methodologies used in biomedical research, the SMART program allows students to work with faculty scientists in state-of-the-art laboratories. SMART participants also attend classroom lectures to study the physiological sciences, general laboratory principles and safety practices. Acceptance into the SMART program includes a stipend and housing allowance. An application may be obtained by calling the Graduate School of Biomedical Sciences at (800) 511-GRAD or (817) 735-2029. It may also be requested by e-mail to: gsbs@hsc.unt.edu.

Ronald E. McNair Post-Baccalaureate Achievement Program

The Ronald E. McNair Post-Baccalaureate Achievement Program was established to prepare low-income students, first generation college students, and students from groups underrepresented in graduate education for doctoral study. It is a national program of the U.S. Department of Education, created in memory of Ronald E. McNair, Ph.D., an African American physicist killed in the Space Shuttle Challenger mission in 1986. Participants in the McNair program on the UNT Health Science Center campus receive tutoring, counseling, assistance with securing graduate program admission and financial aid, preparation for the Graduate Record Examination, and various other support services. McNair scholars also participate in summer internship programs in research laboratories with faculty mentors.

Participants from the Summer Multicultural Advanced Research Training program are given preference for placement in the McNair program but other students are encouraged to apply. An application may be obtained by calling the Graduate School of Biomedical Sciences at (800) 511-GRAD or (817) 735-2029. It may also be requested by e-mail to: gsbs@hsc.unt.edu.

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Admissions

Application

The Graduate School of Biomedical Sciences participates in GradAdvantage, an online application service. It is highly preferred that applicants apply through this online process. Links to the GradAdvantage application are located on our web site at www.hsc.unt.edu. An application for admission can also be obtained from the graduate office by writing or calling:

Graduate School of Biomedical Sciences
UNT Health Science Center at Fort Worth
3500 Camp Bowie Boulevard
Fort Worth, Texas 76107-2699
817-735-2560 or 800-511-GRAD

Applicants applying for the first time to the Graduate School of Biomedical Sciences must pay a non-refundable application fee: $25 for U.S. citizens, $50 for non-U.S. citizens and permanent residents. The fee must be paid in U.S. currency. This application fee is valid for one year from the application date. McNair Scholars are not required to pay application fees.

Deadlines

The deadlines listed below are not postmark deadlines. All application materials must be received by 5:00 p.m. on deadline day. All application materials submitted become the property of UNT Health Science Center and cannot be returned.

	U.S.	Non-U.S. and Permanent Residents
Fall 2000	June 1	April 3
Spring 2001	Oct 2	Sept 1
Summer 2001	April 2	Feb 1
Fall 2001	June 1	May 1
Spring 2002	Oct 1	Sept 3
Summer 2002	April 1	Feb 1

The Graduate Council awards assistantships to entering doctoral students once a year. To be considered for this award, applications for admission in the Fall semester must be completed by February 1 of the same year.

It is highly recommended that non-U.S. citizens apply well in advance of these deadlines to allow preparation of immigration documents.

Requirements for Admission

General Admission Requirements

All applicants for admission to the Graduate School of Biomedical Sciences must meet the following requirements, whether or not admission to a specific degree program is sought.

1. The applicant must hold a bachelor's degree or its equivalent from a regionally accredited institution.
2. Specific grade point average (GPA) requirements for non-degree and degree-seeking students follow. The GPA is calculated by dividing the total number of grade points earned by the total number of semester hours attempted (A equals four grade points, B equals three, C equals two, D equals one, F equals zero). The applicant must have at least a 3.0 GPA on the last 60 undergraduate semester hours of course work before receiving the bachelor's degree, or on all undergraduate work, in order to receive unconditional admission to the Graduate School of Biomedical Sciences. Applicants who have already completed a master's degree must have at least a 3.0 GPA on the master's or meet the undergraduate GPA standards just listed in order to be admitted unconditionally. Non-degree seeking students will be allowed to take only 12 semester credit hours.
3. All students seeking a graduate degree are required to take the Graduate Record Examination (GRE). Specific requirements are listed later in this chapter.
4. The applicant may be required to take entrance examinations, either oral, written, or both, before admission to the Graduate School of Biomedical Sciences is granted.
5. The health science center requires an applicant from a foreign country to demonstrate satisfactory proficiency in oral and written English before being granted admission in addition to supplying official documentation of minimum scores for the Test of English as a Foreign Language (TOEFL) exam. More detail on international admission requirements are listed in this chapter.

6. To be considered for admission, the applicant must file the following official credentials with the dean of the Graduate School of Biomedical Sciences at the address given above:
   - an application for admission to the Graduate School of Biomedical Sciences
   - complete official transcripts from all colleges or universities attended
   - official scores from the Educational Testing Service on the required entrance test or tests (see below)
   - the application fee
   - two letters of evaluation by individuals in a position to comment on the applicant's potential as a graduate student and future professional. Applicants to the Ph.D. program in Public Health/Preventive Medicine must supply four letters of evaluation
   - a written statement of personal career goals

An applicant who has attempted graduate work at another institution within the six-year period immediately before first enrollment in the Graduate School of Biomedical Sciences but has not received a graduate degree will be required to make up any grade point deficiency below a B average either at the institution at which graduate work was attempted or at the health science center. (See "Time Limitations" in the Master's Degree Program section of this catalog for details concerning validity of previous graduate work.)

Admission to the Graduate School of Biomedical Sciences does not imply candidacy for a graduate degree.

Applicants for admission are furnished written notification of their admission status by the dean of the Graduate School of Biomedical Sciences. Statements by other health science center personnel concerning the applicant's admissibility are not valid until confirmed by the dean in writing.

Students who are admitted to a graduate degree program and do not enroll in the semester for which they have applied must contact the Graduate School of Biomedical Sciences to have their file re-evaluated.

Graduate Record Examination Requirements

All students seeking admission to a graduate degree program are required to take the Graduate Record Examination (GRE). Applicants to the D.O./M.S, or D.O./Ph.D. programs may substitute an appropriate Medical College Admissions Test (MCAT) score with the approval of the dean. Only official GRE score reports from the Educational Testing Service are acceptable.

The GRE requirements may be waived by the graduate dean for the individual student only in exceptional cases and only on petition by the student to the graduate dean.

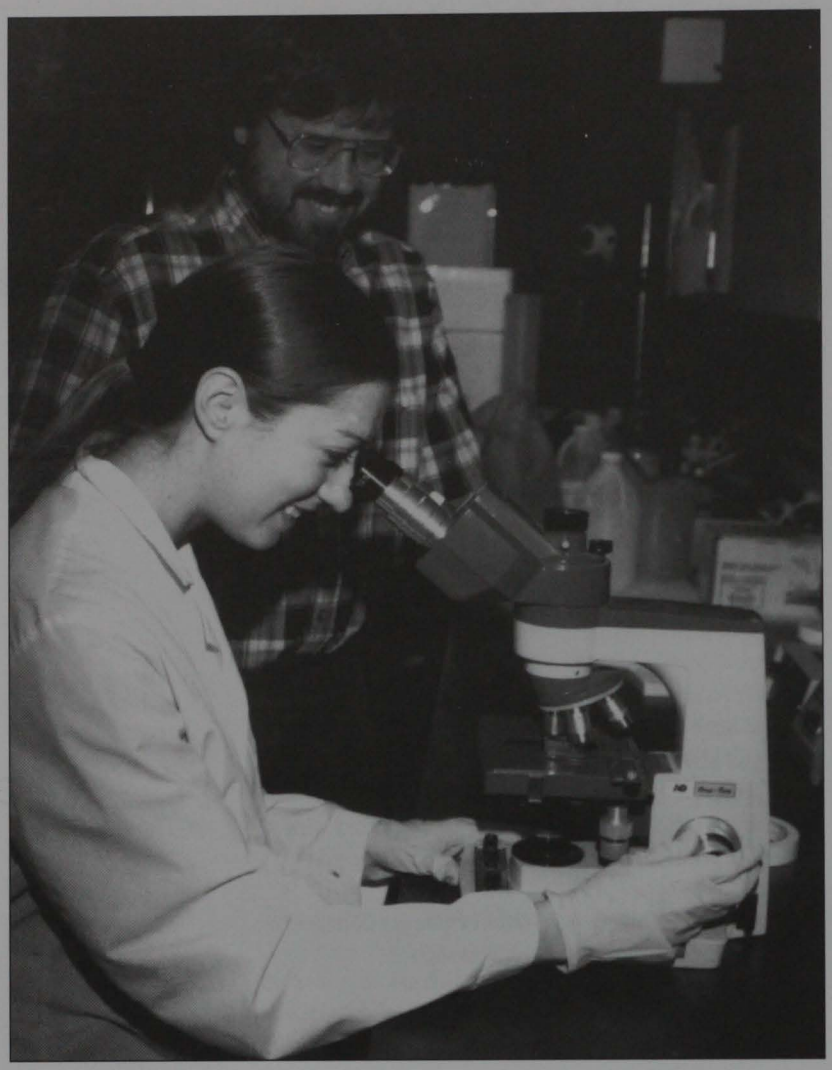
Admission Requirements for International Applicants

Applicants who are not U.S. citizens should apply for admission at least six months before the anticipated enrollment date. If transferring from a college or university they must meet all UNT Health Science Center transfer admission requirements. Specific requirements are detailed below.

The health science center will not issue immigration papers for student visas until all admission credentials have been received and approved. A $50 (U.S.) application fee is required and must be submitted with the application for admission. This fee is subject to change at any time.

Applicants who are graduates of foreign colleges or universities must present the following for application:

- application forms for admission to the Graduate School of Biomedical Sciences accompanied by $50 (U.S.) application fee
- official reports from Educational Testing Service (ETS) on the Graduate Record Examination
- official reports from ETS showing a minimum score of 213 on the computer-based Test of English as a Foreign Language (TOEFL) or evidence of successful completion of a non-credit intensive course in English
- official transcripts from each college or university attended both in English and the native language
- proof of available financial resources, filed with application for admission
- transfer credit from foreign universities. The amount of such credit that can be applied to a degree earned at the health science center will be determined by the graduate dean on recommendation of the student's advisory committee and major department or division. Recognition by the health science center of graduate credit earned elsewhere does not imply



that degree credit will be allowed automatically.

- two letters of evaluation from individuals in a position to comment on the applicant's potential as a graduate student and future professional.
- English screening examination (see details below)
- a written statement of personal career goals

English Screening Examination

All international students and non-exempt permanent residents whose native language is not English are required to take the English Language Proficiency Screening Test after arrival at the health science center during orientation. There are no study aids available for the screening examination.

Exemptions from this test are made only for students who hold a bachelor's or graduate degree from an accredited U.S. college or university, or have completed four years of study at an accredited U.S. four-year secondary school. This screening test requirement is not eliminated by TOEFL scores or scores on other standardized tests (i.e., GRE), by English classes taken at other institutions or by completion of an intensive English program at another institution.

Students may take the screening test only one time before the semester of admission. Students may not retake the test later to get better results or to try to eliminate the requirement for English language classes mandated by the test.

A student's performance on the English Language Proficiency Screening Test determines the student's eligibility for (1) full-time health science center graduate study, (2) part-time health science center graduate study and part-time non-credit English as a Second Language (ESL) course work, or (3) full-time ESL course work. If ESL courses are required, they must be taken during the semester the screening test is taken. Required ESL courses may not be postponed and must receive first priority in the student's course scheduling. Students who do not successfully complete the required ESL course work during the first semester of enrollment will have restricted course registration or be blocked from further enrollment in the health science center. ESL courses are available at the University of North Texas.

Additional Admission Policies

Admission of Applicants to Non-Degree Status

The health science center recognizes that some students may wish to be admitted to the Graduate School of Biomedical Sciences for the purpose of taking courses not necessarily leading to an advanced degree. Admission to the Graduate School of Biomedical Sciences may be granted subject to the following provisions.

1. The applicant must meet all of the general admission requirements described above and must meet all application deadlines.
2. The student in this status is required to receive credit in all graduate courses taken, and must maintain a GPA of 3.0 on all such courses attempted.
3. A student who is admitted to non-degree status has no assurance that work completed under this status will be applicable toward degree requirements should he or she subsequently be admitted to a degree program at the health science center. A maximum of 12 semester hours may be taken. Exceptions to this policy can be approved only by the graduate dean upon recommendation of the student's advisory

committee. Completion of departmental graduate courses by non-degree students does not obligate the Graduate School of Biomedical Sciences to grant admission to a degree program at a later date, unless all general and specific requirements for admission to that program have been met.

4. A student who wishes to change from non-degree status to degree status must have satisfactory GRE scores on file in the Graduate School of Biomedical Sciences.

Admission of Applicants to Probationary Status

UNT Health Science Center admits students on a probationary basis in cases where the GRE scores are below the average of the applicant pool, providing that all other admission criteria are met or exceeded. Students admitted on probation must earn a 3.0 GPA during the first semester of study and retake the GRE. Students may be continued on probation for one semester should these requirements not be met.

Course Deficiencies

An applicant desiring to pursue graduate work in any subdiscipline whose undergraduate record does not show completion of the courses prerequisite to this subdiscipline or track will be required to make up such deficiencies in a manner prescribed by the student's major department.

Admission of Continuing Students

A continuing student is defined as a student who enrolls one time during four consecutive semesters. Example: enrolls Summer I 2000; no enrollment Summer II 2000, Fall 2000 or Spring 2001; re-enrolls Summer I 2001.

Continuing students do not need to reapply to the Graduate School of Biomedical Sciences to enroll if they meet all of the following conditions:

1. The student has not received a degree from the health science center since last enrollment.
2. The student does not have any current blocks on his or her record, i.e., GRE or academic.
3. The student has not attended any other academic institution during his/her absence from the health science center.

Students who are unsure that they meet all of the above conditions for re-enrollment should contact the Graduate School of Biomedical Sciences before the registration period.

Readmission of Former Graduate Students

Students who previously have been admitted to the Graduate School of Biomedical Sciences but have not enrolled here once during the last four consecutive semesters (i.e., Fall, Spring, Summer I and Summer II) must follow these re-enrollment procedures:

1. File an admission application.
2. Submit transcripts from all colleges attended (if any) since leaving the health science center, showing eligibility to re-enroll at each institution. Former students who have not enrolled elsewhere since leaving the health science center and are in good academic standing are required only to submit an admission application.

Courses Taken for Doctoral Credit by Students Completing the Master's Degree

Students completing the master's degree at the health science center who plan to continue work toward the doctorate degree are required to submit application for readmission to the Graduate School of Biomedical Sciences in doctoral status. Those who wish to begin taking courses to be credited on the doctorate before receiving the master's degree must declare this intention in the office of the graduate dean at the time of registration for doctoral status, so that doctoral work may receive proper credit. Final acceptance of such work will not be granted until the student has secured full admission to a specific doctoral program of study.

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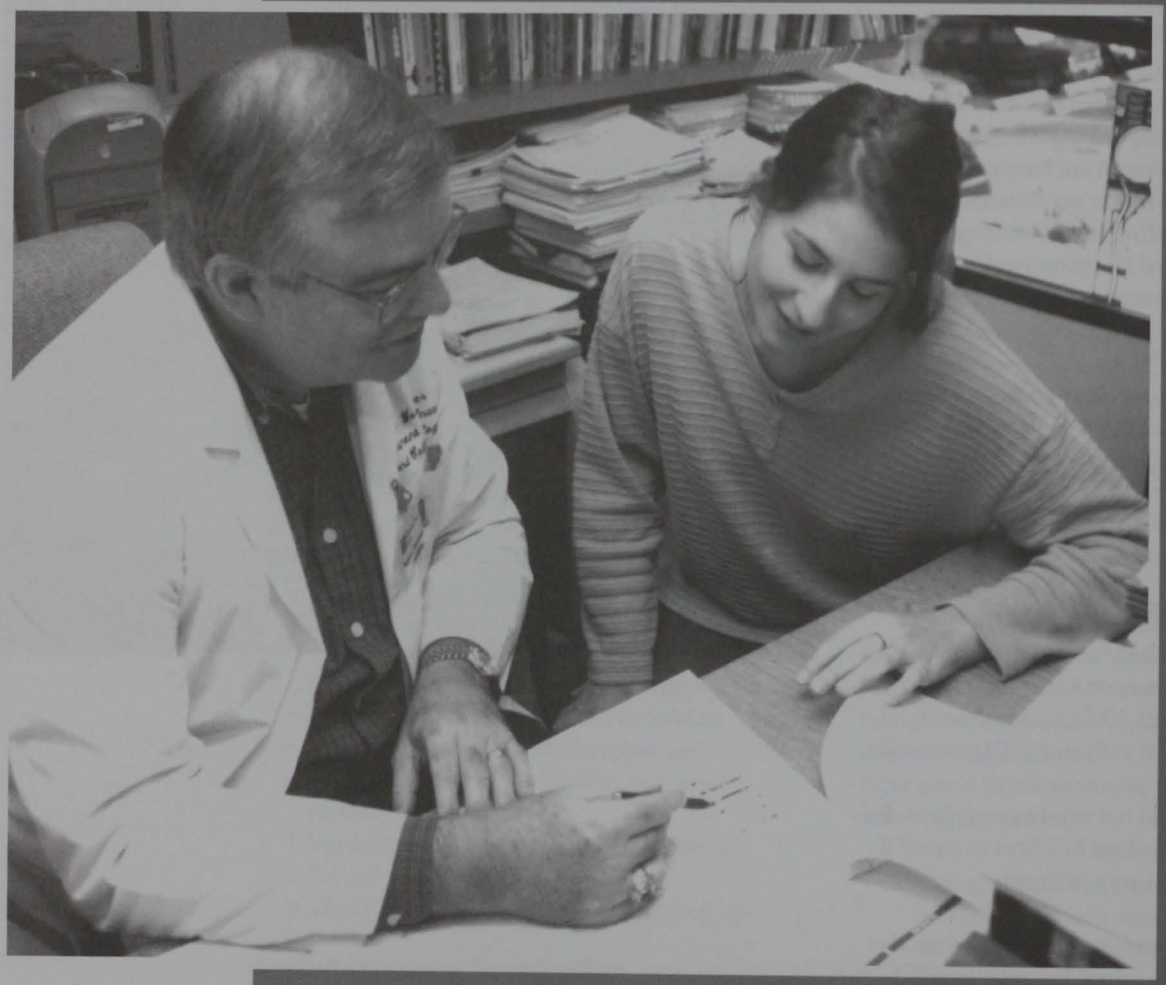

Academic Policies

The general policies of the Graduate School of Biomedical Sciences are determined by the Graduate Council and administered by the dean.

Standards, fees and other requirements may be modified at any time by the Graduate Council. Students should review the Student Handbook for additional policies and procedures concerning their roles as students.

Academic Misconduct

Cheating and plagiarism are types of academic misconduct for which penalties are described and assessed under the health science center's Code of Student Conduct.

The term "cheating" includes, but is not limited to: (1) use of any unauthorized assistance in taking quizzes, tests or examinations; (2) dependence upon the aid of sources specifically prohibited by the instructor in writing papers, preparing reports, solving problems or carrying out other assignments; and (3) the acquisition, without permission, of tests or other academic material belonging to a faculty or staff member of the health science center.

The term "plagiarism" includes, but is not limited to, the use, by paraphrase or direct quotation, of the published or unpublished work of another person without full and clear acknowledgment. Plagiarism also includes the unacknowledged use of materials prepared by another person or agency engaged in the selling of term papers or other academic materials.

Specific penalties can be assigned by a faculty member for certain cases of academic misconduct (including cheating and plagiarism). These penalties include: giving a failing grade for the test or assignment; reducing or changing the grade for the test, assignment or course; requiring additional academic work not required of other students; and assigning a failing grade in the course. Other specific penalties can be recommended by a faculty member to the appropriate administrative/academic authority, including denial of the degree, expulsion from the health science center or revoking of a degree already granted.

All graduate students are responsible for making themselves aware of the definitions and implications of academic misconduct. For further information on academic misconduct, penalties and appeal procedures, the student should refer to the Code of Student Conduct and Discipline in the Student Handbook.

Annual Performance Review

Every graduate student accepted into a degree program will undergo an annual performance review by the major professor which will be reported to the graduate school through the discipline graduate advisor. The review process is designed to assist students in meeting discipline expectations and document students' annual progress toward degree.

Appeal Processes

Specific policies and procedures have been established for students seeking to file academic or misconduct appeals. These policies and procedures appear in the Student Handbook.

Appeals concerning admission to graduate school should be addressed to the graduate dean.

Advice concerning how to pursue appeals on any other matter can be sought from the Associate Dean for Student Affairs.

Auditing

With the written permission of the department chair and the dean of the graduate school, an individual fully eligible to enroll in the graduate school may sit in a class as an auditor without receiving graduate credit. The auditor's name will not be entered on the class roll, and the instructor will not accept any papers, tests or examinations.

Attendance as an auditor may not be used as the basis of a claim for credit in the course. Students who are enrolled for credit may audit classes without payment of additional fees; others pay an auditor's fee as shown in the Tuition and Fee Register.

A person 65 years of age or older may enroll as an auditor and observer without credit and without payment of an audit fee if space is available and if approved by the department chair and the dean. Such enrollment entitles the person to library privileges, but not the use of laboratory equipment and supplies, health and hospital benefits.

Change of Discipline

Any student requesting a change of discipline must be in good academic standing and have approval of the major professor, graduate advisor or track director, and discipline chair of both the original and the requested discipline.

Class Attendance

Regular and punctual class attendance is expected. Although in general students are graded on intellectual effort and performance rather than attendance, absences may lower the student's grade where class attendance and class participation are deemed essential by the faculty member. In those classes where attendance is considered as part of the grade, the instructor should so inform students at the semester's beginning by a written notice. Any instructor who informs students in writing about the necessity of class attendance may request of the Registrar that a student be dropped from the course with a grade of WF upon the accumulation of the stated number of absences.

If the instructor-initiated drop action falls within the time that the student is eligible to drop with instructor consent and without penalty, the Registrar's Office notifies the student that a WF will be recorded unless the student initiates the drop procedure, in which case a W will be assigned.

Disciplines and similar academic units have authority to establish a discipline-wide or course-wide policy, so long as the policy is in accord with the above stipulations.

Concurrent Enrollment at Another Institution

Graduate students must secure written permission from the graduate dean before registering for any course or courses at another institution while registered for any courses at the health science center.

Failure to secure the required permission for concurrent enrollment prior to registration at the second institution may cause the health science center to refuse degree credit for the work taken elsewhere. In no case may the combined total of semester hours enrolled for at the two institutions exceed the maximum load permitted to graduate students.

Course Changes

Adding Courses

Graduate students must initiate all requests for adding courses in the office of the dean of the Graduate School of Biomedical Sciences. All requests must be made in writing. Consult the Academic Calendar for dates during which adds are allowed.

Dropping Courses

Students who wish to drop a course must obtain a form from the Registrar's Office and must first receive the written consent of their instructor before dropping a course. The instructor may withhold consent for students to drop for any reason providing the instructor has informed students in writing at the beginning of the semester.

The grade of W is recorded for any course dropped with the instructor's consent before the end of the sixth week of classes (summer term, eight class sessions). After that time the student must have a passing grade in order for the instructor to assign a grade of W for a dropped course; otherwise, the grade WF is recorded.

Instructors may drop students with grades of WF from courses for non-attendance at any time after the sixth week of classes (summer term, eight class sessions). See "Class Attendance" above.

Drop procedures must be completed by 5 p.m. on the deadline dates specified in the Academic Calendar. After these dates a student may not drop a course for any reason.

Courses of Instruction

Courses normally meet one hour per week in lecture for each semester credit hour (SCH). For the exceptions, the course descriptions in each department will explain meeting times.

Individual courses of instruction are subject to change or withdrawal at any time and may not be offered each semester of every year. Any course may be withdrawn from current offerings if the number of registrants is too small to justify conducting the course.

Enrollment Certification

Enrollment verification and loan deferments are completed in the Registrar's Office based upon the student's having registered and paid tuition and fees according to the criteria listed under "full-time enrollment" below.

International students may also request the International Student and Scholar Office (ISSO, Kendall Hall, Room 103, University of North Texas, Denton, TX) to issue letters of enrollment for the use of foreign governments, embassies, scholarship agencies and banks. See the graduate office of the health science center for details.

Final Examinations

Faculty members are expected to administer final examinations at the designated times during the final week of each long semester and during the specified day of each summer term.

If a final examination is not given in a particular course, the faculty member is expected to use the final examination period for summary, evaluation or other productive purposes.

Students who have as many as three final examinations scheduled on one day may appeal to the graduate dean to reschedule one of those examinations on another day during the final examination period.

Full-time Enrollment

A student must enroll for nine semester hours for each long semester to be considered full-time. Enrollment in a total of six semester hours is considered full-time for the summer.

The M.S. student who has completed all but the thesis requirements for the degree, enrollment in six semester hours is considered full-time. Doctoral students who have advanced to candidacy will also be considered full-time if enrolled for six semester hours. This applies to long semesters. Such students are required to enroll in six semester hours during one summer semester.

Students are responsible for meeting enrollment requirements for federal or state financial aid purposes.

Student Load

Graduate students may schedule as many as 16 hours during any semester of the regular session, or seven hours in any summer term, if in the latter case the seven-hour load includes a four-hour laboratory course. For purposes of fulfilling the graduate residence requirement, a load of 12 semester hours is considered to be a full load.

Special restrictions apply to the load permitted to graduate teaching fellows and teaching assistants. The total load of course enrollment and teaching assignment may not exceed 16 semester hours in any long semester. Approval of the graduate dean is required for loads in excess of this amount, but approval will not be granted for a combined load in excess of 18 semester hours.

Grading System

Courses numbered 5000 or higher ordinarily are taken by students working toward master's and doctoral degrees; those numbered 6000 or higher are open principally to doctoral students.

The Graduate School of Biomedical Sciences' grading system uses the letters A, B, C, F, P, NP, I, PR, W, WF and Z. The letter Z is used to indicate that a grade was not properly received and/or recorded for a course.

A Excellent work; four grade points for each semester hour.

B Good work; three grade points for each semester hour.

C Fair work; two grade points for each semester hour.

F Failure; given when a student: 1) has failed the course while still officially enrolled at the end of the semester; 2) is failing in a course and misses the final examination without satisfactory explanation; or 3) stops attending class without completing an official drop or withdrawal.

