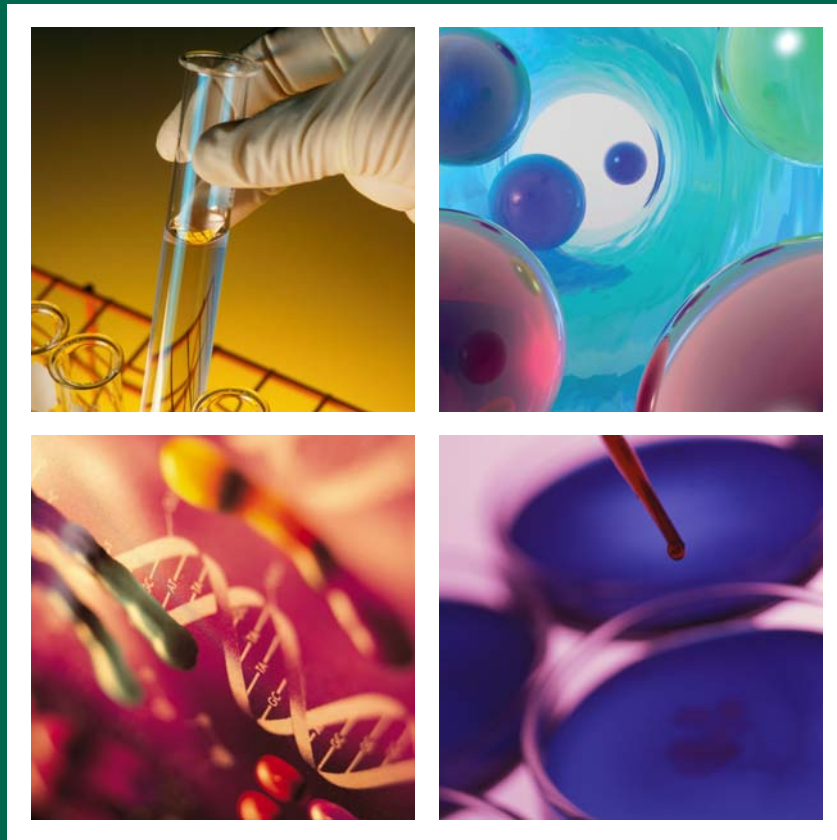




# UNIVERSITY of NORTH TEXAS HEALTH SCIENCE CENTER



GRADUATE SCHOOL OF  
BIOMEDICAL SCIENCES

2007-2008  
CATALOG



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



Graduate School of Biomedical Sciences

**2007-08 Graduate Catalog**

This catalog is an official bulletin of University of North Texas Health Science Center at Fort Worth's Graduate School of Biomedical Sciences and is intended to provide general information. It contains policies, regulations, procedures and fees in effect as of July 1, 2007.

UNT Health Science Center reserves the right to make changes at any time to reflect current Board of Regents 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 UNT Health Science Center and a student or an applicant for admission. The institution is not responsible for an 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 and the web site ([www.hsc.unt.edu](http://www.hsc.unt.edu)). UNT Health Science Center reserves the right to withdraw a student for cause at any time.

UNT Health Science Center 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 at 817-735-2357.

UNT Health Science Center 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.

University of North Texas Health Science Center at Fort Worth  
Graduate School of Biomedical Sciences  
3500 Camp Bowie Boulevard  
Fort Worth, Texas 76107  
817-735-2560 or 800-511-4723  
[www.hsc.unt.edu/gsbs](http://www.hsc.unt.edu/gsbs)  
[gsbs@hsc.unt.edu](mailto:gsbs@hsc.unt.edu)

# Contents

|                         |   |
|-------------------------|---|
| Academic Calendar ..... | 3 |
| Dean's Message.....     | 5 |
| Our Mission .....       | 7 |

## 1/UNT Health Science Center

|                                     |   |
|-------------------------------------|---|
| Overview .....                      | 6 |
| Institutional Support Services..... | 7 |

## 2/Outreach Programs

|   |    |
|---|----|
| Special Programs for Undergraduates ..... | 9  |
| Primary School Outreach Programs .....    | 10 |
| Programs for Graduate Students.....       | 11 |
| Faculty Development.....                  | 11 |

## 3/Admissions

|                                      |    |
|--------------------------------------|----|
| Application.....                     | 12 |
| Deadlines.....                       | 12 |
| Requirements .....                   | 13 |
| Additional Admissions Policies ..... | 14 |

## 3/Academic Policies

|   |    |
|---|----|
| Academic Misconduct .....                         | 15 |
| Academic Standing of Student Officers.....        | 15 |
| Annual Performance Review .....                   | 15 |
| Appeal Processes .....                            | 15 |
| Auditing .....                                    | 15 |
| Change of Discipline/Program .....                | 16 |
| Class Attendance .....                            | 16 |
| Concurrent Enrollment at Another Institution..... | 16 |
| Course Changes.....                               | 16 |
| Course Deficiencies .....                         | 16 |
| Courses of Instruction.....                       | 16 |
| Enrollment Verification.....                      | 16 |
| Final Examinations .....                          | 17 |
| Full-time Enrollment .....                        | 17 |
| Grading System .....                              | 17 |
| Graduate Advisor.....                             | 19 |
| Graduation .....                                  | 19 |
| Leave of Absence.....                             | 19 |
| Official Communications.....                      | 19 |
| Open Records.....                                 | 20 |
| Policies .....                                    | 20 |
| Student Grievances .....                          | 20 |
| Summons.....                                      | 20 |
| Syllabi.....                                      | 20 |
| Temporary Visa Holders.....                       | 20 |
| Withdrawal .....                                  | 20 |

## 4/Degree Programs

|                                   |    |
|-----------------------------------|----|
| Core Curriculum Requirements..... | 22 |
| Master of Science Degree.....     | 23 |
| Doctor of Philosophy Degree ..... | 24 |
| Dual Degrees.....                 | 27 |

## 5/Disciplines

|  |    |
|--|----|
| Biochemistry and Molecular Biology .....     | 28 |
| Biomedical Sciences .....                    | 30 |
| Biotechnology .....                          | 34 |
| Clinical Research Management.....            | 35 |
| Medical Sciences .....                       | 37 |
| Cell Biology and Genetics .....              | 38 |
| Forensic Genetics.....                       | 41 |
| Clinical Research and Education: Osteopathic |    |
| Manipulative Medicine.....                   | 42 |
| Health Psychology.....                       | 43 |
| Integrative Physiology.....                  | 45 |
| Microbiology and Immunology .....            | 48 |
| Pharmacology and Neuroscience .....          | 51 |
| Primary Care Clinical Research.....          | 54 |
| Science Education .....                      | 55 |

## 6/Fiscal and Financial Aid Policies

|                                 |    |
|---------------------------------|----|
| Tuition and Mandatory Fees..... | 57 |
| Financial Aid .....             | 59 |
| Graduate Assistantships .....   | 60 |

## 7/Student Life

|                                       |    |
|---------------------------------------|----|
| Division of Student Affairs .....     | 61 |
| Student Organizations .....           | 62 |
| Campus Resources .....                | 63 |
| Policies Pertaining to Students ..... | 63 |

## 8/Course Descriptions

|  |    |
|--|----|
| Biomedical Sciences .....                | 67 |
| Biochemistry and Molecular Biology ..... | 70 |
| Cell Biology and Genetics .....          | 71 |
| Family Medicine.....                     | 74 |
| Health Psychology.....                   | 75 |
| Integrative Physiology.....              | 76 |
| Microbiology and Immunology .....        | 78 |
| Osteopathic Manipulative Medicine .....  | 79 |
| Pharmacology and Neuroscience .....      | 79 |

## 9/Faculty, Officers and Staff

|                                   |    |
|-----------------------------------|----|
| Faculty .....                     | 81 |
| Adjunct Faculty.....              |    |
| Emeritus Faculty.....             |    |
| Professional Library Faculty..... |    |
| Officers and Staff.....           |    |

# Academic Calendar 2007-08

|  | Fall<br>2007   | Spring<br>2008 | Summer<br>2008 |
|--|----------------|----------------|----------------|
| <b>ADMISSIONS</b>  |                |                |                |
| <b>Application deadline.</b> All application materials must be submitted for consideration.  |                |                |                |
| Applications for PhD program to be considered for funding  | Feb 1          | ---            | ---            |
| Applications for all degree-seeking programs EXCEPT Master of Science in Medical Sciences  | Mar 1          | Aug 31         | Jan 11         |
| Applications for Master of Science in Medical Sciences   | ---            | March 24       | ---            |
| International New Student Orientation (mandatory)  | Aug 8          | Jan 3          | May 22         |
| New Student Orientation (mandatory for all students, incl. international)  | Aug 9-10       | Jan 4          | May 23         |
| Convocation and White Coat Ceremony (mandatory)  | Sep 14         | ---            | ---            |
| Ranchland  | Aug 10         | ---            | ---            |
| <b>REGISTRATION</b>  |                |                |                |
| Regular registration   | Jul 16-27      | Oct 22 - Nov 2 | Apr 21 - May 2 |
| Late registration  | Jul 30 - Aug 3 | Nov 5-11       | May 5-9        |
| New student registration   | Aug 10         | Jan 4          | May 23         |
| <b>IMPORTANT CLASS DAYS</b>  |                |                |                |
| Classes begin  | Aug 13         | Jan 7          | May 27         |
| Audit enrollment dates   | Aug 28         | Jan 22         | May 30         |
| Last day of the semester   | Dec 14         | May 9          | Aug 1          |
| Grades Due   | Dec 19         | May 14         | Aug 6          |
| <b>SCHEDULE CHANGES</b>  |                |                |                |
| Last day to ADD a course   | Aug 17         | Jan 11         | May 30         |
| Last day to drop to prevent course from appearing on transcript  | Aug 28         | Jan 22         | May 30         |
| Last day to DROP a course or withdraw from UNTHSC with a grade of W for courses that a student is not passing. After this date, a grade of WF may be recorded. | Sep 7          | Feb 1          | June 2         |
| Beginning this date, instructors may drop student with a grade of WF for non-attendance.   | Sep 10         | Feb 4          | June 6         |
| Last day to drop a course with consent of the instructor.  | Dec 3          | May 2          | June 20        |
| Last day to withdraw from the health science center. Process must be completed by 5 p.m. in the Registrar's Office.  | Dec 3          | May 2          | June 20        |
| <b>TUITION/FEE PAYMENTS AND COURSE REFUNDS</b>   |                |                |                |
| Financial Aid Disbursement for Returning Students  | Aug 3          | Jan 2          | May 20         |
| Financial Aid Disbursement for New Students  | Aug 13         | Jan 7          | May 27         |

## TUITION/FEE PAYMENTS AND COURSE REFUNDS, CONTINUED

|  |        |       |        |
|--|--------|-------|--------|
| Last day to pay tuition and fees   | Aug 12 | Jan 6 | May 26 |
| Beginning this date, students will be dropped from courses for non-payment of tuition and fees | Aug 13 | Jan 7 | May 27 |

## WITHDRAWAL REFUNDS

|  |        |        |        |
|--|--------|--------|--------|
| Last day to withdraw for a 100% refund | Aug 10 | Jan 4  | May 23 |
| Last day to withdraw for an 80% refund | Aug 17 | Jan 11 | May 30 |
| Last day to withdraw for a 70% refund  | Aug 24 | Jan 18 | N/A    |
| Last day to withdraw for a 50% refund  | Aug 31 | Jan 25 | Jun 4  |
| Last day to withdraw for a 25% refund  | Sep 7  | Feb 1  | N/A    |

## GRADUATION

|  |              |        |         |
|--|--------------|--------|---------|
| Deadline to file Declaration of Intent to Graduate   | Aug 3        | Nov 11 | May 9   |
| Last day to complete all graduation requirements (all major except Clinical Research Management and Forensic Genetics) | Dec 7        | May 2  | July 25 |
| Last day for Clinical Research Management and Forensic Genetics majors to complete all graduation requirements         | Dec 7        | May 2  | Aug 8   |
| Commencement   | May 17, 2008 | May 17 | May 17  |

## HOLIDAYS/SPECIAL EVENTS

**\*Classes will not be held on these days marked with an asterisk (\*) due to holidays and/or special events.**

|  |                |          |           |
|--|----------------|----------|-----------|
| Convocation and White Coat Ceremony*(classes dismissed for ceremony only)* | Sep 14         | ---      | ---       |
| Labor Day*   | Sep 3          | ---      | ---       |
| Outstanding Graduate Faculty Seminar                                       | Sep 27         | ---      | ---       |
| Presidential Inauguration* (afternoon classes dismissed)                   | Oct 19         | ---      | ---       |
| Thanksgiving*  | Nov 22-23      | ---      | ---       |
| Winter Break*  | Dec 17 - Jan 1 | ---      | ---       |
| Martin Luther King, Jr. Day*   | Jan 21         | ---      | ---       |
| Spring Break*  | ---            | Mar 17   | ---       |
| Research Appreciation Day*   | ---            | Mar 28   | ---       |
| Neurobiology of Aging Symposium  | ---            | April 11 | ---       |
| Graduate Student Association Awards Banquet                                | ---            | TBA      | ---       |
| Memorial Day*  | ---            | ---      | May 26    |
| Texas Conference on Health Disparities (hosted by UNTHSC)                  | ---            | ---      | May 29-31 |
| Independence Day*  | ---            | ---      | Jul 4     |

# Dean's Message



*"Our goal is to provide you with the tools needed to undertake the challenges of tomorrow."*

Welcome to the Graduate School of Biomedical Sciences. Your interest in us suggests you are an individual with vision and concern for the future. Biomedical research and the health sciences have transformed our understanding of the human condition 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 are ready to assist you in obtaining the training you need for a career in this exciting field. Our graduate faculty members are dedicated to creating an environment that is stimulating, creative and challenging. Our faculty members have distinguished themselves nationally and internationally for their research programs that utilize state-of-the-art technology.

The institution's centers of research excellence are providing leadership in areas of national need and include: heart disease, diabetes, cancer, infectious diseases, vision, Alzheimer's and aging. To complement these areas are our interests in neuroscience, cell biology, genetics, immunology and molecular biology that utilize technology such as proteomics, gene arrays, nanotechnology and nanophotonics, cellular imaging and laser microdissection.

Our institution recognizes the importance of diversity in our student population and the research areas that derive from an understanding of all cultures. Our graduate school has been nationally recognized for achieving a well-balanced representation of diverse populations that is reflective of our society. By studying in this environment, you will be better prepared to apply your knowledge through research that will benefit all.

Our 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.

*Jamboor K. Vishwanatha, Ph.D.  
Professor and Dean*



# 1 The Health Science Center

*The University of North Texas Health Science Center at Fort Worth, a component institution of the UNT System, is dedicated to excellence in education, research, health care and service.*

*We achieve this mission by:*

*Preparing our students in osteopathic medicine, biomedical sciences, public health and physician assistant studies for successful careers in health care, research and teaching.*

*Advancing the discovery of knowledge through cutting-edge basic and applied research.*

*Teaching, practicing and encouraging the effective deliver of primary health care.*

*Emphasizing health promotion, disease prevention and public health, with a focus on underserved populations.*

*Actively collaborating with other academic institutions, such as other components of the UNT System, health-related organizations and the communities we serve.*

*Supporting a culturally diverse environment that advocates mutual respect for all members of the health science center as they strive for excellence.*

*Meeting and exceeding the needs and expectations of our students, patients, employees, partners, donors and the people of Texas.*

*(Revised by the UNT Health Science Center Board of Regents August 2001)*

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, \$107 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 includes the 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.

The Texas College of Osteopathic Medicine (TCOM) is Texas' only college of osteopathic medicine, and one of only 19 in the nation. TCOM's Physician Assistant Studies program offers a master of physician assistant studies degree, one of the growing number of PA programs educating these mid-level medical professionals at the master's level.

The Graduate School of Biomedical Sciences offers advanced degrees in the biomedical sciences, with specializations in cell biology and genetics, microbiology and immunology, pharmacology and neuroscience, integrative physiology, biochemistry and molecular biology, forensic genetics, clinical research management, biotechnology and medical sciences.

The School of Public Health awards master of public health and doctor of public health degrees.

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, cancer, heart disease, DNA and genetics, substance abuse, osteoporosis and tuberculosis.

The health science center is also home to one of the most advanced medical libraries in the Southwest and an internationally-recognized DNA identity testing laboratory.



## **Graduate School of Biomedical Sciences Mission Statement**

The Graduate School of Biomedical Sciences is committed to:

- Achieving excellence in education, research and service;
- offering students opportunities to earn advanced degrees in the biomedical sciences;
- providing an innovative and diverse educational environment that supports state-of-the-art research in areas of health science and technology;
- exemplary teaching skills;
- service to the community; and
- collaborating with other health science center schools and programs to offer dual degrees for future careers as health science researchers.

Graduates in biomedical sciences fill positions in health science centers, colleges and universities, community health centers, federal agencies and industry.

## **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, staff 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. Video teleconferencing technology links the campus with 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.

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

## **Gibson D. Lewis Health Science Library**

The Gibson D. Lewis Health Science Library supports the educational, patient care, research, and community service missions of the University of North Texas Health Science Center (UNTHSC) 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. All UNTHSC faculty and students receive a full complement of library services, including borrowing privileges, use of individual and group study areas, photocopying, document delivery/interlibrary loan, expert instruction in the use of information resources, and access to professionally trained librarians for reference and search assistance. The library collection consists of books, journals and electronic resources in the basic biomedical sciences, clinical medicine, public health, and affiliated fields. Access to a variety of crucial electronic resources is provided through the Lewis Library web page at <http://library.hsc.unt.edu>. All electronic resources are available to UNTHSC students, staff, and faculty 24 hours a day, 7 days a week from anywhere in the world.

Lewis Library uses an online system from Innovative Interfaces, Inc. (III) to acquire, process, and provide access to its collections. Book and journal literature not owned by the library may be obtained through interlibrary loan from many sources. Lewis Library has been a resource library in the National Network of Libraries of Medicine (NNLM) since 1991. The library is also a member of the South Central Academic Medical Libraries Consortium (SCAMEL), which provides access to 14 academic medical/health science center libraries in Texas, Arkansas, Louisiana, Oklahoma and New Mexico. Additionally, the library participates in TexShare, a state of Texas cooperative library program. TexShare allows UNTHSC students, staff, and faculty physical access to and borrowing privileges from all public libraries and a variety of public and private institutions of higher education in Texas. As a member of the University of North Texas System, the library is able to provide access to a wide array of electronic resources. The library's participation in NNLM, SCAMEL, TexShare, and the UNT System ensures that UNTHSC students have access to the entire world of information beyond the walls of Lewis Library.

## **Information Technology Services**

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

Systems and Programming Services designs and implements computer systems and programs for academic and 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 e-mail with users across the institution and off-campus. Dial-in access is available for both PC 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

Graduate School of Biomedical Sciences



and software. This division also manages the voice mail system, as well as all pagers and answering services, and advises users about cellular telephones.

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 reviews all requests for the disposal of state records.

## **Center for Research Management**

The Center for Research Management coordinates all basic and applied research, clinical trials and biomedical technology programs. 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 pursue careers in research.

The office 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.

# 2 Outreach Programs

University of North Texas Health Science Center has received prestigious recognition for its longstanding history of programs aimed at increasing diversity within the scientific community. These awards include the Award for Excellence in Minority Recruitment from the National Association of Graduate Admissions Professionals, designation as an NIH-Minority Access Role Model Institution, and the President's Award for Excellence in Science, Mathematics and Engineering from the National Science Foundation.

The GSBS Office of Outreach administers programs whose principal goal is to increase the numbers of under-represented, disadvantaged or first-generation college students entering the health professions and the biomedical sciences.

## Special Programs for Undergraduates

### Summer Multicultural Advanced Research Training Program

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 physiology 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 Office of Outreach at (866) 21-REACH or (817) 735-0174. Download an application and learn more about the SMART program at <http://www.hsc.unt.edu/education/gsbs/smart.cfm>

### 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. Download an application and learn more about the program at <http://www.hsc.unt.edu/education/gsbs/mcnair.cfm>

### HBCU Undergraduate Collaborative Summer Training Program in Prostate Cancer

The HBCU Undergraduate Collaborative Summer Training Program in Prostate Cancer provides an excellent opportunity for undergraduate students to gain experience in a research laboratory under the supervision of faculty and senior graduate students.

Participants will be awarded faculty-mentored summer research internships funded by the U.S. Department of Defense Prostate Cancer Research Program. These internships are full-time ten-week commitments.

Download an application and learn more about the program at <http://www.hsc.unt.edu/education/gsbs/HBCUSummer.cfm>



## Summer Training Among Research Scientists Program

The Summer Training Among Research Scientists (STARS) program provides an excellent opportunity for undergraduate students to gain experience in a research laboratory under the supervision of faculty and senior graduate students. Participants are selected in open competition.

Participants will be awarded faculty-mentored summer research internships. These internships are full-time ten-week commitments.

Download an application and learn more about the program at <http://www.hsc.unt.edu/education/gsbbs/STARS.cfm>

## Primary School Outreach Programs

### Schools Cooperative Opportunities for Resources and Education (Project SCORE)

Project SCORE is designed to train and support biomedical graduate students at the University of North Texas Health Science Center to serve as enhanced curriculum resources in collaboration with high school biology students and teachers in the Fort Worth Independent School District.

Designated as “Fellows” and supported by a National Science Foundation initiative, eight graduate students enrolled in UNT Health Science Center's Graduate School of Biomedical Sciences work in pairs for 10 hours per week in one of four Fort Worth Independent School District biology high school classrooms and contribute their advanced knowledge and skills to develop more effective inquiry-based, hands-on science laboratory exercises. The “Fellows” serve to promote the general goals of Project SCORE: 1) to increase interest in and understanding of science and science processes in community public schools, and 2) to enhance the science learning and productive capabilities of teachers and their students.

In order to accomplish the goals, Project SCORE also provides advanced technological tools for the selected biology classrooms including digital, internet-ready ceiling mounted projectors capable of displaying internet website-derived, interactive science resources, along with live microscope images, to entire classrooms of learners, facilitating group participation.

More information on Project SCORE is available at <http://www.hsc.unt.edu/score/>

## Minority K-12 Initiative for Teachers and Students (MKITS)

The Office of Outreach in the Graduate School of Biomedical Sciences is funded by the [National Heart Lung and Blood Institute \(NHLBI\)](#) to further the institution's efforts to interest underrepresented minorities in the biomedical sciences and public health through the More Knowledge In The Sciences (MKITS) program.

This five year program is geared to help students from Manuel Jara Elementary, J.P. Elder Middle School and North Side High School in the Fort Worth Independent School District take advantage of educational opportunities in the biosciences and public health.

MKITS also is designed to train and support graduate students as resources for the district's elementary, middle and high school students and teachers by placing graduate student fellows in the classroom to assist in teaching science concepts with modern day technology.

More information on MKITS is available at <http://www.hsc.unt.edu/education/mkits/>

## Adopt-A-School with Fort Worth Independent School District

UNT Health Science Center has conducted an adopt-a-school (AAS) partnership with the Fort Worth Independent School District since 1982, and is a charter member of the program. Its partnership includes seven schools in two high school pyramids, and enlists the support of faculty, staff and student organizations in its implementation. School partners include Manuel Jara Elementary, J.P. Elder Middle, and North Side High Schools in the North Side pyramid, and Maude I. Logan Elementary, Dunbar Sixth Grade, Dunbar Middle and Dunbar High School in the Dunbar pyramid. It offers a variety of programming, tutoring, mentoring, advising, preceptorships and other activities to address low attendance rates, low academic achievement, low completion rates, and a need to improve cognitive development in science and leadership. Program activities are designed to expose students to the sciences and ensure that students acquire the knowledge and skills in science and leadership to enable them to enroll and succeed in post-secondary education.

## Go Center Project with Fort Worth Independent School District

The Go Center is the physical hub of energy for college preparation activities. In order to reach out to the student body at Northside and Dunbar High School students, a group of students volunteer to be trained as peer educators regarding the career exploration, college preparation, and financial aid processes. This group of students is referred to as the G-Force team and is responsible for conducting campus outreach activities as well as working one-on-one with their peers in the GO Centers. The Go Centers are located at Dunbar and Northside High Schools. In addition, Dunbar and Northside High schools have formed their own G-FORCE teams to assist with their Go Centers.

## Programs for Graduate Students

### Post-Baccalaureate Research Education Program and Retention Enhancement (PREP)

The Post-Baccalaureate Research Education (PREP) program provides underrepresented minority individuals who have received undergraduate degrees in science, a challenging, focused post-baccalaureate experience that will prepare them for acceptance into doctoral programs and allow them to successfully complete the program, thus obtaining their PhDs. Participants must meet the following eligibility requirements:

- Hold a bachelor's degree from a regionally accredited institution
- Have minimum 2.5 GPA on his/her last 60 undergraduate semester hours.
- Required to take the GRE (no minimum score)
- Major in the life sciences (biology, biochemistry, chemistry, biotechnology, etc.)
- U.S. citizenship or permanent resident
- Intention of pursuing a Ph.D.

PREP program participants gain research experience under the supervision of a faculty mentor, receive a research assistant stipend. Additional support includes a review course for the Graduate Record Examination, assistance with study strategies, tutoring, training in research presentation and electronic research techniques, advice for choosing a graduate school and financing graduate education.

Additional information is available at  
<http://www.hsc.unt.edu/education/gsbbs/prep.cfm>

### Bridges to the Doctoral Degree

The Bridges to the Doctoral Degree program is funded by the [National Institutes of Health \(NIH\)](#) to encourage students in master's programs to complete doctoral degrees in science.

Students enrolled in Master's programs at historically underrepresented partner schools such as Southern University in Baton Rouge, Xavier University in New Orleans, Texas A & M University - Corpus Christi, and Texas A & M University - Kingsville, among others, complete a portion of their master's research on the UNT Health Science Center campus. The UNTHSC mentor serves as a member of the master's advisory committee at the home campus. After completion of the master's degree, the Bridge participant then enters the doctoral program at UNT Health Science Center to continue graduate study. During both phases of the program, the Bridge participant typically receives funding through either the Bridges to the

Doctoral Degree grant or the Graduate School of Biomedical Sciences.