P Passed; a credit grade on pass/no pass option in selected graduate individual problems and research courses.

NP Not passed; a failing grade on the pass/no pass option; nonpunitive.

I Incomplete; a nonpunitive grade given only during the last one-fourth of a semester and only if a student is: 1) passing the course; 2) has justifiable reason why the work cannot be completed on schedule; and 3) arranges with the instructor to finish the course at a later date by completing specific requirements which the instructor must list on the grade sheet. For information on removal of I, see "Removal of I" below.

PR Assigned at the close of each semester or summer term in which the graduate student is enrolled in thesis (5950) or dissertation (6950). No credit hours are shown when the grade of PR is assigned. When the thesis or dissertation has been completed and submitted to the graduate dean, appropriate grades and credit hours will be shown on the student's record for the required number of enrollments.

W Drop or withdrawal without penalty. Given when a student drops a course or withdraws from the graduate school according to the dates in the academic calendar. See regulations for dropping and withdrawing.

WF Drop or withdrawal with failing grade. May be assigned after the dates listed in the academic calendar. See regulations for dropping and withdrawing.

At the graduate level, courses assigned F, I, NP, PR, W, WF or Z are not counted toward the degree but do count as courses attempted.

A complete record of all previously used grades and grading systems is detailed on the official transcript.

Grade Point Average

The overall grade point average (GPA) is used to determine student class loads, eligibility for admission to the graduate school and certain programs and eligibility for graduation. It is calculated by dividing the total number of grade points by the total number of semester hours attempted. All GPA calculations are subject to postaudit and correction by the Registrar's Office.

The number of semester hours attempted includes all courses with grades of A, B, C, F and WF unless replaced by a later grade. Courses with grades of I, NP, P, PR, W or Z are not counted as courses attempted.

Course Duplications

A student may enroll for a course a second or subsequent time and have it counted as part of the semester's load. If a course is repeated, the last grade recorded will be considered by the graduate dean in calculating the GPA and in certifying the student's eligibility for graduation.

The responsibility for initiating the official recording of a grade duplication lies entirely with the student. In the absence of such a request the registrar will include a repeated course in the student's cumulative record of hours attempted and grade points earned.

Quality of Work Required

Graduate students must maintain an overall 3.0 GPA. The student whose GPA earned at another institution is below 3.0 will be required to make up the deficiency either at the other institution or at the health science center. This regulation applies not only to graduate work attempted elsewhere before the student was first admitted to the Graduate School of Biomedical Sciences, but also to graduate work attempted elsewhere after the student's admission at the health science center.

Students must make satisfactory progress toward completion of degree requirements in order to remain in good standing within a specific degree program. Students whose progress is unsatisfactory may be removed from the program by the graduate dean on recommendation of the major department.

Probation and Suspension

A student who fails to maintain the required overall GPA of 3.0 will be subject to academic probation. If the student's grades do not improve, the student may be subject to suspension for a period of up to one calendar year before becoming eligible to re-enroll for further graduate courses. Graduate work completed elsewhere during a period of graduate suspension at the health science center may not be counted for graduate credit at the health science center.

The student whose graduate school GPA falls below 3.0 must make up the deficit, either by repeating courses in which the grades are low, or by completing other graduate school courses with grades high enough to bring the graduate school GPA up to 3.0. Low grades made in graduate courses at the health science center may not be duplicated at other institutions.

A failing grade in either BMSC 5600 or BMSC 5700 of the core curriculum may result in the student's dismissal from the graduate program.

Grade Changes

No grade except "I" may be removed from a student's record once properly recorded. Changes are not permitted after grades have been filed except to correct clerical errors.

Requests for error correction must be initiated immediately after the close of the semester for which the grade was recorded.

A faculty member who believes that an error has been made in calculating or recording a grade may submit in person a request for a grade change to the discipline chair and the graduate dean. The registrar accepts requests for grade changes only from the graduate dean.

Grade Reports

A grade report for each student is mailed to the student's permanent address at the close of each semester. It includes a statement of current academic status. If the grade report or the academic status is believed to be in error, the student should contact the Registrar's Office within 30 days.

At midsemester in the long sessions, instructors may provide individual written warnings to students who are doing unsatisfactory class work. These warnings are mailed from the Registrar's Office upon request of the instructor.

Pass/No Pass Grading

Any discipline of the health science center may elect to assign pass/no pass grades in graduate-level courses in which the student is engaged in individual research and is not attending an organized class. The student should inquire at the office of the Graduate School of Biomedical Sciences at the time of registration for such courses whether a letter grade or a pass/no pass grade will be granted. Pass/no pass grades are not taken into account in computing the student's graduate grade point average.

Removal of I

A student may remove a grade of "I" within one year of receiving the initial grade by completing the stipulated work, obtaining signatures of the instructor and the graduate dean (on a permit form from the dean's office), paying a $5 fee in the graduate school office and returning the permit form to the instructor. The instructor then files the permit form in the graduate school office, along with the grade, and the grade point average is adjusted accordingly. If a student does not complete the stipulated work within the time specified (not to exceed one year after taking the course), the instructor may change the grade of "I" to a grade of F, if appropriate, or the "I" will remain on the transcript and the student will be required to register for and repeat the course for it to count toward the degree plan. The GPA is adjusted accordingly.

A student who could not complete final examinations because of illness may remove a grade of "I" without payment of the fee. The graduate dean is authorized to waive the fee upon certification of illness signed by the attending physician.

Graduate Advisor

The graduate advisor is the official representative of the graduate dean in matters affecting graduate students in the advisor's academic unit. There should be a close working relationship between the advisor and the staff of the Graduate School of Biomedical Sciences. The graduate advisor is the liaison between the graduate dean and the discipline. The graduate advisor should keep the discipline chair informed on matters pertaining to graduate education. The dean is dependent upon the experience and judgment of graduate advisors and upon their recommendations in matters requiring the dean's action. The dean's staff provides information to the advisor on a continuing basis and responds to requests for special assistance.

The graduate advisor is responsible for supervising graduate study in the discipline, ensuring that each graduate student is assigned an individual faculty advisor within the discipline, and representing the graduate faculty as a member of the Graduate Council.

Graduation

It is the responsibility of the student to stay abreast of progress toward the degree and to file the appropriate degree application in the office of the graduate dean. Consult the academic calendar section in this catalog for the appropriate dates. The applicant's grade point average on all graduate work attempted must be at least 3.0 for the application to be accepted.

Information concerning graduation fees is furnished on request by the Graduate School of Biomedical Sciences and is contained in the annual Tuition and Fee Register. Students anticipating graduation should consult the academic calendar for final dates for payment of fees and meeting other graduation requirements. All fines, fees, etc. must be cleared before issuance of the diploma.

Because of the time required to receive transcripts, students otherwise eligible for graduation who complete their last course or courses elsewhere will not graduate at the end of the semester or summer session in which the work is completed, but will receive their degrees at the close of a subsequent graduate school semester or summer session.

Commencement Exercises

Commencement exercises are held in May at the health science center. Diplomas may be obtained from the registrar after graduation has been verified.

Leave of Absence

Students may request a leave of absence from the graduate program for a period of up to one year for personal or medical reasons. The leave must be requested in writing to the dean and carry the approval of the major professor and graduate advisor. Students who do not return to study within the specified time must reapply for admission to the Graduate School of Biomedical Sciences.

Open Records Policy

Pursuant to the provisions and intent of Article 6252-17a, Texas Civil Statutes, known as the Open Records Act, and the Family Educational Rights and Privacy Act of 1974 as amended, known as the Buckley Amendment, the graduate school has established a policy relating to the accessibility of information in the custody of the University of North Texas Health Science Center.

Student records that include general information concerning the student and the student's individual relationship to the educational institution are available on request to health science center personnel who have an educational interest in the records, the student, and the student's parent or legal guardian if the student is a dependent for income tax purposes of the parent or legal guardian.

For information regarding the health science center's policy on access to records and to request accessibility to center records, contact the designated Custodian of Public Records, Office of the Vice President and General Counsel, UNT Health Science Center.

Policies

Policies and regulations are explained or printed in full in the Student Handbook, available in the Office of Student Affairs. All health science center policies are subject to change throughout the year.

Summons

In the event a student's conduct or behavior is found to be in violation of a published policy or regulation, a summons may be issued. A summons is an official request that the student appear before a health science center administrator. It is always important and must have the student's immediate attention. Failure to answer a summons can result in disciplinary action.

Temporary Visa Holders

Students holding temporary visas are responsible for maintaining status with the U.S. Immigration and Naturalization Service (INS). All visa restrictions and regulations regarding enrollment, employment and visa renewal must be followed exactly as determined by the INS.

Withdrawal from the Health Science Center

A student may withdraw from the health science center at any time prior to the deadline in the Academic Calendar by making a request in the Registrar's Office. For withdrawals processed by the relevant deadline, the grade of W is recorded for each course in which a withdrawn student was enrolled. After this date a withdrawn student receives a grade of W only for those courses in which there were passing grades at the time of withdrawal; otherwise the grade WF is recorded.

Official dates and deadlines for withdrawing are specified in the Academic Calendar.

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Degree Programs

The Graduate School of Biomedical Sciences offers both M.S. and Ph.D. degrees in biomedical sciences. Students are encouraged to acquire a broad base of knowledge in those disciplines that flourish in the environment of a health science center and required to pursue specialized research and study in a particular area of biomedical and health science. The training students obtain equips them for professional careers in health science centers, universities, health care industry, pharmaceutical and biotechnology companies. Students obtain a degree in biomedical sciences, although a concentration in a discipline may be chosen from anatomy and cell biology, biochemistry and molecular biology, biotechnology, integrative physiology, microbiology and immunology and pharmacology.

Core Curriculum Requirements

All graduate students, regardless of discipline, are expected to complete the core requirements described below. The integrative biomedical sciences curriculum is designed to provide a broad background in biochemistry, microbiology, molecular biology, cell biology, immunology, cancer, pharmacology, and physiology.

M.S. Core Program

BMSC 5600	Integrative Biomedical Sciences I	7 SCH
BMSC 5610	Integrative Biomedical Sciences Workshop I	2 SCH
BMSC 5700	Integrative Biomedical Sciences II	6 SCH
BMSC 5710	Integrative Biomedical Sciences Workshop II	2 SCH
BMSC 5940	Seminar in Current Topics	1 to 3 SCH
BMSC 5960	Biomedical Ethics	1 SCH
BMSC 5950	Thesis	3 to 6 SCH
	and	
Advanced Subdiscipline Courses and Electives		

Ph.D. Core Program

BMSC 5200	Biostatistics I	3 SCH
BMSC 5600	Integrative Biomedical Sciences I	7 SCH
BMSC 5610	Integrative Biomedical Sciences Workshop I	2 SCH
BMSC 5700	Integrative Biomedical Sciences II	6 SCH
BMSC 5710	Integrative Biomedical Sciences Workshop II	2 SCH
BMSC 5940	Seminar in Current Topics	3 SCH
BMSC 5960	Biomedical Ethics	1 SCH
BMSC 5970	Techniques in Biomedical Sciences	3 SCH
BMSC 6010	Grant Writing	3 SCH
BMSC 6940	Individual Research	3 to 12 SCH
BMSC 6950	Doctoral Dissertation	3 to 12 SCH
Advanced Subdiscipline Courses and Electives		

In addition, Ph.D. students must demonstrate competency in computer literacy. Competency may be demonstrated by successful completion of BMSC 6500 and 6510 or the equivalent or by successful completion of a comprehensive examination in computer literacy.

Master of Science Degree

General Requirements

The candidate for a master of science degree must earn 30 or more semester credit hours (SCH), depending upon the specific degree requirements. These degree requirements are determined by the graduate catalog currently in force at the time the student's degree plan is approved by the graduate dean.

The requirements set by the graduate school are that a minimum of 30 SCH must be taken for thesis, 17-20 SCH are core requirements plus three hours of thesis. The use of special problems course numbers (5900, 5910) is limited to a maximum of six SCH.

The Master of Science degree in the discipline of biotechnology is administered by the Department of Biomedical Sciences. Candidates for the degree must earn 36 SCH of which 18 SCH are core requirements and 6 SCH are a laboratory internship practicum. The latter substitutes for the thesis. The program is designed to be completed in 3 semesters plus 2 summer terms.

Consult subsequent sections of this publication for the specific course requirements for the master of science degree.

Time Limitations

All requirements for the Master of Science degree must be completed within six years.

As individual courses exceed this time limit they lose all value for degree purposes. Credits that are more than six years old at the time of first registration for graduate work are not transferable from other institutions.

Time limits are strictly enforced. Students exceeding the time limit may be required to successfully complete a comprehensive exam, replace out-of-date credits with up-to-date work, and/or show other evidence of being up-to-date in their major fields. Students anticipating that they will exceed the time limit should apply for an extension before the normal time period to complete the degree expires. Holding a full-time job is not considered in itself sufficient grounds for granting an extension.

Time spent in active service in the U.S. armed forces will not be used in computing the time limit. However, career members of the armed forces should consult the graduate dean concerning the credit given to work completed before or during active military service.

Use of Transfer Credit

Depending on the student's previous preparation and degree plan, up to 6 SCH of graduate work completed elsewhere may be transferred toward a master of science degree. Only those courses with a grade of B or higher will be transferred.

Extension and correspondence credit earned at other institutions will not be counted toward a graduate degree at UNT Health Science Center. The institution does not award credit for portfolio-based experiential learning.

It is the student's responsibility to insure that official transcripts of courses completed elsewhere are furnished to the office of the graduate dean, and that graduate credit has been assigned by the other institution or institutions to whatever courses are to be counted toward the health science center degree. The student must provide the catalog description and/or syllabus from the semester the course was taken before transfer credit will be approved. Such courses, although listed on the health science center degree plan, will not be counted toward the degree until official transcripts showing graduate credit have been received and the credit has been approved by the graduate dean. All transfer courses are subject to the time limitation described above.

In accordance with the rules of the Texas Higher Education Coordinating Board, at least one-third of the semester credit hours required for any graduate degree must be completed in course work registered through UNT Health Science Center.

Degree Plan

A degree plan listing all courses must be completed by the student, approved by the student's advisory committee and department, and submitted to the graduate dean before the completion of 24 SCH.

The major professor and committee members are chosen on the advice of the department chair or graduate advisor in the major area. All subsequent requests for degree plan changes must be submitted in writing by the major professor to the graduate dean.

Master of Science degree requirements listed in the graduate catalog currently in force at the time the student's degree plan is approved by the graduate dean are those that should be completed by the student.

Master of Science Program Requirements

Each student is responsible for the completion of the Master of Science program according to the procedures that follow. Each item must be completed in the sequence and time period indicated. Forms are subject to revision at any time and should be obtained from the graduate office.

1. Acceptance into the graduate school. If a student has been accepted on probation, he or she must take a minimum of 9 SCH of formal graduate course work during the first regular semester of enrollment. A minimum GPA of 3.0 must be obtained.
2. Before the completion of 24 SCH, the student must select an advisory committee and file a Designation of Advisory Committee form in the graduate school. Enrollment will be restricted to prevent the accumulation of more than 24 SCH without a designated advisory committee.
3. The student must file a degree plan approved by the advisory committee with the graduate school before the completion of 24 SCH. Course work deficiencies will be stipulated at this time. Enrollment will be restricted to prevent the accumulation of more than 24 SCH without an approved degree plan.
4. A research proposal must be approved by the committee and filed with the graduate school during the semester in which the student first enrolls in thesis.
5. Once a student has enrolled in thesis, he/she must maintain continuous enrollment in a minimum of 3 SCH of thesis during each long semester and one summer session until the thesis has been accepted by the dean of the graduate school. Failure to maintain continuous enrollment will either invalidate any previous thesis credit or will result in the student's dismissal from the degree program unless granted an official leave of absence by the graduate dean for medical or other exceptional reasons.
6. The completed thesis should be submitted to the committee at least two weeks prior to the defense.
7. A formal seminar pertaining to the thesis will be presented in the student's last semester.
8. A final oral defense of the thesis and related work will be given by the committee immediately following the seminar.
9. Three copies of the thesis must be bound for institutional use. These are distributed to the major professor, major department and the reference section of the Gibson D. Lewis Health Sciences Library. An additional copy is also required. This fourth copy will remain unbound in the library archives.
10. The thesis must be prepared for digital submission according to the instructions in the Guidelines for Filing Dissertations and Theses.

Master of Science in Biotechnology Program Requirements

Each student is responsible for the completion of the Master of Science in Biotechnology program according to the procedures that follow. Each item must be completed in the sequence and time period indicated. Forms are subject to revision at any time and should be obtained from the graduate school.

1. Acceptance into the graduate school. If a student has been accepted on probation, he or she must take a minimum of 9 SCH of formal graduate course work during the first regular semester of enrollment. A minimum GPA of 3.0 must be obtained.
2. Before the completion of 24 SCH, the student must select a faculty mentor and an advisory committee consisting of the mentor and two other graduate faculty. The names of these individuals must be filed in the graduate school. In addition, a degree plan must also be filed with the graduate school at this time.
3. At the beginning of the second summer term of the first year, the student will enroll in BMSC 5920 (2SCH), the Laboratory Internship Practicum. The Internship will continue in the fall semester of the second year (4SCH) so upon completion, the student will have spent a total of 6 months in the mentor's laboratory.

At the end of BMSC 5920, the student must submit a report and laboratory notebook written in GLP format to the mentor for his/her approval. The advisory committee will meet with the student at this time to approve the work of the internship and the report. The student must make a formal presentation to the advisory committee at this time. A copy of the report must be submitted within the appropriate deadlines to the graduate school according to the guidelines for completing the requirements for graduation.

Doctor of Philosophy Degree

General Requirements

The candidate for a doctor of philosophy degree must earn 60 SCH beyond the master's degree or 90 SCH beyond the bachelor's degree. The degree requirements are determined by the graduate catalog currently in force at the time the student's degree plan is approved by the graduate dean.

This quantitative requirement must be regarded as a minimum. The quantity of course work to be completed by each candidate is arranged individually by the supervisory committee, subject to the approval of the graduate dean, and may be modified both as to quantity and as to type during the progress of the student's course work.

Consult subsequent sections of this publication for the specific course requirements for the doctor of philosophy degree.

Residency Requirement

Every candidate for the doctoral degree must complete the appropriate residency requirement at the health science center. The minimum residency requirement consists of two consecutive long semesters in the graduate school (fall and the following spring, or spring and the following fall), or a fall or spring semester and one adjoining summer session.

Time Limitations

All work to be credited toward the doctoral degree beyond the master's degree must be completed within a period of 10 years from the date doctoral credit is first earned. No course credit beyond the master of science degree that is more than 10 years old at the time the doctoral program is completed will be counted toward the doctorate.

Time limits are strictly enforced. Students exceeding the time limit may be required to repeat the comprehensive exam, replace out-of-date credits with up-to-date work, and/or show other evidence of being up-to-date in their major fields. Students anticipating that they will exceed the time limit should apply for an extension before their ninth year of study. Holding a full-time job is not considered in itself sufficient grounds for granting an extension.

Time spent in active service in the U.S. armed forces will not be used in computing the time limit. However, career members of the armed forces should consult the graduate dean concerning the credit given to work completed before or during active military service.

Use of Transfer Credit

Generally, up to 24 SCH of graduate work completed elsewhere may be transferred toward a Doctor of Philosophy degree, depending on the studentís previous preparation and degree plan. Doctoral students may request approval of additional transfer credit in writing to the dean. Only those courses with a grade of B or higher will be transferred.

Extension or correspondence credit earned at other institutions may not be counted toward a graduate degree at UNT Health Science Center. The institution does not award credit for portfolio-based experiential learning.

It is the student's responsibility to insure that official transcripts of courses completed elsewhere are furnished to the office of the graduate dean and that graduate credit has been assigned by the other institution or institutions to whatever courses are to be counted toward the health science center degree. The student must provide the catalog description and/or the syllabus from the semester the course was taken before transfer credit will be approved. Such courses, although listed on the health science center degree plan, will not be counted toward the degree until official transcripts showing graduate credit have been received and the credit has been approved by the graduate dean. All transfer courses are subject to the time limitation described above.

In accordance with the rules of the Texas Higher Education Coordinating Board, at least one-third of the semester credit hours required for any graduate degree must be completed in course work on the campus of UNT Health Science Center.

Degree Plan

Before the completion of 24 SCH, a degree plan listing all courses should be prepared by the student, approved by the student's advisory committee, graduate advisor, department chair and graduate dean. Entering students holding an appropriate master's degree must file a degree plan within the first year of study at UNT Health Science Center.

The major professor and committee members are chosen on the advice of the department chair or graduate advisor in the major area. All subsequent requests for degree plan changes must be submitted in writing by the major professor to the graduate dean.

Doctoral degree requirements listed in the graduate catalog currently in force at the time the student's degree plan is approved by the graduate dean are those that must be completed by the student.

University Member

When the advisory committee is formed, the major professor and the student must file a Request

for University Member Designation form to submit the names of at least three graduate faculty members outside of the major department. From this list, the graduate dean will appoint the university member.

The university member must be incorporated into the review and approval process of the doctoral dissertation, from the formal or substantive inception of the topic through the comprehensive examination and final approval of the dissertation.

The university member must take part in any formal hearing (proposal defense and qualifying examination). The university member must be a voting member of the final examination committee and will sign the dissertation fly pages.

The purpose of the university member on doctoral committees is to ensure that the policies and procedures of the Graduate School of Biomedical Sciences and UNT Health Science Center have been upheld. The presence of the university member is essential for the process of approval of dissertation proposals and defense examinations. The university member's signature on appropriate forms indicates that the integrity of the review process has been preserved. It is the responsibility of the university member to report to the graduate dean any inappropriate due process.

Advancement to Candidacy

Doctoral students must complete the following two-part process to be advanced to candidacy. First, a discipline-based oral qualifying examination, designed and administered by the disciplineís graduate faculty, must be successfully completed within 72 SCH of coursework inclusive of any advanced standing granted for the completion of a masterís degree. Second, the student must register for Grant Writing (BMSC 6010) in the first long semester immediately following successful completion of the oral examination and before the completion of 84 SCH.

The student is advanced to candidacy and must enroll in Doctoral Dissertation (BMSC 6950) in the first long semester immediately following successful completion of BMSC 6010.

Dissertation Requirement

A dissertation is required of all candidates for the doctorate. In general, 12 SCH are allowed for the dissertation. The student is required to enroll for dissertation credit and must maintain continuous enrollment in BMSC 6950 until the dissertation has been completed and submitted to the graduate dean. Enrollment in BMSC 6950 is limited to nine hours in each long term. Grades of PR will be recorded at the end of each semester until the dissertation is filed with the graduate school and approved by the graduate dean. Appropriate grades and credit hours will then be shown on the student's record. A minimum of three semester credit hours of dissertation enrollment are required during each long semester and one summer session to maintain continuous enrollment.

Doctoral Program Requirements

Each student is responsible for the completion of the doctoral program according to the procedures below. Each item must be completed in the sequence and time period indicated. See the graduate office regarding paperwork when completing each step.

1. A major professor should be selected by the student at the earliest possible time, but no later than the completion of 24 SCH.
2. The student should meet with the intended major professor for guidance until a doctoral committee and degree plan are established.
3. The major professor and the student should select at least four doctoral committee members from the graduate faculty. The student has the responsibility for obtaining the agreement of the professors (using the Designation of Doctoral Advisory Committee form) and will file this in the graduate school before the completion of 24 SCH. At the time the committee is designated, the student should submit the names of at least three graduate faculty members from which the graduate dean will appoint the university member. Enrollment will be restricted to prevent the accumulation of more than 24 SCH without designation of an advisory committee and request for designation of university member.
4. The committee should meet and evaluate all credentials of the student pertinent to the development of the degree program. An approved degree plan will then be submitted to the graduate dean. The committee should meet with the student as needed to discuss progress, but must meet at least once per academic year. The doctoral committee has sole responsibility for quality control of the student's program and dissertation. Enrollment will be restricted to prevent the accumulation of more than 24 SCH without an approved degree plan.
5. An oral qualifying examination intended to establish the student's candidacy for the Ph.D. degree will be administered by the designated departmental committee upon fulfillment of the tool and course work requirements. The qualifying exam must be undertaken prior to the completion of 72 SCH. Results of the qualifying

examinations will be sent to the graduate school in writing. Disciplines may have additional qualifying exam requirements, which are indicated in their graduate program descriptions. Enrollment will be restricted to prevent the accumulation of more than 24 SCH without successful completion of the qualifying examination.

6. After successful completion of the qualifying examination, the student must enroll in Grant Writing (BMSC 6010). As a component of this course, the student must attend a grant writing workshop held by the graduate school. The student will then write, present and defend an NIH-style grant application.
7. A research proposal must be approved by the committee and filed with the graduate school during the semester in which the student first enrolls in dissertation. Enrollment will be blocked to prevent the student from registering for additional dissertation credits before an approved research proposal has been filed with the graduate school.
8 A student must maintain continuous enrollment in a minimum of 3 SCH of dissertation during each long semester and one summer session until the dissertation has been accepted by the dean of the graduate school.

   Failure to maintain continuous enrollment will either invalidate any previous dissertation credits or will result in the student being dropped from the degree program unless granted an official leave of absence by the graduate dean for medical or other exceptional reasons.
9. Upon completion of the research and after consultation with the major professor, the student should submit a rough draft of the dissertation to the committee members at least one month before the receipt of the final draft. The final draft should be distributed to committee members at least two weeks prior to the defense. Committee members should return corrected drafts to the student as soon as possible. Working through committee members at all times, the student and major professor will resolve comments arising from the rough draft and incorporate them into a final draft.
10. During the semester of graduation, the student will present a formal departmental seminar on the research. This seminar should be scheduled immediately prior to the final defense.
11. The doctoral committee will administer the final defense and sign final copies of the dissertation. The university member must be present and sign final copies of the dissertation. The committee will notify the dean of the graduate school of results of the final examination.
12. Three copies of the dissertation must be bound for institutional use. These are distributed to the major professor, major department and the reference section of the Gibson D. Lewis Health Sciences Library. An additional copy is also required. This fourth copy will remain unbound in the library archives.
13. The dissertation must be prepared for digital submission according to the instructions in the Guidelines for Filing Dissertations and Theses.

Medical Scientist Training Program (M.S.T.P.)

General Description

The M.S.T.P. program is a course of study by which a student may concurrently pursue the D.O. degree through the Texas College of Osteopathic medicine and the Ph.D. degree through the Graduate School of Biomedical Sciences. Students may choose from a wide range of disciplines including anatomy and cell biology, biochemistry and molecular biology, microbiology and immunology, physiology and pharmacology. The program is normally six years in duration. At the end of this time, the student is expected to have completed the curriculum requirements for the D.O. degree in accordance with TCOM policies and for the Ph.D. degree in accordance with policies of the graduate school and the relevant department of the University of North Texas Health Science Center as they apply to the second degree.

Application Procedure

An applicant seeking entrance to the Medical Scientist Training Program (D.O./Ph.D.) or D.O./M.S. programs must first apply to the Texas Medical and Dental Schools Application Service. The applicant should indicate the dual-degree program in which he or she is interested on the supplemental application. Dual-degree applicants are reviewed by the Dual Program Admission Committee. It is highly recommended that applicants for the dual-degree programs apply early in the application season.

Entrance Requirements

The entrance requirements for the M.S.T.P. are identical to those for the D.O. program at TCOM and the Ph.D. program in the Graduate School of Biomedical Sciences as described in the respective

catalogs, including an overall undergraduate GPA of at least 3.0 and a competitive GRE or MCAT score.

Format

The general format of the dual-degree program is explained below. While the format may be regarded as the standard working format, it is understood that deviations from this format that meet the curriculum requirements are also acceptable. A degree plan is established by the student's major professor and advisory committee and filed in the graduate office.

Block 1. Block 1 consists of the preclinical years for the D.O. degree. During Block 1, the student will complete the first five semesters of the D.O. curriculum and will pass Part 1 of the College of Osteopathic Medical Licensing Examination (COMLEX). During this block the student will register only at TCOM.

An exception to this rule is if the student wishes to register for graduate courses which are not part of the D.O. curriculum during this block. In this case, the student will register for such graduate courses through the graduate school. During Block 1, the student will select a graduate advisory committee, and

		DO	PhD
Block 1	Year 1	Semesters 1-4	Individual Research
	Year 2	Semesters 1-4	Specialty Courses
Block 2	Year 3		Electives, Qualifying Exam, Individual Research
	Year 4		Individual Research, Dissertation
Block 3	Year 5	Clinical Science, DO Rotations	
	Year 6	Clinic Rotations, Research Rotation Elective	

will file an approved graduate degree plan of at least 90 semester credit hours (SCH) with the graduate school, of which 45 hours are joint D.O./Ph.D. basic science courses.

Block 2. Block 2 consists of two years dedicated to graduate study. In order to maintain enrollment at TCOM during this block, the student will register for a three-hour course in directed studies each semester of this block. (Hours for directed studies will not apply toward the Ph.D.) However, the major course load for the student during Block 2 will be through the Graduate School of Biomedical Sciences. Thus, during Block 2, the student is expected to complete all course work required for the Ph.D. degree, with the exception of dissertation, pass the Qualifying Examination for Doctoral Students (BMSC 6010) and have an approved dissertation research proposal.

Block 3. During Block 3, the student will complete the required clinical rotations and electives and will pass Part 2 of the COMLEX. During this block, the student may also continue work toward the Ph.D. dissertaion.

At the end of block 3, the student is expected to have completed the curriculum required for the D.O. degree and to have completed at least 45 additional hours of graduate courses under the Graduate School of Biomedical Sciences as required for the second degree, including the research dissertation. Following completion of the curriculum required for both degrees, the student is awarded the D.O. degree through TCOM and the Ph.D. through the Graduate School of Biomedical Sciences of the UNT Health Science Center.

Cost of the Program

D.O./Ph.D. students pay the standard medical school tuition during each block that they are enrolled in medical school. They also pay the hourly tuition rate for all courses not required for the D.O. degree, i.e., the 45 or more SCH required for the Ph.D. Non-Texas residents selected for the D.O./Ph.D. by the Dual Program Admission Committee are awarded a small scholarship each year, allowing them to pay in-state tuition for both medical and graduate tuition for the duration of the program.

Financial Assistance

The health science center will provide financial assistance to those students selected into the M.S.T.P. by the Dual Program Admission Committee to seek the D.O./Ph.D. The minimal financial assistance will consist of a fellowship in an amount sufficient to pay all graduate tuition costs during Block 2 and a graduate stipend during this time.

Doctor of Osteopathic Medicine/ Master of Science (D.O./M.S.)

Some students may elect to take a joint D.O./M.S. degree. Students in this program receive up to 18 hours of credit for their didactic medical basic science courses, six SCH of electives and take six semester hours of thesis. Requirements of the M.S. degree program that must be met for the joint program, earlier in this chapter. The graduate office will help students select a major department and mentor to assist in preparing a degree program. Additional graduate courses may be required by a particular discipline. Please see individual discipline course requirements for the M.S. degree.

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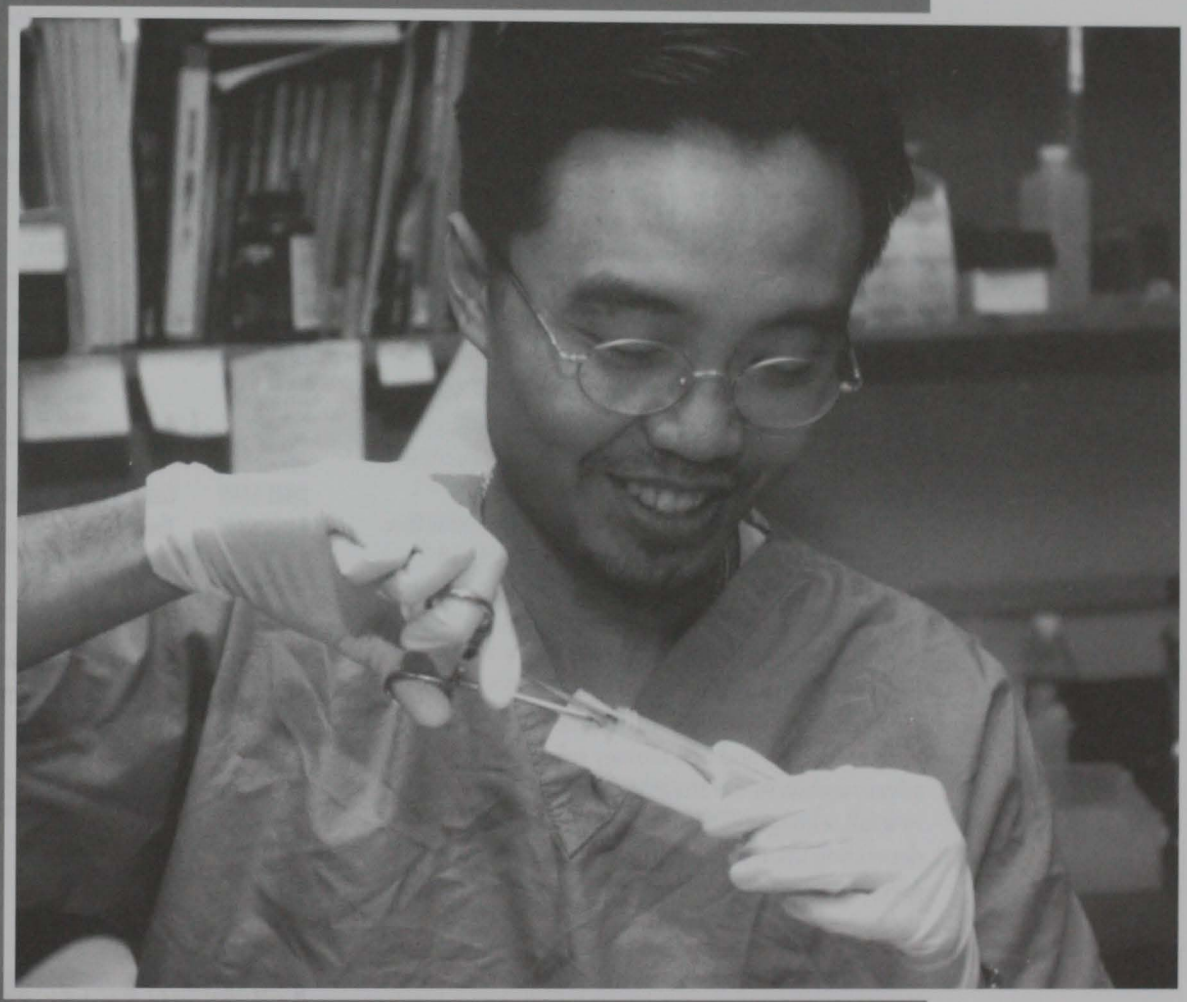

Disciplines

Anatomy and Cell Biology

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Graduate Faculty: Agarwal, Aschenbrenner, Cammarata, M.Garner, Orr, Reeves, Roque, Rudick, Sheedlo, Turner, Wordinger
Adjunct Graduate Faculty: Collier, W. Garner, McCartney

Anatomy and Cell Biology has a primary mission to provide instruction in the anatomical sciences and cell biology, develop and maintain research programs, and participate in the service endeavors of the institution and profession. Research focuses on the eye involving retinal degenerations, glaucoma, diabetic complications and cataracts. Other research programs include angiogenesis, apostosis, cell secretory mechanisms and nervous system inflammatory mechanisms.

In support of the various research programs, the department maintains state-of-the-art facilities in microscopy, tissue culture and molecular biology. Over 8,000 square feet of research space is occupied by department faculty and staff.

The department is home to the North Texas Eye Research Institute which involves faculty from various basic science disciplines, as well as professionals in industry and private clinical practice.

Degree Plans

The following are typical degree plans for students in the anatomy and cell biology subdiscipline. It is advantageous to the student to begin graduate study in a fall semester. This degree plan may vary depending upon availability of course offerings in a given semester and each student's progress toward thesis and dissertation research.

M.S. Degree Plan for Anatomy and Cell Biology

Year 1		
Fall		
ANAT 5940	Seminar in Current Topics	1 SCH
ANAT 6599	Current Topics in Anatomy	1 SCH
BMSC 5600	Integrative Biomedical Science I	7 SCH
BMSC 5610	Integrative Biomedical Science Workshop I	2 SCH
Electives		2 SCH
		13 SCH
Spring		
ANAT 6599	Current Topics in Anatomy	1 SCH
BMSC 5700	Integrative Biomedical Science II	6 SCH
BMSC 5710	Integrative Biomedical Science Workshop II	2 SCH
BMSC 5960	Biomedical Ethics	1 SCH
Electives		3 SCH
		13 SCH
Summer I		
Electives		6 SCH
Year 2		
Fall		
ANAT 6599	Current Topics in Anatomy	1 SCH
BMSC 5950	Thesis	3 SCH
		4 SCH
Spring		
ANAT 5940	Seminar in Current Topics	1 SCH
ANAT 6599	Current Topics in Anatomy	1 SCH
BMSC 5950	Thesis	3 SCH
	or	
BMSC 5930	Problem-in-Lieu of Thesis	3 SCH
		5 SCH
Total		**41 SCH**

Ph.D. Degree Plan for Anatomy and Cell Biology

Year 1		
Fall		
ANAT 5900	Special Problems	3 SCH
ANAT 5940	Seminar in Current Topics	1 SCH
ANAT 6599	Current Topics in Anatomy	1 SCH
BMSC 5600	Integrative Biomedical Science I	7 SCH
BMSC 5610	Integrative Biomedical Science Workshop I	2 SCH
		14 SCH

Spring

ANAT 6599	Current Topics in Anatomy	1 SCH
BMSC 5700	Integrative Biomedical Science II	6 SCH
BMSC 5710	Integrative Biomedical Science Workshop II	2 SCH
BMSC 5960	Biomedical Ethics	1 SCH
Electives		3 SCH
		13 SCH

Summer I

Electives		6 SCH

Year 2

Fall

ANAT5940	Seminar in Current Topics	1 SCH
ANAT 6030	Methods in Molecular Biology	4 SCH
ANAT 6599	Current Topics in Anatomy	1 SCH
BMSC 6940	Individual Research	3-5 SCH
Electives		3-5 SCH
		12-16 SCH

Spring

ANAT 5940	Seminar in Current Topics	1 SCH
ANAT 6599	Current Topics in Anatomy	1 SCH
BMSC 6010	Qualifying Examination for Doctoral Students	3 SCH
BMSC 6940	Individual Research	4-5 SCH
Electives		3-5 SCH
		12-15 SCH

Summer I

ANAT6940	Individual Research	2 SCH
BMSC 5200	Biostatistics I	3 SCH
BMSC 6500	Computer Applications in Science and Medicine	1 SCH
		6 SCH

Year 3

Fall

ANAT 5900	Special Problems	3 SCH
ANAT 5940	Seminar in Current Topics	1 SCH
Electives		6 SCH
		10 SCH

Spring

BMSC 6510	Automated Information Resources in Science and Medicine	1 SCH
BMSC 6950	Doctoral Dissertation	3 SCH
Electives		4 SCH
		8 SCH

Summer

BMSC 6950	Doctoral Dissertation	3 SCH

Year 4

Fall

BMSC 6950	Doctoral Dissertation	3 SCH

Spring

BMSC 6950	Doctoral Dissertation	3 SCH
Total		**90-97 SCH**

Advancement to Doctoral Candidacy

Qualifying Examination

The qualifying examination for doctoral students in the anatomy and cell biology subdiscipline is conducted according to the following guidelines:

1. A student must pass an oral Qualifying Examination to be permitted to register for Grant Writing (BMSC 6010).
2. The examination should be administered no later than the fifth semester of graduate study, excluding summer semesters. A justification for any delay of the examination must be submitted to the Graduate Affairs Committee of the department by the major professor.
3. The student's Advisory Committee will administer the qualifying examination. For the purpose of this examination, the department graduate advisor, in consultation with the department chair and the student's major professor, will appoint a chair of the examination committee. The student's major professor will not be a member of the examination committee.
4. The examination will consist of an oral examination of basic concepts in anatomy and cell biology.
5. Upon successful completion of the oral examination, the student may register for Grant Writing (BMSC 6010).

Grant Writing (BMSC 6010)

During the first two weeks of the semester in which the student first registers for Grant Writing (BMSC 6010), the student will present two or three potential topics to the committee who, in consultation with the student, will select the topic of the proposal. The student will meet with the committee at least two times during the semester to review drafts of the proposal. The final written grant proposal must be distributed to the committee at least ten days prior to the oral presentation.

Biochemistry and Molecular Biology

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Graduate Faculty: Andreev, Basu, Borejdo, Dimitrijevich, Dory, Easom, Goldfarb, Gracy, B. Harris, Kitson, Kudchodkar, Kulkarni, Lacko, McConathy, Rao, Wu
Adjunct Graduate Faculty: Clark, Zachariah

The Department of Biochemistry and Molecular Biology offers comprehensive graduate training in molecular aspects of biological processes. Both M.S. and Ph.D. degree programs are designed to accommodate a broad spectrum of student and faculty interests and require a significant contribution to knowledge through original research. Research training is conducted in modern laboratories and is complemented by informative didactic course work, seminars and journal clubs.

Among the research interests of the faculty are molecular and biochemical aspects of cancer growth factors and signal transduction, cell matrix interactions in normal and injured tissues, mechanism of enzyme action; lipoprotein structure, function and metabolism; post-transcriptional regulation of protein synthesis; regulation of hormone biosynthesis and secretion, regulation of cytokine gene expression, age-related changes in protein structure and function, endothelial cells, arterial wall and steroid binding proteins.

Students with undergraduate science majors in areas such as biology, chemistry and biochemistry that fulfill prerequisite courses of organic and inorganic chemistry will be considered for admission. The graduate curriculum consists of a multidisciplinary core course that surveys the fundamental principles of biochemistry, molecular biology, cell biology, microbiology, immunology, pharmacology and physiology. This is followed by advanced courses that focus on the most recent progress in various areas of biochemistry and molecular biology, and provide the student with a contemporary perspective in areas of greatest current scientific interest.

Most students complete the M.S. requirements in 1-2 years, while Ph.D. requirements are completed within 4-5 years.

Degree Plans

The following are typical degree plans for students in the biochemistry and molecular biology subdiscipline. It is advantageous to the student to begin graduate study in a fall semester. This degree plan may vary depending upon availability of course offerings in a given semester and each student's progress toward thesis and dissertation research.

M.S. Degree Plan for Biochemistry and Molecular Biology

Year 1		
Fall		
BIOC 5940	Seminar in Current Topics	1 SCH
BMSC 5600	Integrative Biomedical Science I	7 SCH
BMSC 5610	Integrative Biomedical Science Workshop I	2 SCH
Electives		2 SCH
		12 SCH
Spring		
BIOC 5940	Seminar in Current Topics	1 SCH
BMSC 5700	Integrative Biomedical Science II	6 SCH
BMSC 5710	Integrative Biomedical Science Workshop II	2 SCH
BMSC 5960	Biomedical Ethics	1 SCH
Electives		2 SCH
		12 SCH
Summer I		
BMSC 6940	Individual Research	3 SCH
Summer II		
BMSC 5950	Thesis	3 SCH
		6 SCH
Year 2		
Fall		
BMSC 5950	Thesis	3 SCH
TOTAL		**33 SCH**

Ph.D. Degree Plan for Biochemistry and Molecular Biology

Year 1

Fall

BIOC 5940	Seminar in Current Topics	1 SCH
BMSC 5600	Integrative Biomedical Science I	7 SCH
BMSC 5610	Integrative Biomedical Science Workshop I	2 SCH
BMSC 6500	Computer Applications in Science and Medicine	1 SCH
Electives		1 SCH
		12 SCH

Spring

BIOC 5940	Seminar in Current Topics	1 SCH
BMSC 5700	Integrative Biomedical Science II	6 SCH
BMSC 5710	Integrative Biomedical Science Workshop II	2 SCH
BMSC 5960	Biomedical Ethics	1 SCH
BMSC 5970	Techniques in Biomedical Science	1 SCH
BMSC 6510	Automated Information Resources in Science and Medicine	1 SCH
		12 SCH

Summer I

BMSC 5200	Biostatistics I	3 SCH

Summer II

BMSC 5970	Techniques in Biomedical Science	1 SCH
Electives		2 SCH
		6 SCH

Year 2

Fall

BIOC 5940	Seminar in Current Topics	1 SCH
BMSC 5970	Techniques in Biomedical Science	1 SCH
BMSC 6940	Individual Research	4 SCH
Journal Club Course **		2 SCH
Electives*		8 SCH
		12 SCH

Spring

BIOC 5940	Seminar in Current Topics	1 SCH
BMSC 5970	Techniques in Biomedical Science	1 SCH
BMSC 6940	Individual Research	6 SCH
Journal Club Course **		2 SCH
Electives*		4 SCH
		12 SCH

Summer I

BMSC 6940	Individual Research	3 SCH

Summer II

BMSC 6940	Individual Research	3 SCH
		6 SCH

Year 3

Fall

BIOC 5940	Seminar in Current Topics	1 SCH
BMSC 6010	Qualifying Examination for Doctoral Students	3 SCH
BMSC 6940	Individual Research	8 SCH
		12 SCH

Spring

BMSC 6940	Individual Research	9 SCH
BMSC 6950	Doctoral Dissertation	3 SCH
		12 SCH

Summer I

BMSC 6950	Doctoral Dissertation	3 SCH

Year 4

Fall

BMSC 6950	Doctoral Dissertation	3 SCH
TOTAL		90 SCH

* Elective Core Courses (7-8 SCH from the following):

BIOC 5425	Advanced Biochemistry	4 SCH
BIOC 5435	Molecular Aspects of Cell Signaling	4 SCH
MICR 6300	Advanced Molecular Biology	3 SCH
BIOC 6040	Molecular Biology of Lipid Transport	2 SCH
BIOC 6050	Molecular and Cell Biochemistry of Cancer	2 SCH

** Journal Club Courses

BIOC 5510	Signal Transduction	2 SCH
BIOC 5520	Enzyme Regulation and Mechanism	2 SCH
BIOC 5530	Structure and Function of Proteins	2 SCH
BIOC 5540	Advanced Lipoprotein Metabolism	2 SCH
BIOC 5920	Cell Motility	2 SCH
BMSC 5720	Cellular Responses to Peptides	2 SCH

Advancement to Doctoral Candidacy

Qualifying Examination

The qualifying examination is to ensure that a doctoral student has sufficient mastery of fundamental principles of biochemistry and molecular biology to be successful as a Ph.D. candidate and independent researcher. A list of major topics to be examined will be distributed to the student after the completion of the first year. The student is expected to become knowledgeable in each of these topics through coursework, individual reading, or discussions with faculty members.

The qualifying examination will be administered by biochemistry and molecular biology faculty, except for the student's major professor, and will consist of both written and oral phases. In the written phase, a student will answer a given set of questions. The oral phase, scheduled subsequently to the written examination, will further explore topics of written questions where necessary but may also be expanded to address other topics in the field of biochemistry and molecular biology.

Grant Writing

This stage of the advancement to doctoral candidacy will evaluate a student's aptitude for independent thought and scientific writing. In this course, a student is required to prepare an NIH-style research proposal, without the assistance of his/her major professor, and defend it before an examination committee. The proposal should be based on an original hypothesis that is distinct from the dissertation research and should describe specific experimental approaches to address this hypothesis. The student will present this proposal in the form of a public seminar and then privately address specific questions of an examination committee. The examination committee will consist of Biochemistry and Molecular Biology graduate faculty (at least three of the five members), associate faculty and adjunct faculty. The Graduate Advisor will serve as coordinator and will meet with enrolled students at the beginning of the semester to review guidelines and answer relevant procedural questions. Upon successful completion of this course, the student is advanced to candidacy.

Biomedical Sciences

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Adjunct Graduate Faculty: Atkinson, Bergamini, Clark, Collier, DeSantis, Dobbs, W. Garner, McCartney, Pang, Pertusi, Sharif, Stoll, Zachariah

The Graduate School of Biomedical Sciences offers both M.S. and Ph.D. degrees in biomedical sciences. Students are encouraged to acquire a broad base of knowledge in those disciplines that flourish in an environment of a health science center and are required to pursue specialized research and study in a particular area of biomedical and health science. The training students obtain equips them for professional careers in health science centers, universities, secondary science education, health care industry, publishing, pharmaceutical and biotechnology companies. All entering graduate students are expected to complete a one year integrated biomedical sciences program that surveys the fundamental principles of biochemistry, cell biology, microbiology, immunology, pharmacology and physiology to prepare them for tomorrow's scientific advancements and employment opportunities. This program is administered under the auspices of biomedical sciences. All students obtain a degree in biomedical sciences; however, a concentration in a discipline may be chosen from anatomy and cell biology, biochemistry and molecular biology, biomedical sciences, integrative physiology, microbiology and immunology, and pharmacology.

The biomedical sciences discipline is inter-disciplinary in nature and so advanced courses focus on the individual student's particular interests. Mentors may be selected from any of the Graduate Faculty, regardless of departmental affiliation. The traditional M.S., M.S. in Biotechnology, or Ph.D. may be obtained through the biomedical sciences discipline.

Degree Plans

The following are typical degree plans for students in the biomedical sciences discipline. Degree plans for students in the biomedical science discipline are tailored to the individual student's interest and vary greatly due to the interdisciplinary nature of the program. For these reasons, advanced and elective courses offered after completion of the first year core curriculum are not indicated.

M.S. Degree Plan for Biomedical Sciences

Year 1

Fall		
BMSC 5600	Integrative Biomedical Sciences I	7 SCH
BMSC 5610	Integrative Biomedical Sciences Workshop I	2 SCH
BMSC 5940	Seminars in Current Topics	1 SCH
BMSC 5650	Laboratory Rotations	2 SCH
		12 SCH
Spring		
BMSC 5700	Integrative Biomedical Sciences II	6 SCH
BMSC 5710	Integrative Biomedical Sciences Workshop II	2 SCH
BMSC 5960	Biomedical Ethics	1 SCH
BMSC 5940	Seminars in Current Topics	1 SCH
BMSC 5650	Laboratory Rotations	2 SCH
		12 SCH
Summer I		
BMSC 5200	Biostatistics I	3 SCH
Summer II		
BMSC 5930	Individual Research	3 SCH
		6 SCH

Year 2

Fall		
BMSC 5930	Individual Research	6 SCH
Electives		2 SCH
		8 SCH
Spring		
BMSC 5950	Thesis	6 SCH
		44 SCH

Ph.D. Degree Plan for Biomedical Sciences

Year 1

Fall		
BMSC 5600	Integrative Biomedical Sciences I	7 SCH
BMSC 5610	Integrative Biomedical Sciences Workshop I	2 SCH
BMSC 6500	Computer Applications	1 SCH
BMSC 5650	Laboratory Rotations	2 SCH
		12 SCH
Spring		
BMSC 5700	Integrative Biomedical Sciences II	6 SCH
BMSC 5710	Integrative Biomedical Sciences Workshop II	2 SCH
BMSC 5960	Biomedical Ethics	1 SCH
BMSC 5940	Seminars in Current Topics	1 SCH
BMSC 6510	Automated Information Resources	1 SCH
BMSC 5650	Laboratory Rotations	1 SCH
		12 SCH
Summer I		
BMSC 5200	Biostatistics I	3 SCH
Summer II		
BMSC 6940	Individual Research	3 SCH
		6 SCH

Year 2

Fall		
BMSC 6940	Individual Research	6 SCH
BMSC 5940	Seminars in Current Topics	1 SCH
BMSC 5970	Techniques in Biomedical Sciences	1 SCH
Electives		3 SCH
		12 SCH
Spring		
BMSC 6940	Individual Research	6 SCH
BMSC 5940	Seminars in Current Topics	1 SCH
BMSC 5970	Techniques in Biomedical Sciences	1 SCH
Electives		3 SCH
		12 SCH
Summer I		
BMSC 6940	Individual Research	3 SCH
Oral Comprehensive Exam		
Summer II		
BMSC 6940	Individual Research	3 SCH
		6 SCH

Year 3		
Fall		
BMSC 6940	Individual Research	2 SCH
BMSC 5940	Seminars in Current Topics	1 SCH
BMSC 6010	Grant Writing	3 SCH
		6 SCH
Spring		
BMSC 6940	Individual Research	6 SCH
Elective		3 SCH
		9 SCH
Summer I		
BMSC 6940	Individual Research	3 SCH
Summer II		
BMSC 6940	Individual Research	3 SCH
		6 SCH
Year 4		
Fall		
BMSC 6950	Dissertation	3 SCH
Spring		
BMSC 6950	Dissertation	6 SCH
		90 SCH

Advancement to Doctoral Candidacy

Qualifying Examination

The qualifying examination ensures that the doctoral student has mastered a broad knowledge base in biomedical sciences necessary to succeed as an independent researcher at the doctoral level. The student obtains this knowledge through course work, reading of textbooks and scientific literature, and discussion with faculty members.