## Faculty Development

### Steps Toward Academic Research (STAR) Fellowship Program

The Texas Center for Health Disparities hosts the Steps Toward Academic Research (STAR) Fellowship Program. The STAR program offers emerging faculty a full year of collaborative training and interaction with faculty from the HSC and other institutions, directed toward fostering Health Disparities Research Initiatives.

Ten faculty members will be selected to join our all-expense-paid STAR Fellowship Program each year, while maintaining their regular faculty positions. The STAR Fellowship Program will provide a unique approach that will combine on-site faculty development and education with distant learning techniques that include video conferencing, on-line digital meetings, and "store and forward" technology in order to provide the skills necessary to STAR Fellows to enter into new health disparities research initiatives.

Successful completion of the STAR Fellows Program will offer each Fellow the opportunity to apply for pilot community-based health disparities research project grants each year (\$25,000).

More information on the STAR Fellowship Program is available at:  
<http://www.hsc.unt.edu/HealthDisparities/starFellowshipHome.html>

# 3 Admissions

## Application

First-time applicants must complete the [online application](#) for admission to the Graduate School of Biomedical Sciences (GSBS). Applicants reapplying or GSBS alumni applying for a second degree program should contact the Office of Admissions and Services for instructions.

Supporting documentation such as letters of evaluation and transcripts should be mailed or delivered to:

Office of Admissions and Services  
Graduate School of Biomedical Sciences  
UNT Health Science Center at Fort Worth  
3500 Camp Bowie Boulevard  
Fort Worth, TX 76107-2699

Questions may be directed to 817-735-2560 or 800-511-GRAD or by e-mail to [gsbs@hsc.unt.edu](mailto:gsbs@hsc.unt.edu).

Applicants applying for the first time to the Graduate School of Biomedical Sciences must pay a non-refundable application fee of \$25. This application fee is valid for one year from the application date. An additional \$50 foreign transcript evaluation fee is assessed to all applicants who have attended universities outside of the United States. All fees must be paid in U.S. currency. Application fees are waived for McNair Scholars that provide documentation of participation in a McNair program.



## Application 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.

|  | Fall 2007  | Spring 2008 | Summer 2008 |
|--|------------|-------------|-------------|
| Applications for PhD programs to be considered for funding                       | February 1 | N/A         | N/A         |
| Applications for all degree-seeking programs and all non-degree seeking students | March 1    | August 31   | January 11  |
| Applications for MS in Medical Sciences  | N/A        | N/A         | March 24    |

Assistantships are awarded to entering doctoral students once each 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 GSBS must meet the following requirements, whether or not admission to a specific degree program is sought.

1. Applicant must hold a bachelor's degree or its equivalent with a major in biology, biochemistry, chemistry or equivalent field from a regionally accredited institution.
2. Specific grade point average (GPA) requirements for both 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. The applicant must have at least a 3.0 GPA on a 4.0 scale 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 listed above in order to be admitted unconditionally. Non-degree seeking students will be allowed to take a maximum of 12 semester credit hours.
3. All applicants seeking admission to a degree program are required to take the Graduate Record Examination (GRE). Applicants to the MS in Medical Sciences or to dual degree programs are allowed to substitute the Medical College Admissions Test (MCAT).
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. Upon acceptance, if it is determined that a student is not proficient in English language, he/she will be required to complete an approved English as a Second Language (ESL) course at his/her own expense.
6. To be considered for admission, the applicant must file the following official credentials with the Graduate School of Biomedical Sciences:
  - an online application for admission
  - complete official transcripts from all colleges or universities attended
  - official scores on the required entrance test or tests
  - the \$25 application fee and a \$50 transcript evaluation fee (if applicable)
  - two letters of evaluation by individuals in positions to comment on the applicant's potential as a graduate student and future professional
  - a written statement of personal career goals
  - a personal essay describing one recent scientific discovery, explaining why or how it is of interest to the applicant.

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.

## Entrance Examination Requirements

All applicants seeking admission to a graduate degree program are required to take the Graduate Record Examination (GRE). Applicants to the D.O./M.S, D.O./Ph.D. degree programs may substitute an appropriate Medical College Admissions Test (MCAT) score. Applicants to the Master of Science in Medical Sciences are required to take the Medical College Admissions Test (MCAT). Applicants to the Medical Sciences program are also encouraged to submit a GRE score as supporting documentation. Only official score reports are acceptable.

The test score requirements may be waived by the graduate dean for the individual applicant only in exceptional cases and only on petition by the applicant 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 \$25 application fee is required and must be submitted with the application for admission. These fees are 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
- the \$25 application fee and a \$50 transcript evaluation fee (if applicable). All fees must be paid in U.S. funds.
- 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 as well as official degree certificates.
- 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

Graduate School of Biomedical Sciences

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 transfer 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
- a written statement of personal career goals
- a personal essay describing one recent scientific discovery, explaining how or why it is of interest to the applicant.

## **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. 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.
5. International applicants are not eligible for non-degree admission.

### **Admission of Applicants to Probationary Status**

UNT Health Science Center admits students on a probationary basis in cases where one of the credentials is 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. Students may be continued on probation for one semester

should these requirements not be met at the discretion of the dean.

### **Admission of Continuing Students**

A continuing student is defined as a student who enrolls one time during three consecutive semesters. Example: enrolls Summer 2005; no enrollment Fall 2005 or Spring 2006; re-enrolls Summer 2006.

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., fiscal 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 prior to 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 three consecutive semesters (i.e., Fall, Spring, and Summer) must follow these re-enrollment procedures:

1. File an admission application; and
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. The application will be processed in the same manner as first-time applications.

### **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 admission 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.

# 4 Academic Policies

The general policies of the Graduate School of Biomedical Sciences are determined by the [Graduate Council](#) and administered by the dean.

Policies 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 and Discipline (see [Student Handbook](#)).

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](#).

## Academic Standing of Student Officers

A student in the Graduate School of Biomedical Sciences must be in good academic standing to run for office in any student organization and must remain in good academic standing throughout the term of office, if elected.

## 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 of Biomedical Sciences through the discipline by the 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](#).

Advice concerning how to pursue appeals on any other matter can be sought from the Division of Student Affairs.

## Auditing

With the written permission of the instructor and the graduate dean, an individual fully eligible to enroll in the Graduate School of Biomedical Sciences may sit in a class as an auditor without receiving graduate credit. The auditor's name will not be entered on the class roster 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 graduate dean. Such enrollment entitles the person to library privileges, but not the use of laboratory equipment and supplies, or health 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 and chair of both the original and the requested disciplines. Students on academic probation are not allowed to change disciplines. Request for Change of Discipline forms are available on the [GSBS Forms and Guidelines](#) site.

## Change of Degree Program

Any student requesting a change of degree program must be in good academic standing and have approval of the major professor, graduate advisor and chair of the disciplines. Request for Change of Degree Program forms are available on the [GSBS Forms and Guidelines](#) site.

## 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 instructor. 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 Office of the Registrar 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 are responsible for adding courses using the [online registration system](#) to complete the process. Consult the [Academic Calendar](#) for dates during which adds are allowed.

### Dropping Courses

Students who wish to drop a course are responsible for using the [online registration system](#) to complete the process.

The grade of W is recorded for any course dropped with the instructor's consent within the timeline listed in the [Academic Calendar](#). 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 may be recorded.

Instructors may drop students with grades of WF from courses for non-attendance at any time after the date listed in the [Academic Calendar](#). 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.

### Course Deficiencies

A student whose undergraduate record does not show completion of the courses prerequisite to his/her discipline will be required to make up such deficiencies in a manner prescribed by the discipline or advisory committee.

### Courses of Instruction

Normally, lectures meet one hour per week for each semester credit hour (SCH). For the exceptions, the [Schedule of Classes](#) 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 Verification

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

## Final Examinations

If a final exam is administered, faculty members are expected to schedule it during the final class meeting.

If a final exam 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 week of the semester.

## Full-time Enrollment

A student must enroll for 12 SCH for each long semester to be considered full-time. Enrollment in a total of 6 SCH is considered full-time for the summer.

The M.S. student who has completed all but the thesis requirements for the degree must enroll in a minimum of 6 SCH each semester. Doctoral students who have advanced to candidacy must also enroll in a minimum of 6 SCH each semester.

Graduate students may schedule as many as 16 SCH during any semester of the regular session or 7 SCH in a summer term.

## Grading System

### Grade Scheme

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 is below:

A+ = 4.0

A = 4.0

A- = 3.7

B+ = 3.3

B = 3.0

B- = 2.7

C+ = 2.3

C = 2.0

C- = 1.7

F = 0

I = Incomplete; No Numerical Value

S = Satisfactory Performance; No Numerical Value

U = Unsatisfactory Performance; No Numerical Value

W = Withdraw; No Numerical Value

WF = Withdraw Failing = 0

Z = Incorrectly Recorded or Grade Not Recorded; No Numerical Value

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 to change disciplines and/or degree program and eligibility for graduation. It is calculated by dividing the total number of grade points by the total number of grade point hours attempted. All GPA calculations are subject to audit and correction by the Office of the Registrar.

The number of semester hours attempted includes all courses with grades of A+, A, A-, B+, B, B-, C+, C, C-, F and WF unless replaced by a later grade. Courses with grades of I, P, S, U, W or Z are not counted as grade point hours attempted and, therefore, are not calculated in the GPA.

## Course Duplications

A student may enroll for a course a second time and have it counted as part of the semester's load. If a course is repeated, the last grade recorded will be considered 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 Office of the Registrar will include a repeated course in the student's cumulative record of hours attempted and grade points earned.

Graduate courses may only be repeated one time.

## 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 student's discipline.

Each student's semester grades and semester GPA will be reviewed at the completion of every semester. To remain in good academic standing, an overall GPA of 3.0 or better must be maintained. The student who does not maintain the GPA will be placed on probation and have one long semester to correct the deficient GPA. Failure to do so may result in dismissal from the Graduate School of Biomedical Sciences. Dismissals may be appealed in writing to the graduate dean within five working days of notification of dismissal. Students involved in an appeal continue to attend class and sit for examinations until final conclusion of the process.

Students receiving state-supported assistantships will remain on assistantship during the semester the student is attempting to correct the deficient GPA, unless otherwise specified by the dean.

A student earning an F in any graduate level course will be dismissed from the Graduate School of Biomedical Sciences. Dismissals may be appealed in writing to the graduate dean within five working days of notification of dismissal. Students involved in an appeal continue to attend class and sit for examinations until final conclusion of the process. If the student is allowed to continue in graduate school, his/her program

Graduate School of Biomedical Sciences



discipline may have additional requirements/stipulations to continue in the discipline. The course in which the student achieved an F grade must be repeated. No student may graduate with an F.

## **Grade Requirements for the Integrated Core Curriculum**

All students in the Graduate School of Biomedical Sciences must successfully complete the Integrated Core Curriculum. The Integrated Core Curriculum refers to the following courses: Integrative Biomedical Sciences I: Principles of Biochemistry (BMSC 5600), Integrative Biomedical Sciences II: Molecular Cell Biology (BMSC 5610); Integrative Biomedical Sciences III: Physiology and Pharmacology (BMSC 5700); and Integrative Biomedical Sciences IV: Immunology and Microbiology (BMSC 5710).

### **Master of Science Students**

A Master of Science student may continue in his/her program in good standing with C grades in the core courses as long as the student's overall GPA is maintained at 3.0 or better. If the student's overall GPA falls below 3.0, he/she will be placed on academic probation and have one long semester to bring the overall GPA to at least 3.0.

Any MS student who has earned C grades in core courses who then elects to apply for the PhD program after completing the master's degree must retake at least one or more of the core courses in which a C grade was earned and obtain a B or better in the repeated course. The student will only be allowed one opportunity to retake the course(s) in question.

### **Doctor of Philosophy Students**

First year doctoral students must maintain an overall core GPA of 3.0 or better to remain in good academic standing.

A student failing to achieve an overall core GPA of 3.0 or better but only receiving one C+, C or C- grade, will be required to retake the course in question and will be on probation until a grade of B or better is earned in the particular core course. The student who does not receive a B or better in a repeated course will be immediately dropped to the master's program.

If a student has an overall core GPA of 3.0 or better after completing all core courses, but has earned one C+, C or C- grade for any core course, the student's discipline will decide if the student must retake the course in question and will be on probation until a grade of B or better is achieved in the particular core course. The student who does not receive a B or better in a repeated course will be immediately dropped to the master's program.

A student receiving two or more C+, C or C- grades in core courses will be immediately dropped to the master's level. This student will not be re-admitted to a PhD program until successful completion of the master's degree and sufficient core courses are repeated with Bs or better to bring the student's core GPA to at least a 3.0 and to meet the requirements of the student's discipline. The student will only be allowed one opportunity to retake the courses in question.

### **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 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 student who receives an Unsatisfactory (U) grade in Internship Practicum (BMSC 5920), Individual Research (BMSC 5930 or 6940), Thesis (BMSC 5950) or Doctoral Dissertation (BMSC 6950) will be placed on academic probation. If the student receives a subsequent U grade, he/she may be subject to suspension.

A student on academic probation as the result of performance in courses other than Internship Practicum (BMSC 5920), Thesis (BMSC 5950), or Dissertation (BMSC 6950) may not register for Internship Practicum (BMSC 5920), Thesis (BMSC 5950), or Dissertation (BMSC 6950).

Students may be dismissed from the program for failure to make academic progress.

See "Quality of Work Required" and "Grade Requirements for Integrated Core Curriculum" sections, above.

## **Grade Changes**

No grade except "I" can 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.

An instructor who believes that an error has been made in calculating or recording a grade may submit a request for grade change to the discipline chair and the graduate dean using a Request for Change of Grade/Removal of Incomplete form available from the Office of the Registrar.

## **Grade Reports**

Students may obtain their unofficial transcripts [online](#) at any time. Grades are typically posted one week after the end of each semester. If a grade or the academic status is believed to be in error, the student must contact the Office of the Registrar within 30 days.

## **Pass/Fail Grading**

Any discipline may elect to assign pass/fail grades in graduate courses. The course directors of any such course must identify it as a pass/fail course in the syllabus.

## **Removal of Incomplete**

A student must remove a grade of "I" within one year of receiving the initial grade by completing the stipulated work, by obtaining a Request for Change of Grade/Removal of Incomplete form available from the Office of the Registrar, completing the student information section, and submitting it to the course instructor. The instructor then files the form in the GSBS Office of Admissions and Services. The form is approved by the dean and sent to the Office of the Registrar for grade

entry. 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 completing the requirements for the degree. The GPA is adjusted accordingly.

## Graduate Advisor

The graduate advisor is the official representative of the graduate dean in matters affecting graduate students in the advisor's discipline. 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 and faculty 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 advisors on a continuing basis and respond 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 faculty of the discipline 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 GSBS Office of Admissions and Services. Consult the [Academic Calendar](#) for the deadlines. The student's overall grade point average must be at least a 3.0 for the application to be accepted.

Information concerning graduation fees is contained in the [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 the diploma will be issued.

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

in which the work is completed, but will receive their degrees at the close of the subsequent semester.

Commencement exercises are held the third Saturday of May. All information related to commencement exercises is available from the Office of the Registrar. Diplomas may be obtained from the Office of the Registrar after verification is received from the Graduate School of Biomedical Sciences that all requirements for the degree have been satisfied.

## Leave of Absence

If a situation arises where a student must set aside his/her graduate studies for a period of time, a leave of absence (LOA) may be requested. LOA may be requested for up to three semesters. If additional leave is needed, a new form must be submitted. The maximum amount of LOA is six semesters (two academic years). A student on LOA cannot receive funding as a graduate student. LOA status may affect student loans. Graduate advisors will be notified of any change to the LOA.

The student initiates the request by completing the LOA Request form, obtaining approval from his or her major professor, and submitting it to the graduate advisor. Upon approval by the graduate advisor, the form is submitted to the GSBS Office of Admissions and Services. Upon approval by the dean, an approved copy is sent to the student, major professor, and graduate advisor for their records.

Toward the end of a period of approved LOA, the student must take steps to resume studies at the beginning of the next semester, extend the LOA, or withdraw from the GSBS. To resume studies, the student obtains approval from the major professor and graduate advisor. To extend the LOA, the student completes and submits a new LOA Request. To withdraw from school, the student follows the normal procedures for withdrawal, including completion of the clearance process.

LOA Request forms are available on the [GSBS Forms and Guidelines](#) site.

## Official Communications

E-mail is considered the primary means of communication for our campus; therefore, students are expected to read their e-mail messages regularly. All new students are assigned a GroupWise e-mail account at orientation. Students who do not check their e-mail accounts regularly are at risk of missing vital information relative to your academic program.

Although e-mail is the primary method of communicating information to students, you may also receive mail at your campus or mailing address. Any communication from a UNT Health Science Center office should be considered important and be given immediate attention. In addition, news, events and announcements of interest to students may be posted on the institution's [website](#).

## 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 institution has established a policy relating to the accessibility of information in the custody of UNT Health Science Center.

Graduate School of Biomedical Sciences

Student records that include general information concerning the student and the student's individual relationship to the educational institution are available upon 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 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 the [Student Handbook](#) or in the UNT Health Science Center Policy Manual, available in Human Resource Services. All health science center policies are subject to change throughout the year.

## Student Grievances

### Academic Issues

A student seeking to resolve any academic problem or complaint other than for misconduct as provided by the Student Code of Conduct and Discipline in the [Student Handbook](#) will first seek solution through the following administrative channels, entering at the appropriate level and proceeding in the order stated: course instructor, course director, graduate advisor, department chair, associate dean. The dean, at his discretion, may convene an *ad hoc* committee to review the case to assist in the resolution of the complaint. Recommendations from the associate dean or *ad hoc* committee will be forwarded to the dean for consideration. All decisions by the dean concerning academic matters are final.

### Conduct Issues

A student seeking to resolve any issue involving misconduct as provided for in the Student Code of Conduct and Discipline in the [Student Handbook](#) should follow the procedures outlined in said code.

### Other Issues

A student seeking to resolve any problem or complaint other than for misconduct as provided by the Student Code of Conduct and Discipline in the [Student Handbook](#) or an academic issue, will normally seek resolution through the appropriate office on campus designated to address the particular student concern. Examples include: issues involving matters of sexual harassment, discrimination, disability, employment or mistreatment fall under institutional policies which are handled by specific offices such as Human Resource Services or the Equal Employment Opportunity Office.

### Enrollment Status During Grievance/Appeal

Any student dismissed from the school who has filed an official appeal of any decision will be permitted to remain in classes, clinical clerkship rotations, and/or internships during the

period of appeal until or unless one or more of the following circumstances is determined by the dean to exist:

1. The appeal has not been made according to officially recognized procedures for appealing a dismissal decision;
2. The presence of the student in classes, clinical rotation, or internship constitutes a disruptive influence to the educational process or to patient care activities; or
3. The presence of the student potentially presents a threat or harm to the health, safety or welfare of patients, students or anyone associated with the educational process.

## 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 may result in disciplinary action.

## Syllabi

Students should receive a syllabus no later than the second class meeting of any course. Syllabi will not be distributed for courses in laboratory techniques, individual research, internship practicum, thesis, or dissertation. All other courses must provide students with syllabi that include the following information as appropriate to the course: required texts, exam dates, lecture topics and assignments for each class meeting, attendance policy, course objectives, explanation of how grades will be determined, and information on contacting the course director. Syllabi must be on file with the Graduate School of Biomedical Sciences prior to the first day of the semester.

## Temporary Visa Holders

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

## Withdrawal from UNT Health Science Center

A student may withdraw from the health science center at any time prior to the deadline published in the [Academic Calendar](#) by making a request in the Office of the Registrar. The student must complete the Withdrawal Clearance form. 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 he/she was passing at the time of withdrawal; otherwise, the grade of WF is recorded.

Official dates and deadlines for withdrawing are specified in the [Academic Calendar](#).

# 5 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 they may choose to specialize in cell biology and genetics, biochemistry and molecular biology, integrative physiology, microbiology and immunology, clinical research and education, pharmacology and neuroscience, and integrative biomedical science. Specialized master's degrees are available in science education, biotechnology, clinical research management, medical sciences, and forensic genetics.

A student may only be enrolled in one degree program within the Graduate School of Biomedical Sciences at any given time. The only exception is to allow a Master of Science student in the last semester of study that has already gained acceptance into the Doctor of Philosophy degree program to enroll in course work to be applied to the doctoral program.

## 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, pharmacology, and physiology.

### General M.S. Core Requirements

|   |                                  |            |
|---|----------------------------------|------------|
| BMSC 5600                                   | Principles of Biochemistry       | 4 SCH      |
| BMSC 5610                                   | Molecular Cell Biology           | 4 SCH      |
| BMSC 5935                                   | Introduction to Faculty Research | 2 SCH      |
| BMSC 5960                                   | Biomedical Ethics                | 1 SCH      |
| BMSC 5950                                   | Thesis*                          | 3 to 6 SCH |
| XXXX 5940                                   | Seminar in Current Topics        | 1 to 3 SCH |
| PLUS at least two of the following courses: |                                  |            |
| BMSC 5700                                   | Physiology                       | 3 SCH      |
| BMSC 5705                                   | Pharmacology                     | 2 SCH      |
| BMSC 5710                                   | Immunology and Microbiology      | 3 SCH      |

AND Advanced Courses and Electives

\*For certain Master's programs, BMSC 5920 is substituted

### General Ph.D. Core Program

|   |                                  |             |
|---|----------------------------------|-------------|
| BMSC 5200                                   | Biostatistics                    | 4 SCH       |
| BMSC 5600                                   | Principles of Biochemistry       | 4 SCH       |
| BMSC 5610                                   | Molecular Cell Biology           | 4 SCH       |
| BMSC 5935                                   | Introduction to Faculty Research | 2 SCH       |
| BMSC 5960                                   | Biomedical Ethics                | 1 SCH       |
| BMSC 6010                                   | Grant Writing                    | 3 SCH       |
| BMSC 6940                                   | Individual Research              | 3 to 40 SCH |
| BMSC 6950                                   | Doctoral Dissertation            | 3 to 12 SCH |
| XXXX 5940                                   | Seminar in Current Topics        | 1 to 3 SCH  |
| PLUS at least two of the following courses: |                                  |             |
| BMSC 5700                                   | Physiology                       | 3 SCH       |
| BMSC 5705                                   | Pharmacology                     | 2 SCH       |
| BMSC 5710                                   | Immunology and Microbiology      | 3 SCH       |

AND Advanced Courses and Electives

In addition, Ph.D. students must pass a qualifying examination prior to registering for BMSC 6010.



# 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. For the traditional Master's degree, 17-20 SCH of the total 30 consist of core requirements and thesis. The use of special problems course numbers (5900, 5910) is limited to a maximum of six SCH.

The specialized Master of Science degrees in the disciplines of biotechnology, medical science, science education, and clinical science are administered by the Department of Biomedical Sciences. The Master of Science degree in the discipline of forensic genetics is administered by the Division of Cell Biology and Genetics.

Consult subsequent sections of this publication for the specific course requirements for the traditional master of science degree and for the specialized master of science degrees.

## 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. Courses to be transferred must be taken within 5 years of transfer.

Extension and correspondence credit earned at other institutions will not be counted toward a graduate degree at UNT Health Science Center. The Graduate School of Biomedical Sciences 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.

## Advisory Committee

Each student must select an advisory committee. Typically, the major professor and/or the graduate advisor assist the student in selecting members to serve on the advisory committee. The committee guides the student in selecting course work appropriate for the degree program and defining research goals and approves the research proposal. The advisory committee administers the final examination for the degree.

The major professor serves as chair of the advisory committee. Advisory committees for Master of Science students must include at least two additional graduate faculty members. Furthermore, all students in programs requiring thesis will be assigned a university member (see details below) who ensures that the policies and procedures of the Graduate School of Biomedical Sciences and UNT Health Science Center are upheld.

Each student is required to meet with his/her advisory committee at least once per academic year.

## 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 30 SCH.

The major professor and advisory 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 approved by the student's advisory committee and 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.



## University Member

When the advisory committee is formed for students in programs requiring thesis, 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 take part in any formal hearing. The university member must be a voting member of the final examination committee and will sign the thesis fly pages.

The purpose of the university member on master's 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 thesis proposals and thesis 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.

Students in M.S. programs that require Internship Practicum (BMSC 5920) rather than Thesis (BMSC 5950) are not required to have a University Member.

## Research Proposal

All Master of Science students are required to submit an approved formal research proposal describing the thesis/practicum project. Clinical Research Management students are required to submit the research proposal by the end of the second month of the internship practicum. Science Education and Biotechnology students are required to submit the research proposal before the end of the fall semester during the second year of study. Forensic Genetics students are required to submit the research proposal before the end of the spring semester of the second year of study.

All other Master of Science students are required to submit the research proposal before registering for thesis credits.

Research Proposal Guidelines and the Research Proposal approval forms are available on the GSBS [Forms and Guidelines](#) site.

## 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 [GSBS Forms and Guidelines](#) site.

1. A major professor should be selected by the student at the earliest possible time, but no later than the completion of 24 SCH after beginning the master's program. The student should meet with the major professor for guidance in forming an advisory committee and degree plan.
2. Before the completion of 30 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 30 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 30 SCH. Course work deficiencies will be stipulated at this time. Enrollment will be restricted to prevent the accumulation of more than 30 SCH without an approved degree plan.

4. A thesis research proposal must be approved by the committee and filed with the graduate school prior to 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 the summer until the thesis has been accepted by 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 advisory committee at least two weeks prior to the defense.
7. A formal public seminar pertaining to the thesis will be presented in the student's last semester.
8. A final oral defense of the thesis or report 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 Theses, Internship Practicum Reports and Dissertations, available on the [GSBS Forms and Guidelines](#) site.

## 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.

The quantitative SCH requirements must be regarded as a minimum. The quantity of course work to be completed by each candidate is arranged individually by the advisory 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.

## 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 student's 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 Graduate School of Biomedical Sciences 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.

## Advisory Committee

Each student must select an advisory committee. Typically, the major professor and/or the graduate advisor assist the student in selecting members to serve on the advisory committee. The committee guides the student in selecting course work appropriate for the degree program and defining research goals and approves the research proposal. In some disciplines, the advisory committee also serves as the examination committee for advancement to candidacy. The advisory committee administers the final examination for the degree.