The oral qualifying examination is administered by each student's qualifying exam committee and may include topics from any aspect of the biomedical sciences. Students are allowed to meet with committee members prior to the examination to discuss potential topics for the questions. Questions will be given to the student in writing 20 minutes prior to the beginning of the exam.

Two attempts to successfully pass the qualifying examination are allowed. Failure of the student to pass the qualifying examination results in dismissal of the student from the doctoral program. A doctoral student who does not pass may be allowed to complete the requirements for a Master of Science degree.

Grant Writing (BMSC 6010)

Successful completion of Grant Writing (BMSC 6010) requires the preparation and oral defense of an original NIH grant proposal. Two attempts to successfully accomplish this are allowed.

The major professor instructs the student on the regulations of the course and assists in initiating and preparing the proposal. The student should submit a report which presents the hypothesis, experimental strategy and specific aims for the proposal to the examination committee by mid-semester. The proposal must consist of the student's original ideas and is expected to significantly extend scientific knowledge in the chosen research area if the proposed experiments were actually conducted. The committee must approve this summary of the research proposal.

The student must prepare a detailed written report of the research proposal in NIH format after the summary has been approved. The final proposal will be typed and presented to the advisory committee at least two weeks prior to the oral defense. The grant proposal and presentation will be evaluated on the basis of originality and ability to synthesize and communicate this information.

If the proposal and defense are satisfactory, the student is advanced to candidacy.

Biotechnology

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Adjunct Graduate Faculty: Atkinson, Bergamini, Clark, Collier, DeSantis, Dobbs, W. Garner, McCartney, Pang, Pertusi, Sharif, Stoll, Zachariah

Science advancements are moving at a record pace. New and exciting approaches have led to our greater understanding of health and disease. Keeping pace with these breakthroughs will require an educated and highly trained workforce.

UNT Health Science Center offers a Master of Science in Biomedical Sciences in the discipline of Biotechnology, designed to train individuals for careers in industry and research by providing the tools and experience needed for the highly technological positions offered in emerging biotechnology companies and research institutions. Students will take integrated biomedical sciences courses that provide the breadth and depth needed to understand complex biomedical problems. All students are required to train in molecular, cellular, physiological and pharmacological techniques and to complete an internship in a research or industrial laboratory that forms the basis of the laboratory internship practicum.

The typical curriculum includes:

ANAT 6030	Methods in Molecular Biology	4 SCH
BMSC 5200	Biostatistics I	3 SCH
BMSC 5600	Integrative Biomedical Sciences I	7 SCH
BMSC 5610	Integrative Biomedical Sciences Workshop I	2 SCH
BMSC 5700	Integrative Biomedical Sciences II	6 SCH
BMSC 5710	Integrative Biomedical Sciences Workshop II	2 SCH
BMSC 5920	Laboratory Internship Practicum	6 SCH
BMSC 5940	Seminar in Current Topics	1 SCH
BMSC 5960	Biomedical Ethics	1 SCH
BMSC 5965	Introduction to Industry Practice	1 SCH
BMSC 5970	Techniques in Biomedical Sciences	3 SCH
		36 SCH

Laboratory Internship Practicum

Once the graduate mentor is chosen, the student will complete a 6 month internship in the mentor's laboratory (BMSC 5920; 6 SCH). During this time, the student will learn how to perform all of the duties expected of a laboratory technician. These may include working under researchers on their projects, doing the student's own research project, purchasing supplies and equipment, repairing and maintaining equipment, etc. The student is expected to keep a laboratory notebook using GLP protocol during this experience. At the end of the practicum, the student will write a report detailing the activities of the internship. The student's advisory committee must approve this report together with the laboratory notebook. The student must make a formal presentation to the advisory committee at this time. A copy of the report must be submitted within the appropriate deadlines to the graduate school according to the guidelines for completing the requirements for graduation.

Integrative Physiology

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Adjunct Faculty: Burke, Stoll

Physiology is an essential foundation for clinical and experimental medicine. The physiologist seeks an understanding of the physical and chemical mechanisms of biological processes. Thus, physiology is the study of the function of living organisms and their various components. It encompasses normal and abnormal function and ranges in scope from an understanding of basic molecular and cellular functions to a cognizance of biological control systems and of the integration of bodily functions among multiple organ systems.

The Department of Integrative Physiology maintains an active and productive research program with special emphasis on cardiovascular physiology. Research interests of the faculty include cardioprotection, myocardial energy metabolism, cardiac endocrinology, coronary flow and flow regulation, cardiovascular responses to exercise, and mechanisms of blood pressure and blood volume regulation. Faculty programs are funded by extramural sources including the American Heart Association, the National Institutes of Health and the National Aeronautics and Space Administration.

Students may enter the program with a variety of academic backgrounds, providing that they have fulfilled prerequisite courses in biology, chemistry, physics, and mathematics. The graduate training program involves basic courses in physiology, neurobiology, pharmacology, molecular biology and biochemistry, and advanced courses in selected topics. The program is designed to integrate the fundamental processes of molecular biology with organ system functions. Students participate in teaching and seminars and receive extensive training in techniques of contemporary physiological research. Doctoral students and Master of Science students selecting the thesis option perform original, publishable research and present their research findings at national scientific meetings. At the end of the first year, all graduate students must pass an oral physiology progress examination. One to two years are required to complete the Master of Science degree requirements. Three to five years are required to complete the Doctorate of Philosophy degree requirements.

It is expected that, prior to the awarding of the doctorate, the student will have published, have on press, or have submitted two first-author publications in peer-reviewed journals.

Graduates with advanced degrees find employment in higher education, industry and government agencies.

Degree Plans

Typical degree plans for students in the integrative physiology subdiscipline appear below. It is advantageous to the student to begin graduate study in a fall semester. This degree plan may vary depending upon availability of course offerings in a given semester and each student's progress toward thesis and dissertation research.

M.S. Degree Plan for Integrative Physiology

Year 1		
Fall		
BMSC 5600	Integrative Biomedical Science I	7 SCH
BMSC 5610	Integrative Biomedical Science Workshop I	2 SCH
Electives		3 SCH
		12 SCH
Spring		
BMSC 5700	Integrative Biomedical Science II	6 SCH
BMSC 5710	Integrative Biomedical Science Workshop II	2 SCH
BMSC 5960	Biomedical Ethics	1 SCH
PSIO 5940	Seminar in Current Topics	1 SCH
Electives		2 SCH
		12 SCH
Summer I		
BMSC 5200	Biostatistics I	3 SCH
Summer II		
BMSC 5950	Thesis	3 SCH
		6 SCH
Year 2		
Fall		
BMSC 5950	Thesis	3 SCH
		3 SCH
Total		**33 SCH**

Ph.D. Degree Plan for Integrative Physiology

Year 1

Fall		
BMSC 5600	Integrative Biomedical Science I	7 SCH
BMSC 5610	Integrative Biomedical Science Workshop I	2 SCH
BMSC 6500	Computer Applications in Science and Medicine	1 SCH
Electives*		2 SCH
		12 SCH
Spring		
BMSC 5700	Integrative Biomedical Science II	6 SCH
BMSC 5710	Integrative Biomedical Science Workshop II	2 SCH
BMSC 5960	Biomedical Ethics	1 SCH
BMSC 6500	Automated Information Resources in Science and Medicine	1 SCH
BMSC 5970	Techniques in Biomedical Science	2 SCH
		12 SCH
Summer I		
BMSC 5200	Biostatistics I	3 SCH
Summer II		
BMSC 5210	Biostatistics II	3 SCH
		6 SCH

Year 2

Fall		
PSIO 5490	Seminar in Current Topics	1 SCH
BMSC 5970	Techniques in Biomedical Science	1 SCH
BMSC 6940	Individual Research	4 SCH
Electives*		6 SCH
		12 SCH
Spring		
BMSC 6940	Individual Research	3 SCH
Electives*		9 SCH
		12 SCH
Summer I		
Electives*		3 SCH
Summer II		
BMSC 6940	Individual Research	3 SCH
		6 SCH

Year 3

Fall		
BMSC 6010	Qualifying Examination for Doctoral Students	3 SCH
Electives*		9 SCH
		12 SCH
Spring		
BMSC 6950	Doctoral Dissertation	3 SCH
Electives*		9 SCH
		12 SCH
Summer I		
BMSC 6950	Doctoral Dissertation	3 SCH

Year 4

Fall		
BMSC 6950	Doctoral Dissertation	3 SCH
Total		**90 SCH**

*Electives Courses (18 SCH from the following):

PSIO 5100	Cardiovascular Physiology I	3 SCH
PSIO 5110	Cardiovascular Physiology II	3 SCH
PSIO 5200	Respiratory Physiology	3 SCH
PSIO 5300	Renal Physiology	3 SCH
PSIO 6050	Physiology of Skeletal and Smooth Muscle	3 SCH
PSIO 6060	Cardiovascular Regulation During Exercise	3 SCH
PSIO 6070	Advanced Endocrine Physiology	3 SCH
PSIO 6080	Advanced Autonomic Nervous System Physiology	3 SCH
PSIO 6090	Myocardial Metabolism: Concepts and Controversies	3 SCH

Advancement to Candidacy

Qualifying Examination for Doctoral Students

Prior to registration for BMSC 6010, doctoral students are required to pass an oral qualifying examination. The examination will be administered by a departmental examining committee, which will not include the student's mentor. The examination may address all aspects of physiology, and, in addition, assess the student's research skills and aptitude.

Grant Writing (BMSC 6010)

After passing the qualifying examination and prior to the completion of 72 SCH, the student must register for Grant Writing (BMSC 6010). In this course, students are required to submit an NIH grant application to their Advisory Committee. The grant application will describe the student's dissertation research project, and will serve as the student's dissertation proposal. Following a public, oral presentation of the research proposal in the grant

application, the student will defend the grant application and research proposal before the his/her Advisory Committee.

Upon successful completion of preparation, public presentation and private defense of an NIH grant, the student is advanced to candidacy.

Microbiology and Immunology

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Adjunct Graduate Faculty: Atkinson, Pertusi

Infectious diseases have a major impact on health around the world. New infectious agents have emerged, and diseases caused by known pathogens have reestablished themselves. Many of these infections result in life-threatening diseases. To complicate matters, many of these infectious agents have developed resistance to antibiotics routinely used in treatments. Thus, prevention and treatment of these infections are of tremendous importance. The development of new antibiotics and vaccines are dependent on an in depth understanding of the mechanisms of disease caused by these organisms and their basic biology. Also, many findings arising from the investigation of the molecular biology of microbes has significantly contributed to our understanding of the molecular basis of cancer.

Cancer continues to be a significant health problem, and is associated with genetic factors, diet and exposure to environmental insults and infectious agents. Cells of the body normally are limited in their growth. In contrast, cancer cells are derived from normal cells and divide uncontrollably, forming tumors. Also, cancer cells spread (metastasize) from primary tumors to distant tissues in the body. Understanding the biology of cancer and the process of metastasis will provide important clues in prevention and treatment of cancer.

Immunology is the study of the defense mechanisms of the host against infectious diseases, cancers and other diseases. By inducing immune responses, as in the case of vaccines, infections and disease can be prevented. Enhancement of appropriate immune responses can also result in the destruction of cancer cells. Research in immunology has a tremendous potential in developing new treatments to prevent or recover from cancer and infectious disease.

Faculty maintain active and productive research programs with special emphasis on infectious disease, microbiology, cancer and immunology. Research interests of the faculty include regulation of prokaryotic and eukaryotic gene expression; molecular biology of microbial virulence; regulation and molecular biology of bacterial carbohydrate metabolism; host response to respiratory infections; molecular immunology; tumor immunology, mRNA decay and RNA-based regulation mechanisms; structure and function of the human chromosome; vaccine development; cancer biology and

metastasis. Faculty programs are funded by extramural sources including the National Science Foundation and the National Institutes of Health.

Students may enter the program with a variety of academic backgrounds, providing that they have fulfilled prerequisite courses. The graduate training program involves basic courses in microbiology and immunology, molecular biology, biochemistry and advanced courses in selected topics. Students participate in seminars and discussion of current research and receive extensive training in techniques of contemporary microbiology, molecular biology and immunology. Doctoral students and Master of Science students selecting the thesis option perform original, publishable research and present their research findings at national scientific meetings. About two years are required to complete the Master of Science. Approximately four to five years are required to complete the Doctorate of Philosophy.

Graduates with advanced degrees find employment in higher education, industry and government agencies.

M.S. Degree Plan for Microbiology and Immunology

Year 1

Fall

BMSC 5600	Integrative Biomedical Science I	7 SCH
BMSC 5610	Integrative Biomedical Science Workshop I	2 SCH
BMSC 5930	Individual Research	2 SCH
MICR 5940	Seminar in Current Topics	1 SCH
		12 SCH

Spring

BMSC 5700	Integrative Biomedical Science II	6 SCH
BMSC 5710	Integrative Biomedical Science Workshop II	2 SCH
BMSC 5960	Biomedical Ethics	1 SCH
BMSC 5930	Individual Research	2 SCH
MICR 5940	Seminar in Current Topics	1 SCH
		12 SCH

Summer I

BMSC 5200	Biostatistics I	3 SCH

Summer II

BMSC 5930	Individual Research	3 SCH

Year 2

Fall

BMSC 5930	Individual Research	10 SCH
MICR 5300	Current Topics in Molecular Microbiology	2 SCH
		12 SCH

Spring

BMSC 5950	Thesis	6 SCH
MICR 5300	Current Topics in Molecular Microbiology	2 SCH
		8 SCH
Total		**50 SCH**

Ph.D. Degree Plan for Microbiology and Immunology

Year 1

Fall

BMSC 5600	Integrative Biomedical Science I	7 SCH
BMSC 5610	Integrative Biomedical Science Workshop I	2 SCH
BMSC 6500	Computer Applications in Science and Medicine	1 SCH
BMSC 6940	Individual Research	2 SCH
MICR 5940	Seminar in Current Topics	1 SCH
		13 SCH

Spring

BMSC 5700	Integrative Biomedical Science II	6 SCH
BMSC 5710	Integrative Biomedical Science Workshop II	2 SCH
BMSC 5960	Biomedical Ethics	1 SCH
BMSC 6510	Automated Information Resources in Science and Medicine	1 SCH
BMSC 6940	Individual Research	1 SCH
MICR 5940	Seminar in Current Topics	1 SCH
		12 SCH

Summer I

BMSC 5200	Biostatistics I	3 SCH

Summer II

BMSC 6940	Individual Research	3 SCH

Year 2

Fall

MICR 5300	Current Topics in Molecular Microbiology	2 SCH
BMSC 5970	Techniques in Biomedical Science	1 SCH
BMSC 6940	Individual Research	9 SCH
		12 SCH

Spring

BMSC 5970	Techniques in Biomedical Science	2 SCH
BMSC 6940	Individual Research	5 SCH
MICR 6300	Advanced Molecular Biology	3 SCH
MICR 5300	Current Topics in Molecular Microbiology	2 SCH
		12 SCH

Summer I

BMSC 6940	Individual Research	3 SCH

Summer II

BMSC 6940	Individual Research	3 SCH
		6 SCH

Year 3		
Fall		
BMSC 6010	Qualifying Examination for Doctoral Students	3 SCH
BMSC 6940	Individual Research	7 SCH
MICR 5300	Current Topics in Molecular Microbiology	2 SCH
		12 SCH
Spring		
BMSC 6940	Individual Research	1 SCH
MICR 5300	Current Topics in Molecular Microbiology	2 SCH
		3 SCH
Summer I		
BMSC 6940	Individual Research	3 SCH

Year 4		
Fall		
BMSC 6940	Individual Research	1 SCH
MICR 5300	Current Topics in Molecular Microbiology	2 SCH
		3 SCH
Spring		
BMSC 6950	Dissertation	3 SCH
Summer I		
BMSC 6950	Dissertation	6 SCH
Total		**91 SCH**

Advancement to Doctoral Candidacy

Qualifying Examination

The qualifying examination ensures that the doctoral student has mastered information needed to succeed as a Ph.D. in the area of Microbiology and Immunology. A list of key topics, compiled by the Microbiology and Immunology faculty, will be distributed to the student after completion of the first year of course work. The student is expected to become knowledgeable in each of these topics through their course work, reading of textbooks and scientific literature, and discussion with faculty members.

The qualifying examination consists of a written and oral phase. A committee comprising the Microbiology and Immunology graduate faculty, except for the student's major professor, administers the examination. The initial phase of the qualifying examination consists of a set of written questions given to all students. After a review of the student's answers, the examination committee will schedule an oral examination. The oral examination consists of questions that further explore the answers given on the written exam, as well as questions on additional topics of microbiology and immunology.

Two attempts to successfully pass the qualifying examination are allowed. Failure of the student to pass the qualifying examination results in dismissal of the student from the doctoral program. A doctoral student who does not pass may be allowed to complete the requirements for a Master of Science degree.

Grant Writing (BMSC 6010)

Successful completion of Grant Writing (BMSC 6010) requires the preparation and oral defense of an original NIH grant proposal. Two attempts to successfully accomplish this are allowed.

The designated faculty coordinator assigns a committee of five graduate faculty, including a committee chair, to serve as the studentís grant proposal committee. Three committee members must be from within the department and at least one member must be from an outside department. The student's major professor may not serve as a committee member.

The faculty coordinator instructs the student on the regulations of the course and assists in initiating and preparing the proposal. The student should submit a report which presents the hypothesis, experimental strategy and specific aims for the proposal to the examination committee by mid-semester. The proposal must consist of the student's original ideas and is expected to significantly extend scientific knowledge in the chosen research area if the proposed experiments were actually conducted. The committee must approve this summary of the research proposal.

The student must prepare a detailed written report of the research proposal in NIH format after the summary has been approved. The final proposal will be typed and presented to the committee at least two weeks prior to the oral defense. The grant proposal and presentation will be evaluated on the basis of originality and ability to synthesize and communicate this information.

If the proposal and defense are satisfactory, the committee will recommend that the student be advanced to candidacy. This recommendation is presented to the disciplineís graduate faculty for approval by the faculty coordinator. Upon completion of this process, the student is advanced to candidacy.

Pharmacology

Eugene Quist, Ph.D., Graduate Advisor
Medical Education Building 2-334
817-735-2056

Graduate Faculty: Das, deFiebre, Dillon, Forster, Luedtke, Martin, Oglesby, Quist, Yorio
Adjunct Graduate Faculty: Bergamini, DeSantis, Dobbs, Pang, Sharif

Pharmacology is a discipline which bridges the basic and clinical sciences. Classically, pharmacologists sought to understand the pharmacological responses, mechanisms and clinical uses of drugs. However, in recent decades, the scope of pharmacology has expanded dramatically and includes cutting edge research in signal transduction and molecular biology. The Department of Pharmacology has several active research programs and has graduated numerous Master of Science and doctoral students. The areas of active research in the department include behavioral pharmacology, substance abuse, aging, eye research, signal transduction and molecular biology. Students in the pharmacology subdiscipline will be provided with a broad scope of research and teaching opportunities in preparation for successful careers in academia, industry and government.

Degree Plans

Typical degree plans for students in the pharmacology subdiscipline appear in this section. It is advantageous to the student to begin graduate study in a fall semester. This degree plan may vary depending upon availability of course offerings in a given semester and each student's progress toward thesis and dissertation research.

M.S. Degree Plan for Pharmacology

Year 1

Fall

BMSC 5600	Integrative Biomedical Science I	7 SCH
BMSC 5610	Integrative Biomedical Science Workshop I	2 SCH
Electives		3 SCH
		12 SCH

Spring

BMSC 5700	Integrative Biomedical Science II	6 SCH
BMSC 5710	Integrative Biomedical Science Workshop II	2 SCH
BMSC 5960	Biomedical Ethics	1 SCH
Electives		3 SCH
		12 SCH

Summer I

BMSC 5200	Biostatistics I	3 SCH

Summer II

BMSC 6940	Individual Research	3 SCH
		6 SCH

Year 2

Fall

BMSC 5950	Thesis	3 SCH

Spring

BMSC 5950	Thesis	3 SCH
Total		**36 SCH**

Ph.D. Degree Plan for Pharmacology

Year 1

Fall

BMSC 5600	Integrative Biomedical Science I	7 SCH
BMSC 5610	Integrative Biomedical Science Workshop I	2 SCH
BMSC 6500	Computer Applications in Science and Medicine	1 SCH
Electives*		2 SCH
		12 SCH

Spring

BMSC 5700	Integrative Biomedical Science II	6 SCH
BMSC 5710	Integrative Biomedical Science Workshop II	2 SCH
BMSC 5960	Biomedical Ethics	1 SCH
BMSC 6500	Automated Information Resources in Science and Medicine	1 SCH
BMSC 5970	Techniques in Biomedical Science	1 SCH
PHRM 5940	Seminar in Current Topics	1 SCH
		12 SCH

Summer I

BMSC 5200	Biostatistics I	3 SCH

Summer II

Electives*		3 SCH
		6 SCH

Year 2

Fall

BMSC 5970	Techniques in Biomedical Science	1 SCH
PHRM 5940	Seminar in Current Topics	1 SCH
PHRM 6940	Individual Research	4 SCH
Electives*		6 SCH
		12 SCH

Spring

BMSC 6940	Individual Research	3 SCH
Electives*		9 SCH
		12 SCH

Summer I

Electives*		3 SCH

Summer II

BMSC 6940	Individual Research	3 SCH
		6 SCH

Year 3

Fall

BMSC 6010	Grant Writing	3 SCH
Electives*		9 SCH
		12 SCH

Spring

BMSC 6950	Doctoral Dissertation	3 SCH
Electives*		9 SCH
		12 SCH

Summer I

BMSC 6950	Doctoral Dissertation	3 SCH

Year 4

Fall

BMSC 6950	Doctoral Dissertation	3 SCH
Total		**90 SCH**

* Electives Courses (Must include 9 SCH in the following courses offered by the Department of Pharmacology):

PHRM 5070	Neuropharmacology	4 SCH
PHRM 5900	Special Problems	3 SCH
PHRM 5910	Special Problems	3 SCH
PHRM 6020	Advances in Molecular Pharmacology	3 SCH
PHRM 6030	Advances in Behavioral Pharmacology	3 SCH
PHRM 6050	Ocular Pharmacology	3 SCH
PHRM 6080	Receptors and Drug Actions	4 SCH
PHRM 6699	Current Topics in Pharmacology	3 SCH

Advancement to Doctoral Candidacy

Qualifying Examination

The qualifying examination determines if the doctoral student has mastered information needed to succeed in the discipline of Pharmacology. The student is required to demonstrate reasonable proficiency in the topics of pharmacology presented during the first two years of graduate study. The student will be administered an oral qualifying examination by a committee comprised of Pharmacology graduate faculty, selected by the departmental graduate advisor. The student's major professor may be present but will not participate in the examination. The initial phase of the qualifying examination consists of presentation of a published pharmacology journal article, approved by the graduate advisor, with a subsequent question period. In the second phase of the examination, the student will be required to address questions on their knowledge of pharmacology. A maximum of two attempts to pass the qualifying examination will be allowed. A doctoral student who does not pass after the second attempt may be dismissed or allowed to complete the requirements for a Master of Science degree.

Grant Writing (BMSC 6010)

Successful completion of Grant Writing (BMSC 6010) requires the preparation and oral defense of an original NIH grant proposal. The student's doctoral advisory committee serves as the student's grant proposal committee. The graduate advisor and the student's major professor instruct the student on the regulations of the course and assists in initiating and preparing the proposal. The student will submit a summary report, which presents the hypothesis, experimental strategy, and specific aims for the proposal to the examination committee at the end of the second year. The proposal must consist of the student's original ideas and is expected to significantly extend scientific knowledge in the chosen research area. The committee must approve this summary of the research proposal. The student must then prepare a detailed written report of the research proposal in NIH format. The final proposal will be typed and presented to the committee at least two weeks prior to the oral defense. The student will present the proposal to faculty and graduate students. The grant proposal and presentation will be evaluated following the presentation, by the committee on the basis of originality and ability to organize and communicate information. A maximum of two attempts to pass will be allowed.

If the proposal and defense are satisfactory, the committee will recommend that the student be advanced to candidacy.

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Fiscal & Financial Aid Policies

Tuition and Mandatory Fees

The amounts shown in this catalog are subject to change without notice by action of the Texas Legislature or the University of North Texas Board of Regents. For current information on tuition and fees, see the Graduate School of Biomedical Sciences' Tuition and Fee Register printed for the particular academic year in which enrollment is planned, or inquire in the graduate office.

The UNT Board of Regents has been granted the authority, within established guidelines, to set graduate tuition rates by program.

For 2000-2001, graduate tuition is $66 per credit hour for in-state residents and $281 per credit hour for out-of-state students. To calculate costs for graduate courses, use the table below.

Students are responsible for payment of the charges listed in the table below.

Admission Application Fee

All applicants new to the University of North Texas Health Science Center must pay a $25 (U.S. residents) or $50 (non-U.S. citizens and permanent residents) non-refundable admission application fee.

Option to Pay Tuition by Installment

The Texas Legislature has the authority to modify or eliminate installment payment of tuition at each regular or called legislative session.

The health science center allows the payment of tuition and fees during the fall and spring semesters through the following alternatives:

- full payment of tuition and fees upon registration or by the payment deadline for early registration; or
- one-half payment of tuition and fees upon registration, or by the payment deadline for early registration, with separate one-fourth payments before the start of the sixth and 11th class weeks. Note: All course-related or optional fees are paid with the initial installment payment.

Fees (Non-Refundable) for Payment of Tuition by Installment

Handling fee: $15

Delinquent payment fee: $15

See the Academic Calendar for installment payment deadlines.

Tuition and Fee Payments

Tuition and fee payments may be made by cash, cashier's check, money order or personal check. Credit cards are not accepted.