The major professor serves as chair of the advisory committee. Doctoral student advisory committees must include at least three additional graduate faculty members. Furthermore, all doctoral students will be assigned a university member (see details below) who ensures that the policies and procedures of the Graduate School of Biomedical Sciences and UNT Health Science Center are upheld.

Each student is required to meet with his/her advisory committee at least once per academic year.

## Degree Plan

Before the completion of 42 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 advisory 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 approved by the advisory committee and 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 (BMSC 6010 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 discipline's graduate faculty, must be successfully completed within 72 SCH of coursework inclusive of any advanced standing granted for the completion of a master's degree. Second, the student must complete Grant Writing (BMSC 6010). The student is advanced to candidacy and must enroll in Doctoral Dissertation (BMSC 6950) in the first long semester immediately following successful completion of Grant Writing (BMSC 6010). Disciplines may establish more stringent guidelines or establish earlier deadlines for completing the advancement to candidacy process.

## Passing Advancement to Candidacy Requirements with Distinction

A doctoral student whose performance on either the oral qualifying examination or the defense for Grant Writing (BMSC 6010) is most exemplary may be deemed by his/her committee to "pass with distinction."

A doctoral student who has been passed with distinction will receive the following:

- Inclusion of the distinction on the UNTHSC transcript
- Recognition at the annual Graduate Student Association Awards dinner.

## Research Proposal

All doctoral students must submit a dissertation research proposal. The research proposal is an outline of the dissertation project. It must include a summary of the proposed project, the hypothesis to be investigated, significance of the project, research design and methodology to be used, and a review of the salient literature that supports or opposes the hypothesis and potential limitations. To take advantage of the student's advisory committee's expertise and advice, and to clearly define the project and the committee's expectations, it is imperative that the student meet with his/her advisory committee before preparing the research proposal. The research proposal must be approved by the student's advisory committee and the dean prior to registering in Dissertation (BMSC 6950). Research Proposal Guidelines and the Research Proposal approval forms are available on the GSBS [Forms and Guidelines](#) site.

## 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 Satisfactory (S) or Unsatisfactory (U) will be recorded at the end of each semester until the dissertation is filed with the graduate school and approved by the graduate dean. A letter grade is recorded for the final semester of enrollment in dissertation and the dissertation credit hours for this semester are included in the GPA calculation. A minimum of three semester credit hours of dissertation enrollment is 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 42 SCH after beginning the doctoral program.
2. The student should meet with the intended major professor for guidance in forming an advisory committee and degree plan.
3. The major professor and the doctoral student should select at least three advisory 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 42 SCH after beginning the doctoral program. 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 42 SCH after beginning the doctoral program without designation of an advisory committee and request for designation of university member.
4. The advisory 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 advisory 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 42 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 course 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. Notations are added to the student's transcript to denote "Qualifying Exam Passed," "Qualifying Exam Passed with Distinction" or "Qualifying Exam Failed." A student that fails the qualifying exam twice will be transferred to the Master of

Science Program.

6. By the end of the first long semester immediately following successful completion of the qualifying examination, the student completes 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 write, present and defend an NIH-style grant application in fulfillment of the course requirements. Incomplete grades are not assigned for Grant Writing (BMSC 6010). Valid grades are Pass (P) or Fail (F). A student that is assigned a failing grade at the end of the semester must repeat the course during the next semester. If a passing grade is earned, the student will be advanced to candidacy and the original F excluded from the grade point average on the transcript. A second failure will result in the student's transfer to the Master of Science program.
7. A student who has passed the qualifying examination and successfully completed Grant Writing (BMSC 6010) must maintain continuous enrollment in a minimum of 6 SCH each semester 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.
8. Prior to registering for Dissertation (BMSC 6950), a student must submit a dissertation research proposal. The proposal must be approved by the advisory committee and the GSBS dean before the prerequisite is fulfilled.
9. Upon completion of the research and after consultation with the major professor, the student should submit a Declaration of Intent to Graduate form during the semester when he/she plans to complete the requirements for graduation. Consult the academic calendar for deadlines. An Intent to Defend form must be filed with the Graduate School of Biomedical Sciences 30 days prior to the dissertation defense.
10. Upon completion of the research and after consultation with the major professor, the student should submit a rough draft of the dissertation to the advisory 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.
11. During the semester of graduation, the student will present a formal seminar on the research. This seminar should be scheduled immediately prior to the final defense.
12. The advisory 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.
13. Three copies of the dissertation must be bound for institutional use. These are distributed to the major professor, major discipline 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.

14. The dissertation must be prepared for digital submission according to the instructions in the Guidelines for Filing Theses, Internship Practicum Reports and Dissertations available on the [GSBS Forms and Guidelines](#) site.

## Dual Degree Programs

University of North Texas Health Science Center offers several dual degree programs. The Graduate School of Biomedical Sciences (GSBS) participates in the DO/MS and DO/PhD programs with the Texas College of Osteopathic Medicine (TCOM). Typically, the DO/PhD program will be 6 to 7 years in length. The DO/MS program is typically 5 to 6 years in length.

Students may pursue the DO/PhD through the Medical Scientist Training Program (MSTP) which guarantees funding from the GSBS during Block 2 of the program, as well as payment of graduate tuition and fees. Support may be available during other blocks of the program through TCOM.

Applicants to the DO/MS program may apply either using the dual degree admissions process described below or by applying to each school separately. DO/MS applicants are not considered for the MSTP.

## Application Procedures

An applicant to the MSTP must first apply to the Texas Medical and Dental Schools Application Service (TMDSAS). The applicant should indicate the dual degree program in which he/she is interested on the application. If invited to interview, the applicant will participate in three interviews rather than the standard two for applicants to the DO program. The application is then processed through a dual program admissions committee.

Individuals who become interested in pursuing the DO/PhD after gaining acceptance into either TCOM or GSBS must make formal application to the school in which he/she is not already enrolled. Procedures are in place to streamline this process by sharing information already in institutional records. Applicants who decide to pursue the DO/PhD after gaining acceptance to either TCOM or GSBS may not be considered for the MSTP.

## Costs, Financial Obligations and Assistance

DO/MS and DO/PhD students pay the standard medical school tuition and fees during each block that they are enrolled in TCOM. They also pay the hourly tuition rate and fees for all courses not required for the DO degree (ie, the credit hours required for the graduate degree). Non-Texas residents pursuing the DO/PhD are assessed tuition at the in-state rate for both medical and graduate school.

The health science center will provide financial support to those student selected for the MSTP by the dual program admissions committee to seek the DO/PhD. This includes a graduate assistantship during Block 2 and payment of all tuition and fees related to GSBS enrollment. Support may be available during other blocks as well.

Students who are not selected to participate in the MSTP often receive funding during Block 2 from other sources, including research grants, departmental assistantships, and other



departmental funds.

All dual degree program students are eligible to apply for financial aid.

## Dual Degree Formats

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 curricular requirements are also acceptable. A degree plan is established by the student's major professor and advisory committee and filed in the GSBS Office of Admissions and Services.

### DO/MS Format

**Block 1.** Block 1 consists of the preclinical years for the DO degree. During Block 1, the student will complete the first two years of the DO curriculum and must pass Part 1 of the College of Osteopathic Medical Licensing Examination (COMLEX). During this block, the student will register only in TCOM.

An exception to this rule may be made only with the approval of the appropriate TCOM associate dean. If an exception is granted, the student may register for graduate courses through the GSBS. During Block 1, the student will select a graduate advisory committee and file an approved graduate degree plan of at least 30 SCH (which includes 6 SCH advanced standing awarded for the basic science didactic course work required in the DO curriculum) with the GSBS Office of Admissions and Services.

**Block 2.** Block 2 consists of at least one year dedicated to graduate study. During Block 2, the student is expected to complete all course work required for the MS degree, file an approved thesis research proposal, and make significant progress toward the completion of the thesis research.

**Block 3.** During Block 3, the student will complete the required clinical rotations and electives and must pass Part 2 of the COMLEX. During this block, the student may also continue work toward the master's thesis.

At the end of Block 3, the student is expected to have completed the curriculum required for the DO degree and to have completed at least 24 additional SCH of graduate courses under the GSBS, as required for the second degree, including the thesis. Following completion of the curricula required for both degrees, the student is awarded the DO degree through TCOM and the MS through GSBS.

| DO/MS Format   |        |  |                                    |
|----------------|--------|--|------------------------------------|
|                |        | DO   | MS                                 |
| <b>Block 1</b> | Year 1 | Semesters 1-4                                  | Lab Rotations, Individual Research |
|                | Year 2 | Semesters 5-8                                  | Specialty Courses                  |
| <b>Block 2</b> | Year 3 |  | Specialty Courses, Thesis Research |
| <b>Block 3</b> | Year 4 | Clinical Science, Rotations                    | Thesis Research                    |
|                | Year 5 | Clinical Rotations, Research Rotation Elective | Thesis Research                    |

### DO/PhD Format

**Block 1.** Block 1 consists of the preclinical years for the DO degree. During Block 1, the student will complete the first two years of the DO curriculum and must pass Part 1 of the College of Osteopathic Medical Licensing Examination (COMLEX). During this block, the student will register only in TCOM.

An exception to this rule may be made only with the approval of the appropriate TCOM associate dean. If an exception is granted, the student may register for graduate courses through the GSBS. During Block 1, the student will select a graduate advisory committee and file an approved graduate degree plan of at least 90 SCH (which includes 30 SCH advanced standing awarded for the basic science didactic course work required in the DO curriculum) with the GSBS Office of Admissions and Services.

**Block 2.** Block 2 consists of at least two years dedicated to graduate study. During Block 2, the student is expected to complete all course work required for the PhD degree, complete the requirements for advancing to candidacy, file an approved dissertation research proposal, and make significant progress toward the completion of the dissertation research. It is not uncommon for students to extend Block 2 for an additional year to continue research and complete the dissertation in Block 3.

**Block 3.** During Block 3, the student will complete the required clinical rotations and electives and must pass Part 2 of the COMLEX. During this block, the student may also continue work toward the master's thesis.

At the end of Block 3, the student is expected to have



completed the curriculum required for the DO degree and to have completed at least 60 additional SCH of graduate courses under the GSBS, as required for the second degree, including the thesis. Following completion of the curricula required for both degrees, the student is awarded the DO degree through TCOM and the PhD through the GSBS.

| <b>DO/PhD Format</b> |        |  |  |
|----------------------|--------|--|--|
|                      |        | <b>DO</b>                                      | <b>PhD</b>                                     |
| <b>Block 1</b>       | Year 1 | Semesters 1-4                                  | Lab Rotations, Individual Research             |
|                      | Year 2 | Semesters 5-8                                  | Specialty Courses                              |
| <b>Block 2</b>       | Year 3 |  | Electives Qualifying Exam, Individual Research |
|                      | Year 4 |  | Individual Research, Dissertation              |
| <b>Block 3</b>       | Year 5 | Clinical Science, Rotations                    | Individual Research, Dissertation              |
|                      | Year 6 | Clinical Rotations, Research Rotation Elective | Individual Research, Dissertation              |

# 6 Disciplines

## Biochemistry and Molecular Biology

Richard Easom, Ph.D., Graduate Advisor  
Research and Education Building 416G  
817-735-2139  
E-mail: [reasom@hsc.unt.edu](mailto:reasom@hsc.unt.edu)

**Graduate Faculty:** Basu, Borejdo, Dory, Easom, Gryczynski, Harris, Kim, Kudchodkar, Lacko, Nair, Prokai, Vishwanatha,

**Adjunct Graduate Faculty:** Clark, Das, Garner, McConathy

The Biochemistry and Molecular Biology program offers comprehensive graduate training in two (2) major areas: (1) the biochemical and molecular basis of biological processes; and (2) modern fluorescence spectroscopy/microscopy and proteomic analyses and their application to biophysical and 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. The Department of Molecular Biology & Immunology houses a newly established Center for Commercialization of Fluorescence Technologies (<http://www.hsc.unt.edu/CCFT>) and laboratories featuring state-of-the-art mass spectrometric equipment.

A broad range of students is accommodated by a diverse range of faculty research interests that range from clinical studies in human subjects to biophysical analyses of muscle contraction. Within the setting of the health science center, specific research interests of the faculty address a wide range of prominent diseases including cancer, diabetes, cardiovascular disease, aging and Alzheimers. Specific projects addressed include the role of oxidative stress and posttranslational protein modification in health and disease, disorders of lipid metabolism in atherosclerosis, the use of recombinant lipoproteins in drug delivery and nanoparticle-mediated delivery of genes into cancer cells and aspects of parasite control. Under these broad umbrellas, research topics encompass an interest in cellular/tissue processes, such as signal transduction, tumor invasion, muscle contraction, enzymology, gene expression, angiogenesis, exocytosis, apoptosis, cell proliferation and differentiation, drug resistance, gene delivery, protein phosphorylation-dephosphorylation, protein structure and function, protein-ligand and protein-protein interactions, lipoprotein metabolism. Research projects employ state-of-the-art molecular and biochemical techniques that include

proteomics, mass spectrometry, advanced fluorescence spectroscopy and optical imaging.

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. Detailed policies and procedures are available from the graduate advisor and supplied to the student during orientation.

## Degree Plans

The following are typical degree plans for students in the biochemistry and molecular biology discipline. It is advantageous to the student to begin graduate student in the 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.

### MS Degree Plan for Biochemistry & Molecular Biology

#### Year 1: Fall

|           |   |              |
|-----------|---|--------------|
| BMSC 5600 | Integrative Biomedical Sciences I: Principles of Biochemistry | 4 SCH        |
| BMSC 5610 | Integrative Biomedical Sciences II: Molecular Cell Biology    | 4 SCH        |
| BMSC 5935 | Introduction to Faculty Research Programs                     | 1 SCH        |
| BMSC 5650 | Lab Rotations   | 2 SCH        |
| BMSC 5960 | Biomedical Ethics   | 1 SCH        |
|           |   | <hr/> 12 SCH |

#### Year 1: Spring

|                                      |  |             |
|--------------------------------------|--|-------------|
| <i>Two of the following courses:</i> |  |             |
| BMSC 5700                            | Integrative Biomedical Sciences III: Physiology                | 3 SCH       |
| BMSC 5700                            | Integrative Biomedical Sciences IV: Pharmacology               | 2 SCH       |
| BMSC 5710                            | Integrative Biomedical Sciences V: Immunology and Microbiology | 3 SCH       |
| <i>And:</i>                          |  |             |
| BMSC 5935                            | Introduction to Faculty Research Programs                      | 1 SCH       |
|                                      |  | <hr/> 3 SCH |
|                                      |  | 12 SCH      |

|                       |                                     |               |
|-----------------------|-------------------------------------|---------------|
| <b>Year 1: Summer</b> |                                     |               |
| BMSC 5930             | Individual Research for MS Students | 3 SCH         |
| BMSC 5950             | Thesis                              | 3 SCH         |
|                       |                                     | <b>6 SCH</b>  |
| <b>Year 2: Fall</b>   |                                     |               |
| BMSC 5950             | Thesis                              | 6 SCH         |
| <b>TOTAL</b>          |                                     | <b>36 SCH</b> |

|   |  |               |
|---|--|---------------|
| <b>PhD Degree Plan for Biochemistry &amp; Molecular Biology</b> |  |               |
| <b>Year 1: Fall</b>   |  |               |
| BMSC 5600   | Integrative Biomedical Sciences I: Principles of Biochemistry  | 4 SCH         |
| BMSC 5610   | Integrative Biomedical Sciences II: Molecular Cell Biology     | 4 SCH         |
| BMSC 5935   | Introduction to Faculty Research Programs                      | 1 SCH         |
| BMSC 5650   | Lab Rotations  | 2 SCH         |
| BMSC 5960   | Biomedical Ethics  | 1 SCH         |
|   |  | <b>12 SCH</b> |
| <b>Year 1: Spring</b>   |  |               |
|   | <i>Two of the following courses:</i>                           |               |
| BMSC 5700   | Integrative Biomedical Sciences III: Physiology                | 3 SCH         |
| BMSC 5705   | Integrative Biomedical Sciences IV: Pharmacology               | 2 SCH         |
| BMSC 5710   | Integrative Biomedical Sciences V: Immunology and Microbiology | 3 SCH         |
|   | <i>And:</i>  |               |
| BMSC 5935   | Introduction to Faculty Research Programs                      | 1 SCH         |
|   | Electives*   | 3 SCH         |
|   |  | <b>12 SCH</b> |
| <b>Year 1: Summer</b>   |  |               |
| BMSC 5200   | Biostatistics for BMSC   | 4 SCH         |
| BMSC 6940   | Individual Research  | 2 SCH         |
|   |  | <b>6 SCH</b>  |
| <b>Year 2: Fall</b>   |  |               |
| BIOC 5940   | Seminar in Current Topics                                      | 1 SCH         |
| BMSC 6940   | Individual Research  | 2-10 SCH      |
|   | Electives*   | 3-8 SCH       |
|   | Journal Club Course**  | 1-3 SCH       |
|   |  | <b>12 SCH</b> |
| <b>Year 2: Spring</b>   |  |               |
| BIOC 5940   | Seminar in Current Topics                                      | 1 SCH         |
| BMSC 6940   | Individual Research  | 2-10 SCH      |
|   | Electives*   | 3-8 SCH       |
|   | Journal Club Course**  | 1-2 SCH       |
|   | Qualifying Examination   | 0 SCH         |
|   |  | <b>12 SCH</b> |
| <b>Year 2: Summer</b>   |  |               |
| BMSC 6940   | Individual Research  | 6 SCH         |

|  |                           |               |
|--|---------------------------|---------------|
| <b>PhD Degree Plan for Biochemistry &amp; Molecular Biology, continued</b> |                           |               |
| <b>Year 3: Fall</b>  |                           |               |
| BIOC 5940  | Seminar in Current Topics | 1 SCH         |
| BMSC 6010  | Grant Writing             | 3 SCH         |
| BMSC 6940  | Individual Research       | 8 SCH         |
|  |                           | <b>12 SCH</b> |
| <b>Year 3: Spring</b>  |                           |               |
| BMSC 6940  | Individual Research       | 3 SCH         |
| BMSC 6950  | Doctoral Dissertation     | 3 SCH         |
|  |                           | <b>6 SCH</b>  |
| <b>Year 3: Summer</b>  |                           |               |
| BMSC 6950  | Doctoral Dissertation     | 6 SCH         |
| <b>Year 4: Fall</b>  |                           |               |
| BMSC 6950  | Doctoral Dissertation     | 6 SCH         |
| <b>TOTAL</b>   |                           | <b>96 SCH</b> |

\*Elective Courses (6-8 SCH) from the following:

|           |                                      |       |
|-----------|--------------------------------------|-------|
| BIOC 5425 | Advanced Biochemistry                | 4 SCH |
| BIOC 5435 | Molecular Aspects of Cell Signaling  | 4 SCH |
| BIOC 5530 | Enzyme Regulation and Mechanism      | 2 SCH |
| BIOC 6020 | Cellular and Molecular Fluorescence  | 2 SCH |
| BIOC 6040 | Molecular Biology of Lipid Transport | 2 SCH |
| BIOC 6050 | Mol and Cell Biochem of Cancer       | 2 SCH |
| BIOC 6060 | Advanced Biophysics                  | 3 SCH |
| CGEN 6020 | Genomics and Proteomics              | 3 SCH |
| MICR 6300 | Advanced Molecular Biology           | 3 SCH |

\*\* Journal Club Courses

|           |                                    |       |
|-----------|------------------------------------|-------|
| BIOC 5510 | Signal Transduction                | 1 SCH |
| BIOC 5530 | Structure and Function of Proteins | 2 SCH |
| BIOC 5560 | Current Topics in Cancer Biology   | 1 SCH |
| BIOC 5920 | Cell Motility                      | 1 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 an oral

examination. The student will answer a given set of questions within a given time (3 hours). The questions may also be expanded to address related topics in the field of biochemistry and molecular biology. The student must demonstrate an ability to discuss and apply concepts of biochemistry and molecular biology.

1. The comprehensive examination will be scheduled in the summer semester (I or II) of the student's second year of graduate school.
2. It will consist of an oral examination to be attended by all Biochemistry & Molecular Biology Graduate Faculty members and the University member assigned to the student's committee. The Graduate Advisor will serve as examination coordinator. The examination will take approximately 2 hours.
3. The student will be expected to have a sound knowledge of major principles of biochemistry and molecular biology taught in the core curriculum; BMSC 5600 (Principles of Biochemistry) and BMSC 5610 (Molecular Cell Biology). As an additional guide, students will be provided a list of topics in which they are to prove proficiency at the beginning of the second (2nd) year of graduate study.
4. The examination will consist of 12 questions organized into four (4) sections written by members of Biochemistry & Molecular Biology Graduate Faculty. Students will be required to answer 6 questions in total, one (1) from sections I and IV, and two (2) each from sections II & III:
  - I. Protein/Enzymes  
2 questions; answer 1
  - II. Metabolism  
4 questions; answer 2
  - III. Principles of Molecular Biology  
4 questions; answer 2
  - IV. Biochemical and Biophysical Analyses  
2 questions; answer 1
4. The student will be given the question set thirty (30) minutes prior to the oral examination, from which he/she will prepare answers for 6 questions. The student may answer the questions in any order. Any faculty member can ask questions pertaining to the subject matter of each question during the examination. The questions should be answerable in approximately 15 min so that the students can be tested in all of the defined areas.
5. On completion of the examination, the faculty will vote on a pass/fail grade for the student. At least 75% favorable vote will be required for the student to successfully pass. If a student does not pass, the faculty will inform the student of specific areas of weakness in writing.
6. If necessary, a student will be allowed to retake the oral examination once but this must be completed before the end of the following semester. Failure on the second attempt will result in dismissal from the doctoral program, although the student will be permitted to pursue a Master of Science degree.

7. Following designations could be used to indicate the performance of the student.

Qualifying examination passed  
Qualifying examination passed with distinction  
Qualifying examination failed

8. It is the responsibility of the student to obtain signatures from the Examination Committee Chair, Graduate Advisor, University Member and Department Chair on completion of the examination. The appropriate form may be obtained from the graduate school [website](#).

## Grant Writing (6010)

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 may be related but should be 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

Jamboor K. Vishwanatha, Ph.D., Graduate Advisor  
Education and Administration Building-816  
817-735-2560  
E-mail: [jvishwan@hsc.unt.edu](mailto:jvishwan@hsc.unt.edu)

**Graduate and Adjunct Graduate Faculty:** All members of the graduate and adjunct graduate faculty are included in Biomedical Sciences.

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, molecular biology, cell biology, microbiology, immunology, pharmacology and physiology to prepare them for tomorrow's scientific advancements and employment opportunities.

Biomedical Sciences is interdisciplinary in nature; therefore, 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, Forensic Genetics, Medical Science or Science Education; or Ph.D. may be obtained through the biomedical sciences discipline.

## Biomedical Sciences Advisory Committee

Research leading to theses and dissertations must reflect the interdisciplinary nature of the biomedical sciences discipline, i.e. the research must involve two or more disciplines, such as integrative physiology and biochemistry/microbiology. Each traditional M.S. or Ph.D. student is required to select a major professor from the primary discipline. Together, the student and major professor select a minor professor from the secondary discipline. The student's research will then be conducted in both the major and minor professors' laboratories. The remaining advisory committee members will reflect the interdisciplinary nature of the student's specific research and may be selected from any discipline, provided that they are members of the graduate faculty. For the master's program, at least one additional member will be required and, for the doctoral program, at least two additional members will be required. Both master's and doctoral students must have a university member present at any qualifying examination, proposal defense, or final thesis/dissertation defense, as required by the Graduate School of Biomedical Sciences.