Administrative Withdrawal for Non-Payment

Tuition and fee charges are incurred upon registration. Failure to pay either the first installment of the tuition payment plan or tuition and fees in full according to the deadlines set forth in the Academic Calendar, will result in the students administrative withdrawal from the institution without additional notice. Account statements are mailed to the student's home address. It is the student's responsibility to contact the Office of Accounting to determine account balance if a statement is not received.

Tuition and Fee Policies

Tuition covers graduate work. It and the various fees provide limited health services and admission to various center-sponsored events. Course-related fees and materials are additional. Students must purchase their own textbooks and supplies.

Fees charged for application, late registration, duplication of records, graduation and regalia, late

Tuition and Mandatory Fees for 2000-2001

	TEXAS RESIDENTS	NON-RESIDENTS	
Tuition per semester hour	$66	$281	Minimum of $100 in long semesters;
General use fee per semester hour	$6	$6	Maximum $60
Student service fee per semester hour	$6	$6	Maximum $72
Activities Center fee	$25	$25	$12.50 in summer terms
Computer fee	$25	$25	$12.50 in summer terms
Medical fee	$25	$25	$12.50 in summer terms
Identification card fee	$5	$5	One-time fee; replacement ID cards are $5

Tuition rates for non-resident and foreign students must be determined no later than January 1 of each odd-numbered year by the Texas Higher Education Coordinating Board. The tuition rate is currently set at $281 per semester credit hour.

filing for graduation, replacement diplomas and miscellaneous items are noted in the current Tuition and Fee Register available at the graduate office.

Residency Regulations for Tuition Purposes

Rules and regulations for determining residency status are specified under Title III of the Texas Education Code and are available in the Graduate School of Biomedical Sciences. In general, students must physically reside in Texas for the 12-month period immediately preceding their initial registration in an educational institution in Texas. Other factors may be considered for residency determination for tuition.

Students who are not legal residents of Texas must pay non-resident tuition including the statutory tuition charges and standard health science center fees approved by the UNT Board of Regents. Admission requirements for non-residents are the same as for resident students.

Certain residency exceptions do not affect actual residency status but do allow for a non-resident tuition exemption. Refer to "Tuition and Fee Waivers" section of this chapter for further information.

Responsibility of the Student

The student is responsible for knowing residence status and for registering under the proper status. Any questions concerning residency must be discussed with the proper authority in the graduate office before registration.

Any student erroneously classified as a resident will be reclassified and will be required to pay all out-of-state tuition due. Attempts to evade non-resident fees may subject the student to the statute penalty and to possible disciplinary action.

Change of Status: Non-resident to Resident

A student who is at any time classified as a non-resident retains non-resident status until reclassification as a resident is applied for and is officially approved by the registrar.

Change of Status: Resident to Non-resident

Students who are classified as residents but become non-residents by virtue of any change of domicile must notify the registrar of such change immediately. Students who believe they have been erroneously classified have the opportunity for appeal. The appeal is to be made to the authority by whom the original classification was assigned, either in the graduate office or in the Registrar's Office.

Tuition and Fee Waivers

Several exemptions and waivers are available to qualifying students. Brief descriptions of these are listed below. Waiver refunds must be requested during the semester application is made. Such requests must be made before the 12th class day in long semesters and the fourth class day in summer terms. Requests for retroactive refunds cannot be honored. Additional information and applications are available in the graduate office.

Exemptions and Waivers

1. Certain veterans, dependents, etc., of the U.S. armed forces who are Texas residents are exempted from payment of tuition.
2. Certain orphans of members of the U.S. armed forces, Texas National Guard and Texas Air National Guard are exempted from payment of tuition.
3. Deaf or blind students are exempted from payment of tuition.
4. Children of disabled firemen, peace officers, employees of the Texas Department of Corrections and game wardens are exempted from payment of tuition.
5. Children of U.S. prisoners of war or persons missing in action are exempted from payment of tuition.
6. Resident rather than non-resident tuition is applied to certain students from other nations of the American hemisphere.
7. Resident rather than non-resident tuition is applied to teachers and professors of Texas state institutions of higher education, their spouses and their children.
8. Resident rather than non-resident tuition is applied to a teaching or research assistant provided the student is employed at lease one-half time by the health science center in a position that relates to the degree sought.
9. Resident rather than non-resident tuition is applied to a non-resident holding a health science center competitive academic scholarship of at least $1000 for the academic year for which the student is enrolled.
10. Students who are concurrently enrolled in more than one program at UNT Health Science Center are not charged duplicate fees.
11. Certain health science center fees are waived for students enrolled only in off-campus courses.

Tuition and Fee Refunds

A student who drops a course or withdraws from the graduate school within certain time periods may be entitled to a partial refund of tuition and fees. These refunds are calculated according to the category and time schedule listed below. Application fees, late registration charges, fee for student identification card, delinquent payment fees, and installment handling fees are non-refundable. Any financial obligation to the health science center must be resolved before any refunds will be made.

Class Drops

Refunds are made for any course dropped through the 12th class day for the long semester and through the fourth class day in the summer (see Academic Calendar for dates). The semester's first class day is always the first official day of classes for the graduate school rather than the first day of an individual's class.

To calculate the refund for a class dropped, take the fee paid for the original hours and subtract the fee shown in the Tuition and Fee Register for the new number of hours. The difference between the two is the amount of the refund. Note: If all classes for the semester are dropped, see "Schedule of Withdrawal Refunds" in this catalog.

Withdrawal from the Graduate School of Biomedical Sciences

Withdrawal refunds are determined by the number of enrolled semester credit hours at the time of withdrawal. Withdrawal percentages are applied to the total amount of tuition and fees as prescribed by state law, not the amount paid. The withdrawal schedule and percentages of refund shown below pertain to total withdrawal for the semester. The withdrawal schedule and the percentages of refund are mandated by the Texas Legislature. The semester's first class day is always the first official graduate school day of classes rather than the first day the individual attends class. A withdrawal refund is based on the day of withdrawal, regardless of the date the class first meets. See the Academic Calendar in this catalog for the dates classes begin.

Additional information may be found in the Tuition and Fee Register or by contacting the graduate office.

Schedule of Withdrawal Refunds

UNT Health Science Center shall refund a percentage of tuition and mandatory fees to students withdrawing from the institution during a fall or spring semester according to the following withdrawal schedule:

Before first day of class	100%
During the first five class days	80%
During the second five class days	70%
During the third five class days	50%
During the fourth five class days	25%
After the fourth five class days	None

General Financial Policies

The UNT Health Science Center is a state-supported institution subject to state laws. Extension of credit is prohibited and all financial obligations to the health science center must be paid when due. Any outstanding obligation must be cleared prior to registration in the next subsequent semester. Tuition and fees are subject to change by action of the Texas Legislature or the UNT Board of Regents.

Correction of Errors

Students are responsible for any additional amounts due the health science center resulting from auditing and correction of records after registration fees have been paid including all registration assessment errors, change from off-campus to on-campus classes, invalid employment waivers, etc.

Payments by Third Party

Checks issued by a third party in payment of a student's tuition, fees or other charges should be made payable to either the student or to both the student and the health science center. Arrangements may be made with the graduate office in cases where cash amounts should not be made available to the student.

Returned Checks

A returned check is defined as any check returned to the health science center unpaid due to no fault of the bank or the university.

Upon receipt of a returned check, notification is mailed to the issuing party or the individual in whose behalf the check was issued. The address on the check and/or the address in the official health science center records is used.

An additional $5 fee is charged for each returned check.

Financial Aid

UNT Health Science Center offers programs to assist graduate students in meeting the costs of financing their education. Though financial aid is an alternative for eligible students, it should be considered a supplement to a student's own financial resources. Students must be accepted into an eligible program to be considered for financial aid. Non-degree seeking students are not eligible for financial aid.

Student Eligibility

To be considered for financial assistance, a student must meet the following eligibility criteria:

- Certify that he or she does not owe a refund on any grant or loan, is not in default on any loan or has made satisfactory arrangements to repay any defaulted loan, and has not borrowed in excess of the loan limits on any federal programs.
- If required to do so, must be registered with the Selective Service.
- Must maintain satisfactory academic progress.
- Must use all funds received as financial aid for educational purposes only.

Student Counseling

Individual student counseling is available and encouraged. The counselors are available to discuss budgeting and types of financial aid awards. Students receiving federal loans are required to receive in-person counseling before the release of the first disbursement of their first loan.

Student Budgets

Student budgets are developed within federal guidelines and must meet the approval of the Texas State Coordinating Board. These budgets are re-evaluated periodically and may or may not change depending on requirements by federal law. The cost of attendance is summarized as follows and is for the student only:

- Tuition and fees
- Books and supplies
- Room and board
- Transportation
- Miscellaneous expenses

Allowances for those students with dependents requiring dependent care and allowances for handicapped students may be permitted for students meeting specific requirements. In addition, students with unusual or extenuating school-related circumstances that may require special consideration should contact the Financial Aid Office promptly. In some instances, students may be required to supply additional information for a complete evaluation of a request.

A student may apply for financial aid by completing the Free Application for Federal Student Aid (FAFSA). This should be done immediately upon acceptance to TCOM and yearly thereafter.

Federal Programs

Students who complete the FAFSA, show financial need as determined by the needs- analysis service and meet all general eligibility requirements as outlined for each program may apply for federal financial aid. In addition, most aid programs require that the recipient adhere to academic and/or financial criteria in order to maintain eligibility. Some programs have limited funds; therefore, student files that are completed first are considered first.

Federal and State Programs

Federal Work Study
Federal Perkins Loans
Federal Family Education Loan Program
Texas Public Education Grant

In addition, students may apply through the health science center's Office of Financial Aid for assistance to private programs. Students may also apply directly to private foundations for scholarships and loans. Most programs have individual selection criteria and various award limits.

Contact the Office of Financial Aid, Medical Education Building 1-116 at 817-735-2520 or 800-346-8266 for more information.

Graduate Assistantships

Graduate assistantships are awarded annually to qualified doctoral students by disciplines and by the Graduate Council. Funding for doctoral and master's students may also be available from research grants held by individual faculty members.

The Graduate School of Biomedical Sciences mandates the level of funding to be at least $16,000 for doctoral students and $12,600 for master's students.The assistantship entitles the recipient to applicable health insurance and allows out-of-state students to pay tuition at the in-state rate.

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Student Life

Division of Student Affairs

The Division of Student Affairs assists the president of the health science center in interpreting student needs, creating an atmosphere that stimulates learning and integrating extracurricular experiences into the formal learning programs.

The goals of this office are to encourage student participation in and contribution to the health science center's programs, to establish and coordinate a system of student academic advisement, and to interpret institutional regulations on academic and non-academic matters to students.

Staff members are available for general counseling or information and assistance with any phase of campus life. In emergency situations (such as a death in the family) special assistance can be provided for notification of professors, medical withdrawal, etc. The office provides rights adjustment upon request, handles disciplinary and social adjustment problems, and offers self-development opportunities and enrichment activities.

The Division of Student Affairs encompasses student development, academic support, admissions, financial aid and the registrar.

Academic Support Services

The Office of Academic Support provides co-curricular support for student learning. Learning assessment and other services are available to current students by appointment or on a walk-in basis. Services include workshops on learning strategies, test-taking skills, time management and academic tutoring. Workshops and presentations for students are presented during student orientation programs and throughout the academic year. This office also arranges group and individual tutorials.

For more information, to make an appointment for study skills counseling, or to request tutoring assistance, contact Academic Support Services at (817) 735-2407.

Student Development Services

The Office of Student Development supports the mission of the Division of Student Affairs and the health science center. Its role is to address issues that are relative to all medical and graduate students, from pre-enrollment through graduation. This office coordinates programs and activities that promote the intellectual, professional, moral, social, physical and emotional development of all students. These programs and activities include:

- Clubs and organizations
- New Student Orientation
- Ranchland
- Holiday Dinner Dance
- Spring Fling

The Student Development Office also provides students and prospective students information on housing, child care and employment opportunities in and around Fort Worth.

Food Services

Lunch is available in the lounge on the first floor of the Gibson D. Lewis Health Science Library. Snack foods and beverages can be purchased from vending machines located throughout the health science center. A student/staff lounge is conveniently located on the first floor of Medical Education Building 1. There are also a variety of restaurants within walking distance of campus.

Founders' Activity Center

The Founders' Activity Center, located on the north end of campus, is open to students, faculty and staff seven days a week. The center features aerobics classes, regularly scheduled recreational sports, lecture series, multi-purpose outdoor court and recreational equipment. Cardiovascular exercise equipment is available, as well as free weights and weight machines. Exercise and nutrition programs can be tailored to the individual by the center's Health Promotions Manager.

Health Insurance Program

As noted in the Academic Policies section of this catalog, it is compulsory for all students to carry medical and hospitalization insurance, and proof of insurance must be provided at each registration.

Although health insurance may be purchased from any insurance carrier, a group student health insurance plan is offered by a non-university-affiliated carrier for students enrolled at the health science center. Application forms are available in the Office of Student Affairs.

Health Services

Health care services are available to students and their immediate family members through the UNT Health Science Center's Central Family Practice Clinic, which is in the Patient Care Center on the northwest corner of campus. This clinic is a public family practice facility, however, and you must make an appointment for every visit. You also must provide insurance information, and a claim will be filed.

Honors Day

Each year during Honors Day, the health science center recognizes students who have excelled academically, as well as those who have made outstanding contributions to the institution, the community and the medical and scientific professions.

Identification Card Regulations

The identification card is distributed after all fees have been paid. The card entitles the bearer to access to all health science center facilities and serves as an identification for clinic and health services.

Lost ID cards may be replaced for a $5 charge.

The card is void upon termination or interruption of enrollment and when not properly encoded.

Fraudulent use of the ID card subjects the user to a fine of $2,000 and up to one year in jail (Class A Misdemeanor). Anyone who uses the ID card to give false information to a police officer is subject to a fine of $200 (Class C Misdemeanor).

Liability

The health science center is not responsible for and does not assume any liability for loss of or damage to personal property. A student may want to provide personal insurance coverage for possessions on campus.

Living Accommodations

There is no on-campus housing at UNT Health Science Center. The health science center does not assume any responsibility in housing arrangements but does support the federal housing policies that housing owners not discrimate because of race, color, sex, age, disability, veteran status or national origin. Information on local housing accommodations is available in the student lounge.

Motor Vehicle Regulations

People who operate motor vehicles and bicycles on the health science center campus must comply with the Texas Uniform Traffic Code and the published center regulations regarding vehicle and bicycle use, parking, display of decals and penalties for violation. See Student Handbook for details on parking policies.

Student Organizations

The University of North Texas Health Science Center recognizes the right of any group of students, faculty or staff to form a voluntary organization for purposes not forbidden by the laws of the United States or the state of Texas. All organizations that include enrolled students as members must be registered with the Office of Student Affairs if they will use any university facilities, space or grounds for meetings.

Policies regulating the organization, functioning, sponsorship and privileges of registered or recognized organizations are available in the Office of Student Affairs.

Graduate Student Association

All members of the graduate student body, full or part-time, are full and equal members of the Graduate Student Association (GSA). GSA promotes the interests and opinions of the student body, sponsors projects and events beneficial to students and acts as the voice of students on matters of policy and student welfare. Monthly GSA meetings are held during the long semesters. Members elect officers at the end of each spring semester. The GSA president and vice president serve as student representatives to the Graduate Council.

Black Graduate Student Association

The Black Graduate Student Association (BGSA) is open to all African-American graduate students. BGSA was formed to promote fellowship among African-American graduate students. Further goals of the organization include assisting in recruitment and retention efforts, generating funds for scholarships, and serving as role models in the arena of science for elementary and secondary youth.

D.O./Ph.D. Student Association

The D.O./Ph.D. Student Association (DPSA) is open to all students involved in the dual D.O./Ph.D. program. DPSA takes an active roll in developing the policies governing the dual program. DPSA serves as a formal liaison between the Graduate Student Association and the Student Government Association of the Texas College of Osteopathic Medicine. A further goal of the organization is to promote research among fellow osteopathic medical students.

Scheduling Events

Student organizations are required to schedule events, seminars, programs and lectures through the Student Development Office. Facilities reservation forms may be picked up from this office and submitted to the Office of Student Affairs for official approval and scheduling.

Student Lounge

The Student Lounge is located on the first floor of Medical Education Building 1, directly across from the Main Auditorium. The lounge provides a relaxed atmosphere for students with various recreational game tables available. The Student Development Coordinator and Speculum offices are housed within the lounge.

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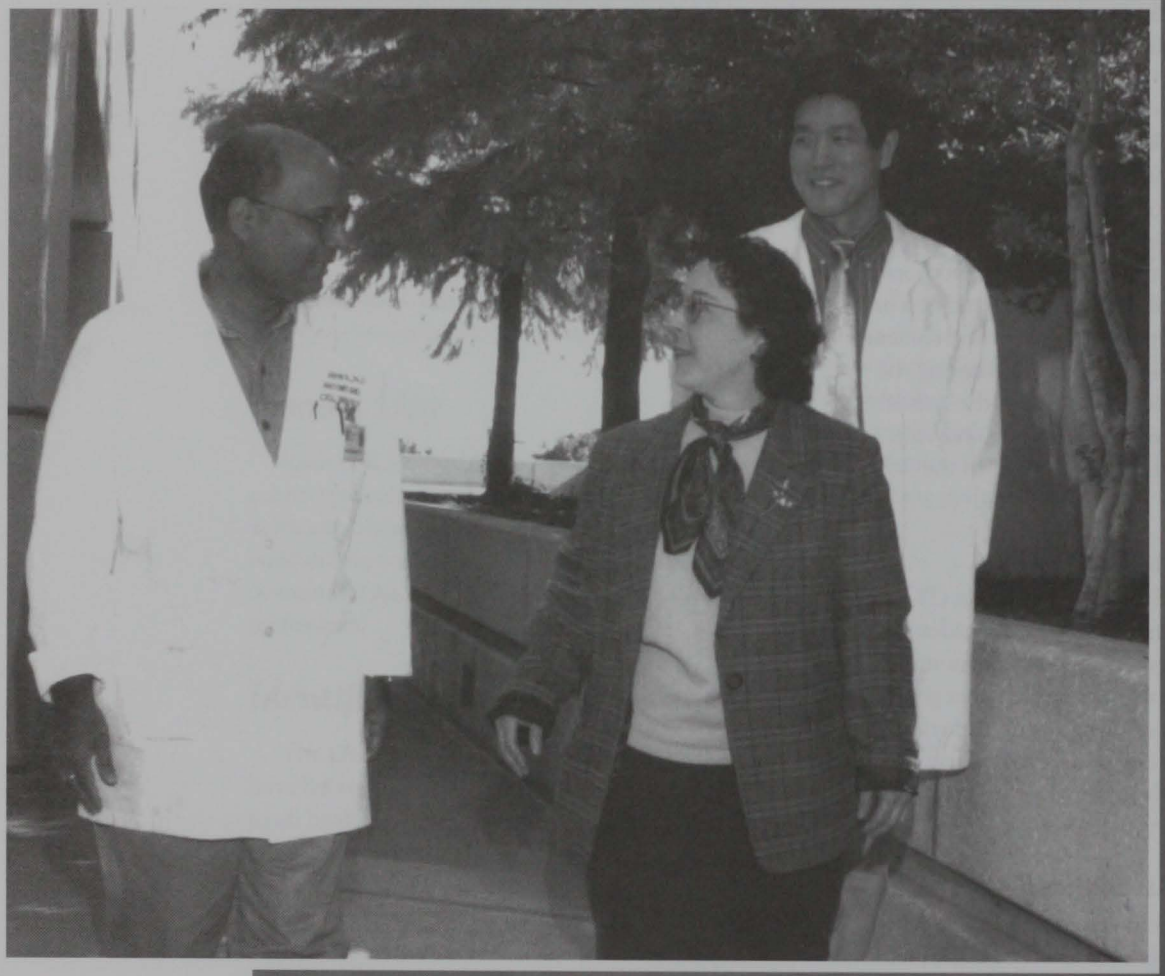

Course Descriptions

Prerequisite requirements may be waived on an individual basis as determined by department. All courses require permission of the course director for enrollment.

Biomedical Sciences (BMSC)

5000. Introduction to Concepts in Biomedical Science.
2 hours. Course designed for undergraduate participants in the summer research programs with emphasis on data collection, analysis and presentation in the areas of physiology, pharmacology, microbiology, molecular biology, anatomy and cell biology. Offered each Summer.

5080. Radioisotopes in Biomedicine.
1 hour. Radiation sources, interaction of radiation with matter and human tissues, radiation measurement and dosage, instrumentation, regulations, and practical and safety procedures. Prerequisite(s): consent of department. Offered on demand.

5200. Biostatistics I.
3 hours. Statistical methods and experimental design; descriptive statistics; data presentation; parametric and non-parametric methods of hypothesis testing including two-sample tests, analysis of variance, regression and correlation analyses; introduction to multivariate statistics. Competency with computer statistical packages is developed. Offered each summer.

5210. Biostatistics II.
3 hours. Course content includes multivariate analysis, experimental design and statistical software. Prerequisite: BMSC 5200. Offered each Summer II.

5600. Integrative Biomedical Sciences I.
7 hours. Course designed to provide foundation for studies in biomedical sciences through an integrated curriculum that includes instruction in biochemistry, micro/molecular biology and cell biology. Concurrent enrollment in BMSC 5610 required. Offered each Fall.

5610. Integrative Biomedical Sciences Workshop I.
2 hours. Seminar/journal club format for investigating and discussing current research corresponding to lecture topics in BMSC 5600. Concurrent enrollment in BMSC 5600 required. Offered each Fall.

5650. Laboratory Rotations.
1-3 hours. Designed to allow first year graduate students an opportunity to work in a particular research laboratory on activities directed by the instructor in order to become acquainted with the research and laboratory environment before selecting a mentor. Prerequisite: instructor consent. Offered each semester.

5700. Integrative Biomedical Sciences II.
6 hours. Course designed to provide foundation for studies in biomedical sciences through an integrated curriculum that includes immunology/cancer/pharmacology and physiology. Prerequisite: BMSC 5600 and 5610. Concurrent enrollment in BMSC 5710 required. Offered each Spring.

5710. Integrative Biomedical Sciences Workshop II.
2 hours. Seminar/journal club format for investigating and discussing current research corresponding to lecture topics in BMSC 5700. Prerequisite: BMSC 5600 and 5610. Concurrent enrollment in BMSC 5700 required. Offered each Spring.

5900-5910. Special Problems.
1-3 hours each. For master's students capable of developing a finite problem independently through conferences and activities directed by the instructor. Problem chosen by the student with the consent of the instructor. May be repeated for credit. Offered each semester.

5920. Laboratory Internship Practicum for Biotechnology
1-6 hours. The candidate must complete an internship in the mentor's laboratory. During this time, the student will learn how to perform all of the duties expected of a laboratory technician. These may include working under researchers on their projects, doing the student's own research project, purchasing supplies and equipment, repairing and maintaining equipment, etc. The student is expected to keep a laboratory notebook using GLP protocol during this experience. At the completion of the practicum, the student will write a report detailing the activities of the internship. The student's advisory committee must approve this report together with the laboratory notebook. The student must make a formal presentation to the advisory committee at this time. A copy of the report must be submitted within the appropriate deadlines to the graduate school according to the guidelines for completing the requirements for graduation. Offered each semester.

5930. Individual Research.
1-12 hours. Master's-level research of independent nature. A maximum of 12 SCH allowed toward degree. Offered each semester.

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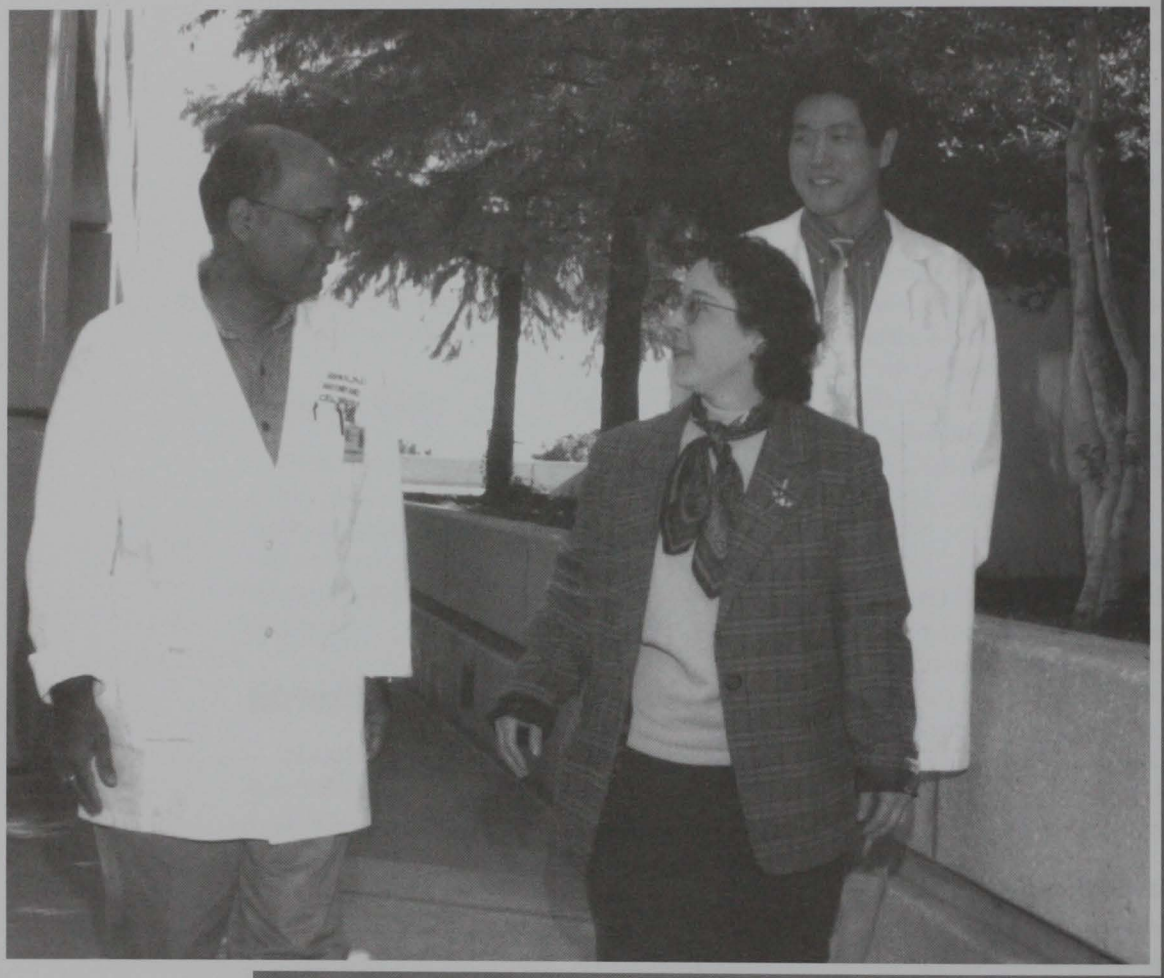

Course Descriptions

5940. Seminar in Current Topics.

1 hour. Student will attend 15 lectures of current interest presented by students and/or invited speakers throughout the institution. Attendance is mandatory. May be repeated for credit. Offered Fall and Spring.