## 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.

### MS Degree Plan for Biomedical Sciences

#### Year 1: Fall

|           |   |        |
|-----------|---|--------|
| BMSC 5600 | Integrative Biomedical Sciences I: Principles of Biochemistry | 4 SCH  |
| BMSC 5610 | Integrative Biomedical Sciences II: Molecular Cell Biology    | 4 SCH  |
| BMSC 5935 | Introduction to Faculty Research Programs                     | 1 SCH  |
| BMSC 5650 | Lab Rotations   | 2 SCH  |
| BMSC 5960 | Biomedical Ethics   | 1 SCH  |
|           |   | 12 SCH |

#### Year 1: Spring

|           |  |        |
|-----------|--|--------|
| BMSC 5700 | Integrative Biomedical Sciences III: Physiology                | 3 SCH  |
| BMSC 5705 | Integrative Biomedical Sciences IV: Pharmacology               | 2 SCH  |
| BMSC 5710 | Integrative Biomedical Sciences V: Immunology and Microbiology | 3 SCH  |
| BMSC 5935 | Introduction to Faculty Research Programs                      | 1 SCH  |
|           | Electives  | 3 SCH  |
|           |  | 12 SCH |

#### Year 1: Summer

|           |                                     |       |
|-----------|-------------------------------------|-------|
| BMSC 5200 | Biostatistics for BMSC              | 4 SCH |
| BMSC 5930 | Individual Research for MS Students | 2 SCH |
|           |                                     | 6 SCH |

#### Year 2: Fall

|           |                                     |       |
|-----------|-------------------------------------|-------|
| BMSC 5930 | Individual Research for MS Students | 6 SCH |
|           | Electives                           | 3 SCH |
|           |                                     | 9 SCH |

#### Year 2: Spring

|           |        |       |
|-----------|--------|-------|
| BMSC 5950 | Thesis | 6 SCH |
|-----------|--------|-------|

|              |  |               |
|--------------|--|---------------|
| <b>TOTAL</b> |  | <b>45 SCH</b> |
|--------------|--|---------------|



| <b>PhD Degree Plan for Biomedical Sciences</b> |  |               |
|--|--|---------------|
| <b>Year 1: Fall</b>                            |  |               |
| BMSC 5600                                      | Integrative Biomedical Sciences I: Principles of Biochemistry  | 4 SCH         |
| BMSC 5610                                      | Integrative Biomedical Sciences II: Molecular Cell Biology     | 4 SCH         |
| BMSC 5935                                      | Introduction to Faculty Research Programs                      | 1 SCH         |
| BMSC 5650                                      | Lab Rotations  | 2 SCH         |
| BMSC 5960                                      | Biomedical Ethics  | 1 SCH         |
|  |  | <b>12 SCH</b> |
| <b>Year 1: Spring</b>                          |  |               |
| BMSC 5700                                      | Integrative Biomedical Sciences III: Physiology                | 3 SCH         |
| BMSC 5705                                      | Integrative Biomedical Sciences IV: Pharmacology               | 2 SCH         |
| BMSC 5710                                      | Integrative Biomedical Sciences V: Immunology and Microbiology | 3 SCH         |
| BMSC 5935                                      | Introduction to Faculty Research Programs                      | 1 SCH         |
|  | Electives  | 3 SCH         |
|  |  | <b>12 SCH</b> |
| <b>Year 1: Summer</b>                          |  |               |
| BMSC 5200                                      | Biostatistics for BMSC   | 4 SCH         |
| BMSC 6940                                      | Individual Research  | 2 SCH         |
|  |  | <b>6 SCH</b>  |
| <b>Year 2: Fall</b>                            |  |               |
| BMSC 5940                                      | Seminar in Current Topics                                      | 1 SCH         |
| BMSC 5970                                      | Techniques in Biomedical Science                               | 1 SCH         |
| BMSC 6940                                      | Individual Research  | 7 SCH         |
|  | Electives  | 3 SCH         |
|  |  | <b>12 SCH</b> |
| <b>Year 2: Spring</b>                          |  |               |
| BMSC 5940                                      | Seminar in Current Topics                                      | 1 SCH         |
| BMSC 5970                                      | Techniques in Biomedical Science                               | 1 SCH         |
| BMSC 6940                                      | Individual Research  | 7 SCH         |
|  | Electives  | 3 SCH         |
|  |  | <b>12 SCH</b> |
| <b>Year 2: Summer</b>                          |  |               |
| BMSC 6940                                      | Individual Research  | 6 SCH         |
|  | Qualifying Examination   | 0 SCH         |
|  |  | <b>6 SCH</b>  |
| <b>Year 3: Fall</b>                            |  |               |
| BMSC 5940                                      | Seminar in Current Topics                                      | 1 SCH         |
| BMSC 6010                                      | Grant Writing  | 3 SCH         |
| BMSC 6940                                      | Individual Research  | 8 SCH         |
|  |  | <b>12 SCH</b> |
| <b>Year 3: Spring</b>                          |  |               |
| BMSC 5970                                      | Techniques in Biomedical Science                               | 1 SCH         |
| BMSC 6940                                      | Individual Research  | 3 SCH         |
|  | Electives  | 2 SCH         |
|  |  | <b>6 SCH</b>  |
| <b>Year 3: Summer</b>                          |  |               |
| BMSC 6940                                      | Individual Research  | 6 SCH         |

| <b>Year 4: Fall</b>   |                       |               |
|-----------------------|-----------------------|---------------|
| BMSC 6950             | Doctoral Dissertation | 6 SCH         |
| <b>Year 4: Spring</b> |                       |               |
| BMSC 6950             | Doctoral Dissertation | 6 SCH         |
| <b>TOTAL</b>          |                       | <b>96 SCH</b> |

## 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 research 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. The student will select one area of primary interest from the areas covered in the integrative core curriculum. These include biochemistry, molecular biology, cell biology, microbiology, immunology, physiology, and pharmacology. The student will also identify two areas of secondary interest. 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 30 minutes prior to the beginning of the exam.

Two attempts to successfully pass the qualifying examination are allowed. Failure 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 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. Failure to pass Grant Writing (BMSC 6010) 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.

# Biotechnology

Jamboor K. Vishwanatha, Ph.D., Graduate Advisor  
Education and Administration Building-816  
817-735-2560  
E-mail:[jvishwan@hsc.unt.edu](mailto:jvishwan@hsc.unt.edu)

**Graduate and Adjunct Graduate Faculty:** All members of the graduate and adjunct graduate faculty are included in Biotechnology.

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 education and highly trained workforce.

The biotechnology degree program is designed to train individuals for careers in industry and research by providing the tools and experience needed for highly technical 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 practicum in a research or industrial laboratory that forms the basis of the laboratory internship practicum report.

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 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 and defend the work at this time. A copy of the report must be submitted within the appropriate deadlines for graduation (see the [Academic Calendar](#)).

## Typical Curriculum

|              |  |                  |
|--------------|--|------------------|
| BIOS 5210    | Biostatistics I (School of Public Health course)               | 3 SCH            |
| BMSC 5550    | Laboratory Management  | 2 SCH            |
| BMSC 5600    | Integrative Biomedical Sciences I: Principles of Biochemistry  | 4 SCH            |
| BMSC 5610    | Integrative Biomedical Sciences II: Molecular Cell Biology     | 4 SCH            |
| BMSC 5700    | Integrative Biomedical Sciences III: Physiology                | 3 SCH            |
| BMSC 5705    | Integrative Biomedical Sciences IV: Pharmacology               | 2 SCH            |
| BMSC 5710    | Integrative Biomedical Sciences V: Immunology and Microbiology | 3 SCH            |
| BMSC 5920    | Laboratory Internship Practicum                                | 14 SCH           |
| BMSC 5935    | Introduction to Faculty Research Programs                      | 2 SCH            |
| BMSC 5940    | Seminar in Current Topics                                      | 1 SCH            |
| BMSC 5650    | Lab Rotations  | 2 SCH            |
| BMSC 5960    | Biomedical Ethics  | 1 SCH            |
| BMSC 5965    | Introduction to Industry Practice                              | 1 SCH            |
| BMSC 5540    | Introduction to Lab Techniques                                 | 2 SCH            |
| CGEN 6030    | Methods in Molecular Biology                                   | 4 SCH            |
| <b>TOTAL</b> |  | <b>46-50 SCH</b> |

## Laboratory Internship Practicum

Once the major professor is chosen, the student will complete a Laboratory Internship Practicum (BMSC 5920) in the major professor'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

2006-07 Catalog

# Cancer Biology

Alakananda Basu, Ph.D., Graduate Advisor  
Research and Education 437  
817-735-2487  
E-mail: [abasu@hsc.unt.edu](mailto:abasu@hsc.unt.edu)

**Graduate Faculty:** Awasthi, Basu, Das, Dimitrijevic,  
Eisenberg, Grant, I. Gryczynski, Z. Gryczynski, Jiang, Jones,  
Koulou, Lacko, Mathew, Page, L. Prokai, Siede, Singh,  
Vishwanatha, Wordinger, Yang,

The Cancer Biology program is an interdisciplinary program that offers both M.S. and Ph.D. degrees. The goal of this program is to provide students with rigorous education and training in biomedical sciences with a specialty in Cancer Biology. Students receive training through original research, formal classroom education, problem-based learning, seminars and journal clubs. The program includes faculty members from several departments. Our faculty members are engaged in various aspects of cancer research, including signal transduction, apoptosis, cell proliferation and differentiation, cancer immunology, drug resistance, tumor invasion & metastasis, DNA damage and repair, gene delivery, cancer therapeutics, molecular carcinogenesis, and nanotechnology/imaging. The research projects employ state-of-the-art molecular, cellular & biochemical techniques that include genomics, proteomics, mass spectrometry, molecular cloning, gene targeting, FACS analysis, advanced fluorescence spectroscopy, and optical imaging.

Students may choose faculty advisors from any department according to their research interests. In addition, students will be able to utilize the resources and expertise of faculty members with diverse background from several departments. During the first year, students will acquire sufficient background in biological sciences, including biochemistry, molecular biology and genetics, cell biology, pharmacology, physiology, microbiology & immunology. The students will have the opportunity to rotate in research laboratories in any department prior to selecting their thesis advisors. In the second year, the students will take advanced courses, such as Molecular Aspects of Cell Signaling and Molecular and Cell Biochemistry of Cancer. The students will be able to select additional elective courses from any department based on their needs and interests. Ph.D. candidates are admitted to candidacy after successful completion of their preliminary oral qualifying examinations and defense of an NIH-style research grant proposal. M.S. candidates are expected to graduate in 1.5 to 2 years whereas Ph.D. candidates may require 4 to 5 years to complete their degree.

## Degree Plans

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

| <b>MS Degree Plan for Cancer Biology</b> |  |                     |
|--|--|---------------------|
| <b>Year 1: Fall</b>                      |  |                     |
| BMSC 5600                                | Integrative Biomedical Sciences I: Biochemistry                | 4 SCH               |
| BMSC 5610                                | Integrative Biomedical Sciences II: Molecular Cell Biology     | 4 SCH               |
| BMSC 5650                                | Lab Rotations  | 2 SCH               |
| BMSC 5935                                | Introduction to Faculty Research Programs                      | 1 SCH               |
| BMSC 5960                                | Biomedical Ethics  | 1 SCH               |
|  |  | <hr/> 12 SCH        |
| <b>Year 1: Spring</b>                    |  |                     |
| <i>At least 5 SCH from following:</i>    |  |                     |
| BMSC 5700                                | Integrative Biomedical Sciences III: Physiology                | 3 SCH               |
| BMSC 5705                                | Integrative Biomedical Sciences IV: Pharmacology               | 2 SCH               |
| BMSC 5710                                | Integrative Biomedical Sciences V: Immunology and Microbiology | 3 SCH               |
| <i>And</i>                               |  |                     |
| BIOC 6050                                | Molecular and Cell Biology of Cancer                           | 2 SCH               |
| BMSC 5930                                | Individual Research  | 1 SCH               |
| BMSC 5935                                | Introduction to Faculty Research Programs                      | 1 SCH               |
|  |  | <hr/> 12 SCH        |
| <b>Year 1: Summer</b>                    |  |                     |
| BMSC 5200                                | Biostatistics for BMSC   | 4 SCH               |
| BMSC 5930                                | Individual Research  | 2 SCH               |
|  |  | <hr/> 6 SCH         |
| <b>Year 2: Fall</b>                      |  |                     |
| BMSC 5930                                | Individual Research  | 5-6 SCH             |
|  | Electives*   | 3-4 SCH             |
|  | Journal Club/Current Topics**                                  | 1-2 SCH             |
|  |  | <hr/> 9 SCH         |
| <b>Year 2: Spring</b>                    |  |                     |
| BMSC 5930                                | Individual Research  | 3 SCH               |
| BMSC 5950                                | Thesis   | 3CH                 |
|  |  | <hr/> 6 SCH         |
| <b>TOTAL</b>                             |  | <hr/> <b>45 SCH</b> |

| <b>PhD Degree Plan for Cancer Biology</b> |  |               |
|---|--|---------------|
| <b>Year 1: Fall</b>                       |  |               |
| BMSC 5600                                 | Principles of Biochemistry                                     | 4 SCH         |
| BMSC 5610                                 | Molecular Cell Biology   | 4 SCH         |
| BMSC 5935                                 | Introduction to Faculty Research Programs                      | 1 SCH         |
| BMSC 5650                                 | Lab Rotations  | 2 SCH         |
| BMSC 5960                                 | Biomedical Ethics  | 1 SCH         |
|   |  | <u>12 SCH</u> |
|   |  | 12 SCH        |
| <b>Year 1: Spring</b>                     |  |               |
| BMSC 5700                                 | Integrative Biomedical Sciences III: Physiology                | 3 SCH         |
| BMSC 5705                                 | Integrative Biomedical Sciences IV: Pharmacology               | 2 SCH         |
| BMSC 5710                                 | Integrative Biomedical Sciences V: Immunology and Microbiology | 3 SCH         |
| BMSC 5935                                 | Introduction to Faculty Research Programs                      | 1 SCH         |
| BMSC 6940                                 | Individual Research  | 1 SCH         |
|   | Electives*   | 2 SCH         |
|   |  | <u>12 SCH</u> |
| <b>Year 1: Summer</b>                     |  |               |
| BMSC 5200                                 | Biostatistics  | 4 SCH         |
| BMSC 6940                                 | Individual Research  | 2 SCH         |
|   | Qualifying Exam  | 0 SCH         |
|   |  | <u>6 SCH</u>  |
| <b>Year 2: Fall</b>                       |  |               |
| BMSC 5010                                 | Grant Writing  | 3 SCH         |
| BMSC 6940                                 | Individual Research  | 4-6 SCH       |
|   | Electives*   | 2-4 SCH       |
|   | Journal Club/Current Topics**                                  | 1-2 SCH       |
|   |  | <u>12 SCH</u> |
| <b>Year 2: Spring</b>                     |  |               |
| BMSC 6010                                 | Grant Writing  | 3 SCH         |
| BMSC 6940                                 | Individual Research  | 4-6 SCH       |
|   | Electives*   | 2-4 SCH       |
|   | Journal Club/Current Topics **                                 | 1 SCH         |
|   |  | <u>12 SCH</u> |
| <b>Year 2: Summer</b>                     |  |               |
| BMSC 6940                                 | Individual Research  | 6 SCH         |
|   |  | <u>6 SCH</u>  |
| <b>Year 3: Fall</b>                       |  |               |
| BMSC 6940                                 | Individual Research  | 3-5 SCH       |
|   | Electives*   | 0-3 SCH       |
|   | Journal Club/Current Topics **                                 | 1 SCH         |
|   |  | <u>6 SCH</u>  |
| <b>Year 3: Spring</b>                     |  |               |
| BMSC 6940                                 | Individual Research  | 5 SCH         |
|   | Journal Club/Current Topics **                                 | 1 SCH         |
|   |  | <u>6 SCH</u>  |

|                       |                       |               |
|-----------------------|-----------------------|---------------|
| <b>Year 3: Summer</b> |                       |               |
| BMSC 6940             | Individual Research   | 6 SCH         |
|                       |                       | <u>6 SCH</u>  |
| <b>Year 4: Fall</b>   |                       |               |
| BMSC 6940             | Individual Research   | 3 SCH         |
| BMSC 6950             | Doctoral Dissertation | 3 SCH         |
|                       |                       | <u>6 SCH</u>  |
| <b>Year 4: Spring</b> |                       |               |
| BMSC 6950             | Doctoral Dissertation | 6 SCH         |
| <b>TOTAL</b>          |                       | <b>90 SCH</b> |

\*Elective courses must include 6-8 SCH in advanced courses (below):

|           |  |       |
|-----------|--|-------|
| BIOC 5435 | Molecular Aspects of Cell Signaling    | 4 SCH |
| BIOC 5510 | Signal Transduction                    | 2 SCH |
| BIOC 5560 | Current Topics in Cancer Biology       | 2 SCH |
| BIOC 6020 | Cellular and Molecular Fluorescence    | 2 SCH |
| BIOC 6050 | Molecular and Cell Biology of Cancer   | 2 SCH |
| BMSC 5400 | Introduction to Human Subject Research | 2 SCH |
| CGEN 6020 | Genomics and Proteomics                | 3 SCH |
| CGEN 6030 | Methods in Molecular Biology           | 4 SCH |
| MICR 6300 | Advanced Molecular Biology             | 3 SCH |

\*\*Journal Club/Current Topics

|           |   |       |
|-----------|---|-------|
| BIOC 5510 | Signal Transduction                               | 2 SCH |
| BIOC 5560 | Current Topics in Cancer Biology                  | 1 SCH |
| BMSC 5720 | Novel Macromolecules that Regulate the Cell Cycle | 2 SCH |

## Advancement to Doctoral Candidacy

### Qualifying Examination

The qualifying examination is to ensure a doctoral student has sufficient mastery of fundamental principles of cancer biology and biomedical sciences, including biochemistry, molecular biology and cell 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 faculty members of the cancer biology program, and will consist of an oral examination. A student will answer a given set of questions within a given time. The student must demonstrate an ability to discuss and apply concepts of cancer biology. 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. In this case, a student may be allowed to complete the requirements for a Master of Science degree.

## **Grant Writing (BMSC 6010)**

This stage of the advancement to doctoral candidacy will evaluate a student's aptitude for independent thought and scientific writing. The student is required to (a) prepare an NIH-style research proposal without the assistance of his/her major professor, (b) present the proposal in a public seminar, and (c) address specific questions of an examination committee. The proposal should be based on an original hypothesis that could be related but should be distinct from the major professor's funded research, and should describe specific experimental approaches to address the 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 Cancer Biology faculty (4 members) appointed by the graduate advisor. The chairperson of the committee (appointed by the graduate advisor) will serve as coordinator and will meet with the student at the beginning of the semester to review guidelines and answer relevant procedural questions. The grant proposal and the student's oral presentation and defense will be evaluated on the basis of originality and ability to communicate the proposal content. Upon successful completion of this course, the student is advanced to doctoral candidacy. Two attempts to successfully pass the BMSC 6010 Grant Writing are allowed. Failure of the student to pass the BMSC 6010 Grant Writing results in dismissal of the student from the doctoral program. In this case, a student may be allowed to complete the requirements for a Master of Science degree.



## Cardiovascular Sciences

Robert Mallet, Ph.D., Graduate Advisor  
Research and Education Building 302  
817-735-2080

**Graduate Faculty:** Caffrey, Carrol, Dimitrijevic, Downey, Grant, Gwartz, Raven, Shi, Smith

Cardiovascular disorders are the leading causes of death and disability in the United States. Efforts to define the mechanisms of cardiovascular diseases and to develop effective treatments for these diseases are at the forefront of academic and pharmaceutical industry research. The graduate training program in Cardiovascular Science is designed to foster development of a comprehensive understanding of the physiology and pathophysiology of the heart and cardiovascular system, and to facilitate development of technical proficiencies and communication skills essential for successful careers in this dynamic field. Scholars will train under the direction of a full complement of faculty renowned for their expertise in cardiovascular physiology, pathology, pharmacology, endocrinology, metabolism and molecular biology. State-of-the-art facilities and instrumentation are available to conduct research over the full spectrum from molecules to human subjects. The combination of advanced coursework and laboratory training will establish the foundation enabling the scholar to formulate, conduct and publish focused, cutting-edge research. Graduates of the Cardiovascular Science program will be thoroughly prepared to pursue rewarding, productive careers in cardiovascular research.

## Degree Plans

Typical degree plans leading to the M.S. and Ph.D. degrees are outlined below. It is advantageous to the student to begin graduate study in the summer or fall semesters. The degree plan may vary depending upon availability of course offerings in a given semester and each student's background and progress toward thesis or dissertation research.

### MS Degree Plan for Cardiovascular Science

#### Year 1: Fall

|           |   |              |
|-----------|---|--------------|
| BMSC 5600 | Integrative Biomedical Sciences I: Principles of Biochemistry | 4 SCH        |
| BMSC 5610 | Integrative Biomedical Sciences II: Molecular Cell Biology    | 4 SCH        |
| BMSC 5935 | Introduction to Faculty Research Programs                     | 1 SCH        |
| BMSC 5960 | Biomedical Ethics   | 1 SCH        |
| PSIO 5940 | Seminar in Current Topics                                     | 1 SCH        |
|           | Electives   | 1 SCH        |
|           |   | <hr/> 12 SCH |

#### Year 1: Spring

|           |  |              |
|-----------|--|--------------|
| BMSC 5700 | Integrative Biomedical Sciences III: Physiology                | 3 SCH        |
| BMSC 5705 | Integrative Biomedical Sciences IV: Pharmacology               | 2 SCH        |
| BMSC 5710 | Integrative Biomedical Sciences V: Immunology and Microbiology | 3 SCH        |
| BMSC 5935 | Introduction to Faculty Research Programs                      | 1 SCH        |
| BMSC 5950 | Thesis   | 3 SCH        |
|           |  | <hr/> 12 SCH |

#### Year 1: Summer

|           |                        |             |
|-----------|------------------------|-------------|
| BMSC 5200 | Biostatistics for BMSC | 4 SCH       |
| BMSC 5950 | Thesis                 | 3 SCH       |
|           |                        | <hr/> 7 SCH |

|              |  |               |
|--------------|--|---------------|
| <b>TOTAL</b> |  | <b>31 SCH</b> |
|--------------|--|---------------|

| <b>PhD Degree Plan for Cardiovascular Science</b> |   |               |
|---|---|---------------|
| <b>Year 1: Fall</b>                               |   |               |
| BMSC 5600   | Integrative Biomedical Sciences I: Principles of Biochemistry   | 4 SCH         |
| BMSC 5610   | Integrative Biomedical Sciences II: Molecular Cell Biology      | 4 SCH         |
| BMSC 5935   | Introduction to Faculty Research Programs                       | 1 SCH         |
| BMSC 5960   | Biomedical Ethics   | 1 SCH         |
| PSIO 5940   | Seminar in Current Topics                                       | 1 SCH         |
|   | Electives*  | 1 SCH         |
|   |   | <b>12 SCH</b> |
| <b>Year 1: Spring</b>                             |   |               |
| BMSC 5700   | Integrative Biomedical Sciences III: Physiology                 | 3 SCH         |
| BMSC 5705   | Integrative Biomedical Sciences IV: Immunology and Microbiology | 2 SCH         |
| BMSC 5710   | Integrative Biomedical Sciences V: Immunology and Microbiology  | 3 SCH         |
| BMSC 5935   | Introduction to Faculty Research Programs                       | 1 SCH         |
| PSIO 5940   | Seminar in Current Topics                                       | 1 SCH         |
|   | Electives*  | 2 SCH         |
|   |   | <b>12 SCH</b> |
| <b>Year 1: Summer</b>                             |   |               |
| BMSC 5200   | Biostatistics for BMSC  | 4 SCH         |
| BMSC 6940   | Individual Research   | 2 SCH         |
|   |   | <b>6 SCH</b>  |
| <b>Year 2: Fall</b>                               |   |               |
| PSIO 5100   | Cardiovascular Physiology I                                     | 3 SCH         |
| PSIO 5940   | Seminar in Current Topics                                       | 1 SCH         |
|   | Electives*  | 8 SCH         |
|   |   | <b>12 SCH</b> |
| <b>Year 2: Spring</b>                             |   |               |
| PSIO 5110   | Cardiovascular Physiology II                                    | 3 SCH         |
| PSIO 5940   | Seminar in Current Topics                                       | 1 SCH         |
|   | Electives*  | 8 SCH         |
|   |   | <b>12 SCH</b> |
| <b>Year 2: Summer</b>                             |   |               |
|   | Electives*  | 6 SCH         |
| <b>Year 3: Fall</b>                               |   |               |
|   | Qualifying Examination  |               |
|   | Electives*  | 6 SCH         |
| <b>Year 3: Spring</b>                             |   |               |
| BMSC 6010   | Grant Writing   | 3 SCH         |
|   | Electives*  | 9 SCH         |
|   |   | <b>12 SCH</b> |
| <b>Year 3: Summer</b>                             |   |               |
| BMSC 6950   | Doctoral Dissertation   | 6 SCH         |
| <b>Year 4: Fall</b>                               |   |               |
| BMSC 6950   | Doctoral Dissertation   | 6 SCH         |
| <b>TOTAL</b>                                      |   | <b>96 SCH</b> |

\*Electives must include at least 1 additional SCH of Individual Research (BMSC 6940) and at least 3 of the following courses:

|           |  |       |
|-----------|--|-------|
| PSIO 5200 | Respiratory Physiology                             | 3 SCH |
| PSIO 5300 | Renal Physiology                                   | 3 SCH |
| PSIO 5400 | Molecular Genetics of Cardiac and Vascular Disease | 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 Doctoral Candidacy

### Qualifying Examination

Prior to registration for Grant Writing (BMSC 6010), and before completion of 72 SCH of course work, 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, the student must register for Grant Writing (BMSC 6010) in the next long semester. 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 his/her Advisory Committee.

Upon approval of the grant application and the research proposal, the student is advanced to candidacy.

# Cell Biology and Genetics

Wolfram Siede, Ph.D., Graduate Advisor  
Research and Education Building 202  
817-735-2045  
E-mail: [wsiede@hsc.unt.edu](mailto:wsiede@hsc.unt.edu)

**Graduate Faculty:** Agarwal, Aschenbrenner, Cammarata, Eisenberg, M. Garner, Gryczynski, Planz, Reeves, Roque, Rosales, Sheedlo, Siede, Warren, Wordinger

**Adjunct Graduate Faculty:** Collier, W. Garner, Jacobson, McCartney, Pang, Shepard

Cell Biology and Genetics has a primary mission to provide instruction in cell biology, forensic genetics, and the anatomical sciences; to develop and maintain research programs; and to participate in the service endeavors of the institution and profession. The major focus of research in the discipline is on the eye involving degenerative retinal diseases, glaucoma, diabetic complications, and cataracts. Other research programs include angiogenesis, apoptosis, cell secretory mechanisms, cell cycle, cellular differentiation, cell signaling, DNA damage, endothelial physiology, fluorescence microscopy, glial cell biology, growth factors and neurotrophins, nitric oxide, nuclear function, oxidative stress, regulated intramembrane proteolysis, stem cell research, and yeast genetics. Genetics research concentrates on the methods of analysis and procedures used in genetic identity testing of evidentiary materials from human and non-human sources utilizing advanced and state-of-the-art technologies, including microsatellite analysis, mitochondrial DNA, RT-PCR, and SNP technologies.