5950. Thesis.

3-6 hours. To be scheduled only with consent of department. 6 SCH required. No credit assigned until thesis has been completed and filed with the graduate dean. Continuous enrollment required once work on thesis has begun. May be repeated for credit. Offered each semester.

5960. Biomedical Ethics.

1 hour. Covers major ethical issues in biomedical sciences, including: authorship and intellectual property; conflict of interest; data selection/research design; privacy and confidentiality; discrimination and sexual harassment; misconduct and whistle-blowing; animals in research; human subjects in research; implication of funding sources for research. Offered each Spring.

5965. Introduction to Industry Practices I.

1 hour. Introduction to the practice of industry science with an emphasis on good laboratory practice, new drug applications, FDA regulations, clinical trials and biotechnology transfer. Offered each Spring.

5970. Techniques in BMSC.

1-2 hours (varies by technique chosen). A practical course in techniques. Students will participate in laboratories demonstrating up-to-date techniques in biomedical sciences. A listing of the techniques of participating laboratories is available in the schedule of classes. Offered each semester.

6010. Grant Writing.

3 hours. Demonstration of competence in a specific area of biomedical science as evidenced by writing, presenting and defending an NIH grant application. Attendance at a grant writing workshop held by the graduate school is required. Must be undertaken prior to the completion of 84 SCH. Prerequisite: Successful completion of a discipline-based qualifying examination. This course is graded Pass/Fail. Offered Fall, Spring and Summer I.

6500. Computer Applications in Science and Medicine.

1 hour. Use of computers in the scientific and medical fields. Special attention is given to hardware configurations; using word processing, spreadsheets and databases; charting and graphing statistical data; discussion of cross-platform issues; email; basic Internet skills; and presentation software. Practical integration of different software tools is addressed. Enrollment is limited. Offered each Fall and Summer I.

6510. Automated Information Resources in Science and Medicine.

1 hour. Extensive training on the Internet, Library Information System (LIS), and MEDLINE is provided. Instruction is provided on creating correctly formatted bibliographies for journal article publication. Other search engines and databases such as Grateful Med and Current Contents are discussed. Prerequisite: BMSC 6500 or equivalent. Enrollment is limited. Offered each Spring and Summer II.

6900-6910. Special Problems.

1-3 hours each. For doctoral students capable of developing a problem independently through conferences and activities directed by the instructor. Problem chosen by the student with the consent of the instructor. May be repeated for credit. Offered each semester.

6940. Individual Research.

1-12 hours. Doctoral research of independent nature. A maximum of 24 SCH allowed toward degree. Offered each semester.

6950. Doctoral Dissertation.

3, 6 or 9 hours. To be scheduled with consent of department. A maximum of 12 SCH allowed toward degree. No credit assigned until dissertation has been completed and filed with the graduate office. Doctoral students must maintain continuous enrollment in this course subsequent to passing qualifying examination for admission to candidacy. May be repeated for credit. Offered each semester.

Anatomy & Cell Biology (ANAT)

5000. Structural Neuroscience.

6 hours. A complete study of the structure and function of the human nervous system utilizing basic principles of neuroanatomy, neurohistology, and neurophysiology. Laboratory activities will require students to participate in gross dissections of the brain and spinal cord. This integrated approach will provide the student with a fundamental understanding of the basic concepts of neuroscience. The course will consist of both lectures and labs related to the functioning of the normal and diseased nervous system. Prerequisites: BMSC 5600, 5610, 5700, 5710. Offered each Fall.

5010. Structural Anatomy.

9 hours. A complete study of the gross morphological and histological structures of the human body (excluding those areas taught in Structural Neuroscience). The unity of the human body will be examined beginning at the cellular level and progressing to the macroscopic level. Lecture material and dissections in the gross anatomy portion are organized regionally. Laboratory activities will require students to participate in gross dissections of the abdomen, thorax, pelvis, perineum, lower limb and portions of the head and neck. Dry labs (dissections) of the superficial and deep back, axilla, and the upper limb will be performed through computer simulation. Students will also be required to examine, by means of light microscope and computer simulation, the cells, tissue and organs of the human body. Each student will be required to participate fully in dissection of a human cadaver for successful completion of the course. In addition, both lecture and laboratory sessions will emphasize clinical significance. Prerequisites: BMSC 5600, 5610, 5700, 5710. Offered each Spring.

5900-5910. Special Problems.

1-3 hours each. For students capable of developing a problem independently through conferences and activities directed by the instructor. Problem chosen by the student with the consent of the instructor and department. May be repeated for credit. Offered each semester.

5940. Seminar in Current Topics.

1 hour. Specialized weekly lectures on topics of current interest by students, faculty and/or invited speakers. May be repeated for credit. Offered Fall and Spring.

6030. Methods in Molecular Biology.

4 hours. An intensive laboratory course designed to give students the expertise to perform basic techniques currently utilized in cell and molecular biology. Techniques will include plasmid preparation; isolation of cDNA inserts from various plasmids; extraction of nucleic acids; agarose gel electrophoresis; Northern and Southern blot analyses; cDNA cloning; sequencing and analysis; PCR amplification; protein gel electrophoresis; and immunoblot analysis. Prerequisite: graduate-level biochemistry. Offered each Fall.

6040. Advances in Ocular Biology.

3 hours. Emphasis is on the current literature and contemporary approaches dealing with current topics in ocular biology. Each year will focus on one or several research and/or clinical areas. Offered every other Fall (odd years).

6050. Visual Sciences Seminar.

1 hour. A monthly presentation by a visiting distinguished visual scientist. The seminar will be preceded by a journal check where articles relating to the seminar will be discussed. Offered each Fall and Spring.

6080. Diseases of the Eye.

3 hours. Structure and function of the various ocular tissues, as well as the diseases which affect them. Lectures presented by basic scientists and clinical ophthalmologists. Offered on demand.

6599. Current Topics in Anatomy and Cell Biology.

1 hour. Contemporary topic chosen each semester from the broad areas of anatomy, cell biology, visual science. Format consists of presentations of current research articles by both faculty and students. May be repeated for credit as topics vary. Offered each Fall and Spring.

6690. Special Problems in Anatomy and Cell Biology.

1-3 hours. For students capable of developing a problem independently through conferences and activities directed by the faculty. Problem chosen by the student with the consent of the instructor and the department chair. Offered each semester.

6699. Special Problems in Ocular Research.

1-3 hours. For students capable of developing a problem independently through conferences and activities directed by the faculty in areas of visual sciences. Problem chosen by the student with the consent of the instructor and the department chair. Offered each semester.

Biochemistry & Molecular Biology (BIOC)

5425. Advanced Biochemistry.

4 hours. Topics include structure and function of nucleic acids and proteins, lipids, carbohydrates and regulation of metabolism. Tools for structural studies will be considered and current research reports in this area will be discussed. Prerequisites: BMSC 5600, 5610, 5700 and 5710. Offered each Spring.

5435. Molecular Aspects of Cell Signaling.

4 hours. Advanced study of signal transduction events from the plasma membrane to the nucleus. Topics include receptor activation, the generation of second messengers and eukaryotic transcriptional activation and repression. Prerequisites: BMSC 5600, 5610, 5700 and 5710. Offered each Fall and Spring.

5510. Signal Transduction.

2 hours. Current publications in the general area of receptor-signal transduction will be discussed in the journal club format. Students are required to participate in presentation and discussion of current articles. Offered each Fall and Spring.

5520. Enzyme Regulation and Mechanism.

2 hours. Current topics in the areas of Enzyme Mechanism and Regulation will be discussed, based on student and faculty presentations of literature articles. Offered each Fall and Spring.

5530. Structure and Function of Proteins.

2 hours. Topics will include the isolation of proteins from tissue, their structural and functional characterization, effects of natural and synthetic mutants on the structure, stability and function of proteins. Prerequisite: BIOC 5010 or BIOC 5011; may be taken concurrently. Offered each Fall and Spring.

5540. Advanced Lipoprotein Metabolism.

2 hours. Presentation and discussion of recent research findings and literature reports in lipoprotein metabolism and related areas. Prerequisite: BIOC 5010 or BIOC 5011; may be taken concurrently. Offered each Fall and Spring.

5550. Advanced Clinical Biochemistry.

3 hours. This course has an emphasis on performance, evaluation and diagnostic interpretation of clinical laboratory tests. Topics include endocrine biochemistry, cancer biochemistry tumor markers, biochemistry of nutrition, etc. Offered each Fall and Spring.

5680. Selected Topics in Biochemistry.

1-3 hours. Current research interests in the field of biochemistry. May be repeated as topics vary. Offered on demand.

5900-5910. Special Problems.

1-3 hours each. For students capable of developing a problem independently through conferences and activities directed by the instructor. Problem chosen by the student with consent of the instructor and department. May be repeated for credit. Offered each semester.

5920. Seminar in Cell Motility.

1 hour. Review of the current literature in muscle contration, ciliary movement, microfilaments and actin-binding proteins, microtubules and microtubule-associated proteins, intermediate filaments, non-muscle motility, the organization of the cytoskeleton and the novel biochemical and biophysical techniques. Offered each Fall and Spring.

5940. Seminar in Current Topics.

1 hour. Specialized weekly lectures on topics of current interest by students, faculty and/or invited speakers. May be repeated for credit. Offered Fall and Spring.

6040. Molecular Biology of Lipid Transport.

2 hours. Sterol-mediated regulation of gene expression, molecular function of lipoproteins. Emphasis on discussion of assigned readings and student presentations of literature articles. Prerequisites: BMSC 5600, 5610, 5700, 5710. Offered each Spring.

6050. Molecular and Cell Biochemistry of Cancer.

2 hours. Emphasis on cancer; initiation, promotion and progression — apoptosis/caspases, angiogenesis, oncogenes and tumor suppressors, adhesion molecules; tumor immunology and metastasis. Course format will consist of brief lecture, discussion of assigned readings, and student presentations of literature articles. Prerequisites: BMSV 5600, 5610, 5700, 5710. Offered each Spring.

6680. Advanced Techniques in Biochemistry.

1 hour. Methods and instrumentation currently used in biochemical analyses. Presented in four-week mini-courses consisting of 8 hours of lecture and 24 hours of laboratory. Topics vary from year to year but will include among others, protein sequencing and amino acid analysis, nucleic acid sequencing, tissue culture, monoclonal antibody production, column chromatography, radioisotopes, peptide synthesis and gel electrophoresis and electrofocusing. Offered on demand.

6690. Current Topics in Biochemistry and Molecular Biology.

1-3 hours. Emphasis on the current literature and contemporary approaches dealing with current topics in Biochemistry and Molecular Biology. Each semester will focus on one of several research areas. Prerequisite: BIOC 5425. Offered on demand.

Integrative Physiology (PSIO)

5100. Cardiovascular Physiology I.

3 hours. Designed to familiarize the student with current concepts and progress in human cardiovascular function. Topics include molecular basis of myocardial contraction, electrochemical coupling, regulation of myocardial mechanics and ventricular performance, the peripheral circulation and the vessel wall, local regulation of tissue blood flows, and neural control of the circulation. Prerequisite: BMSC 5600, 5700. Offered every other Fall (even years).

5110. Cardiovascular Physiology II.

3 hours. Continuation of PSIO 5100. Topics include capillary and lymphatic dynamics, control of blood pressure, splanchnic blood flow, regulation of cardiac output and specific cardiovascular perturbations. Prerequisites: BMSC 5600, 5700 and PSIO 5100. Course format includes student presentations, term paper and examinations. Offered every other Spring (odd years).

5200. Respiratory Physiology.

3 hours. Designed as an in-depth study of the functional anatomy and physiology of the respiratory system with emphasis on the human. Topics presented by students, followed by class discussions including pulmonary mechanics and blood flow. Respiratory blood gases and neurohumoral control of ventilation. Prerequisite: BMSC 5600, 5700. Offered every other Fall (odd years).

5300. Renal Physiology.

3 hours. This course familiarizes the student with current concepts and progress in human renal function. Topics include the body fluids, the renal vascular bed, glomerular filtration, tubular function, acid-based physiology, renal pathophysiology and the history of renal physiology. Prerequisite: BMSC 5600, 5700. Offered every other Spring (even years).

5400. Molecular Genetics of Cardiac and Vascular Disease.

Advanced in-depth study of the molecular biology and genetics of both normal and disease state cardiovascular functions. Emphasis is to be placed on the genetics behind disease state etiologies. a thorough review of all new genetic and molecular techniques developed to explore disease state physiology will be presented. Prerequisites: BMSC 5600 and 5700. Offered every other Spring (odd years).

5900-5910. Special Problems.

1-3 hours each. For students capable of developing a problem independently through conferences and activities directed by the instructor. Problem chosen by the student with the consent of the instructor and department. May be repeated for credit. Offered each semester.

5940. Seminar in Current Topics.

1 hour. Specialized weekly lectures on topics of current interest by students, faculty and/or invited speakers. May be repeated for credit. Offered Fall and Spring.

6020. Advances in Cardiovascular Physiology I.

3 hours. Directed, in-depth study of current research literature with emphasis on the heart. Oral reports and written reviews are required. Prerequisite: PSIO 5100. Offered each semester.

6030. Advances in Cardiovascular Physiology II.

3 hours. Directed, in-depth study of current research literature with emphasis on the peripheral circulation. Oral reports and written reviews are required. Prerequisite: PSIO 5110. Offered each semester.

6050. Physiology of Skeletal and Smooth Muscle.

3 hours. Designed as an in-depth study of the functional anatomy and physiology of skeletal and smooth muscle. Topics include functional anatomy, molecular basis of contraction, excitation-contraction coupling, electro- and pharmaco-coupling and regulation of muscle mechanics and adaptations of the neuromuscular system. Special topics are presented by students. Prerequisites: BMSC 5600 and 5700. Offered every other Fall (odd years).

6060. Cardiovascular Regulation During Exercise.

3 hours. The course will provide an integrative physiological basis of blood pressure regulation during exercise. The mechanisms to be discussed include "Central Command" and the "exercising muscle pressor reflex" and their integration with basic hemodynamic responses to exercise. Offered every other Summer I (even years).

6070. Advanced Endocrine Physiology.

3 hours. An interactive survey of modern endocrinology presented largely from the current primary literature. The scope will focus on mechanisms and will extend from molecular biology (hormone interactions with genes, receptors, ion channels, second messengers, etc.) to systematic control (feedback, secretion, distribution, metabolic clearance rate, etc.) Broad topic areas discussed will be determined in part by class interests. Offered every other Fall (odd years).

6080. Advanced Autonomic Physiology.

3 hours. This course will cover anatomy, neurotransmitters, and cellular mechanisms of the autonomic nervous system with special emphasis on the peripheral systems. Parasympathetic and sympathetic control of physiological function will be discussed with system emphasis determined in part by student interests. Current research literature combined with up to date reviews will be used to spur discussions which will focus on mechanisms extending from molecular biology to systemic control. Individual student interests will be used to determine special topic areas for the last half of the course. Prerequisites: BMSC 5600 and 5700. Offered every other Fall (even years).

6090. Myocardial Metabolism: Concepts and Controversies.

3 hours. Comprehensive survey of current scientific issues related to heart muscle metabolism and function. Specific topics include: control of myocardial substrate metabolism; ATP synthesis and utilization; myocardial ischemia, "stunning," and "hibernation;" advanced techniques for studying myocardial metabolism. Prerequisites: BMSC 5600 and 5700. Offered every other Spring (odd years).

6699. Current Topics in Physiology.

1-3 hours. Survey of literature, oral presentations and written reports. Offered each semester.

Microbiology & Immunology (MICR)

5050. Host-Parasite Relationships in Infectious Diseases.
3 hours. Emphasis on pathogenicity, pathogenesis, and the host's innate and acquired resistance to infection. Lectures, conferences, literature review are utilized for student instruction. Demonstration of independent student initiative is an essential part of this course, and a special project is required. Offered once every 2-3 years.

5120. Current Topics in Immunology.
1 hour. Format consists of presentations of current research articles in the various areas of immunology by faculty, research staff and students. May be repeated for credit. Offered each semester.

5130. Structure and Function of the Eukaryotic Chromosome.
2 hours. Current publications in the general area of chromosomal structure and function in mammalian cells will be discussed in the journal club format. Students are required to participate in the presentation and discussion of current articles related to chromatin structure, nucleosomes, histone proteins, metaphase chromosomes, telomeres, centromeres, nuclear matrix, nuclear pores, nucleolus, nuclear envelope, nuclear laminas, DNA replication, transcription, DNA damage and repair, ribonucleoprotein particles, splicesosomes, and macromolecular interactions in heterochromatin and euchromatin (interphase chromatin). Offered each Spring.

5300. Current Topics in Molecular Microbiology.
2 hours. Presentation and discussion of current research, emphasizing microbial physiology, genetics and molecular biology. Offered each semester.

5900-5910. Special Problems.
1-3 hours each. For students capable of developing a problem independently through conferences and activities directed by the instructor. Problem chosen by the student with the consent of the instructor and department. May be repeated for credit. Offered each semester.

5940. Seminar in Current Topics.
1 hour. Specialized weekly lectures on topics of current interest by students, faculty and/or invited speakers. May be repeated for credit. Offered Fall and Spring.

6080. Advances in Virology.
3 hours. Course is designed to cover modern culture techniques, molecular biology, host-virus interaction, interferon and antivirals among other topics. Prerequisite: MICR 5020. Offered on demand.

6300. Advanced Molecular Biology.
3 hours. Course designed for students familiar with basic molecular biology. Lectures emphasize modern paradigms in molecular biology. Offered once every 2-3 years.

6650. Current Topics in Microbiology and Immunology.
3 hours. A consideration of findings in the most recent literature—microbiology, immunology, parasitology and virology. Course will follow a small group interactive format, student's presentations and panel discussions. Prerequisite: MICR 5020. Offered on demand.

Pathology (PATH)

5900-5910. Special Problems.

1-3 hours each. For students capable of developing a problem independently through conferences and activities directed by the instructor. Problem chosen by the student with the consent of the instructor and department. May be repeated for credit. Offered each semester.

Pharmacology (PHRM)

5020. Advanced Pharmacology

3 hours. A continuation of PHRM 5010, covering specific drug classes and emphasizing molecular basis for drug action and basic principles of pharmacology and toxicology. Offered on demand.

5030. Principles of Pharmacology.

3 hours. Topics include cardiovascular, endocrine and antibiotic pharmacology. Offered each Fall.

5050. Introduction to Toxicology.

3 hours. The interrelationships of natural and synthetic agents to biologic systems are compared with the resulting toxicological response of the organism. Identification of causative agents and determination of limits of detection and safety are discussed. The principles of instrumentation methods and their use in a toxicological laboratory are described. Offered on demand.

5060. Experimental Toxicology.

3 hours. Lecture and laboratory experience emphasizes adverse reactions to chemicals and drugs, environmental hazards and analytical techniques for detection of foreign substances in biological fluids and tissues. Includes qualitative and quantitative laboratories, identification of causative agents and metabolic studies of toxic agents. Visits to professional laboratories specializing in toxicology are included. Offered on demand.

5070. Neuropharmacology.

4 hours. In-depth presentations on: 1) mechanisms of neurotransmitter synthesis, storage and release; 2) mechanisms of neuropharmacological agents; 3) molecular and behavioral aspects of Alzheimer's and aging; and 4) drugs and neurodegenerative diseases. Prerequisites: BMSC 5600, 5610, 5700 and 5710. Offered every other Spring (even years).

5900-5910. Special Problems.

1-3 hours each. For students capable of developing a problem independently through conferences and activities directed by the instructor. Problem chosen by the student with the consent of the instructor and department. May be repeated for credit. Offered each semester.

5940. Seminar in Current Topics.

1 hour. Specialized weekly lectures on topics of current interest by students, faculty and/or invited speakers. May be repeated for credit. Offered Fall and Spring.

6020. Advances in Molecular Pharmacology.

3 hours. An in-depth review of the current literature on modern pharmacology and signal transduction of drug receptors. Oral reports and written reviews required. Prerequisite: ANAT 6020. Offered on demand.

6030. Advances in Behavioral Pharmacology.

3 hours. Directed, in-depth study of current research literature with an emphasis on behavioral pharmacology. Oral reports and written reviews required. Prerequisite: PHRM 5070. Offered every other Spring (odd years).

6050. Ocular Pharmacology.

3 hours. Review of pharmacological principles and therapeutic approaches regarding ocular diseases and eye organ systems. Offered on demand.

6080. Receptors and Drug Action.

4 hours. In-depth course of drug receptor pharmacology and receptor classes. Emphasis on techniques for studying receptor function, second messenger signaling and molecular pharmacology. Offered every other Spring (even years).

6699. Current Topics in Pharmacology.

1-3 hours. Review of current topics in pharmacology including pharmacology of aging, ocular pharmacology, behavioral pharmacology and new drugs on the horizon. Offered each Fall.

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Faculty, Officers & Staff

Full-time faculty members are classified as Category I, II or III. The qualifications in appointment to a category depend upon the faculty member's record of scholarly, creative and research activities. Category III reflects the highest level of scholarly attainment. Faculty members in any of the three categories may serve on thesis or dissertation committees as a member. Category II faculty members may serve as directors of thesis committees and co-directors of dissertation committees. Graduate faculty members in Category III are the only faculty eligible to serve as chairs of dissertation or doctoral lecture recital committees. Each faculty member's status is enclosed in parentheses.

Graduate faculty of the University of North Texas Toulouse School of Graduate Studies and the University of North Texas Health Science Center at Fort Worth School of Public Health are also members of the graduate faculty of Graduate School of Biomedical Sciences and thus can serve as mentors or committee members of GSBS students appropriate to their appointments. See the catalogs of the respective schools in graduate faculty listings.

All personnel listings in this section are based on information available when this bulletin went to press.