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 cell biology and genetics discipline. It is advantageous to the student to begin graduate student in the 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.

| <b>MS Degree Plan for Cell Biology and Genetics</b> |  |       |                     |
|---|--|-------|---------------------|
| <b>Year 1: Fall</b>                                 |  |       |                     |
| BMSC 5600   | Integrative Biomedical Sciences I: Principles of Biochemistry  | 4 SCH |                     |
| BMSC 5610   | Integrative Biomedical Sciences II: Molecular Cell Biology     | 4 SCH |                     |
| BMSC 5935   | Introduction to Faculty Research Programs                      | 1 SCH |                     |
| BMSC 5960   | Biomedical Ethics  | 1 SCH |                     |
| CGEN 5940   | Seminar in Current Topics                                      | 1 SCH |                     |
| CGEN 6599   | Current Topics in Cell Biology and Genetics                    | 1 SCH |                     |
|   |  |       | <hr/> 12 SCH        |
| <b>Year 1: Spring</b>                               |  |       |                     |
| <i>At least two of the following:</i>               |  |       |                     |
| BMSC 5700   | Integrative Biomedical Sciences III: Physiology                | 3 SCH |                     |
| BMSC 5705   | Integrative Biomedical Sciences IV: Pharmacology               | 2 SCH |                     |
| BMSC 5710   | Integrative Biomedical Sciences V: Immunology and Microbiology | 3 SCH |                     |
| <i>And</i>  |  |       |                     |
| BMSC 5935   | Introduction to Faculty Research Programs                      | 1 SCH |                     |
| CGEN 5900   | Special Problems in CGEN                                       | 1 SCH |                     |
| CGEN 5940   | Seminar in Current Topics                                      | 1 SCH |                     |
| CGEN 6599   | Current Topics in CGEN   | 1 SCH |                     |
|   |  |       | <hr/> 12 SCH        |
| <b>Year 1: Summer</b>                               |  |       |                     |
| BMSC 5930   | Individual Research for MS Students                            | 2 SCH |                     |
| CGEN 6030   | Methods in Molecular Biology (CGEN Advanced Course)            | 4 SCH |                     |
|   |  |       | <hr/> 6 SCH         |
| <b>Year 2: Fall</b>                                 |  |       |                     |
| BMSC 5930   | Individual Research for MS Students                            | 3 SCH |                     |
|   | Elective   | 3 SCH |                     |
|   |  |       | <hr/> 6 SCH         |
| <b>Year 2: Spring</b>                               |  |       |                     |
| BMSC 5930   | Individual Research for MS Students                            | 3 SCH |                     |
| BMSC 5950   | Thesis   | 3 SCH |                     |
|   |  |       | <hr/> 6 SCH         |
| <b>TOTAL</b>  |  |       | <hr/> <b>42 SCH</b> |

| <b>PhD Degree Plan for Cell Biology and Genetics</b> |  |        |
|--|--|--------|
| <b>Year 1: Fall</b>                                  |  |        |
| BMSC 5600  | Integrative Biomedical Sciences I: Principles of Biochemistry  | 4 SCH  |
| BMSC 5610  | Integrative Biomedical Sciences II: Molecular Cell Biology     | 4 SCH  |
| BMSC 5935  | Introduction to Faculty Research Programs                      | 1 SCH  |
| BMSC 5960  | Biomedical Ethics  | 1 SCH  |
| CGEN 5940  | Seminar in Current Topics                                      | 1 SCH  |
|  |  | 12 SCH |
| <b>Year 1: Spring</b>                                |  |        |
|  | <i>At least two of the following:</i>                          |        |
| BMSC 5700  | Integrative Biomedical Sciences III: Physiology                | 3 SCH  |
| BMSC 5705  | Integrative Biomedical Sciences IV: Pharmacology               | 2 SCH  |
| BMSC 5710  | Integrative Biomedical Sciences V: Immunology and Microbiology | 3 SCH  |
|  | <i>And</i>   |        |
| BMSC 5650  | Lab Rotations  | 1 SCH  |
| BMSC 5935  | Introduction to Faculty Research Programs                      | 1 SCH  |
| CGEN 5940  | Seminar in Current Topics                                      | 1 SCH  |
| CGEN 6599  | Current Topics in CGEN   | 1 SCH  |
|  |  | 12 SCH |
| <b>Year 1: Summer</b>                                |  |        |
| CGEN 6030  | Methods in Molecular Biology (CGEN Advanced Course)            | 4 SCH  |
| CGEN 6699  | Special Problems in CGEN                                       | 2 SCH  |
|  |  | 6 SCH  |
| <b>Year 2: Fall</b>                                  |  |        |
| BMSC 5010  | Scientific Communications                                      | 3 SCH  |
| BMSC 6940  | Individual Research  | 2 SCH  |
| CGEN 5940  | Seminar in Current Topics                                      | 1 SCH  |
| CGEN 6599  | Current Topics in CGEN   | 1 SCH  |
| CGEN 6690  | Special Problems in CGEN                                       | 2 SCH  |
|  | Elective 1   | 3 SCH  |
|  |  | 12 SCH |
| <b>Year 2: Spring</b>                                |  |        |
| <b>BMSC 6940</b>                                     | Individual Research  | 2 SCH  |
| <b>CGEN 5940</b>                                     | Seminar in Current Topics                                      | 1 SCH  |
| CGEN 6020  | Proteomics and Genomics (CGEN Advanced Course 2)               | 3 SCH  |
| CGEN 6599  | Current Topics in CGEN   | 1 SCH  |
| CGEN 6690  | Special Problems in CGEN                                       | 2 SCH  |
|  | Elective 2   | 3 SCH  |
|  | Qualifying Examination   | 0 SCH  |
|  |  | 12 SCH |
| <b>Year 2: Summer</b>                                |  |        |
| BMSC 5200  | Biostatistics for BMSC   | 4 SCH  |
| BMSC 6940  | Individual Research  | 2 SCH  |
|  |  | 6 SCH  |

|                       |                                   |               |
|-----------------------|-----------------------------------|---------------|
| <b>Year 3: Fall</b>   |                                   |               |
| BMSC 6010             | Grant Writing                     | 3 SCH         |
| BMSC 6940             | Individual Research               | 2 SCH         |
| CGEN 5940             | Seminar in Current Topics         | 1 SCH         |
| CGEN 6599             | Current Topics in CGEN            | 1 SCH         |
| CGEN 6699             | Special Problems in CGEN          | 2 SCH         |
|                       | Elective 3                        | 3 SCH         |
|                       |                                   | 12 SCH        |
| <b>Year 3: Spring</b> |                                   |               |
| BMSC 5965             | Introduction to Industry Practice | 1 SCH         |
| BMSC 6940             | Individual Research               | 2 SCH         |
|                       | Elective 4                        | 3 SCH         |
|                       |                                   | 6 SCH         |
| <b>Year 3: Summer</b> |                                   |               |
| BMSC 6940             | Individual Research               | 6 SCH         |
| <b>Year 4: Fall</b>   |                                   |               |
| BMSC 6940             | Individual Research               | 3 SCH         |
| BMSC 6950             | Doctoral Dissertation             | 3 SCH         |
|                       |                                   | 6 SCH         |
| <b>Year 4: Spring</b> |                                   |               |
| BMSC 6940             | Individual Research               | 3 SCH         |
| BMSC 6950             | Doctoral Dissertation             | 3 SCH         |
|                       |                                   | 6 SCH         |
| <b>TOTAL</b>          |                                   | <b>96 SCH</b> |

## Advancement to Doctoral Candidacy

### Qualifying Examination

The qualifying examination within the discipline of Cell Biology and Genetics must be successfully completed prior to concluding 72 semester credit hours (SCH). The main goal of the examination is to ensure that each doctoral student has a broad knowledge base in biomedical sciences and has mastered the fundamental principles of cell biology and genetics in order to be a successful doctoral candidate and an independent researcher. The qualifying examination consists of written and oral phases. The examination will be directed towards the didactic course work of the student. Basic knowledge and understanding of general research techniques in cell and molecular biology will be included.

The initial phase of the qualifying examination consists of a set of written questions administered by a qualifying examination committee (QEC) composed of faculty members of the Department of Cell Biology and Genetics. Within 4 weeks of taking the written examination, the chair of the QEC will schedule the oral examination. The oral examination will consist of questions that further explore the student's answers in the written phase, as well as questions on additional topics in cell biology and genetics as deemed appropriate by the QEC. The University Member must be in attendance for the oral phase of the examination.

The qualifying examination will be graded on a Pass/Fail basis. Successful completion of the qualifying exam must be

accomplished before the student can register for Grant Writing (BMSC 6010). Two attempts to pass the qualifying examination will be allowed. Failure to pass the qualifying examination after 2 attempts will result in dismissal from the doctoral program. In this case, a student may be allowed to complete the requirements for a Master of Science degree.

### **Grant Writing (6010)**

After passing the qualifying examination, but prior to the completion of 84 SCH, the student must register for Grant Writing (BMSC 6010). This stage of the advancement to doctoral candidacy evaluates a student's aptitude for independent thought and scientific writing. The student is required to (a) prepare an NIH-style research proposal; (b) present the proposal in a public seminar; and (c) orally defend the proposal before his/her doctoral advisory committee. The proposal should be based on an original hypothesis and should describe specific experimental approaches to address the hypothesis. The graduate advisor will appoint a member of the student's advisory committee to coordinate the process. The student will meet with the advisory committee at least two times during the semester to review drafts of the proposal. The final written proposal must be typed in NIH format and presented to the advisory committee at least two weeks prior to the public seminar and oral defense. The grant proposal and the student's oral presentation and defense will be evaluated on the basis of originality and ability to synthesize and communicate the proposal content. The student's University Member must be present for the public seminar and oral defense of the proposal. Upon successful completion of Grant Writing (BMSC 6010), the student is advanced to doctoral candidacy. Two attempts to successfully complete Grant Writing (BMSC 6010) will be allowed. Failure to pass Grant Writing (BMSC 6010) will result in dismissal from the doctoral program. In this case, a student may be allowed to complete the requirements for a Master of Science degree.



# Clinical Research and Education: Osteopathic Manipulative Medicine

Christine des Anges Cruser, Ph.D., MPA, Graduate Advisor  
Master of Science and Doctor of Philosophy  
Clinical Research and Education Programs  
817-735-2009  
e-mail: dcruser@hsc.unt.edu

**Graduate Faculty:** Cruser, Gamber, King, Licciardone, Smith, Stoll

**Adjunct Graduate Faculty:** May be selected at the request of the Graduate Advisor depending on the area of research selected by the student.

The Department of Osteopathic Manipulative Medicine, in which the national Osteopathic Research Center is housed, offers both M.S. and Ph.D. degrees in Clinical Research and Education through the Graduate School of Biomedical Sciences. These are multidisciplinary degree tracks that differ from the traditional degree programs in public health or basic sciences. These academic programs are focused on research and education in musculoskeletal and manual medicine. Manual medicine research requires individualized, scientifically rigorous protocols for research that are different from more mainstream bench or clinical research. Students are provided with closely mentored experiences in their academic course work and research.

This is a unique opportunity for medical students to complete a pre-doctoral fellowship in Manipulative & Neuromusculoskeletal Medicine and a Master of Science or Doctor of Philosophy in a specialty research and education program. The program is also available to post-doctoral, licensed physicians who wish to complete an advanced degree in a flexible environment while being involved in clinical and academic training.

Since 2002, the National Osteopathic Research Center (ORC) has developed a broad scope of research education and research initiatives in the area of manual/manipulative medicine. The ORC is funded for research and research training by the National Institutes of Health, the Osteopathic Heritage Foundation, and other public and private sponsors. This program offers access to researchers and educators from partnering institutions across the U.S. and internationally. Research is ongoing in areas of chronic disease and acute medical conditions, including pain, respiratory disease, and immune function as well as physical and neuron-musculoskeletal conditions.

## Degree Plans

There are two degree plan options for medical students in the Clinical Research and Education programs: a Master of Science and Doctor of Philosophy.

The Master of Science program requires a minimum of 30 scholastic credit hours (SCH) and includes provisions for transfer of 6 SCH from an osteopathic medical school curriculum. This program generally requires two academic years to complete, and may be completed during the fellowship in intermittent blocks during the third and fourth years, thus adding a year to medical school. The student is expected to conduct mentored collaborative research for the thesis project in an aspect of musculoskeletal medicine. For more information, contact the Graduate Advisor for the Master of Science degree.

The required core courses and recommended electives are listed in the table below, illustrative of a recommended degree plan. After an academic foundation is achieved, as determined by the Graduate Advisor and the student's major professor, there is flexibility in the Ph.D. program to customize the degree plan and training suitable to the selected area of focus for research.

The degree plan may vary with the research focus and the student's educational goals as approved by the student's advisory committee.

### MS Degree Plan for Clinical Research and Education: Osteopathic Manipulative Medicine

|   |       |
|---|-------|
| Advanced standing for medical school course work* | 6 SCH |
|---|-------|

#### Required Courses

|              |  |               |
|--------------|--|---------------|
| BMSC 5010    | Scientific Communications  | 3 SCH         |
| BMSC 5150    | Principles of Evidence Based Medicine and Epidemiology             | 3 SCH         |
| BMSC 5200    | Biostatistics for BMSC   | 4 SCH         |
| BMSC 5310    | Evaluation and Instruction in Teaching                             | 3 SCH         |
| BMSC 5320    | Issues in Higher Professional Education                            | 1 SCH         |
| BMSC 5520    | Ethical, Legal and Social Issues for Responsible Clinical Research | 1 SCH         |
| BMSC 5950    | Thesis   | 6 SCH         |
| OMMC 5510    | Introduction to Osteopathic Research and Studies                   | 3 SCH         |
| OMMC 5900    | Special Problems in Research                                       | 3 SCH         |
| OMMC 5910    | Special Problems in Education                                      | 3 SCH         |
| <b>Total</b> |  | <b>36 SCH</b> |

**\*If 6 SCH of advanced standing is not approved, additional course work must be approved by the Graduate Advisor and completed by the student to acquire a total of at least 31 SCH.**

The Doctor of Philosophy degree is available for pre-doctoral medical students as a dual degree program, and for post-graduate physicians. Post graduate physicians qualify for “Advanced Standing” with 30 Scholastic Credit Hours. A minimum of 90 scholastic credit hours is required for the Ph.D.

The required core courses and recommended electives are listed in the table below, illustrative of a recommended degree plan. After an academic foundation is achieved, as determined by the Graduate Advisor and the student’s major professor, there is flexibility in the Ph.D. program to customize the degree plan and training suitable to the selected area of focus for research.

The degree plan may vary with the research focus and the student’s educational goals as approved by the student’s Advisory Committee.

#### PhD Degree Plan for Clinical Research and Education: Osteopathic Manipulative Medicine

|   |               |
|---|---------------|
| Advanced Standing for medical school course work                                  | 30 SCH        |
| BMSC 5010 Scientific Communication  | 3 SCH         |
| BMSC 5150 Principles of Evidence Based Medicine and Epidemiology                  | 3 SCH         |
| BMSC 5200 Biostatistics   | 4 SCH         |
| BMSC 5310 Evaluation and Instruction in Teaching                                  | 3 SCH         |
| BMSC 5320 Issues in Higher Professional Education                                 | 1 SCH         |
| BMSC 5400 Regulation of Human Subject Research                                    | 2 SCH         |
| BMSC 5520 Ethical, Legal, and Social Issues for Responsible Clinical Research     | 1 SCH         |
| BMSC 6010 Grant Writing   | 3 SCH         |
| BMSC 6940 Individual Research   | 10 SCH        |
| BMSC 6950 Doctoral Dissertation   | 12 SCH        |
| CGEN 6000 Structural and Developmental Anatomy of the Musculoskeletal/Skin System | 3 SCH         |
| OMMC 5510 Introduction to Osteopathic Research and Studies                        | 3 SCH         |
| OMMC 5600 Current Topics in OMM   | 1 SCH         |
| OMMC 5940 Seminar in Current Topics   | 1 SCH         |
| PSIO 6050 Physiology of Skeletal and Smooth Muscle                                | 3 SCH         |
| PSIO 6080 Advanced Autonomic Physiology   | 3 SCH         |
| TBD Upper-level biostatistics and basic science course work**                     | 6 SCH         |
| <b>Total</b>  | <b>90 SCH</b> |

Director of the Dual D.O./Ph.D. program. The student's major professor may be present but does not participate in the examination. The initial phase of the qualifying examination consists of presentation of a published research article in the student’s chosen field of research with a subsequent question period. In the second phase of the examination, the student will be required to address questions of scientific knowledge in the chosen field of study. The basic science areas covered may include physiology, immunology, and anatomy.

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 alternatively allowed to complete the requirements for a Master of Science degree.

#### Grant Writing (BMSC 6010)

Following the qualifying examination, and before completing 72 hours of course work, the student will complete BMSC 6010, prepare, and defend an original research grant proposal in conformance with the guidelines of the National Institutes of Health. 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 his/her Advisory Committee.

Upon approval of the grant application and the research proposal, the student is advanced to candidacy.

#### Dissertation

To complete requirements for the doctor of philosophy degree, the student will conduct original research, prepare and defend a dissertation.

Students in this program will comply with all requirements of the Graduate School of Biomedical Sciences found in the Catalog of the Graduate School of Biomedical Sciences and official university web sites or other policy documents.

## Advancement to Doctoral Candidacy

### Qualifying Examination

An oral qualifying examination determines if the doctoral student has mastered information needed to succeed in the discipline of research and education in manual and neuron-musculoskeletal medicine. The oral exam will be administered by a committee comprised of Neuro-musculoskeletal clinical specialist graduate faculty, one basic science graduate faculty, and a biostatistician, selected by the departmental graduate advisor in consultation with the chair of the OMM Department and the

# Clinical Research Management

Jamboor K. Vishwanatha, Ph.D., Graduate Advisor  
Education and Administration Building-816  
817-735-2560  
E-mail:[jvishwan@hsc.unt.edu](mailto:jvishwan@hsc.unt.edu)

Clinical Research involves the testing and determination of safety and efficacy of new unapproved products, including pharmaceuticals, devices and biologics in human subjects. Clinical trials in humans (volunteers and patients) are required prior to marketing approval, by regulatory authorities such as the U.S. Food and Drug Administration (FDA). The law that governs clinical research is spelled out in Chapter 21 of the Code of Federal Regulations (CFR). In addition to requiring and legislating clinical trials, regulatory authorities define the standards by which clinical trials are to be conducted. These standards are known as Good Clinical Practices (GCPs).

In depth knowledge of the CFR and GCP guidelines as well as International Guidelines specifically as they relate to protection of human rights, prevention and detection of fraud and the use of sound scientific principles, is a fundamental requirement for a clinical research professional. These individuals are key personnel involved in the conduct of clinical trials, which in turn are pivotal in getting new products approved and on the market.

The master's program in Clinical Research Management will provide a strong foundation upon which to build a career. The rigorous curriculum focuses on providing students a broad-based view of the biomedical sciences, as well as in depth knowledge of regulatory requirements (code of federal regulations, good clinical practices), ethical issues, and both the medical writing and administrative skills necessary to conduct clinical research. As part of the program, all students will complete an internship practicum in clinical studies and use this experience to write the thesis pursuant to receiving the Master of Science degree. The average time to complete the degree is eighteen months.

Each student is responsible for the completion of the requirements for the Master of Clinical Research Management 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 of Biomedical Sciences.

## Opportunities for Graduates in Clinical Research Management

Well-trained clinical research professionals are in high demand. The tremendous increase in medical technology and information in the last decade has resulted in an explosion of potential new drugs, devices and biologics that must be tested before being released for use by the public. The profession is constantly challenged to improve and streamline the clinical research programs in order to shorten the development timelines and control the cost for new product development.

Clinical research professionals can hold a multitude of positions either in industry, at the investigational site, or in the clinical research service profession either at a contract research organization (CRO) or a site management organization (SMO).

Job titles may include, but are not restricted to, clinical research associate, clinical research scientist, clinical research coordinator, medical writer, clinical trial auditor, clinical trial monitor, product safety specialist, clinical research trainer, etc. Industry (sponsor) and service professions (CRO, SMO) usually provide technical and managerial career paths and ample growth opportunities.

Typically a clinical research coordinator who has been involved with the implementation and coordination of a clinical trial at a research site (private, clinic, hospital), will advance his/her career by switching to either industry or one of the service professions. Others make the reverse switch because they prefer the interactions with the patients, or they may want to travel less than what is typically required from a clinical trial monitor. Turnover in all these industries and positions is relatively high because of the growing variety of choices clinical research professionals have, especially after they have accumulated a number of years of experience.

## Program Requirements

Each student is responsible for the completion of the requirements for the Clinical Research Management 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 can be obtained from the [GSBS Forms and Guidelines](#) site.

1. The Graduate School Admission Committee will review all applicants for acceptance into the Clinical Research Management degree program. A student must have either a B.A. or B.S. degree and must meet the general requirements of the Graduate School of Biomedical Sciences as described in the current graduate catalog. If a student has been accepted on probation, he/she must take a minimum of 12 SCH of formal graduate course work during the first regular semester of enrollment. A minimum GPA of 3.0 must be obtained.
2. By the end of the second semester, the student will be assigned a faculty mentor and an advisory committee consisting of the mentor and two other graduate faculty. The names of these individuals will be filed on the designation of advisory committee form with the GSBS Office of Admissions and Services. A degree plan must also be filed with the GSBS Office of Admissions and Services at this time.
3. Students must be in good academic standing prior to be allowed to start their internship at a site (cumulative GPA 3.0). Exceptions to this rule can only be granted by the Dean of the Graduate School or his designee.
4. During the summer of year one, the student will enroll in BMSC 5920, the Internship Practicum (BMSC 5920). The student will complete a six month unpaid internship at a site previously approved by the graduate school. The student is responsible for transportation to and from the site. During this time, the student will learn how to perform the duties expected of particular clinical research positions in clinical research centers such as a hospital or clinic, pharmaceutical or medical device company, a clinical research organization or site management organization.
5. A formal research proposal describing how the practicum is to be spent must be approved by the advisory committee.

and submitted to the graduate school early in the summer semester, year one.

6. At the end of the practicum, the student must submit a report and internship daily notebook to the mentor for his/her approval. The advisory committee will meet with the student at this time and review both the notebook and written report. The student will present his/her work as both an oral and written report. The oral presentation will be open to the public and will then be followed by a private meeting with the advisory committee. The written report should be given to the committee two weeks before the formal meeting. At this time, the committee will either approve or disapprove the work of the practicum and the report. If not approved, the student may have a chance to revise the report or repeat the practicum one time at the discretion of the committee. The mentor, together with the other members of the committee, will assign a letter grade to the final semester of practicum. A copy of the approved report must be submitted to the GSBS Office of Admissions and Services according to the deadlines for graduation in the [Academic Calendar](#). A more detailed description of the internship practicum and report requirements may be found in the Internship Practicum Guidelines available on the [GSBS Forms and Guidelines](#) site.
7. It is strongly suggested that the student and major professor, as well as the major professor and the on-site mentor communicate on a regular basis to review the student's progress during the practicum.

## Degree Plans

The following is a typical degree plans for students in the clinical research management discipline.

| <b>MS Degree Plan for Clinical Research Management</b> |  |               |
|--|--|---------------|
| <b>Year 1: Fall</b>                                    |  |               |
| BIOS 5210  | Biostatistics I (School of Public Health course)                   | 3 SCH         |
| BMSC 5010  | Scientific Communications  | 3 SCH         |
| BMSC 5600  | Integrative Biomedical Sciences I: Principles of Biochemistry      | 4 SCH         |
| BMSC 5610  | Integrative Biomedical Sciences II: Molecular Cell Biology         | 4 SCH         |
|  |  | 14 SCH        |
| <b>Year 1: Spring</b>                                  |  |               |
| BMSC 5510  | Introduction to Clinical Research and Studies                      | 3 SCH         |
| BMSC 5520  | Ethical, Legal and Social Issues for Responsible Clinical Research | 1 SCH         |
| BMSC 5700  | Integrative Biomedical Sciences III: Physiology                    | 3 SCH         |
| BMSC 5705  | Integrative Biomedical Sciences IV: Pharmacology                   | 2 SCH         |
| BMSC 5710  | Integrative Biomedical Sciences IV: Immunology and Microbiology    | 3 SCH         |
| BMSC 5965  | Introduction to Industry Practice                                  | 1 SCH         |
|  |  | 12 SCH        |
| <b>Year 1: Summer</b>                                  |  |               |
| BMSC 5920  | Laboratory Internship Practicum                                    | 6 SCH         |
| <b>Year 2: Fall</b>                                    |  |               |
| BMSC 5920  | Laboratory Internship Practicum                                    | 6 SCH         |
| <b>TOTAL</b>   |  | <b>38 SCH</b> |



# Forensic Genetics

John V. Planz, Ph.D., Graduate Advisor  
Education and Administration Building 310E  
817-735-2397  
E-mail: [jplanz@hsc.unt.edu](mailto:jplanz@hsc.unt.edu)

**Graduate Faculty:** Eisenberg, Planz, Warren

The forensic genetics program is designed to offer a broad-based learning experience in forensic science with teaching and research emphasis in DNA technology. The Master of Science degree requirements are met upon satisfactory completion of 58 semester credit hours (SCH) of course work, including six semester hours of an internship that culminates in a practicum report. In addition to completing selected components of the integrative core curriculum, students in forensic genetics are required to take, among other subjects, population genetics, several forensic DNA methodology laboratories, and courses that prepare them to give legal evidence in forensic science. The program prepares individuals for careers in forensic DNA sciences, emphasizing the application of current methods and technologies to legal proceedings. Upon completion of the program, graduates will be qualified to become DNA analysts and, later, after obtaining job experience, to develop into forensic DNA laboratory managers. The program was designed to meet all educational and many training requirements as outlined in the *National Quality Assurance Standards for Forensic DNA Testing Laboratories* adopted by the FBI. Graduates will also find the program helpful in building a foundation to pursue further studies at the doctoral level. Certain individuals interested in related investigative fields or practicing law might find the curriculum appropriate for their professional objectives as well.

## Degree Plans

The following is a typical degree plan for students in the forensic genetics discipline. This degree plan may vary depending upon availability of course offerings in a given semester and each student's progress.