Faculty

AGARWAL, NEERAJ, Associate Professor of Pathology and Anatomy. PhD, The Post-Graduate Institute of Medical Education and Research. (III)

ALEXANDER, JERRY, Associate Professor of Medical Education. PhD, University of Southern Mississippi. (I)

ALVAREZ-GONZALEZ, RAFAEL, Associate Professor of Molecular Biology and Immunology. PhD, University of North Texas. (III)

ANDREEV, OLEG, Research Assistant Professor of Molecular Biology and Immunology. PhD, Moscow Institute of Physics and Technology. (I)

ASCHENBRENNER, JOHN, Associate Professor of Pathology and Anatomy. PhD, Baylor University. (I)

BARKER, DAVID, Associate Professor of Integrative Physiology. PhD, University of Illinois at Urbana Champaign. (I)

BARRON, BARBARA, Associate Professor of Integrative Physiology. PhD, University of Nebraska Medical Center. (III)

BASU, ALAKANADA, Associate Professor of Molecular Biology and Immunology. PhD, University of Pittsburgh. (III)

BLACKWELL, DEBORAH, Assistant Professor of Pediatrics. DO, University of North Texas Health Science Center at Fort Worth. (I)

BOREJDO, JULIAN, Associate Professor of Molecular Biology and Immunology. PhD, Macquarie University. (III)

CAFFREY, JAMES, Professor of Integrative Physiology. PhD, University of Virginia. (III)

CAMMARATA, PATRICK, Professor of Pathology and Anatomy. PhD, Hunter College, City University of New York. (III)

COLERIDGE, SAMUEL T., Professor of Family Medicine. DO, University of Health Sciences. (II)

CUNNINGHAM, LINDA, Associate Professor of Pathology and Anatomy. MD, Vanderbilt University. (I)

DAS, HRIDAY K., Associate Professor of Pharmacology. PhD, University of Nebraska-Lincoln. (III)

DE FIEBRE, CHRISTOPHER, Assistant Professor of Pharmacology. PhD, University of Colorado. (III)

DILLON, GLENN H., Associate Professor of Pharmacology. PhD, University of Illinois at Urbana-Champaign. (III)

DIMITRIJEVICH, S. DAN, Research Associate Professor of Molecular Biology and Immunology. PhD, University of Bath. (III)

DORY, LADISLAV, Professor of Molecular Biology and Immunology. PhD, McGill University. (III)

DOWNEY, H. FRED, Professor of Integrative Physiology. PhD, University of Illinois at Urbana-Champaign. (III)

EASOM, RICHARD A., Associate Professor of Molecular Biology and Immunology. PhD, University of Glasgow. (III)

EISENBERG, ARTHUR, Associate Professor of Pathology and Anatomy. PhD, State University of New York at Albany. (III)

FORSTER, MICHAEL J., Professor of Pharmacology. PhD, Bowling Green State University. (III)

GARNER, MARGARET, Associate Professor of Pathology and Anatomy. PhD, Indiana University. (III)

GOLDFARB, RONALD H., Professor of Molecular Biology and Immunology. PhD, State University of New York. (III)

GRACY, ROBERT W., Professor of Molecular Biology and Immunology. PhD, University of California at Riverside. (III)

GRANT, STEPHEN R., Assistant Professor of Integrative Physiology. PhD, University of Tennessee. (III)

GWIRTZ, PATRICIA A., Professor of Integrative Physiology. PhD, Thomas Jefferson University. (III)

HARRIS, BEN G., Professor of Molecular Biology and Immunology. PhD, Oklahoma State University. (III)

HART, MARK E., Assistant Professor of Molecular Biology and Immunology. PhD, Mississippi State University. (III)

KITSON, RICHARD P., Research Associate Professor of Molecular Biology and Immunology. PhD, University of Michigan. (II)

KUDCHODKAR, BHALCHANDRA J., Research Associate Professor of Molecular Biology and Immunology. PhD, University of Saskatchewan. (II)
KULKARNI, GOPAL, Research Assistant Professor of Molecular Biology and Immunology. PhD, Indian Institute of Science. (II)
LACKO, ANDRAS G., Professor of Molecular Biology and Immunology. PhD, University of Washington. (III)
LUEDTKE, ROBERT R., Associate Professor of Pharmacology. PhD, University of Pennsylvania. (III)
MALLET, ROBERT T., Associate Professor of Integrative Physiology. PhD, George Washington University. (III)
MARTIN, MICHAEL W., Assistant Professor of Pharmacology. PhD, University of Texas at Houston. (III)
MATHEW, PORUNELLOOR, Assistant Professor of Molecular Biology and Immunology. PhD, University of Poona. (III)
McCONATHY, WALTER J., Associate Professor of Internal Medicine. PhD, University of Oklahoma School of Medicine. (III)
MOTHERAL, M. SUSAN, Assistant Professor of Medical Education. PhD, Duke University. (I)
OGLESBY, MICHAEL W., Professor of Pharmacology. PhD, State University of New York at Buffalo. (III)
ORR, EDWARD, Associate Professor of Pathology and Anatomy. PhD, University of California at Berkeley. (III)
PUTTHOFF, STEPHEN, Associate Professor of Pathology and Anatomy. DO,University of Health Science College of Osteopathic Medicine-Kansas City, MO. (I)
RAO, G.S. JAGANNATHA, Research Assistant Professor of Molecular Biology and Immunology. PhD, Indian Institute of Science. (II)
RAVEN, PETER B., Professor of Integrative Physiology. PhD, University of Oregon. (III)
REEVES, RUSTIN, Assistant Professor of Pathology and Anatomy. PhD, University of North Texas Health Science Center at Fort Worth. (I)
ROMEO, TONY, Associate Professor of Molecular Biology and Immunology. PhD, University of Florida. (III)
ROQUE, ROUEL, Assistant Professor of Pathology and Anatomy. MD, University of the Philippines. (III)
RUBIN, BERNARD, Professor of Medicine. DO, Chicago College of Osteopathic Medicine. (II)
RUDICK, VICTORIA L., Associate Professor of Pathology and Anatomy. PhD, Ohio State University. (III)
SHEEDLO, HAROLD, Research Assistant Professor of Pathology and Anatomy. PhD, Memphis State University. (II)
SHI, XIANGRONG, Assistant Professor of Integrative Physiology. PhD, Yale University. (III)
SIMECKA, JERRY W., Assistant Professor of Molecular Biology and Immunology. PhD, University of Alabama at Birmingham. (III)
SMITH, MICHAEL L., Associate Professor of Integrative Physiology. PhD, University of North Texas. (III)
TURNER, JAMES E., Professor of Pathology and Anatomy. PhD, University of Tennessee. (III)
WEIS, STEPHEN, Professor of Internal Medicine. DO, College of Osteopathic Medicine-DesMoines. (II)
WORDINGER, ROBERT, Associate Professor of Pathology and Anatomy. PhD, Clemson University. (III)
WU, MING-CHI, Professor of Molecular Biology and Immunology. PhD, University of Wisconsin. (III)
YORIO, THOMAS, Professor of Pharmacology. PhD, Mt. Sinai School of Medicine. (III)

Adjunct Faculty

ATKINSON, BARBARA, Adjunct Faculty in Molecular Biology and Immunology. DO, Michigan State University College of Osteopathic Medicine. (II)
BERGAMINI, MICHAEL, Adjunct Faculty in Pharmacology. PhD, Mt. Sinai School of Medicine. (III)
CLARK, ABBOTT, Adjunct Faculty in Molecular Biology and Immunology. PhD, Case Western Reserve University. (III)
COLLIER, ROBERT, Adjunct Faculty in Pathology and Anatomy. PhD, University of Rochester. (III)
DANSEREAU, MARGARET, Adjunct Instructor in Medical Education. M.Ed., Texas Christian University. (I)
GARNER, WILLIAM, Adjunct Faculty in Pathology and Anatomy. PhD, Indiana University. (III)
HACKETT, ROBERT, Adjunct Faculty in Pharmacology. PhD, University of Mississippi. (II)
McCARTNEY, MITCHELL, Adjunct Faculty in Pathology and Anatomy. PhD, Dalhousie University. (I)
PANG, IOKHOU, Adjunct Faculty in Pharmacology. PhD, University of Texas Southwestern Medical Center at Dallas. (III)
PERTUSI, RAYMOND, Adjunct Faculty in Molecular Biology and Immunology. DO, New York College of Osteopathic Medicine. (II)
SHARIF, NAJ, Adjunct Faculty in Pharmacology. PhD, University of Southampton. (III)
STOLL, SCOTT, Adjunct Faculty in Integrative Physiology. DO, University of North Texas Health Science Center at Fort Worth; PhD, University of North Texas. (III)

Neeraj Agarwal, PhD
The Post Graduate Institute of Medical Education and Research, Chandigarh, India
Associate Professor
Department of Pathology and Anatomy

Research focuses on the question of mechanisms of apoptosis of photoreceptor and ganglion cell death in retinal dystrophies and glaucoma respectively. Cultured phtotreceptor and retinal ganglion cells are used to test the hypothesis that oxidative damage is responsible for the apoptosis of these ocular cells. To understand the mechanisms of oxidative stress induced apoptosis, the role of nuclear factor-kappa B, (NF-kB) and other apoptotic related genes such as Bcl-2 Bax, Bad, and caspases and their protein in apoptotic cell death are being studied. Research indicates that Re1A subunit of NF-kB is down-modulated under oxidative stress and may play a critical role in cell death (Krishnamoorthy et al., 1999, J Biological Chemistry, 274: 3734-3743). Also under investigation is whether over-expression of Bcl-2 and RelA subunit of NF-kB by gene transfer to cultured ocular cells will protect cells from oxidative stress induced in photoreceptor/ganglion cells. These studies are extended to investigate a light damaged rat retina in vivo model for photoreceptor cell death in retinal dystrophies and an elevated intra-ocular pressure induced model of retinal ganglion cell apoptosis in glaucoma. In glaucoma, a culture of retinal ganglion cells to test the hypothesis that "ischemia and or neurotrophin deprivation results in oxidative stress to cause ganglion cell apoptosis in glaucoma" is being established. This laboratory is also establishing the role of calcineurin in activation of caspases to delineate the apoptotic mechanisms in ocular diseases. On similar lines, studies have been initiated related to mechanisms of neuronal cell death in Alzheimer's disease. Various techniques involved with these projects are: electrophoretic mobility gel shift assays, gene transfections including dominant negative gene transfer, RT-PCR analysis, RNase protection assays, immunoblot analysis, immunocytochemistry, and other cell and molecular biological techniques. E-mail: nagarwal@hsc.unt.edu

Rafael Alvarez-Gonzalez, Ph.D.
University of North Texas
Associate Professor
Department of Molecular Biology and Immunology

This laboratory studies signal transduction pathways, chromatin structure and function, and gene expression in eucaryotes. Emphasis is placed in the molecular biology and biochemical regulation of DNA-replication, transcription, carcinogenesis (DNA damage and repair), and calcium signaling by ADP-ribose transfer enzymes. Projects currently in progress include: the characterization of ADP-ribosylated DNA-binding proteins, e.g., DNA-metabolizing enzymes, transcription factors, and histone proteins; the physiological function of oncogenes (c-fos, c-jun), p53 (a tumor suppressor gene) and chromatin-(ADP-ribosyl)ation in apoptosis and cell necrosis; the enzymology (molecular, chemical, kinetic, and regulatory mechanisms) of poly(ADP-ribose) polymerase, poly(ADP-ribose) glycohydrolase, and ADP-ribose cyclase; and the biological function of cyclic(ADP-ribose), a potent intracellular calcium mobilizing cyclic nucleotide. Methods and laboratory techniques utilized include: tissue culture of human cells (normal and transformed); cell fractionation, chromatin isolation, and protein purification; DNA-replication, transcription and enzyme assays; immunoprecipitation, immunofluorescence, and immunoblotting; electrophoresis, autoradiography and radiochemical assays; affinity chromatography and HPLC; and peptide mapping, mobility shift and DNA-"footprinting" assays.

Oleg A. Andreev, Ph.D.
Moscow Institute of Physics and Technology
Research Assistant Professor
Director of Confocal Microscopy and Fluorescence Spectroscopy Laboratory
Department of Molecular Biology and Immunology

Research interests are in molecular biophysics, muscle contraction, fluorescence studies of cell and proteins. Current research projects are: (1) Molecular mechanism of muscle contraction. Fluorescence and cross-linking studies of interaction of myosin with actin and ATP. Mechanism of coupling of ATP hydrolysis with force generation in muscle. Structure and function of skeletal and cardiac muscle cells. (2) Fluorescence and cross-linking studies of metalloproteinases. Role of metalloproteinases in cancer metastasis. (3) Application of confocal microscopy to study cell regulation and function.

John Aschenbrenner, Ph.D.
Baylor University
Associate Professor
Department of Pathology and Anatomy

Current research endeavors involve the use of both light and electron microscopy methods to study retinal photoreceptor regeneration.

David Barker, Ph.D.
University of Illinois at Urbana-Champaign
Associate Professor
Department of Integrative Physiology

Current interests are in instructional technology and internet-based education.

Barbara Barron, Ph.D.
University of Nebraska Medical Center
Associate Professor
Department of Integrative Physiology

The endogenous opioid peptides and their interactions with the heart and autonomic nervous system are the primary focus of research. Little is known about the ability of the heart to produce and process enkephalins. The opioid effects and the effects of stress on enkephalin cardiac production are studied. Stressors to the heart include hypertension, exercise, shock, drug abuse, etc. Studies include 1) regulation of cardiac enkephalin production: What signals increase or decrease cardiac enkephalin production? Does the autonomic nervous system cause changes in cardiac enkephalin production?; 2) opioid involvement in baroreflex control before and after renovascular hypertension; 3) effects of hypertension on enkephalin content in peripheral tissue with and without beta-adrenergic blockade; 4) effects of opioids on myocardial molecular biology. Current projects include both in vivo and in vitro experiments. The release of catecholamines and enkephalins from the heart is quantitated during rest, baroreflex stimulation and after direct nerve stimulation. E-mail address barronb@hsc.unt.edu

Alakanada Basu, Ph.D.
University of Pittsburgh
Associate Professor
Department of Molecular Biology and Immunology

Dr. Basu's research interest is in signal transduction, especially in the context of cancer chemotherapy. A major research effort is to investigate how signal transduction pathways regulate cell death by apoptosis. Currently used anticancer agents are of limited value due to their toxicity to normal tissues and development of resistance by malignant tissues to these drugs. One area of research is to investigate how signal transduction pathways regulate anticancer drug sensitivity and to elucidate the molecular mechanism(s) of drug resistance. Tumor necrosis factor-_ (TNF), a pleotropic cytokine has been associated with sheptic shock, inflammatory disease, autoimmune disease and cancer. Another area is to study TNF signaling in breast cancer. A third area is to define the role of protein kinase C and Akt/protein kinase B signal transduction pathways in tumorigenesis and as a target for anticancer therapy. The ultimate goal is to exploit intracellular signaling systems to benefit cancer therapy. E-mail address is abasu@hsc.unt.edu

Julian Borejdo, Ph.D.
Macquarie University
Associate Professor
Department of Molecular Biology and Immunology

The long term goal of this laboratory is to find out how muscle works. The key to understanding the mechanism of contraction is the knowledge of the interactions between actin and myosin — the two chief protein components of skeletal muscle. We have been studying this interaction by three independent approaches: (i) biochemical approach to determine the proximity of actin to myosin (ii) physico-chemical approach to measure the orientation of myosin in vivo and (iii) molecular biology aproach (cloning mutants of myosin) to establish the role of various amino acid residues in muscle function.

James L. Caffrey, Ph.D.
University of Virginia
Professor
Department of Integrative Physiology

Endocrine and neuroendocrine responses which enable the organism to cope with circulatory stress. This program concentrates on interactions between the autonomic nervous system and endogenous opioids in the regulation of the heart and peripheral vasculature. Stress results in profound activation of the pituitary-adrenal and sympatho-adrenal axes and the rapid release of steroids, catecholamines and opioids (dynorphins, enkephalins and endorphins). Significant opioid concentrations identified in the myocardium have been found to respond to changes in the functional autonomic circulatory environment. Studies suggest that cardiac opioids may be important to our understanding the cardiovascular adaptions to exercise, heart failure, silent myocardial ischemia, ventricular fibrillation, circulatory shock and drug abuse.

Patrick Cammarata, Ph.D.
Hunter College
City University of New York
Professor
Department of Pathology and Anatomy

Mechanism(s) of ocular diabetic complications, including sugar cataract development. Inositol lipid metabolism, myo-inositol uptake and efflux, molecular cloning, fine structure analysis of the sodium/myo-insitol cotransporter gene, promotes characterization and transcriptional regulation of the sodium/myo-inositol cotransporter gene.

Samuel T. Coleridge, D.O.
University of Health Sciences
Professor and Chair
Department of Family Medicine

Emergency medical systems operating in urban, suburban and rural areas. Studies of violence from a multidisciplinary perspective.

Hriday K. Das, Ph.D.
University of Nebraska-Lincoln
Associate Professor
Department of Pharmacology

Plasma levels of LDL cholesterol and apolipoprotein B (apoB) correlate directly with atherosclerosis susceptibility in humans. Therefore, apoB gene plays a central role in the development of coronary artery disease. Interaction of cis-acting elements in the promoter of the apoB gene with transacting protein factors mediates liver specific expression of the aopB gene. Purification and characterization of these trans-acting proteins and their co-activators will enable us to clone genes encoding these factors. Availability of these genes will help understand the roles of these trans-acting genes and their co-activator genes in the development of atherosclerosis and in the design of drugs to cure heart disease. Transcriptional regulations of presenilin genes are also being studied to understand the mechanism of early onset Alzheimer's disease.

Christopher M. de Fiebre, Ph.D.
University of Colorado
Assistant Professor
Department of Pharmacology

Characterization of interactions between ethanol and nicotine with particular emphasis on the actions of ethanol at neuronal nicotinic cholinergic receptors. Studies are conducted in both in vivo and in vitro systems utilizing techniques of molecular biology, electrophysiology, neurochemistry, cell culture, cellular imaging, pharmacogenetics and behavioral analyses. Current areas of inquiry include studies of genetic factors regulating interactions between ethanol and nicotine and studies of the interactive effects of these agents in regulating neuronal viability. Related to the latter, another area of interest is in the development of nicotine-like drugs for the treatment of neurodegenerative pathologies.

Glenn H. Dillon, Ph.D.
University of Illinois at Urbana-Champaign
Associate Professor
Department of Pharmacology

Neurotransmitter Receptor/Ion Channel Function. Research interests are directed toward understanding the mechanisms and functional domains through which neurotoxins and other agents (both exogenous and endogenous) affect ion channel function. A variety of techniques, including site-directed-mutagenesis, patch clamp electrophysiology and radioligand binding, are used to assess the actions of these ligands on both recombinant and native neurotransmitter receptors, and the influence of receptor structure on the ability of these ligands to modulate channel activity. An additional more recent interest deals with abnormalities in cardiac ion channel function in transgenic models of heart failure. E-mail address gdillon@hsc.unt.edu

S. Dan Dimitrijevich, Ph.D.
University of Bath
Research Associate Professor
Director, Wound Healing Research Institute
Department of Molecular Biology and Immunology

Studies directed towards understanding the role of cell-cell and cell-matrix interactions in human tissues under normal and wound healing conditions. Human tissue equivalents, in vitro living models of human skin and ocular tissue, have been developed and are being used in studies of human epithelial and endothelial injury and repair. The effects of hyperbaric oxygen and growth factors (FGF) on wound healing, initiation and amplification of inflammatory process in the anterior segment of the eye (e.g. cornea, conjunctiva), and control of tissue contraction/scar formation are studied at cellular and molecular level (specific gene activation and expression). A major recent interest concerns the effect of near zero gravity on tissue development (skin), and the role of rotating wall vessels in tissue engineering. These interests are directed towards developing strategies for tissue and cell replacement therapies.

Ladislav Dory, Ph.D.
McGill University
Professor
Department of Molecular Biology and Immunology

Laboratory focused on several areas of research centering on atherosclerosis. One is the regulation of expression of apoE in cultured cells with emphasis on post-transcriptional loci. The role of coordinate regulation of apoE expression and cholesterol efflux from peripheral cells in the prevention of atherosclerosis is actively pursued. The effect of

hyperbaric oxygen on the expression of several candidate anti-oxidant enzymes is also actively investigated. These studies are designed to understand the protective effect of hyperbaric oxygen in animal models of atherosclerosis. Caveolin -1 and -2 expression in macrophages and their relationship to sterol metabolism in these cells represents the third major area of active research. Overall, tools of molecular and cellular biology are used along the more traditional biochemical techniques. E-mail address ldory@hsc.unt.edu

H. Fred Downey, Ph.D.
University of Illinois at
Urbana-Champaigne
Professor
Department of Integrative Physiology

Mechanisms controlling coronary blood flow and myocardial oxygen demand in the normal and diseased heart. Differential effects of lack of oxygen (hypoxia) and lack of blood flow (ischemia) on the coronary circulation and on heart function and metabolism are investigated. Of particular interest are endogenous cardioprotective mechanisms that enable myocardium to survive moderate ischemic and hypoxic insults. These mechanisms include collateral blood flow, modulation of ventricular contractile function and wall stiffness, and substrate selection. Cardiovascular responses to nicotine and tobacco products are also investigated.

Richard Easom, Ph.D.
University of Glasgow
Associate Professor
Department of Molecular Biology and Immunology

Endocrine Pancreas Development/ Regulation of Insulin Biosynthesis and Exocytosis. Two events contributing to the manifestation of Diabetes mellitus are autoimmune destruction of the endocrine pancreas or the loss of function of insulin producing b-cells. Research efforts are therefore directed towards understanding b-cell mechanisms that control b-cell growth/differentiation and insulin secretion. Current goals are: (1) to evaluate the role of Ca2+-dependent protein kinases and phosphatases in insulin gene expression and secretory granule exocytosis; and (2) to achieve the expansion, in culture, of functional human islets for replacement therapies for the treatment of Type I diabetes. E-mail address: reasom@hsc.unt.edu

Arthur Eisenberg, Ph.D.
State University of New York at Albany
Director of DNA Repository
Associate Professor
Department of Pathology and Anatomy

Application of DNA probe methodologies for human identification in both paternity and forensic cases. PCR methodologies for human infectious disease diagnostics and inheritable genetic disorders including Attention Deficit Hyperactivity Disorder (ADHD). In association with local medical centers, the development of rapid and sensitive DNA-based cancer tests.

Michael J. Forster, Ph.D.
Bowling Green State University
Professor
Department of Pharmacology

Mechanisms of brain aging and the associated declines of cognitive, sensory and motor functions. Longitudinal and cross-sectional studies of aging mice are focused on identification of biological factors responsible for brain aging using behavioral testing techniques applied across the life span. A focal hypothesis is that oxidative molecular damage is an important factor in age-related functional losses. This hypothesis is being tested by examining molecular damage as a correlate of behavioral dysfunction, and by examination of functional aging in mice following experimental interventions that impact concurrently upon life-span and the degree of age-related oxidative molecular damage. These interventions include lifelong dietary restriction, antioxidant treatment, and genetic manipulations.

Margaret Garner, Ph.D.
Indiana University
Associate Professor
Department of Patholgy and Anatomy

Cell nuclei accumulate, release or exclude large marcromolecules (RNA and proteins), small molecules (sugars and amino acids), cations (Na+, K+, Ca2+) and anions (C1-). While the nuclear membrane is believed to be restrictive to proteins, it is probably not restrictive to smaller organic molecules or ions because of the large internal diameter of the nuclear pore complex. To effectively exclude or release the small organics and ions, transport systems are present in the nuclear envelope to counteract the sizable leak. The nuclear envelope has its own Ca2+ stores, Ca2+ channels, a Ca2+ -ATPases, enzymes to generate cAMP and IP3 chloride channels, and K+ channels. Na,K-ATPases in the nucleus, primarily along the inner nuclear membrane and perhaps associated with euchromatin

have been discovered in this laboratory. The longer-term goal is to define the role of the perinuclear cisternae (nuclear envelope lumen) as ion reservoirs that are available for regulation of cell cycle, programmed cell death, and cellular differentiation. The second goal is to define the role of the Na,K-ATPases of the cell nucleus and their endogenous inhibitors in prevention and treatment of cancer. email: mgarner@hsc.unt.edu

Ronald H. Goldfarb, Ph.D.
Downstate Medical Center
State University of New York
Professor and Chair
Department of Molecular Biology and Immunology

Current research interests are directed towards: tumor cell biology, molecular biology, biochemistry, tumor invasion, angiogenesis, microvasculature, metastasis, apoptosis, extracellular matrix degradation, and degradative proteolytic enzymes including plasminogen activators, matrix metalloproteinases and the proteasome. Tumor immunology investigations emphasize Natural Killer (NK) cell adhesive and degradative properties, NK cells as vehicles for delivery of chemotherapy, and NK cells for therapy of cancer metastases in combination with chemotherapy. We also investigate NK cell-derived proteolytic enzymes for extracellular matrix degradation, NK cell accumulation into cancer metastases, and activation of NK cells within tumor metastases for maximal destruction of tumor cells. Our goal is to translate our basic research findings to the development of novel therapeutic agents for the treatment of advanced human cancer, i.e. established cancer metastases. Our laboratory therefore works closely with pharmaceutical corporations and biotechnology companies to transfer our technology to anti-cancer drug discovery and development of novel anti-cancer therapeutic agents. E-mail address rgoldfar@hsc.unt.edu

Robert W. Gracy, Ph.D.
University of California at Riverside
Professor
Department of Molecular Biology and Immunology
Dean for Research and Biotechnology

Aging: Abnormal proteins accumulate in aging cells and tissues and account for many of the medical problems of aging. For example, oxidized proteins accumulate in the brain and are believed to be a primary cause of Alzheimer's disease. The molecular basis for the accumulation of these modified proteins with age is being examined with the goal of designing drugs or therapies to prevent their accumulation or to aid in their degradation and removal. Research is also directed toward the development of early diagnosis of Alzheimer's and other neurodegenerative diseases using both protein and gene biomarkers. In addition, aging is being studied in vitro using human tissue equivalents. For example, human skin equivalents derived from young and old persons should provide insight into the age-related impairment of wound healing and tissue repair. These systems are also ideally suited for the development of transdermal delivery of new drugs.

Stephen R. Grant, Ph.D.
University of Tennessee
Assistant Professor
Department of Integrative Physiology

Molecular Genetics of Enlarged Heart and Dilated Cardiac Myopathy research focuses on molecular mechanisms controlling contractile protein gene expression during cardiovascular hypertrophy. Recent research efforts have identified a new calcium sensitive nuclear signaling pathway. This activated signaling pathway can transcriptionally activate and/or silence contractile protein expression in the cardiovascular system. Transcriptional up-regulation involves the activation of a calcium dependent phosphatase. Transcriptional silencing involves a calcium dependent kinase. Maintenance of this signaling pathway controls hypertrophy events in the mammalian cardiovascular system. Murine transgenic models for human cardiac hypertrophy and early heart failure using truncated mutated genes of these two enzymes are currently being generated. The research plan includes: 1) generating in vivo murine models of early heart failure by over-expressing the constitutively active forms of each of the two cardiac calcium-sensitive enzymes; 2) characterizing a newly identified cardiac transcriptional repression model; 3) modeling transcriptional control of vascular hypertrophy in arteries during chronic exercise; and 4) characterizing YY1 induced cardiac repression as a mechanism for a stress-responsive cardiomyocyte phenotype.

Patricia A. Gwirtz, Ph.D.
Thomas Jefferson University
Professor
Department of Integrative Physiology

Research emphasizes neural control of cardiac contractile function and coronary blood flow. Chronically instrumented conscious dog model is used to examine neural control mechanisms at rest, during exercise, transient myocardial ischemia, peripheral vascular insufficiency and hypertension. Studies are examining the interaction between neural, endothelial and humoral control mechanisms.

Additional studies examine the cardiac and coronary vascular adaptations that occur as a result of exercise training.

Ben G. Harris, Ph.D.
Oklahoma State University
Professor
Department of Molecular Biology and Immunology

Biochemistry of parasitic helminths. Research interests are in the area of regulation of carbohydrate metabolism in parasitic helminths. The parasite primarily studied is the roundworm, Ascaris suum. Projects involve physico-chemical, kinetic and structural characterization of regulatory enzymes governing the utilization of carbohydrates in the essentially anaerobic parasites. Some of the enzymes being studied are phosphofructokinase and malic enzyme. Current projects involve x-ray crystallographic studies of malic enzyme, sequence studies on both malic enzyme and phospho-fructokinase, and structural studies on both enzymes.

Mark E. Hart, Ph.D.
Mississippi State University
Assistant Professor
Department of Molecular Biology and Immunology

Characterization and regulation of in vivo-expressed genes of Staphylococcus aureus. Despite numerous antimicrobial regimens and improved public health, Staphylococcus aureus remains an important bacterial pathogen responsible for a number of disease syndromes in both humans and animals. In vitro, this organism is known to make greater than thirty extracellular and cell-wall associated proteins, many of which have been implicated in the disease process. Definition of the role of most of these proteins as virulence factors has been dependent upon our rather limited ability to mimic the host environment in the laboratory. Research conducted is concerned with the identification, characterization, and regulation of S. aureus genes expressed specifically in the host environment. Ultimately, these studies will lead to the identification of factors critical to the disease process which will serve as potential candidates for vaccine and antimicrobial drug development.

Robert Kaman, Ph.D.
Virginia Polytechnic Institute
Associate Professor
Department of Public Health and Preventive Medicine

Exercise physiology. Athletic performance may be enhanced by food supplements that enable exercise training to be conducted at a higher intensity, thereby leading to an enhanced training effect. The focus of these studies is the effect of Chinese herbal products on glycogen and fatty acid metabolism. Worksite health promotion may be the best way to attack the problem of rising employee health care costs. As this expense rises, companies find themselves struggling to maintain employee health benefits without losing profitability. Health promotion which provides programs to encourage healthy behaviors has been shown to be effective in lowering risk for illness among participants, improving productivity, and reducing illness-related absenteeism. Research is designed to quantify those outcomes by studying company records for health care expenditures, absenteeism and productivity.

Richard P. Kitson, Ph.D.
University of Michigan
Research Associate Professor
Department of Molecular Biology and Immunology

Immunotherapy with interleukin-2 activated natural killer (A-NK) cells and the role of proteases in A-NK cell function. Current studies are focused in two broad areas involving A-NK cells: first, an examination of the role of proteases in A-NK cell function including cell-mediated cytotoxicity and migration, and second, an investigation of novel methods to improve adoptive immunotherapy with A-NK cells. An examination of the proteases of A-NK cells has shown that they produce a number of cell-associated and extracellular proteases including matrix metalloproteinases.

Besides studies of the role of proteases in A-NK cell function, the broader question of improving A-NK cell adoptive immunotherapy of metastatic cancer is also being investigated. A NK cells by virtue of their ability to localize within metastatic tumors are being examined as potential vehicles for the delivery of chemotherapeutic agents.

Bhalchandra J.Kudchodkar, Ph.D.
University of Saskatchewan
Research Associate Professor
Department of Molecular Biology and Immunology

Increased plasma levels of high density lipoproteins (HDL) are believed to protect from the development of atherosclerosis. Although mechanism of this protection is not clear, increasing attention is being focused on the potential antioxidant activity of serum enzymes associated with HDL. One of these enzymes, paraoxonase has been postulated to play an important role in preventing oxidation of plasma LDL and thus prevent atherosclerosis. Regulation of serum paraoxonase expression is the focus of our investigation. hyperbaric oxygen (HBO: treatment with 100% oxygen at greater than atmospheric

pressure) was recently found to markedly suppresses atherosclerosis in cholesterol fed rabbits without affecting their elevated plasma cholesterol levels. The mechanism by which oxygen exerts an inhibitory effect on atherosclerosis is presently under investigation.

Gopal Kulkarni, Ph.D.
Indian Institute of Science
Research Assistant Professor
Department of Molecular Biology and Immunology

Molecular biology of parasitic helminths. Current research focuses on the molecular cloning functional expression and genetic analysis of key regulatory enzymes involved in the carbohydrate metabolism in the parasitic nematode Ascaris suum. As a basis for the study of molecular architecture of these enzymes to aid in rational drug design, site-directed mutagenesis and biochemical characterization of mutant enzyme forms are proposed.

Andras G. Lacko, Ph.D.
University of Washington
Professor
Department of Molecular Biology and Immunology

Research interests include the regulation of plasma lipid transport and antioxidant defenses in mammals. Studies are focused on the lecithin:cholesterol acyltransferase reaction and associated components of the reverse cholesterol transport pathway. Research is currently conducted in the following areas: 1) Structure /function of recombinant LCAT; 2) Effects of lipid lowering drugs on HDL levels and reverse cholesterol transport; and 3) Enzymatic antioxidant defense mechanisms in the blood circulation and in ocular tissues.

Robert R. Luedtke, Ph.D.
University of Pennsylvania
Associate Professor
Department of Pharmacology

Antipsychotic drugs that are used to treat neuropsychiatric illness, including schizophrenia, have been found to be high affinity antagonists for dopamine receptors. Recent studies have established that there are multiple subtypes of dopamine receptors. Pharmacologic, Immunologic and Molecular Genetic approaches are being used to study the extent of genetic polymorphism of dopamine receptor genes, to develop a panel of anti-receptor antibodies that are specific for each of the dopamine receptor subtypes, to genetically engineer cell lines for the expression of a homogeneous population receptors using the baculovirus expression system, to study the molecular mechanisms responsible for dopamine receptor expression and regulation, and to understand the molecular basis for the interaction between antipsychotic drugs and dopamine receptors.

Robert T. Mallet, Ph.D.
George Washington University
Associate Professor
Department of Integrative Physiology

Metabolic basis of cardiac performance. Recent investigations in this laboratory have demonstrated that cardiac function, energetics, membrane ion transport, and cellular injury can be modulated by metabolic substrates. The primary goals of this laboratory are to delineate cellular mechanisms for enhancement of cardiac performance by energy-yielding fuels, characterize metabolic adaptations of heart muscle in response to aerobic exercise training, and develop therapeutic interventions for improving cardiac performance and preventing cellular injury following ischemia. Methodologies include both in vivo and isolated perfused heart models as well as state-of-the-art analytic techniques.

Michael W. Martin, Ph.D.
University of Texas at Houston
Assistant Professor
Department of Pharmacology

Molecular mechanisms of neurotransmitter and hormone signal transduction. The research applies biochemical and molecular approaches to investigate adaptative changes that occur in membrane receptors and their coupling to signal transduction apparatus using animal models and cultured cell systems. The aim of these studies is to understand how cells, especially neurons, modulate their sensitivity to extracellular chemical signals. These fundamental regulatory processes are important not only for normal cellular activity, but also may be the underlying mechanisms responsible for the development of tolerance/dependence to benzodiazepines, alcohol, cocaine and other drugs of abuse in humans.

Porunelloor Mathew, Ph.D.
University of Poona
Assistant Professor
Department of Molecular Biology and Immunology

Cancer Immunology: Molecular basis of tumor cell killing by Natural Killer (NK) cells. Characterization of receptors expressed on NK cells and how they interact with the ligands on tumor cells. Major area of research also includes the transcriptional regulation of NK receptors and the signaling mechanism. The long term objective is to eliminate tumor cells by manipulating one's own immune system using recombinant DNA technology

Walter J. McConathy, Ph.D.
University of Oklahoma School of Medicine
Associate Professor
Department of Internal Medicine

Structure and function of human apolipoproteins/lipoproteins in health and disease. Currently, the focus is on the role of lipoproteins/ apolipoproteins at the endothelial barrier in promoting flux of cholesterol using biochemical, molecular and cell biology techniques. Other areas of interest include role of androgens in cardiovascular disease; development and application of analytical microprocedures to monitor events at the molecular level; Alzheimer's disease and the blood brain barrier; phylogeny and ontogeny of the plasma lipid transport system; and the relationships between plasma lipids, nutrition, and various pathological states such as breast cancer and respiratory distress.

M. Susan Motheral, Ph.D.
Duke University
Assistant Professor
Department of Medical Education

Envisioning information. Scientific recordkeeping. The impact of health care reform on health care delivery systems, and on work force needs for health care professionals and biomedical scientists. Biomedical and medical ethics.

Michael W. Oglesby, Ph.D.
State University of New York at Buffalo Professor
Department of Pharmacology

Drug tolerance and withdrawal. An animal model has been developed that is useful for investigation of subjective events that occur during drug withdrawal. Additional studies focus on the mechanisms of development of tolerance after chronic use. The research involves training animals to detect the stimulus properties of drugs (i.e., the presence or absence of a perceived drug effect). This laboratory also investigates the fundamental variables that control the detection of drug stimuli.

Edward Orr, Ph.D.
University of California at Berkeley
Associate Professor
Department of Pathology and Anatomy

Research in this laboratory encompasses the areas of neuroimmunology, neurochemistry and neuropathology. Current research is focused on defining the significance and roles of meningeal mast cells and their products in regulating the blood-brain and blood-cerebrospinal fluid barriers under normal and pathological conditions including migraine headaches, nervous system trauma and experimental autoimmune diseases of nervous tissues. Elucidating the neurobiology of histamine, a neurotransmitter in the CNS, continues to be another focus of research in this lab.

Stephen L. Putthoff, D.O.
University of Health Sciences
Associate Professor and Chair
Department of Pathology and Anatomy

Forensic Pathology, medical education methodologies, computer-assisted instruction.

Eugene Quist, Ph.D.
University of British Columbia
Associate Professor
Department of Pharmacology

Roles of neurologic and endocrine hormones and cytokines in myocardial adaptation. The heart is capable of adapting or remodeling in response to aging and exercise training. Goals are to define how hormones influence intracellular messages transmitted by phospholipase C, protein kinases, adenylate cyclase and $Ca^{2}+$ to modulate protein synthesis and $Ca^{2}+$ mobilization in myocardial tissue or in primary cultures of cardiomyocytes from adult heart. Emphasis is on regulation of remodeling with aging and exercise training.

G.S. Jagannatha Rao, Ph.D.
Indian Institute of Science;
Research Assistant Professor,
Department of Molecular Biology and Immunology

Biochemistry of parasitic helminths. Research interests are in the area of enzymology and protein chemistry, with particular emphasis on enzyme mechanisms, allosteric regulation, x-ray crystallography, protein phosphorylation and dephosphorylation. Studies include Aspartate transcarbamylase, a key regulatory enzyme of the pyrimidine biosynthetic pathway, phospho-fructokinase, a key allosteric enzyme of carbohydrate metabolism, and NAD-malic enzyme, involved in energy production in Ascaris suum, Calcineurin, a calmodulin-dependent protein phosphatase and O-acetylserinesulfhydralase from Salmonella typhimurium. These enzymes have been purified and characterized by kinetics, chemical modification, physiochemical studies including fluorescence, circular dichroism and x-ray crystallography.

Peter B. Raven, Ph.D.
University of Oregon
Professor and Chair
Department of Integrative Physiology

Cardiovascular regulation of the human during exercise and orthostasis. Aerobic fitness, weight training and aging have all been shown to affect regulation of blood pressure during exercise and orthostasis. Indeed orthostatic hypotension is a clinical syndrome which affects 25% of the population over the age of 65 years. By using invasive and non-invasive procedures integrative physiological mechanisms of cardiovascular regulation of the human are investigated during dynamic exercise and gravitational stress in both young and elderly individuals.

Rustin E. Reeves, Ph.D.
University of North Texas Health Science Center at Fort Worth
Assistant Professor
Department of Pathology and Anatomy

Current interests include introduction of multimedia into new medical and graduate curricula, with an emphasis on web-supported educational materials. E-mail address rustyr@hsc.unt.edu

Tony Romeo, Ph.D.
University of Florida
Associate Professor
Department of Molecular Biology and Immunology

Global regulatory mechanisms in bacteria. Bacteria are able to sense change in the environment and respond with profound physiological adaptations. In large part, these adaptations involve changes in gene expression, mediated by DNA-binding proteins and corresponding signaling systems. A single regulatory factor that coordinates the expression of numerous genes and thus affects many physiological properties is termed a "global regulatory factor". This laboratory has discovered a new kind of bacterial global regulation, which uses a small RNA-binding protein, CsrA, as its effector. CsrA is able to interact with specific messenger RNAs, and cause either their stabilization or turnover. We are currently studying the molecular mechanisms of CsrA, the components of the Csr systtem, which also includes a regulatory RNA (CsrB), and the global role of CsrA in bacterial metabolism, physiology and virulence. The genetic engineering of Csr for biotechnology and medical applications is also under investigation, and already has resulted in U.S. and Foreign Patents. Email: tromeo@hsc.unt.edu

Rouel S. Roque, M.D.
University of the Philippines College of Medicine
Associate Professor
Department of Pathology and Anatomy

Cellular and molecular mechanisms of angiogenesis, neuronal degeneration, and carcinogenesis. The role of growth factors and cytokines, and their receptors, in the mechanisms of cell growth and cell death in the central nervous system, especially in the retina, are of main interests. Ongoing studies are directed towards identifying cytokines and novel retina-derived cytotoxic factors (RDCF) involved in photoreceptor cell apoptosis, vascular degeneration, or inhibition of tumor growth in the retina. Molecular events during degenerative retinopathy closely resemble neuronal degeneration in the CNS suggesting that RDCFs may also be involved in neurodegenerative diseases such as Alzheimer's or Parkinson's. Other studies are directed towards characterization of angiogenic growth factors including VEGF183, discovered in our laboratory, and isolation of retina-derived tumor inhibitors, called gliastatins, using protein biochemistry and molecular biology techniques.

Bernard Rubin, D.O.
Chicago College of Osteopathic Medicine Professor
Department of Medicine

Clinical research involving innovative techniques for the treatment of osteoporosis, rheumatoid arthritis, osteoarthritis and fibromyalgia syndrome. Therapeutic protocols involve combinations of pharmaceutical products and nontraditional medical therapies with outcomes measured by biological markers and quality of life assessments.

Victoria Rudick, Ph.D.
Ohio State University
Associate Professor
Department of Pathology and Anatomy

Mechanism(s) of targeting secretory proteins in canine kidney epithelial (MDCK) cells and regulation of organelle biosynthesis: Endomembranous organelles respond to change in measurable ways that contribute to the expression of cell phenotype. For example, the Golgi complex plays a key role in the cell, functioning to direct vesicles and proteins to a variety of cell destinations and therefore affecting numerous other organelles in the process. Thus, its own morphology and functions must be flexible to maintain cellular homeostasis. By introducing genes that code for exogenous secretory proteins into MDCK cells we are able to study what happens to the particular protein as it is routed through the secretory pathway and, also, to examine the effects that the

protein has on the cell. For example, expression of the human growth hormone gene is being used to examine the nature and consequences of hypertrophy of Golgi elements, while expression of the apolipoprotein A-I gene allows investigation of apoA-I processing and trafficking. Study of the latter protein has direct medical relevance since plasma concentration of HDL, of which apoA-I is the main protein component, has been correlated with reduced risk of cardiovascular disease. E-mail address is vrudick@hsc.unt.edu.

Harold J. Sheedlo, Ph.D.
Memphis State University
Research Assistant Professor
Department of Pathology and Anatomy

Study of the temporal response, such as the survival, proliferation and differentiation, of progenitor cells from embryonic and postnatal rat retinas to endogenous growth factors, secreted by the retinal pigment epithelium (RPE) and progenitor cell survival/differentiation upon transplantation into rat eyes. RPE cells exist as a monolayer, immediately adjacent to the neural retina, thus in a unique position to influence retinal development, particularly progenitor cells, by trophic interactions. Retinal explant cultures exposed to conditioned media (CM) from RPE cultures showed neurites and the production, survival, proliferation and differentiation of retinal progenitor cells, which expressed the message for various growth factors and receptors and nestin, a neuroepithelial cell marker. Pure populations of progenitor cells from embryonic and postnatal rat retinas will be cultured in growth factors known to be secreted by the RPE and tested by reverse transcriptase-polymerase chain reaction (RT-PCR) for their respective biological response, such as upregulation or downregulation of other growth factors and retinal cell-specific proteins. These cells will also be grown on extracellular substrates and monitored for morphological and genetic differentiation. Progenitor cells have been produced from human fetal retinas by exposure to RPE-CM. Thus, progenitor cells isolated from rat retinal explants will be transplanted into diseased rodent eyes to document the feasibility of such a procedure in human ocular diseases such as age-related macular degeneration (ARMD) and retinitis pigmentosa (RP). E-mail: hsheedlo@hsc.unt.edu

Xiangrong Shi, Ph.D.
Yale University
Assistant Professor
Department of Integrative Physiology

Arterial and cardiopulmonary baroreflexes and their interaction in the regulation of blood pressure; Body fluid and volume-regulating hormonal responses to physical exercise and various environmental challenges; Aging-related adaptations of body fluid and cardiovascular regulation; Impact of acute exercise and chronic training on blood volume and cardiovascular function.

Jay Shores, Ph.D.
University of Wisconsin
Associate Professor, Department of Medical Education

Primary research interest is the cognitive processes used by physicians to diagnose illnesses. Further interest in modeling phenomena in the biomedical sciences using multifactorial statistics. Assists clinical colleagues in conducting research on the efficacy of osteopathic manipulation in the treatment of disease.

Jerry W. Simecka, Ph.D.
University of Alabama at Birmingham
Assistant Professor
Department of Molecular Biology and Immunology

Respiratory disease is a major health problem, particularly in the young and elderly. There is a need to understand the role of host responses to infectious agents in the pathogenesis and resistance to disease. This information will contribute to the development of new vaccines and approaches to therapy. This laboratory is characterizing the development of immune and inflammatory responses during the development and recovery from bacterial and viral respiratory diseases. In addition, new approaches to vaccination against respiratory infection are being studied. E-mail address is jsimecka@hsc.unt.edu.

Michael L. Smith, Ph.D.,
North Texas State University
Associate Professor
Department of Integrative Physiology

Research efforts focus on the neural control of cardiovascular function. Two lines of research relate to factors which precipitate sudden cardiac death: 1) autonomic neural responses during ventricular dysrhythmias, and 2) neural responses during recovery from exercise and the effects of training on these responses. Two other lines of research relate to abnormal control mechanisms provoked in sleep disorders: 1) mechanisms of the association between obstructive sleep apnea and hypertension, and 2) effects of sleep deprivation on normal cardiovascular control.

James E. Turner, Ph.D.
University of Tennessee
Professor
Department of Pathology and Anatomy

Research interests include the actions of retinal pigment epithelial cells (RPE) in retina health and disease. Specific interest is in the use of RPE transplantation techniques in helping to cure eye disease conditions. Through RPE transplantation techniques developed in the laboratory, the loss of photoreceptor cells was halted, and the eye disease in an animal model of inherited retinal dystrophy cured. Research also involves the study of retina directed trophic factors produced by RPE cells which influence the development and survival of retinal tissue and may have therapeutic value in the treatment of eye diseases. Current studies focus on the characterization of these factors and their use in in vitro and in vivo models. Techniques used in these investigations include: light and electron microscopy, tissue culture, immunocytochemistry, neurochemistry, biochemistry and molecular biology.

Robert Wordinger, Ph.D.
Clemson University
Associate Professor
Department of Pathology and Anatomy

Role of growth factors in the development of glaucoma. Glaucoma is a leading cause of blindness and is characterized by a defect in the ability of aqueous humor to drain efficiently through the human trabecular meshwork. This leads to an intraocular pressure higher than the eye can tolerate and blindness through death of retinal ganglion cells. The primary hypothesis of this laboratory is that gene expression and mRNA levels of specific growth factors or their high affinity receptor is altered in glaucomatous trabecular meshwork cells. Recent studies have utilized in vitro culture of normal and glaucomatous trabecular meshwork cells and molecular biology techniques including reverse transcriptase-polymerase chain reaction and Northern and Southern blotting techniques. The members of this laboratory are also interested in steroid induced glaucoma and study this by exposing trabecular meshwork cells to the glucocorticoid dexamethasone. This approach should further our knowledge of the biologic characteristics of healthy and glaucomatous human trabecular meshwork cells and will be critical to discover new and innovative avenues for the diagnosis, management and treatment of glaucoma.

Ming-chi Wu, Ph.D.
University of Wisconsin
Professor
Department of Molecular Biology and Immunology

Research interests are in the general area of colony-stimulating factors and their roles in the regulation of myelopoiesis and other biological functions. Current research projects are: (1) Regulation of human M-CSF gene expression. (2) Cloning, expression and mechanism of action of a novel leukemia differentiation factor. (3) Expression of cytokines including M-CSF, GM-CSF, IL-6 and G-CSF by different expression systems. Other projects include angiostatin production by pancreatic cancer cells in culture and orthomolecular treatment of sickle cell anemia.

Thomas Yorio, Ph.D.
Mt. Sinai School of Medicine
Professor, Department of Pharmacology
Chair, Department of Biomedical Sciences
Dean, Graduate School of Biomedical Sciences

Major research focus is in ocular pharmacology, particularly as it relates to the understanding of the cellular and molecular mechanisms that may be coupled to the regulation of intraocular pressure and factors defining and contributing to the development of glaucoma. Current emphasis is on ocular derived peptides and defining their role in regulating intraocular pressure and optic neuropathies. The intent on designing better drugs for the clinical management of glaucoma.

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Non-Discrimination & Harassment Policies

Respect for Diversity

The Nondiscrimination/Equal Employment Opportunity and Affirmative Action policy affirms the requirement for every member of the UNT Health Science Center community to comply with existing federal and state equal opportunity laws and regulations.

The UNT Health Science Center is committed to the philosophy of a multicultural environment. The institution prohibits harassment based on race, gender, disability, age, national origin, religion, veteran status or lifestyle.

The health science center has long been an open, tolerant and democratic institution, proud of its commitment to personal and academic excellence but unpretentious in the atmosphere of its campus in its willingness to accept all members of the health science center community on their value as human beings.

The increasing diversity of the UNT Health Science Center community is one of the institution's greatest strengths. Differences of race, religion, age, gender, culture, physical ability, language, nationality and lifestyle make it a microcosm of the nation as a whole, reflecting the values of our pluralistic society.

As an educational institution, the UNT Health Science Center is committed to advancing the ideas of human worth and dignity by teaching respect for human beliefs and values and encouraging open discussions. Hatred or prejudice and harassment of any kind are inconsistent with the center's educational purpose.

The UNT Health Science Center is strongly committed to the ethical principle that every member of the community enjoys certain human and constitutional rights, including the right to free speech. As a community of scholars, the health science center also is dedicated to maintaining a learning environment that is nurturing, fosters respect, and encourages growth among cultures and individuals represented here. Individuals who work, study, live and teach within this community are expected to refrain from behaviors that threaten the freedom and respect every individual deserves.

Sexual Harassment

A primary objective of the UNT Health Science Center is to provide an environment in which faculty, staff and students may pursue their careers and studies with a maximum of productivity and enjoyment.

Harassment of students on the basis of gender is a violation of Section 106.31 of Title IX of the Education Amendments of 1972. Harassment of health science center employees on the basis of gender is a violation of Section 703 of Title VII of the Civil Rights Act of 1964 and the Texas Commission on Human Rights Act. Sexual advances, requests for sexual favors and other verbal or physical conduct of a sexual nature constitutes sexual harassment.

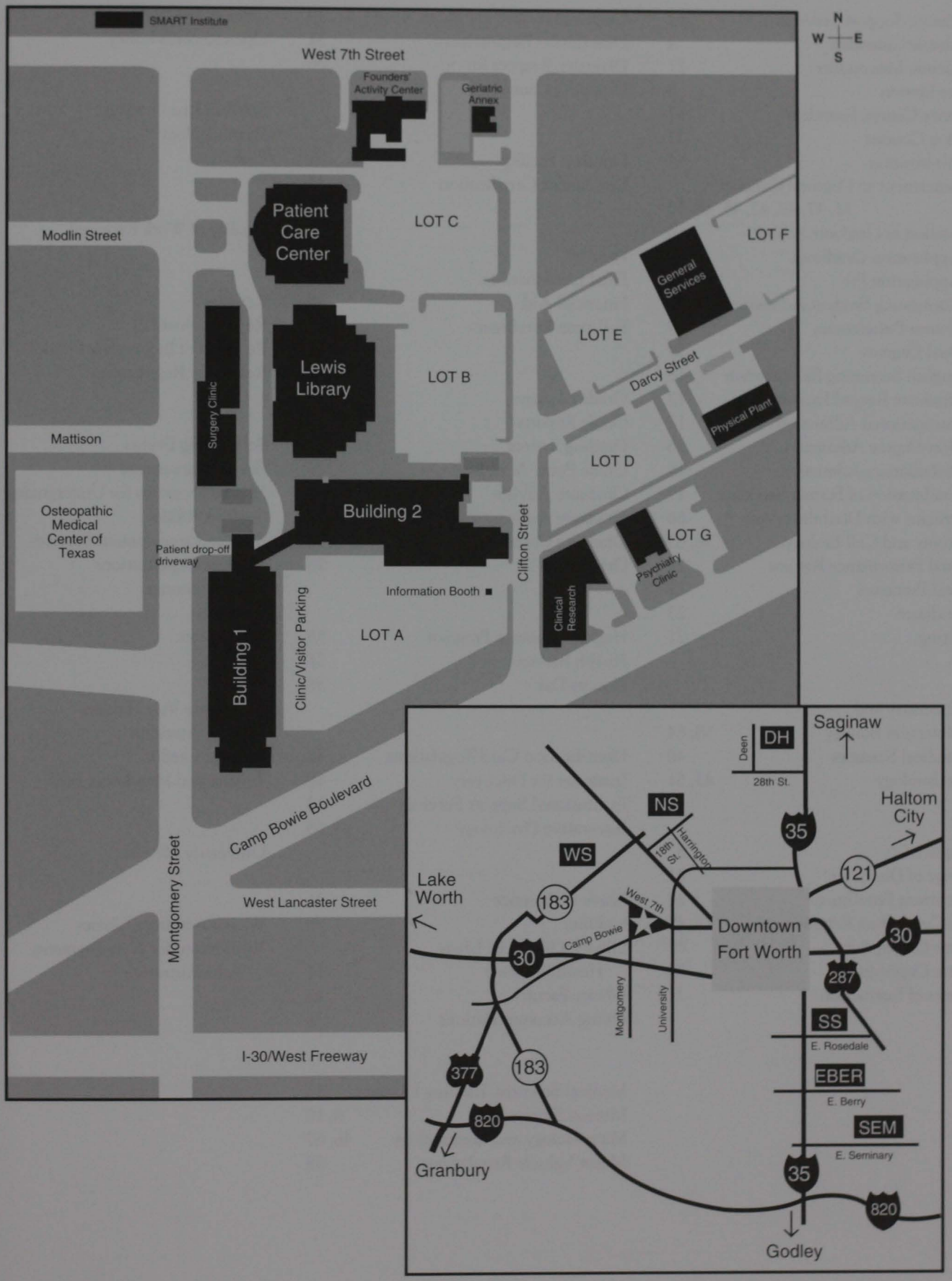
It is the policy of the health science center to maintain a workplace and a learning environment free of sexual harassment and intimidation. Behavior or conduct that interferes with this goal is not condoned or tolerated.

Americans with Disabilities Act

The UNT Health Science Center does not discriminate on the basis of an individual's disability and complies with Section 504 and Public Law 101-336 (Americans with Disabilities Act) in its admissions, accessibility, treatment and employment of individuals in its programs and activities.

The UNT Health Science Center provides academic adjustments and auxiliary aids to individuals with disabilities, as defined under the law, who are otherwise qualified to meet the institution's academic and employment requirements. For assistance contact the Equal Employment Opportunity Office at the health science

Campus Map


SMART Institute
West 7th Street
Founders' Activity Center
Geriatric Annex
Patient Care Center
LOT C
LOT F
Modlin Street
General Services
LOT E
Lewis Library
LOT B
Darcy Street
Physical Plant
Surgery Clinic
Mattison
LOT D
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Building 2
Patient drop-off driveway
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LOT G
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Clinical Research
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Godley

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