### MS Degree Plan for Cell Biology and Genetics

#### Year 1: Fall

|           |   |              |
|-----------|---|--------------|
| BMSC 5600 | Integrative Biomedical Sciences I: Principles of Biochemistry | 4 SCH        |
| BMSC 5610 | Integrative Biomedical Sciences II: Molecular Cell Biology    | 4 SCH        |
| BIOS 5210 | Biostatistics (School of Public Health course)                | 3 SCH        |
| CGEN 5600 | Current Topics in Forensic and Molecular Genetics             | 2 SCH        |
|           |   | <hr/> 13 SCH |

#### Year 1: Spring

|           |  |       |
|-----------|--|-------|
| BMSC 5520 | Ethical, Legal and Social Issues for Responsible Clinical Research | 1 SCH |
| BMSC 5710 | Integrative Biomedical Sciences IV: Immunology and Microbiology    | 3 SCH |
| CGEN 5300 | Population Genetics  | 3 SCH |

|                       |  |               |
|-----------------------|--|---------------|
| CGEN 5600             | Current Topics in Forensic and Molecular Genetics Elective | 2 SCH         |
|                       |  | <hr/> 3 SCH   |
|                       |  | 12 SCH        |
| <b>Year 1: Summer</b> |  |               |
| CGEN 5050             | Methods in Forensic Molecular Biology                      | 4 SCH         |
| CGEN 6510             | Forensic Laboratory Quality Assurance                      | 1 SCH         |
|                       |  | <hr/> 5 SCH   |
| <b>Year 2: Fall</b>   |  |               |
| CGEN 5100             | Biological Evidence Evaluation                             | 4 SCH         |
| CGEN 5310             | Genetic Data Analysis                                      | 4 SCH         |
| CGEN 5600             | Current Topics in Forensic and Molecular Genetics Elective | 2 SCH         |
|                       |  | <hr/> 2 SCH   |
|                       |  | 12 SCH        |
| <b>Year 2: Spring</b> |  |               |
| CGEN 5200             | Expert Testimony in Forensic Science                       | 3 SCH         |
| CGEN 5600             | Current Topics in Forensic and Molecular Genetics          | 2 SCH         |
| CGEN 5950             | Forensic Anthropology Electives                            | 3 SCH         |
|                       |  | <hr/> 2 SCH   |
|                       |  | 10 SCH        |
| <b>Year 2: Summer</b> |  |               |
| BMSC 5920             | Laboratory Internship Practicum                            | 6 SCH         |
| <b>TOTAL</b>          |  | <b>52 SCH</b> |

The following courses are electives that can be taken as part of the program. Courses from other disciplines may also be used as electives, upon approval of the advisory committee.

|           |   |       |
|-----------|---|-------|
| BMSC 5540 | Introduction to Laboratory Techniques for Biomedical Sciences                     | 2 SCH |
| BMSC 5550 | Laboratory Management   | 2 SCH |
| CGEN 5101 | Applications of Y-Chromosome Analysis in Forensic and Genealogical Investigations | 1 SCH |
| CGEN 5700 | Forensic Hair Analysis  | 1 SCH |
| CGEN 5060 | Forensic Biology: The History and Science of Human Identification                 | 2 SCH |
| CGEN 6100 | Forensic Mitochondrial DNA Analysis   | 2 SCH |



# Health Psychology

Suasn Franks, Ph.D., Graduate Advisor  
1002 Montgomery, Suite 106  
817-735-2400  
E-mail: [franks@hsc.unt.edu](mailto:franks@hsc.unt.edu)

**Core Graduate Faculty:** Franks, Hall  
**Concentration Graduate Faculty:** Carroll, Dillon, Forster, Gwartz, Raven, Reeves, Simecka, Smith  
**Adjunct Graduate Faculty:** Avila, Bodenhamer-Davis, Collins, Doster, Guarnaccia, Kelly, Nejtek, Taylor, Vosvick, Watson  
In addition, all UNT-Denton Psychology faculty may serve as graduate faculty.

Health Psychology is a natural science approach to the promotion of health, the prevention and treatment of illness, and the identification of etiologic and diagnostic correlates of illness and health. This program of study emphasizes an interdisciplinary understanding of biological, psychological, and social factors relevant to illness and health. The Health Psychologist seeks to understand these interrelationships and contribute to the body of scientific knowledge concerning disease prevention and health promotion.

Despite numerous scientific advances in understanding the mechanisms of disease and the development of treatments designed to prevent or recover from illness, many preventable and treatable conditions continue to persist and some are growing at an alarming rate. The Health Psychologist recognizes the influence of multiple factors as they interact to promote disease or sustain health. The human body and its surrounding environment are seen as a dynamic unit, with various levels of interaction occurring along a continuum from the molecular level to the social milieu. From this perspective, there are numerous points at which these components come together. Research in Health Psychology can positively impact the human health condition through the elucidation of critical relationships at any point along the continuum.

The program is broadly defined, with faculty representing a wide variety of research areas. The Health Psychology Program Faculty maintains active and productive research programs. Research interests of the core faculty include diabetes, obesity cardiovascular disease, aging, dementia, neuropsychology, neurobehavioral toxicology, cancer, HIV, pain and pain management, prevention and wellness, applied psychophysiology, public health, multicultural aspects of health, and psychoneuroimmunology. Students may also select basic animal research or applied human research.

Students may enter the program with a variety of academic backgrounds, provided that they have fulfilled prerequisite courses. Students who have obtained a degree in the basic sciences must also have a minimum of 18 hours of undergraduate psychology coursework with a minimum obtained GPA of 3.0 prior to admission to the program. Students who have obtained a degree in psychology, must also have a minimum of 18 hours of basic science courses with a minimum obtained GPA of 3.0 prior to admission to the program. The graduate training program involves basic courses in psychology, biochemistry, physiology, and pharmacology; and advanced courses in selected topics. Students receive extensive training in research methodology and contemporary investigative

techniques. Students perform original, publishable research and present their research findings at national scientific meetings.

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

## Degree Plans

A typical degree plan in Health Psychology appears below. It is advantageous to the student to begin graduate study in a fall semester. This degree plan may vary according to course offerings in a given semester and each student's background and progress toward dissertation research.

| PhD Degree Plan for Cell Biology and Genetics |  |        |
|---|--|--------|
| <b>Year 1: Fall</b>                           |  |        |
| BMSC 5600                                     | Integrative Biomedical Sciences I: Principles of Biochemistry        | 4 SCH  |
| BMSC 5610                                     | Integrative Biomedical Sciences II: Molecular Cell Biology           | 4 SCH  |
| BMSC 5940                                     | Seminar in Current Topics: Introduction to Faculty Research Programs | 1 SCH  |
| BMSC 5960                                     | Biomedical Ethics  | 1 SCH  |
| PSYC 5700*                                    | Advanced Quantitative Methods  | 4 SCH  |
|   |  | 14 SCH |
| <b>Year 1: Spring</b>                         |  |        |
| BMSC 5700                                     | Integrative Biomedical Sciences III: Physiology                      | 3 SCH  |
| BMSC 5705                                     | Integrative Biomedical Sciences IV: Pharmacology                     | 2 SCH  |
| BMSC 5710                                     | Integrative Biomedical Sciences IV: Immunology and Microbiology      | 3 SCH  |
| BMSC 5940                                     | Seminar in Current Topics: Introduction to Faculty Research Programs | 1 SCH  |
| BMSC 5650                                     | Laboratory Rotations   | 2 SCH  |
| BMSC 5940                                     | Health Psychology Concentration Core                                 | 1 SCH  |
|   |  | 14 SCH |
| <b>Year 1: Summer</b>                         |  |        |
| PSYC 5030*                                    | Advanced Research Design   | 4 SCH  |
|   | Health Psychology Concentration Core                                 | 3 SCH  |
|   |  | 7 SCH  |
| <b>Year 2: Fall</b>                           |  |        |
| BMSC 5970                                     | Techniques in Biomedical Sciences                                    | 2 SCH  |
| BMSC 5970                                     | Individual Research  | 4 SCH  |
| PSYC 5790                                     | Advanced Physical Psychology   | 3 SCH  |
|   | Health Psychology Concentration Core                                 | 3 SCH  |
|   |  | 12 SCH |
| <b>Year 2: Spring</b>                         |  |        |
| BMSC 5970                                     | Techniques in Biomedical Sciences                                    | 2 SCH  |
| BMSC 6940                                     | Individual Research  | 4 SCH  |
|   | Health Psychology Concentration Core                                 | 6 SCH  |
|   |  | 12 SCH |

|                       |                                      |                |
|-----------------------|--------------------------------------|----------------|
| <b>Year 2: Summer</b> |                                      |                |
| PSYC 5640             | Theories of Learning and Cognition   | 4 SCH          |
| BMSC 6940             | Individual Research                  | 2 SCH          |
|                       |                                      | 6 SCH          |
| <b>Year 3: Fall</b>   |                                      |                |
| BMSC 6010             | Grant Writing                        | 3 SCH          |
|                       | Health Psychology Concentration Care | 3 SCH          |
|                       | Electives                            | 6 SCH          |
|                       |                                      | 12 SCH         |
| <b>Year 3: Spring</b> |                                      |                |
| PSYC 6810             | Multivariate Procedures              | 4 SCH          |
| BMSC 6940             | Individual Research                  | 3 SCH          |
|                       | Electives                            | 6 SCH          |
|                       |                                      | 12 SCH         |
| <b>Year 3: Summer</b> |                                      |                |
| BMSC 6940             | Electives                            | 3 SCH          |
| <b>Year 4: Fall</b>   |                                      |                |
| BMSC 6950             | Doctoral Dissertation                | 3 SCH          |
|                       | Electives                            | 3 SCH          |
|                       |                                      | 6 SCH          |
| <b>Year 4: Spring</b> |                                      |                |
| BMSC 6950             | Doctoral Dissertation                | 6 SCH          |
|                       |                                      | 6 SCH          |
| <b>Year 4: Summer</b> |                                      |                |
| BMSC 6950             | Doctoral Dissertation                | 3 SCH          |
|                       |                                      | 3 SCH          |
| <b>TOTAL</b>          |                                      | <b>100 SCH</b> |

examination, the student will be required to address questions on his/her knowledge of psychology and biomedical science.

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-style 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 assist in initiating and preparing the proposal. The proposal must consist of the student's original ideas and is expected to significantly extend scientific knowledge in the chosen research area. The student will first submit a summary report, which presents the hypothesis, experimental strategy, and specific aims for the proposal to the examination committee within the first three weeks of the semester. Once the committee approves this summary, the student must then proceed to 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 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.

## Health Psychology Concentration Core

The student is required to select, within the first year, an area of concentration that reflects the student's interest and intended area of Health Psychology research specialization. A concentration core curriculum of 18-24 SCH will be developed with the assistance of the student's major professor and must be approved by the graduate advisor.

\*Denotes course offered by University of North Texas (UNT) in Denton.

## Advancement to Doctoral Candidacy

### Qualifying Examination

The qualifying examination determines if the doctoral student has mastered information needed to succeed in the discipline of Health Psychology. The student is required to demonstrate reasonable proficiency in the topics of health psychology and biomedical science presented during the first two years of graduate study. An oral qualifying examination will be administered by a committee comprised of Psychology 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 health psychology journal article, approved by the graduate advisor, with a subsequent question period. In the second phase of the

# Integrative Physiology

Fred Downey, Ph.D., Graduate Advisor  
Research and Education Building 302  
817-735-2080

**Graduate Faculty:** Caffrey, Carrol, Dimitrijevic, Downey, Grant, Gwartz, Raven, Shi, Smith

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 autonomic regulation, cardiac hypertrophy and failure, cardiac resuscitation, cardiac opioids, coronary circulation, adaptation to exercise and hypoxia, lymph flow, effects of aging and obesity, tissue engineering, and calcium signaling. Faculty programs are funded by extramural sources including the American Heart Association, the National Institutes of Health, American Diabetes Association, 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 one year of courses in biomedical sciences and advanced courses in physiology, neurobiology, pharmacology, molecular biology and biochemistry. 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 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 Doctor of Philosophy degree requirements. It is expected that, prior to the awarding of the doctorate, the student will have published, have in 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 leading to the M.S. and Ph.D. degrees are outlined below. The doctoral program offers the choice of two tracks, one focusing on Integrative Cardiovascular Science and the other focusing on Molecular Cardiovascular Science. It is advantageous to the student to begin graduate study in the summer or fall semesters. The degree plan may vary depending upon availability of course offerings in a given semester and each student's background and progress toward thesis or dissertation research.

| <b>MS Degree Plan for Integrative Physiology</b> |   |               |
|--|---|---------------|
| <b>Year 1: Fall</b>                              |   |               |
| BMSC 5600  | Integrative Biomedical Sciences I: Principles of Biochemistry             | 4 SCH         |
| BMSC 5610  | Integrative Biomedical Sciences II: Molecular Cell Biology                | 4 SCH         |
| BMSC 5935  | Introduction to Faculty Research Programs                                 | 1 SCH         |
| BMSC 5960  | Biomedical Ethics   | 1 SCH         |
| PSIO 5940  | Seminar in Current Topics   | 1 SCH         |
|  | Electives   | 1 SCH         |
|  |   | <b>12 SCH</b> |
| <b>Year 1: Spring</b>                            |   |               |
| BMSC 5700  | Integrative Biomedical Sciences III: Physiology                           | 3 SCH         |
| BMSC 5705  | Integrative Biomedical Sciences IV: Physiology and Pharmacology           | 2 SCH         |
| BMSC 5710  | Integrative Biomedical Sciences V: Immunology and Microbiology (optional) | 3 SCH         |
| BMSC 5935  | Introduction to Faculty Research Programs                                 | 1 SCH         |
| BMSC 5950  | Thesis  | 3 SCH         |
|  |   | <b>12 SCH</b> |
| <b>Year 1: Summer</b>                            |   |               |
| BMSC 5200  | Biostatistics for BMSC  | 4 SCH         |
| BMSC 5950  | Thesis  | 3 SCH         |
|  |   | <b>7 SCH</b>  |
| <b>TOTAL</b>                                     |   | <b>31 SCH</b> |

| <b>PhD Degree Plan for Integrative Physiology, Integrative Cardiovascular Science Track</b> |   |               |
|---|---|---------------|
| <b>Year 1: Fall</b>   |   |               |
| BMSC 5600   | Integrative Biomedical Sciences I: Principles of Biochemistry | 4 SCH         |
| BMSC 5610   | Integrative Biomedical Sciences II: Molecular Cell Biology    | 4 SCH         |
| BMSC 5935   | Introduction to Faculty Research Programs                     | 1 SCH         |
| BMSC 5960   | Biomedical Ethics   | 1 SCH         |
| PSIO 5940   | Seminar in Current Topics                                     | 1 SCH         |
|   | Electives*  | 1 SCH         |
|   |   | <b>12 SCH</b> |

|                       |   |               |
|-----------------------|---|---------------|
| <b>Year 1: Spring</b> |   |               |
| BMSC 5700             | Integrative Biomedical Sciences III: Physiology                           | 3 SCH         |
| BMSC 5705             | Integrative Biomedical Sciences IV: Physiology and Pharmacology           | 2 SCH         |
| BMSC 5710             | Integrative Biomedical Sciences V: Immunology and Microbiology (optional) | 3 SCH         |
| BMSC 5935             | Introduction to Faculty Research Programs                                 | 1 SCH         |
| PSIO 5940             | Seminar in Current Topics   | 1 SCH         |
|                       | Electives*  | 2 SCH         |
|                       |   | <b>12 SCH</b> |
| <b>Year 1: Summer</b> |   |               |
| BMSC 5200             | Biostatistics for BMSC  | 4 SCH         |
| BMSC 6940             | Individual Research   | 2 SCH         |
|                       |   | <b>6 SCH</b>  |
| <b>Year 2: Fall</b>   |   |               |
| PSIO 5100             | Cardiovascular Physiology I   | 3 SCH         |
| PSIO 5940             | Seminar in Current Topics   | 1 SCH         |
|                       | Electives*  | 8 SCH         |
|                       |   | <b>12 SCH</b> |
| <b>Year 2: Spring</b> |   |               |
| PSIO 5110             | Cardiovascular Physiology II  | 3 SCH         |
| PSIO 5940             | Seminar in Current Topics   | 1 SCH         |
|                       | Electives*  | 8 SCH         |
|                       |   | <b>12 SCH</b> |
| <b>Year 2: Summer</b> |   |               |
|                       | Electives*  | 6 SCH         |
| <b>Year 3: Fall</b>   |   |               |
|                       | Oral Qualifying Examination   |               |
|                       | Electives*  | 6 SCH         |
| <b>Year 3: Spring</b> |   |               |
| BMSC 6010             | Grant Writing   | 3 SCH         |
|                       | Electives*  | 9 SCH         |
|                       |   | <b>12 SCH</b> |
| <b>Year 3: Summer</b> |   |               |
| BMSC 6950             | Doctoral Dissertation   | 6 SCH         |
| <b>Year 4: Fall</b>   |   |               |
| BMSC 6950             | Doctoral Dissertation   | 6 SCH         |
| <b>TOTAL</b>          |   | <b>96 SCH</b> |

|           |  |       |
|-----------|--|-------|
| PSIO 5200 | Respiratory Physiology                             | 3 SCH |
| PSIO 5300 | Renal Physiology                                   | 3 SCH |
| PSIO 5400 | Molecular Genetics of Cardiac and Vascular Disease | 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 |

\*Electives must include at least 1 additional SCH of Individual Research (BMSC 6940) and at least 3 of the following courses:

| <b>PhD Degree Plan for Integrative Physiology,<br/>Molecular Cardiovascular Science Track</b> |   |               |
|---|---|---------------|
| <b>Year 1: Fall</b>   |   |               |
| BMSC 5600   | Integrative Biomedical Sciences I: Principles of Biochemistry             | 4 SCH         |
| BMSC 5610   | Integrative Biomedical Sciences II: Molecular Cell Biology                | 4 SCH         |
| BMSC 5935   | Introduction to Faculty Research Programs                                 | 1 SCH         |
| BMSC 5960   | Biomedical Ethics   | 1 SCH         |
| PSIO 5940   | Seminar in Current Topics   | 1 SCH         |
|   | Electives*  | 1 SCH         |
|   |   | <b>12 SCH</b> |
| <b>Year 1: Spring</b>   |   |               |
| BMSC 5700   | Integrative Biomedical Sciences III: Physiology                           | 3 SCH         |
| BMSC 5705   | Integrative Biomedical Sciences IV: Physiology and Pharmacology           | 2 SCH         |
| BMSC 5710   | Integrative Biomedical Sciences V: Immunology and Microbiology (optional) | 3 SCH         |
| BMSC 5935   | Introduction to Faculty Research Programs                                 | 1 SCH         |
| PSIO 5940   | Seminar in Current Topics   | 1 SCH         |
|   | Electives*  | 2 SCH         |
|   |   | <b>12 SCH</b> |
| <b>Year 1: Summer</b>   |   |               |
| CGEN 6030   | Methods in Molecular Biology  | 4 SCH         |
| BMSC 6940   | Individual Research   | 2 SCH         |
|   |   | <b>6 SCH</b>  |
| <b>Year 2: Fall</b>   |   |               |
| CGEN 6030   | Cardiovascular Physiology I   | 3 SCH         |
| PSIO 5940   | Seminar in Current Topics   | 1 SCH         |
|   | Electives*  | 8 SCH         |
|   |   | <b>12 SCH</b> |
| <b>Year 2: Spring</b>   |   |               |
| PSIO 5400   | Molecular Genetics of Cardiovascular Disease                              | 3 SCH         |
| PSIO 5940   | Seminar in Current Topics   | 1 SCH         |
|   | Electives*  | 8 SCH         |
|   |   | <b>12 SCH</b> |
| <b>Year 2: Summer</b>   |   |               |
| BMSC 5200   | Biostatistics for BMSC  | 4 SCH         |
|   | Electives*  | 2 SCH         |
|   |   | <b>6 SCH</b>  |
| <b>Year 3: Fall</b>   |   |               |
|   | Oral Qualifying Examination   |               |
|   | Electives*  | 6 SCH         |
| <b>Year 3: Spring</b>   |   |               |
| BMSC 6010   | Grant Writing   | 3 SCH         |
|   | Electives*  | 9 SCH         |
|   |   | <b>12 SCH</b> |
| <b>Year 3: Summer</b>   |   |               |
| BMSC 6950   | Doctoral Dissertation   | 6 SCH         |
| <b>Year 4: Fall</b>   |   |               |
| BMSC 6950   | Doctoral Dissertation   | 6 SCH         |
| <b>TOTAL</b>  |   | <b>96 SCH</b> |

\*Electives must include at least 1 additional SCH of Individual Research (BMSC 6940) and at least 2 of the following courses:

|  |   |       |
|--|---|-------|
| BIOC 5435                                  | Molecular Aspects of Cell Signaling               | 4 SCH |
| PSIO 6010                                  | Functional Genomics and Proteomics                | 3 SCH |
| PSIO 6090                                  | Myocardial Metabolism: Concepts and Controversies | 3 SCH |
| And at least two of the following courses: |   |       |
| 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 Doctoral Candidacy

### Qualifying Examination

Prior to registration for Grant Writing (BMSC 6010), and before completion of 72 SCH of course work, 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, the student must register for Grant Writing (BMSC 6010) in the next long semester. 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 his/her Advisory Committee.

Upon approval of the grant application and the research proposal, the student is advanced to candidacy.



# Medical Sciences Premedical Program

Jamboor K. Vishwanatha, Ph.D., Graduate Advisor  
Education and Administration Building-816  
817-735-2560  
E-mail:[jvishwan@hsc.unt.edu](mailto:jvishwan@hsc.unt.edu)

The Master of Science program in Medical Sciences is designed to provide additional opportunities to those individuals who would like to enhance their credentials for entry into medical school by offering a strong, challenging biomedical science core curriculum in the environment of a health science center.

The average time to complete the M.S. in Medical Sciences is twelve months (mid-May through mid-May). Each student is responsible for the completion of the requirements for Master of Science program in Medical Sciences 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 of Biomedical Sciences' [web site](#).

Each student is responsible for the completion of the Post-baccalaureate Premedical Certification 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 of Biomedical Sciences' [web site](#).

This program admits students each summer.

## Admissions Requirements

1. All applications must be completed and received into the Graduate School by the established deadline listed in the [Academic Calendar](#). EIS application records will be updated before letters are mailed. Applicants may check their application records online at <http://my.hsc.unt.edu> for admissions decisions. No admissions decisions will be released by phone.
2. Applicants must hold either a B.A. or B.S. degree and must meet the general requirements of the Graduate School of Biomedical Sciences as described in the current graduate catalog
3. The Medical College Admissions Test (MCAT) is required for admission to this program. Applicants may also chose to submit a Graduate Record Examination (GRE) score as supporting documentation. While not the only criterion considered in acceptance into medical school, the applicant should have a competitive MCAT score before the application deadline. In general, composite MCAT scores below 20 and individual subset scores below 6 are not competitive for medical school. If the applicant has plans to retake the MCAT for future medical school admissions, he/she must sit for the exam no later than August during the first semester of the year he/she enters the program. The applicant must indicate in writing the actual date he/she will take the MCAT. This information must be filed with the Graduate School of Biomedical Sciences at the time of admission to the program. A student already accepted into another UNTHSC degree program that requests to transfer into the program will be reviewed by the Medical Sciences Admission Committee. All such applicants

must have met the requirements described in steps one through three, above.

4. For those individuals who are planning to qualify for consideration for medical school admission at TCOM as part of the program, the following are required:
  - a. Successful completion of all undergraduate course requirements for TCOM as listed in the current catalog;
  - b. Competitive undergraduate grade point average (In general, an overall undergraduate GPA below 3.0 is not considered competitive for medical school) and a GPA of 3.5 in the Graduate School of Biomedical Sciences' Medical Sciences program;
  - c. Competitive MCAT score taken prior to the application deadline; and
  - d. Completed medical school application submitted to the Texas Medical and Dental Schools Application Service (TMDSAS) and a secondary application submitted to the TCOM Office of Medical Student Admissions according to the TMDSAS and TCOM application deadlines.

## MS Degree Plan for Medical Science

### Summer

|               |   |           |
|---------------|---|-----------|
| BMSC 5100     | Clinical Practice Preceptorship                 | 2 SCH     |
| BMSC 5200     | Biostatistics for BMSC                          | 4 SCH     |
| BMSC 5900.001 | Special Problems: Health Disparities Conference | 1 SCH     |
| BMSC 5900.003 | Special Problems: Introductory Biochemistry*    | 2 SCH     |
| BMSC 5900.004 | Special Problems: MCAT Prep*                    | 2 SCH     |
| BMSC 5900.005 | Special Problems: Application Workshop*         | 0 SCH     |
|               |   | 7- 11 SCH |

\* Optional Course

### Fall

|           |  |        |
|-----------|--|--------|
| BMSC 5150 | Principles of Epidemiology and Evidence-based Medicine         | 3 SCH  |
| BMSC 5530 | Introduction to Health Disparities/Issues in the United States | 2 SCH  |
| BMSC 5600 | Integrative Biomedical Sciences I: Principles of Biochemistry  | 4 SCH  |
| BMSC 5610 | Integrative Biomedical Sciences II: Molecular Cell Biology     | 4 SCH  |
|           |  | 13 SCH |

### Spring

|           |  |        |
|-----------|--|--------|
| BMSC 5700 | Integrative Biomedical Sciences III: Physiology                    | 3 SCH  |
| BMSC 5705 | Integrative Biomedical Sciences IV: Pharmacology                   | 2 SCH  |
| BMSC 5510 | Introduction to Clinical Research & Studies                        | 2 SCH  |
| BMSC 5520 | Ethical, Legal and Social Issues for Responsible Clinical Research | 1 SCH  |
| CGEN 5010 | Structural Anatomy   | 7 SCH  |
|           |  | 15 SCH |

### TOTAL

**35-38  
SCH**

# Microbiology and Immunology

Rance Berg, Ph.D., Graduate Advisor  
Research and Education Building 416T  
817-735-2121

**Graduate Faculty:** Berg, Hodge, Jones, Kim, P. Mathew, S. Mathew, Simecka, Vishwanatha

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; T cell and NK cell biology; host response to respiratory, bacterial, and viral infections; molecular immunology; tumor immunology; vaccine development; regulation and function of cytokines; 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. Students 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 Doctor of Philosophy.

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

## Degree Plans

The following are typical degree plans for students in the Microbiology and Immunology discipline. However, not all of the courses listed below are required for graduation. It is important for each student to consult with the graduate advisor and his/her major professor prior to registering for courses. It is advantageous to the student to begin graduate school in the 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.

### MS Degree Plan for Microbiology and Immunology

#### Year 1: Fall

|           |   |        |
|-----------|---|--------|
| BMSC 5600 | Integrative Biomedical Sciences I: Principles of Biochemistry | 4 SCH  |
| BMSC 5610 | Integrative Biomedical Sciences II: Molecular Cell Biology    | 4 SCH  |
| BMSC 5935 | Introduction to Faculty Research Programs                     | 1 SCH  |
| BMSC 5650 | Lab Rotations   | 2 SCH  |
| BMSC 5960 | Biomedical Ethics   | 1 SCH  |
|           |   | 12 SCH |

#### Year 1: Spring

|                                       |   |        |
|---------------------------------------|---|--------|
| <i>At least one of the following:</i> |   |        |
| BMSC 5700                             | Integrative Biomedical Sciences III: Physiology                 | 3 SCH  |
| BMSC 5705                             | Integrative Biomedical Sciences IV: Physiology and Pharmacology | 2 SCH  |
| <i>And</i>                            |   |        |
| BMSC 5930                             | Individual Research for MS Students                             | 4 SCH  |
| BMSC 5710                             | Integrative Biomedical Sciences V: Immunology and Microbiology  | 3 SCH  |
| BMSC 5935                             | Introduction to Faculty Research Programs                       | 1 SCH  |
| MICR 5120                             | Current Topics in Immunology                                    | 1 SCH  |
| MICR 5940                             | Seminar in Current Topics                                       | 1 SCH  |
|                                       |   | 12 SCH |

#### Year 1: Summer

|           |                                     |       |
|-----------|-------------------------------------|-------|
| BMSC 5200 | Biostatistics for BMSC              | 4 SCH |
| BMSC 5930 | Individual Research for MS Students | 2 SCH |
|           |                                     | 6 SCH |

#### Year 2: Fall

|           |                                     |        |
|-----------|-------------------------------------|--------|
| BMSC 5010 | Scientific Communications           | 3 SCH  |
| BMSC 5930 | Individual Research for MS Students | 7 SCH  |
| MICR 6300 | Advanced Molecular Microbiology     | 2 SCH  |
|           |                                     | 12 SCH |

|                       |                     |               |
|-----------------------|---------------------|---------------|
| <b>Year 2: Spring</b> |                     |               |
| BMSC 5950             | Thesis              | 6 SCH         |
| MICR 5050             | Advanced Immunology | 3 SCH         |
|                       |                     | <u>9 SCH</u>  |
| <b>TOTAL</b>          |                     | <b>51 SCH</b> |

|  |   |               |
|--|---|---------------|
| <b>PhD Degree Plan for Microbiology and Immunology</b> |   |               |
| <b>Year 1: Fall</b>                                    |   |               |
| BMSC 5600  | Integrative Biomedical Sciences I: Principles of Biochemistry   | 4 SCH         |
| BMSC 5610  | Integrative Biomedical Sciences II: Molecular Cell Biology      | 4 SCH         |
| BMSC 5935  | Introduction to Faculty Research Programs                       | 1 SCH         |
| BMSC 5650  | Lab Rotations   | 2 SCH         |
| BMSC 5960  | Biomedical Ethics   | 1 SCH         |
|  |   | <u>12 SCH</u> |
| <b>Year 1: Spring</b>                                  |   |               |
|  | <i>At least one of the following:</i>                           |               |
| BMSC 5700  | Integrative Biomedical Sciences III: Physiology                 | 3 SCH         |
| BMSC 5705  | Integrative Biomedical Sciences IV: Physiology and Pharmacology | 2 SCH         |
|  | <i>And</i>  |               |
| BMSC 6940  | Individual Research   | 4 SCH         |
| BMSC 5710  | Integrative Biomedical Sciences IV: Immunology and Microbiology | 3 SCH         |
| BMSC 5935  | Introduction to Faculty Research Programs                       | 1 SCH         |
| MICR 5120  | Current Topics in Immunology                                    | 1 SCH         |
| MICR 5940  | Seminar in Current Topics                                       | 1 SCH         |
|  |   | <u>12 SCH</u> |
| <b>Year 1: Summer</b>                                  |   |               |
| BMSC 5200  | Biostatistics for BMSC  | 4 SCH         |
| BMSC 6940  | Individual Research   | 2 SCH         |
|  | Qualifying Exam   | 0 SCH         |
|  |   | <u>6 SCH</u>  |
| <b>Year 2: Fall</b>                                    |   |               |
| BMSC 5010  | Scientific Communications                                       | 3 SCH         |
| BMSC 6940  | Individual Research   | 7 SCH         |
| MICR 6300  | Advanced Molecular Microbiology                                 | 2 SCH         |
|  |   | <u>12 SCH</u> |
| <b>Year 2: Spring</b>                                  |   |               |
| BMSC 6940  | Individual Research   | 9 SCH         |
| BMSC 6010  | Grant Writing   | 3 SCH         |
|  |   | <u>12 SCH</u> |
| <b>Year 2: Summer</b>                                  |   |               |
| BMSC 6940  | Individual Research   | 6 SCH         |
| <b>Year 3: Fall</b>                                    |   |               |
| MICR 5120  | Current Topics in Immunology                                    | 1 SCH         |
| BMSC 6940  | Individual Research   | 10 SCH        |
| MICR 5940  | Seminar in Current Topics                                       | 1 SCH         |
|  |   | <u>12 SCH</u> |

|                       |                       |                |
|-----------------------|-----------------------|----------------|
| <b>Year 3: Spring</b> |                       |                |
| BMSC 6940             | Individual Research   | 4 SCH          |
| MICR 5050             | Advanced Immunology   | 3 SCH          |
|                       |                       | <u>6 SCH</u>   |
| <b>Year 3: Summer</b> |                       |                |
| BMSC 6940             | Individual Research   | 6 SCH          |
| <b>Year 4: Fall</b>   |                       |                |
| BMSC 6940             | Individual Research   | 6 SCH          |
|                       |                       | <u>6 SCH</u>   |
| <b>Year 4: Spring</b> |                       |                |
| BMSC 6950             | Doctoral Dissertation | 6 SCH          |
|                       |                       | <u>6 SCH</u>   |
| <b>Year 4: Summer</b> |                       |                |
| BMSC 6950             | Doctoral Dissertation | 6 SCH          |
|                       |                       | <u>6 SCH</u>   |
| <b>TOTAL</b>          |                       | <b>102 SCH</b> |

## 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 field 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 oral qualifying examination is administered by a committee comprised of members of the Microbiology and Immunology graduate faculty and the student's university member. The oral examination consists of questions from a selected list of topics provided to the student.

The qualifying exam will be administered during the summer after completion of the core course work. 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 (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. BMSC 6010 should be registered for during the spring of the student's second year.

The graduate advisor will serve as the examination coordinator and select an examination committee consisting of four graduate faculty, including a committee chair. The student's major professor may not serve as a committee member. The student's university member will oversee the entire examination

process.

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 proposal should be unrelated to any previous research performed by the student and unrelated to any research currently being pursued in the major professor's laboratory. 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 presentations 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 discipline's graduate faculty for approval by the faculty coordinator. Upon successful completion of this course, the student is advanced to candidacy.

Two attempts to successfully complete Grant Writing (BMSC 6010) will be allowed. Failure to pass Grant Writing (BMSC 6010) will result in dismissal from the doctoral program. In this case, a student may be allowed to complete the requirements for a Master of Science degree.

# Neurobiology of Aging

Michael J. Forster, Ph.D., Graduate Advisor  
Center for BioHealth 521  
817-735-2092  
E-mail: [forsterm@hsc.unt.edu](mailto:forsterm@hsc.unt.edu)

**Graduate Faculty:** Basu, Das, Dillon, Forster, Jung, Koulen, Jones, Krishnamoorthy, Luedtke, Machu, Prokai-Tatrai, Prokai, Schetz, Stokely, Simpkins, Singh, Sumien, Yang, Yorio, Gwartz

The Neurobiology of Aging program offers both M.S. and Ph.D. degrees in a wide range of research areas, but with focus on biological aging processes and age-related diseases affecting the nervous system. The Neurobiology of Aging program bridges all major discipline-oriented programs, including Biochemistry and Molecular Biology, Cell Biology and Genetics, Psychology, Integrative Physiology, Microbiology and Immunology, and Pharmacology and Neuroscience. Students are encouraged to acquire a broad base of knowledge and techniques in biomedical sciences, and to acquire a basic understanding of biological aging processes as they affect neurophysiological function and promote diseases of the nervous system.

With the "graying of America," society is faced with increasing numbers of individuals with diminished cognitive, sensory, or psychomotor function, which contribute to decreased independence and diminished quality of life. Further, aging promotes an increase in susceptibility to devastating neurodegenerative diseases such as Alzheimer's and Parkinson's diseases, as well as an increased susceptibility to brain insults. For example, it is estimated that by the year 2020, more than 14 million Americans will have Alzheimer's disease. Research in the Neurobiology of Aging includes efforts aimed at delineating the mechanisms of these debilitating neurological and neurodegenerative diseases, as well as fundamental studies to gain understanding of how normal processes of aging in the brain confer an increase in risk for these conditions.

Students with a variety of academic backgrounds may gain acceptance to the Neurobiology of Aging program, though they must be prepared to complete an integrated biomedical science core curriculum that includes fundamental principles of biochemistry, cellular and molecular biology, microbiology and immunology, pharmacology, physiology and neurobiology. Following the completion of the core curriculum, students must complete advanced courses in Functional Neuroscience and the Neurobiology of Aging, as well as other advanced elective courses in any discipline related to their individual research interests. Students will also participate in seminars and group discussions of current research topics, and will be trained in a number of techniques required to address existing research problems in the Neurobiology of Aging. Both M.S. and Ph.D. students will conduct original, publishable research and will be expected to present their results at national scientific conferences.

Completion of the M.S. degree typically requires two years; the Ph.D. degree is generally completed in four to five years. Students who successfully complete a graduate degree in the Neurobiology of Aging will be well prepared for careers in academic and government research laboratories, as well as in the pharmaceutical/biotechnology industry.

## Degree Plans

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

### MS Degree Plan for Neurobiology of Aging

#### Year 1: Fall

|                   |   |               |
|-------------------|---|---------------|
| BMSC 5600         | Integrative Biomedical Sciences I: Principles of Biochemistry | 4 SCH         |
| BMSC 5610         | Integrative Biomedical Sciences II: Molecular Cell Biology    | 4 SCH         |
| BMSC 5935         | Introduction to Faculty Research Programs                     | 1 SCH         |
| BMSC 5650         | Lab Rotations   | 1 SCH         |
| BMSC 5960         | Biomedical Ethics   | 1 SCH         |
| <b>AND EITHER</b> |   |               |
| PHRM 6699         | Current Topics in Pharmacology                                | 1 SCH         |
| <b>OR</b>         |   |               |
| PHRM 5940         | Seminar in Current Topics                                     | 1 SCH         |
|                   |   | <b>12 SCH</b> |

#### Year 1: Spring

|                   |  |               |
|-------------------|--|---------------|
| BMSC 5010         | Scientific Communications                                      | 3 SCH         |
| BMSC 5700         | Integrative Biomedical Sciences III: Physiology                | 3 SCH         |
| BMSC 5705         | Integrative Biomedical Sciences IV: Principles of Pharmacology | 2 SCH         |
| BMSC 5710         | Integrative Biomedical Sciences V: Immunology and Microbiology | 3 SCH         |
| BMSC 5935         | Introduction to Faculty Research Programs                      | 1 SCH         |
| BMSC 5650         | Laboratory Rotations   | 1 SCH         |
| <b>AND EITHER</b> |  |               |
| PHRM 6699         | Current Topics in Pharmacology                                 | 1 SCH         |
| <b>OR</b>         |  |               |
| PHRM 5940         | Seminar in Current Topics                                      | 1 SCH         |
|                   |  | <b>14 SCH</b> |

#### Year 1: Summer

|           |                                     |              |
|-----------|-------------------------------------|--------------|
| BMSC 5200 | Biostatistics for BMSC              | 4 SCH        |
| BMSC 5930 | Individual Research for MS Students | 2 SCH        |
|           |                                     | <b>6 SCH</b> |

#### Year 2: Fall

|           |        |       |
|-----------|--------|-------|
| BMSC 5950 | Thesis | 6 SCH |
|-----------|--------|-------|

#### Year 2: Spring

|           |        |       |
|-----------|--------|-------|
| BMSC 5950 | Thesis | 6 SCH |
|-----------|--------|-------|

|              |  |               |
|--------------|--|---------------|
| <b>TOTAL</b> |  | <b>44 SCH</b> |
|--------------|--|---------------|



| <b>PhD Degree Plan for Pharmacology and Neuroscience</b> |   |                               |
|--|---|-------------------------------|
| <b>Year 1: Fall</b>                                      |   |                               |
| BMSC 5600  | Integrative Biomedical Sciences I: Principles of Biochemistry   | 4 SCH                         |
| BMSC 5610  | Integrative Biomedical Sciences II: Molecular Cell Biology      | 4 SCH                         |
| BMSC 5935  | Introduction to Faculty Research Programs                       | 1 SCH                         |
| BMSC 5650  | Lab Rotations   | 1 SCH                         |
| BMSC 5960  | Biomedical Ethics   | 1 SCH                         |
| <b>AND EITHER</b>  |   |                               |
| PHRM 6699  | Current Topics in Pharmacology                                  | 1 SCH                         |
| <b>OR</b>  |   |                               |
| PHRM 5940  | Seminar in Current Topics                                       | 1 SCH                         |
|  |   | <b>12 SCH</b>                 |
| <b>Year 1: Spring</b>                                    |   |                               |
| BMSC 5010  | Scientific Communications                                       | 3 SCH                         |
| BMSC 5700  | Integrative Biomedical Sciences III: Physiology                 | 3 SCH                         |
| BMSC 5705  | Integrative Biomedical Sciences IV: Principles of Pharmacology  | 2 SCH                         |
| BMSC 5710  | Integrative Biomedical Sciences IV: Immunology and Microbiology | 3 SCH                         |
| BMSC 5935  | Introduction to Faculty Research Programs                       | 1 SCH                         |
| BMSC 5650  | Laboratory Rotations  | 1 SCH                         |
| <b>AND EITHER</b>  |   |                               |
| PHRM 6699  | Current Topics in Pharmacology                                  | 1 SCH                         |
| <b>OR</b>  |   |                               |
| PHRM 5940  | Seminar in Current Topics                                       | 1 SCH                         |
|  |   | <b>14 SCH</b>                 |
| <b>Year 1: Summer</b>                                    |   |                               |
| BMSC 5200  | Biostatistics for BMSC  | 4 SCH                         |
| BMSC 5650  | Laboratory Rotations (if necessary)                             | 1 SCH                         |
| BMSC 6940  | Individual Research   | 1-2 SCH                       |
|  |   | <b>6 SCH</b>                  |
| <b>Year 2: Fall</b>                                      |   |                               |
| PHRM 6000  | Functional Neuroscience   | 4 SCH                         |
| PHRM 5100  | Neurobiology of Aging   | 3 SCH                         |
| BMSC 6940  | Individual Research   | 1-4 SCH                       |
|  |   | <b>0-4 SCH</b>                |
|  |   | <b>12 SCH</b>                 |
| <b>Year 2: Spring</b>                                    |   |                               |
| BMSC 6940  | Individual Research   | 1-8 SCH                       |
|  |   | <b>Electives*</b>             |
|  |   | <b>1-8 SCH</b>                |
|  |   | <b>12 SCH</b>                 |
| <b>Year 2: Summer</b>                                    |   |                               |
| BMSC 6940  | Individual Research   | 6 SCH                         |
|  |   | <b>Qualifying Examination</b> |
|  |   | <b>0 SCH</b>                  |
|  |   | <b>6 SCH</b>                  |
| <b>Year 3: Fall</b>                                      |   |                               |

|                       |                       |                   |
|-----------------------|-----------------------|-------------------|
| BMSC 6010             | Grant Writing         | 3 SCH             |
| BMSC 6940             | Individual Research   | 3-8 SCH           |
|                       |                       | <b>Electives*</b> |
|                       |                       | <b>0-6 SCH</b>    |
|                       |                       | <b>12 SCH</b>     |
| <b>Year 3: Spring</b> |                       |                   |
| BMSC 6950             | Doctoral Dissertation | 3-6 SCH           |
|                       |                       | <b>Electives</b>  |
|                       |                       | <b>0-3 SCH</b>    |
|                       |                       | <b>6 SCH</b>      |
| <b>Year 3: Summer</b> |                       |                   |
| BMSC 6940             | Individual Research   | 3 SCH             |
| BMSC 6950             | Doctoral Dissertation | 3 SCH             |
|                       |                       | <b>6 SCH</b>      |
| <b>Year 4: Fall</b>   |                       |                   |
| BMSC 6940             | Individual Research   | 3 SCH             |
| BMSC 6950             | Doctoral Dissertation | 3 SCH             |
|                       |                       | <b>6 SCH</b>      |
| <b>Year 4: Spring</b> |                       |                   |
| BMSC 6950             | Doctoral Dissertation | 6 SCH             |
|                       |                       | <b>TOTAL</b>      |
|                       |                       | <b>98 SCH</b>     |

\*Elective courses must include 9 SCH in courses offered by any discipline. These may include but are not limited to relevant department of Pharmacology and Neuroscience electives (below). Course offerings of other departments are listed elsewhere in this catalog. The successful completion of Functional Neuroscience and Neurobiology of Aging, as well as one of the elective courses, is required before a student can take his/her oral examination

| <i>Courses offered each year:</i>    |   |       |
|--------------------------------------|---|-------|
| PHRM 5200                            | Intracellular Calcium Signaling                     | 1 SCH |
| PHRM 5900                            | Special Problems                                    | 3 SCH |
| PHRM 5910                            | Special Problems                                    | 3 SCH |
| PHRM 6000                            | Functional Neuroscience                             | 4 SCH |
| PHRM 6050                            | Ocular Pharmacology                                 | 3 SCH |
| PHRM 6040                            | Neurobiological Basis of Neuropsychiatric Disorders | 3 SCH |
|                                      |   |       |
| <i>Courses offered "even" years:</i> |   |       |
| PHRM 5070                            | Neuropharmacology                                   | 4 SCH |
|                                      |   |       |
| <i>Courses offered "odd" years:</i>  |   |       |
| PHRM 5100                            | Neurobiology of Aging                               | 3 SCH |
| PHRM 5435                            | Molecular Aspects of Cell Signaling                 | 4 SCH |
| PHRM 6080                            | Receptors and Drug Action                           | 4 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 Neurobiology of Aging. The student is required to demonstrate reasonable proficiency in the topics of general

biomedical science, functional neuroscience, and the neurobiology of aging presented during the first two years of graduate study. An oral qualifying examination will be administered by a committee comprised of graduate faculty from Pharmacology and Neuroscience selected by the graduate advisor, and may also include faculty from another discipline when appropriate. 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 Neurobiology of Aging 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 his/her knowledge of biomedical science and the Neurobiology of Aging.

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-style 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 assist in initiating and preparing the proposal. The proposal must consist of the student's original ideas and is expected to significantly extend scientific knowledge in the chosen research area. The student will first submit a summary report, which presents the hypothesis, experimental strategy, and specific aims for the proposal to the examination committee within the first three weeks of the semester. Once the committee approves this summary, the student must then proceed to 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 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.

# Pharmacology and Neuroscience

Meharvan Singh, Ph.D., Graduate Advisor  
Center for Biohealth 549  
817-735-5429  
E-mail: [msingh@hsc.unt.edu](mailto:msingh@hsc.unt.edu)

**Graduate Faculty:** Das, Dillon, Forster, Gatch, Jung, Koulen, Krishnamoorthy, Luedtke, Machu, Oglesby, Prokai-Tatrai, Schetz, Stokely, Simpkins, Singh, Sumien, Yang, Yorio

**Adjunct Graduate Faculty:** Bergamini, DeSantis, Dobbs, Pang, Sharif

The Department of Pharmacology and Neuroscience offers both M.S. and Ph.D. degrees in a wide range of research areas. Pharmacology is a discipline that bridges the basic and clinical sciences. Classically, pharmacologists sought to understand the pharmacological responses, mechanisms and clinical uses of drugs. In recent decades, the scope of pharmacology has expanded dramatically and includes cutting edge research in signal transduction and molecular biology.

With the "graying of America," society is faced with increasing numbers of individuals affected with disorders of the nervous system. For example, it is estimated that by the year 2020, more than 14 million Americans will have Alzheimer's Disease. Research in neuroscience includes efforts aimed at delineating the mechanisms of these debilitating neurological and neurodegenerative diseases, as well as fundamental studies to gain understanding of how the brain functions. The Department of Pharmacology and Neuroscience has active research programs in these areas, as well as programs in cellular and molecular signaling, vision and glaucoma, molecular and behavioral analysis of substance abuse, and new drug discovery.

Students with a variety of academic backgrounds may gain acceptances to the Pharmacology and Neuroscience program, providing they have completed a number of prerequisite courses. All students entering the program will complete an integrated biomedical science core curriculum that includes fundamental principles of biochemistry, cellular and molecular biology, microbiology and immunology, pharmacology, physiology and neurobiology. Following the completion of the core curriculum, students may choose from a number of advanced courses in Pharmacology and Neuroscience that are related to their individual research interests. Students will also participate in seminars and group discussions of current research topics, and will be trained in a number of techniques required to address existing research problems in pharmacology and neuroscience. Both M.S. and Ph.D. students will conduct original, publishable research and will be expected to present their results at national scientific conferences.

Completion of the M.S. degree typically requires two years; the Ph.D. degree is generally completed in four to five years. Students who successfully complete a graduate degree in Pharmacology and Neuroscience will be well prepared for careers in academic and government research laboratories, as well as in the pharmaceutical/biotechnology industry.

## Degree Plans

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

| <b>MS Degree Plan for Pharmacology and Neuroscience</b> |  |               |
|---|--|---------------|
| <b>Year 1: Fall</b>                                     |  |               |
| BMSC 5600   | Integrative Biomedical Sciences I: Principles of Biochemistry  | 4 SCH         |
| BMSC 5610   | Integrative Biomedical Sciences II: Molecular Cell Biology     | 4 SCH         |
| BMSC 5935   | Introduction to Faculty Research Programs                      | 1 SCH         |
| BMSC 5650   | Lab Rotations  | 1 SCH         |
| BMSC 5960   | Biomedical Ethics  | 1 SCH         |
| <b>AND EITHER</b>                                       |  |               |
| PHRM 6699   | Current Topics in Pharmacology                                 | 1 SCH         |
| <b>OR</b>   |  |               |
| PHRM 5940   | Seminar in Current Topics                                      | 1 SCH         |
|   |  | 12 SCH        |
| <b>Year 1: Spring</b>                                   |  |               |
| BMSC 5010   | Scientific Communications                                      | 3 SCH         |
| BMSC 5700   | Integrative Biomedical Sciences III: Physiology                | 3 SCH         |
| BMSC 5705   | Integrative Biomedical Sciences IV: Principles of Pharmacology | 2 SCH         |
| BMSC 5710   | Integrative Biomedical Sciences V: Immunology and Microbiology | 3 SCH         |
| BMSC 5935   | Introduction to Faculty Research Programs                      | 1 SCH         |
| BMSC 5650   | Laboratory Rotations   | 1 SCH         |
| <b>AND EITHER</b>                                       |  |               |
| PHRM 6699   | Current Topics in Pharmacology                                 | 1 SCH         |
| <b>OR</b>   |  |               |
| PHRM 5940   | Seminar in Current Topics                                      | 1 SCH         |
|   |  | 14 SCH        |
| <b>Year 1: Summer</b>                                   |  |               |
| BMSC 5200   | Biostatistics for BMSC   | 4 SCH         |
| BMSC 5930   | Individual Research for MS Students                            | 2 SCH         |
|   |  | 6 SCH         |
| <b>Year 2: Fall</b>                                     |  |               |
| BMSC 5950   | Thesis   | 6 SCH         |
| <b>Year 2: Spring</b>                                   |  |               |
| BMSC 5950   | Thesis   | 6 SCH         |
| <b>TOTAL</b>  |  | <b>44 SCH</b> |

| <b>PhD Degree Plan for Pharmacology and Neuroscience</b> |   |                               |
|--|---|-------------------------------|
| <b>Year 1: Fall</b>                                      |   |                               |
| BMSC 5600  | Integrative Biomedical Sciences I: Principles of Biochemistry   | 4 SCH                         |
| BMSC 5610  | Integrative Biomedical Sciences II: Molecular Cell Biology      | 4 SCH                         |
| BMSC 5935  | Introduction to Faculty Research Programs                       | 1 SCH                         |
| BMSC 5650  | Lab Rotations   | 1 SCH                         |
| BMSC 5960  | Biomedical Ethics   | 1 SCH                         |
| <b>AND EITHER</b>  |   |                               |
| PHRM 6699  | Current Topics in Pharmacology                                  | 1 SCH                         |
| <b>OR</b>  |   |                               |
| PHRM 5940  | Seminar in Current Topics                                       | 1 SCH                         |
|  |   | <b>12 SCH</b>                 |
| <b>Year 1: Spring</b>                                    |   |                               |
| BMSC 5010  | Scientific Communications                                       | 3 SCH                         |
| BMSC 5700  | Integrative Biomedical Sciences III: Physiology                 | 3 SCH                         |
| BMSC 5705  | Integrative Biomedical Sciences IV: Principles of Pharmacology  | 2 SCH                         |
| BMSC 5710  | Integrative Biomedical Sciences IV: Immunology and Microbiology | 3 SCH                         |
| BMSC 5935  | Introduction to Faculty Research Programs                       | 1 SCH                         |
| BMSC 5650  | Laboratory Rotations  | 1 SCH                         |
| <b>AND EITHER</b>  |   |                               |
| PHRM 6699  | Current Topics in Pharmacology                                  | 1 SCH                         |
| <b>OR</b>  |   |                               |
| PHRM 5940  | Seminar in Current Topics                                       | 1 SCH                         |
|  |   | <b>14 SCH</b>                 |
| <b>Year 1: Summer</b>                                    |   |                               |
| BMSC 5200  | Biostatistics for BMSC  | 4 SCH                         |
| BMSC 5650  | Laboratory Rotations (if necessary)                             | 1 SCH                         |
| BMSC 6940  | Individual Research   | 1-2 SCH                       |
|  |   | <b>6 SCH</b>                  |
| <b>Year 2: Fall</b>                                      |   |                               |
| PHRM 6000  | Functional Neuroscience   | 4 SCH                         |
| PHRM 6410  | Basic and Clinical Pharmacology                                 | 4 SCH                         |
| BMSC 6940  | Individual Research   | 1-4 SCH                       |
|  |   | <b>0-4 SCH</b>                |
|  |   | <b>12 SCH</b>                 |
| <b>Year 2: Spring</b>                                    |   |                               |
| BMSC 6940  | Individual Research   | 1-8 SCH                       |
|  |   | <b>Electives*</b>             |
|  |   | <b>1-8 SCH</b>                |
|  |   | <b>12 SCH</b>                 |
| <b>Year 2: Summer</b>                                    |   |                               |
| BMSC 6940  | Individual Research   | 6 SCH                         |
|  |   | <b>Qualifying Examination</b> |
|  |   | <b>0 SCH</b>                  |
|  |   | <b>6 SCH</b>                  |
| <b>Year 3: Fall</b>                                      |   |                               |
| BMSC 6010  | Grant Writing   | 3 SCH                         |

|                       |                                 |                |
|-----------------------|---------------------------------|----------------|
| BMSC 6940             | Individual Research Electives*  | 3-8 SCH        |
|                       |                                 | <b>0-6 SCH</b> |
|                       |                                 | <b>12 SCH</b>  |
| <b>Year 3: Spring</b> |                                 |                |
| BMSC 6950             | Doctoral Dissertation Electives | 3-6 SCH        |
|                       |                                 | <b>0-3 SCH</b> |
|                       |                                 | <b>6 SCH</b>   |
| <b>Year 3: Summer</b> |                                 |                |
| BMSC 6940             | Individual Research             | 3 SCH          |
| BMSC 6950             | Doctoral Dissertation           | 3 SCH          |
|                       |                                 | <b>6 SCH</b>   |
| <b>Year 4: Fall</b>   |                                 |                |
| BMSC 6940             | Individual Research             | 3 SCH          |
| BMSC 6950             | Doctoral Dissertation           | 3 SCH          |
|                       |                                 | <b>6 SCH</b>   |
| <b>Year 4: Spring</b> |                                 |                |
| BMSC 6950             | Doctoral Dissertation           | 6 SCH          |
|                       |                                 | <b>6 SCH</b>   |
| <b>TOTAL</b>          |                                 | <b>98 SCH</b>  |

\*Elective courses must include 9 SCH in courses offered by the Department of Pharmacology and Neuroscience (below). Elective courses offered by other departments must also be taken, provided that the required electives in Pharmacology and Neuroscience are completed. Refer to the course offerings for other departments in this catalog. The successful completion of one of these courses is required before a student can take his/her oral examination

| <i>Courses offered each year:</i>    |   |       |
|--------------------------------------|---|-------|
| PHRM 5200                            | Intracellular Calcium Signaling                     | 1 SCH |
| PHRM 5900                            | Special Problems                                    | 3 SCH |
| PHRM 5910                            | Special Problems                                    | 3 SCH |
| PHRM 6000                            | Functional Neuroscience                             | 4 SCH |
| PHRM 6050                            | Ocular Pharmacology                                 | 3 SCH |
| PHRM 6040                            | Neurobiological Basis of Neuropsychiatric Disorders | 3 SCH |
| <i>Courses offered "even" years:</i> |   |       |
| PHRM 5070                            | Neuropharmacology                                   | 4 SCH |
| <i>Courses offered "odd" years:</i>  |   |       |
| PHRM 5100                            | Neurobiology of Aging                               | 3 SCH |
| PHRM 5435                            | Molecular Aspects of Cell Signaling                 | 4 SCH |
| PHRM 6080                            | Receptors and Drug Action                           | 4 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 and neuroscience presented during the first two

years of graduate study. An oral qualifying examination will be administered by a committee comprised of Pharmacology and Neuroscience 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 and/or neuroscience 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 his/her knowledge of pharmacology and neuroscience.

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-style 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 assist in initiating and preparing the proposal. The proposal must consist of the student's original ideas and is expected to significantly extend scientific knowledge in the chosen research area. The student will first submit a summary report, which presents the hypothesis, experimental strategy, and specific aims for the proposal to the examination committee within the first three weeks of the semester. Once the committee approves this summary, the student must then proceed to 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 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.



## Primary Care Clinical Research

Roberto Cardarelli, D.O., M.P.H., F.A.A.F.P., Graduate Advisor  
Central Family Medicine Clinic  
817-735-2405  
[rcardare@hsc.unt.edu](mailto:rcardare@hsc.unt.edu)

**Graduate Faculty:** Cage, Cardarelli, Franks, Sanders, Virgilio

The Primary Care Clinical Research program, administered by the Department of Family Medicine, is designed to provide select osteopathic medical students with the research training, experience, and mentoring necessary to pursue a career in clinical research or academic medicine.

The program offers research practica and mentoring in projects undertaken by many of the family medicine faculty, plus other collaborating investigators within the Texas College of Osteopathic Medicine, the Graduate School of Biomedical Sciences, and the School of Public Health.

At entry to medical school and throughout the medical curriculum, each student will establish collaborative research relationships with faculty members within the Department of Family medicine and other departments of the health science center. These relationships will enable the student to become part of research teams working on various projects relative to family medicine, primary care, and osteopathic medicine.

As part of the program, students will complete the requirements for the Master of Science in the Graduate School of Biomedical Sciences. This program is offered to provide students with clinical research training pertinent to family medicine and other issues involving primary care and osteopathic medicine. This degree affords students an opportunity to acquire the didactic training needed to complement their research practica.

The formal presentations and courses in the program are designed to give the student a knowledge base in clinical research design; evidence-based medicine; biostatistics and epidemiology, policies, procedures and compliance issues relevant to human subjects research and responsible conduct of research; scientific communications and writing; and educational methodologies for becoming an effective instructor.

## Course Requirements

It is anticipated that a student will be able to complete the M.S. degree requirements within the four years allocated to medical school. Below is a list of the required courses:

| Primary Care Clinical Research<br>Required Courses |  |               |
|--|--|---------------|
| BIOS 5210  | Biostatistics I (School of Public Health course)                   | 3 SCH         |
| BIOS 5215  | Biostatistics II (School of Public Health course)                  | 3 SCH         |
| BMSC 5010  | Scientific Communications  | 3 SCH         |
| BMSC 5520  | Ethical, Legal and Social Issues for Responsible Clinical Research | 1 SCH         |
| BMSC 5150  | Principles of Evidence Based Medicine and Epidemiology             | 3 SCH         |
| FMED 5540  | Research Colloquium  | 3 SCH         |
| FMED 5900  | Special Problems in Clinical Research                              | 3 SCH         |
| BMSC 5950  | Thesis   | 6 SCH         |
| Advanced Standing from TCOM                        |  | 6 SCH         |
| <b>Total</b>                                       |  | <b>31 SCH</b> |

## Visual Sciences

Robert Wordinger, Ph.D., Graduate Advisor  
Research and Education Building, 202  
817-735-2045  
Email: [rwording@hsc.unt.edu](mailto:rwording@hsc.unt.edu)

**Graduate Faculty:** Aschenbrenner, Y. Awashti, Cammarata, Dibas, Koulen, Krishnamoorthy, Rosales, Sheedlo Wordinger, Yorio

**Adjunct Faculty:** Clark, Collier, Goode, Jacobson, Jamison, Pang, Romano, Shepard

The graduate training program in Visual Sciences is designed to provide the students with knowledge, skills and technical experience to prepare them for a research career in industry or academia. Students will undertake advanced courses in vision-related topics involving the normal structure and function of the eye and associated structures; and pathologies affecting these organs such as Age-Related Macular Degeneration (AMD), Glaucoma, Diabetic Retinopathy, Inherited Retinal Degenerations, Proliferative Retinal Diseases, and Cataracts. The students will also be involved in in-depth basic research training utilizing genetic, molecular, cellular, biochemical, physiological or pharmacological approaches in laboratories of university-affiliated vision experts in order to complete major requirements for master's or doctoral degrees. In order to accomplish these, students are encouraged to acquire a broad based knowledge from various disciplines in the institution and laboratories which can then be applied towards vision research.

Like other interdisciplinary programs, the Visual Science Program is intended to provide the student with a repertoire of courses and training from various basic science disciplines. It is the responsibility of the student's mentor and advisory committee to direct the student to make the best choices among these courses and training in order to select those that will best fit the specific research project the student is interested in. To reflect this policy, at least 2 members of the advisory committee in addition to the mentor should be directly involved in eye or vision-related research. The advisory committee could include adjunct faculty from industry involved in eye research.

## Degree Plans

The following are typical degree plans for students in the M.S. or Ph.D. programs in the Visual Sciences Discipline. In both programs, students are required to take the Core Courses during their first year. At the end of the first year, they should have identified their mentor and an advisory committee and should have filed a degree plan with the graduate school. In general, M.S. students could complete their programs in 2 years while Ph.D. students could graduate after 4 years, if they are able to satisfy the requirements on time.

### MS Degree Plan for Visual Sciences

#### Year 1: Fall

|           |   |              |
|-----------|---|--------------|
| BMSC 5600 | Integrative Biomedical Sciences I: Principles of Biochemistry | 4 SCH        |
| BMSC 5610 | Integrative Biomedical Sciences II: Molecular Cell Biology    | 4 SCH        |
| BMSC 5935 | Introduction to Faculty Research Programs                     | 1 SCH        |
| BMSC 5960 | Biomedical Ethics   | 1 SCH        |
| CGEN 6050 | Visual Science Seminar  | 1 SCH        |
| CGEN 6699 | Special Problems in Ocular Research                           | 1 SCH        |
|           |   | <hr/> 12 SCH |

#### Year 1: Spring

|                                       |  |              |
|---------------------------------------|--|--------------|
| <i>At least two of the following:</i> |  |              |
| BMSC 5700                             | Integrative Biomedical Sciences III: Physiology                | 3 SCH        |
| BMSC 5705                             | Integrative Biomedical Sciences IV: Pharmacology               | 2 SCH        |
| BMSC 5710                             | Integrative Biomedical Sciences V: Immunology and Microbiology | 3 SCH        |
| <i>And</i>                            |  |              |
| BMSC 5935                             | Introduction to Faculty Research Programs                      | 1 SCH        |
| CGEN 6050                             | Visual Science Seminar   | 1 SCH        |
| CGEN 6699                             | Special Problems in Ocular Research                            | 1 SCH        |
|                                       |  | <hr/> 12 SCH |

#### Year 1: Summer

|           |   |             |
|-----------|---|-------------|
| CGEN 6030 | Methods in Molecular Biology (CGEN Advanced Course) | 4 SCH       |
| CGEN 6699 | Special Problems in Ocular Research                 | 2 SCH       |
|           |   | <hr/> 6 SCH |

#### Year 2: Fall

|           |                                     |             |
|-----------|-------------------------------------|-------------|
| BMSC 5950 | Thesis                              | 3 SCH       |
| CGEN 6040 | Advances in Ocular Science          | 2 SCH       |
| CGEN 6050 | Visual Science Seminar              | 1 SCH       |
| CGEN 6699 | Special Problems in Ocular Research | 1 SCH       |
|           |                                     | <hr/> 3 SCH |
|           |                                     | 10 SCH      |

#### Year 2: Spring

|           |                                   |              |
|-----------|-----------------------------------|--------------|
| BMSC 5950 | Thesis                            | 3 SCH        |
| BMSC 5965 | Introduction to Industry Practice | 1 SCH        |
| CGEN 6040 | Advances in Ocular Science        | 2 SCH        |
| CGEN 6050 | Visual Science Seminar            | 1 SCH        |
| CGEN 6080 | Diseases of the Eye               | 3 SCH        |
|           |                                   | <hr/> 10 SCH |

|              |  |               |
|--------------|--|---------------|
| <b>TOTAL</b> |  | <b>50 SCH</b> |
|--------------|--|---------------|

| <b>PhD Degree Plan for Visual Sciences</b> |  |               |
|--|--|---------------|
| <b>Year 1: Fall</b>                        |  |               |
| BMSC 5600                                  | Integrative Biomedical Sciences I: Principles of Biochemistry  | 4 SCH         |
| BMSC 5610                                  | Integrative Biomedical Sciences II: Molecular Cell Biology     | 4 SCH         |
| BMSC 5650                                  | Lab Rotations  | 1 SCH         |
| BMSC 5935                                  | Introduction to Faculty Research Programs                      | 1 SCH         |
| BMSC 5960                                  | Biomedical Ethics  | 1 SCH         |
| CGEN 6050                                  | Visual Sciences Seminar  | 1 SCH         |
|  |  | <b>12 SCH</b> |
| <b>Year 1: Spring</b>                      |  |               |
|  | <i>At least two of the following:</i>                          |               |
| BMSC 5700                                  | Integrative Biomedical Sciences III: Physiology                | 3 SCH         |
| BMSC 5705                                  | Integrative Biomedical Sciences IV: Pharmacology               | 2 SCH         |
| BMSC 5710                                  | Integrative Biomedical Sciences V: Immunology and Microbiology | 3 SCH         |
|  | <i>And</i>   |               |
| BMSC 5650                                  | Lab Rotations  | 1-2 SCH       |
| CGEN 6050                                  | Visual Science Seminar   | 1 SCH         |
| BMSC 5935                                  | Introduction to Faculty Research Programs                      | 1 SCH         |
| CGEN 6699                                  | Special Problems in Ocular Research                            | 2-3 SCH       |
|  |  | <b>12 SCH</b> |
| <b>Year 1: Summer</b>                      |  |               |
| CGEN 6030                                  | Methods in Molecular Biology                                   | 4 SCH         |
| CGEN 6699                                  | Special Problems in Ocular Research                            | 2 SCH         |
|  |  | <b>6 SCH</b>  |
| <b>Year 2: Fall</b>                        |  |               |
| BIOC 5435                                  | Molecular Aspects of Cell Signaling                            | 4 SCH         |
| BMSC 5010                                  | Scientific Communications                                      | 3 SCH         |
| BMSC 6940                                  | Individual Research  | 2 SCH         |
| CGEN 6040                                  | Advances in Ocular Biology                                     | 2 SCH         |
| CGEN 6050                                  | Visual Science Seminar   | 1 SCH         |
|  |  | <b>12 SCH</b> |
| <b>Year 2: Spring</b>                      |  |               |
| BMSC 5965                                  | Introduction to Industry Practice                              | 1 SCH         |
| BMSC 6940                                  | Individual Research  | 2 SCH         |
| CGEN 6040                                  | Advances in Ocular Biology                                     | 2 SCH         |
| CGEN 6050                                  | Visual Science Seminar   | 1 SCH         |
| CGEN 6080                                  | Diseases of the Eye  | 3 SCH         |
| CGEN 6699                                  | Special Problems in Ocular Research                            | 3 SCH         |
|  | Qualifying Examination   | 0 SCH         |
|  |  | <b>12 SCH</b> |
| <b>Year 2: Summer</b>                      |  |               |
| BMSC 5200                                  | Biostatistics for BMSC   | 4 SCH         |
| BMSC 6940                                  | Individual Research  | 2 SCH         |
|  |  | <b>6 SCH</b>  |

| <b>Year 3: Fall</b>   |                                    |               |
|-----------------------|------------------------------------|---------------|
| BMSC 6010             | Grant Writing                      | 3 SCH         |
| BMSC 6940             | Individual Research                | 4 SCH         |
| CGEN 6040             | Advances in Ocular Biology         | 1 SCH         |
| CGEN 6050             | Visual Sciences Seminar            | 1 SCH         |
| PHRM 6050             | Ocular Pharmacology                | 3 SCH         |
|                       |                                    | <b>12 SCH</b> |
| <b>Year 3: Spring</b> |                                    |               |
| BMSC 6940             | Individual Research                | 1 SCH         |
| CGEN 6020             | Functional Genomics and Proteomics | 3 SCH         |
| CGEN 6050             | Visual Science Seminar             | 1 SCH         |
| CGEN 6040             | Advances in Ocular Biology         | 2 SCH         |
|                       |                                    | <b>7 SCH</b>  |
| <b>Year 3: Summer</b> |                                    |               |
| BMSC 6940             | Individual Research                | 6 SCH         |
|                       |                                    | <b>6 SCH</b>  |
| <b>Year 4: Fall</b>   |                                    |               |
| BMSC 6950             | Doctoral Dissertation Electives    | 3 SCH         |
|                       |                                    | 3 SCH         |
|                       |                                    | <b>6 SCH</b>  |
| <b>Year 4: Spring</b> |                                    |               |
| BMSC 6950             | Doctoral Dissertation Electives    | 3 SCH         |
|                       |                                    | 3 SCH         |
|                       |                                    | <b>6 SCH</b>  |
| <b>TOTAL</b>          |                                    | <b>96 SCH</b> |

Advanced courses offered by various disciplines can be used as electives. The advisory committee will advise the student on the courses that would best fit his/her program.

## Advancement to Doctoral Candidacy

### Qualifying Examination

The qualifying examination within the discipline of Visual Sciences must be successfully completed prior to concluding 72 semester credit hours (SCH). The main goal of the examination is to ensure that each doctoral student has a broad knowledge base and has mastered the fundamental principles of biomedical sciences. The qualifying examination consists of written and oral phases. The examination will be directed mainly towards the didactic coursework of the student but understanding of general research techniques in biomedical research will be included. The student is expected to become knowledgeable in these areas via individual reading of textbooks and scientific literature, coursework, seminar attendance, and/or journal club discussions. Successful completion of the qualifying examination must be accomplished before the student can register for Grant Writing (BMSC 6010). During the first month of the semester in which the examination is to be taken, the student will submit a written request and meet with the graduate advisor for Visual Sciences to discuss the format of the examination. The initial phase of the qualifying examination consists of a set of written questions administered by an

Graduate School of Biomedical Sciences

Examination Committee (EC) appointed by the graduate advisor. The student's major professor **may not** sit on the EC. The student may meet with members of EC prior to the examination to discuss the topics and the examination schedule. Each exam answer will be graded independently by at least two EC members who are experts in the subject area. Within 4 weeks of passing the written examination, the Chair of the EC will schedule the oral examination. The oral examination will consist of questions that further explore the student's answers in the written exam, as well as questions on additional topics deemed appropriate by the QEC. The student's major professor may be present during the oral examination but **will not** participate in the examination or vote on the outcome. A University Committee Member must be in attendance for the oral phase of the examination. The qualifying examination will be graded on a Pass/Fail basis. In the written exam, 70% or higher comprises a passing grade. A student who passes both phases will receive a passing mark while failure in both phases will result in a failing mark. A student must pass the written portion before proceeding to the oral part of the exam. A student who passes the written phase but fails the oral phase will be required to retake the oral portion. Two attempts to pass the qualifying examination will be allowed. Failure to pass the qualifying examination after 2 attempts will result in dismissal from the doctoral program. In this case, a student may be allowed to complete the requirements for a Master of Science degree.

## **Grant Writing (BMSC 6010)**

After passing the qualifying examination, but prior to the completion of 84 SCH, the student must register for Grant Writing (BMSC 6010). This stage of the advancement to doctoral candidacy evaluates a student's aptitude for independent thought and scientific writing. The student is required to (a) prepare an NIH-style research proposal, (b) present the proposal in a public seminar, and (c) orally defend the proposal before the student's doctoral advisory committee. The proposal should be based on an original hypothesis and should describe specific experimental approaches to address the hypothesis. The graduate advisor will appoint a chair from the student's advisory committee to coordinate the process. The student will meet with the committee at least 2 times during the semester to review drafts of the proposal. The final written proposal must be typed in NIH format and presented to the committee at least 2 weeks prior to the public seminar and oral defense. The grant proposal and the student's oral presentation and defense will be evaluated on the basis of originality and ability to synthesize and communicate the proposal content. The student's major professor may be present but will **not** participate in the process **nor** vote on the outcome. The student's university member **must** be present for the public seminar and oral defense of the proposal. Upon successful completion of Grant Writing (BMSC 6010), the student is advanced to doctoral candidacy. Two attempts to successfully complete the Grant Writing (BMSC 6010) defense will be allowed. Failure to pass Grant Writing (BMSC 6010) will result in dismissal from the doctoral program in Visual Sciences. In this case, a student may be allowed to complete the requirements for a Master of Science degree.

# 7 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 Health Science Center Board of Regents.

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

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 cleared prior to registration in the next subsequent semester.

## 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 Office of the Registrar. 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 fees approved by the Board of Regents.

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 Graduate School of Biomedical Sciences' Office of Admissions and Services 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 official approved.

## 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 Office of Admissions and Services of such change immediately. Students who believe they have been erroneously classified have the opportunity for appeal by requesting review from the Office of Admissions and Services.

## 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 audit enrollment date in any given term. Audit enrollment dates are published in the [Academic Calendar](#). Requests for retroactive refunds cannot be honored. Additional information and applications are available in the Office of Admissions and Services.

## 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 of 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 professor of Texas state-supported institutions of higher education, their spouses and their dependent children.
8. Resident rather than non-resident tuition is applied to teaching or research assistant provided the student is employed at least one-half time by UNT 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.
12. Certain health science center fees are waived for UNT students concurrently enrolled in courses at both UNT and UNTHSC.

## Tuition and Fee Refunds

A student who drops a course or withdraws from 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 in the [Academic Calendar](#). Application fees, late registration charges, fee for student identification card, delinquent payment fees and installment handling fees are non-refundable.

Any financial obligation to UNT Health Science Center must be resolved before any refunds will be made.

## Class Drop Policy

Refunds are made for any course dropped though the audit enrollment date (see [Academic Calendar](#) for dates). The semester's first class day is always the first official day of classes rather than the first day of an individual 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 Refunds" in this catalog.

## Class Drop Refunds

UNT Health Science Center shall refund a percentage of tuition and mandatory fees to students dropping a course or multiple courses as long as enrollment is maintained in at least one course (see [Academic Calendar](#) for dates).

## Withdrawal Policy and Procedure

If a student leaves UNT Health Science Center through withdrawal, dismissal or leave of absence, the following procedure should be followed:

1. Inform the Office of Admissions & Services which will direct the student to the appropriate form(s).
2. Complete required forms according to established deadlines (when applicable).
3. Students receiving financial aid are required to schedule exit interviews to process the paperwork for repayment.

A student who leaves UNT Health Science Center without completing the appropriate exit process or leave of absence will be dismissed. It is not always possible to complete the clearance process in one day. Until a student is cleared in all areas, a hold will be in force on his/her transcript.

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 day of classes for the semester 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](#) for dates.

## 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 the first day of class    | 100% |
| During the first 5 class days    | 80%  |
| During the second 5 class days   | 70%  |
| During the third 5 class days    | 50%  |
| During the fourth 5 class days   | 25%  |
| After the fourth five class days | None |

## Correction of Errors

Students are responsible for any additional amounts due UNT 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 either to the student or to both the student and the health science center. Arrangements may be made with the Office of Student Financials where cash amounts should not be made available to the student.

## Returned Checks

A returned check is defined as any check returned to UNT Health Science Center unpaid due to no fault of the bank or the institution. 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 record is used. An additional \$25 fee is charged for each returned check.

## Financial Aid

UNT Health Science Center offers Federal and State aid programs to assist students in meeting the costs of financing a graduate education. Although financial aid is available for eligible students, it should be considered a supplement to a student's own financial resources.

The focuses of the Financial Aid Office are customer service, and prompt delivery of student funds. Counselors take students step by step through the application process to ensure that students receive the best funds available and that details of all programs are understood. While financial aid is heavily regulated, the staff strives to help students navigate this complex path in a professional and courteous manner.

## Student Eligibility

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

- Certify that he/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 program
- Register with the Selective Service if required
- Maintain satisfactory academic progress
- Use all funds received as financial aid for education purposes only.
- Must be accepted into an eligible degree program
- Must be a U.S. citizen or eligible non-citizen

## Applying for Financial Aid

1. New applicants should complete a Free Application for Federal Student Aid (FAFSA) electronically at <http://www.fafsa.ed.gov>. A computer with access to a printer and the previous tax year's information are required. For continuing student you can complete a renewal application with your pin number.
2. All Students **must** complete a student questionnaire located on the financial aid website at: <http://www.hsc.unt.edu/departments/financialaid/>
3. The Office of Financial Aid does not have application deadlines. However, it is highly recommended that applications be submitted by April 1st for continuing students and May 1st for new students (entering in the subsequent fall semester). The Office of Financial Aid cannot guarantee that funds will be available by the start of the fall semester if these deadlines are not met. Students who file applications after the recommended dates should be prepared to pay for their own expenses and wait until aid dollars arrive to be reimbursed.
4. Students selected for verification will be required to provide additional documentation and financial aid forms. If the selected data is incorrect, the processing time may increase.
5. Take adequate time to complete the FAFSA. Read and answer all questions carefully and accurately. The additional

time spent will enhance and ensure a successful application process.

6. Schedule an appointment with a financial aid counselor to discuss eligibility requirements, verification problems, budgeting of resources, or loan applications. Call (817) 735-2505 or (800) 346-8266.
7. The Office of Financial Aid is located in the Division of Student Affairs on the second floor of the Education and Administration building (EAD-247).

## Financial Aid Counseling

Individual student counseling is available and encouraged. 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 Higher Education Coordinating Board. These budgets are evaluated annually 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. These expenses are for a 12-month period:

|                  | <b>Texas Resident</b> | <b>Non Resident</b> |
|------------------|-----------------------|---------------------|
| Tuition          | \$ 3,450.00           | \$13,350.00         |
| Fees             | 1,212.00              | 1,212.00            |
| Books/supplies   | 795.00                | 795.00              |
| Room/board       | 12,199.00             | 12,199.00           |
| Transportation   | 3,204.00              | 3,204.00            |
| Personal         | 3151.00               | 3151.00             |
| Health Insurance | 2240.00               | 2240.00             |
| <b>Total</b>     | <b>\$26,251.00</b>    | <b>\$36,151.00</b>  |

**Regardless of the source, the total of all financial aid received cannot exceed the cost of attendance.**

Allowances for those students with dependents requiring dependent care 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 Office of Financial Aid promptly. In some instances, students may be required to supply additional information for a complete evaluation of a request.

## Federal and State Programs

Students who complete the FAFSA 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. Major federal programs available include:

- TPEG Grant (very limited funds)
- Federal Work Study
- Federal Perkins Loans (very limited funds)
- Federal Subsidized Loan
- Federal Unsubsidized Loan

**We encourage all students to apply early since some funding is limited.** Students may also apply directly to private foundations for scholarships and loans. Programs have individual selection criteria and various award limits. Contact the Office of Financial Aid for more information.

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 annual level of funding to be at least \$20,770 for doctoral students and \$14,156 for master's students. The assistantship carries some health insurance benefits and allows out-of-state students to pay tuition at the in-state rate.

## Credit Eligibility

Due to the demanding course schedule, holding a part-time job may not be possible. This creates a greater dependence on financial aid to cover living expenses. Some students discover a need to borrow additional funds beyond what the Federal and State programs will allow. The source of these additional funds is usually a private alternative educational loan.

Unlike Stafford loans, the government does not guarantee alternative loans. Therefore, lenders usually review a student's credit history before granting an alternative loan. Educational loan defaults, bankruptcies, charge-offs, foreclosures, judgments, liens, or an excess of slow payments could damage the chances of receiving the alternative loans necessary to cover all educational and living expenses that a student is responsible for while attending graduate school.

A good credit history is important to ensure that any student is able to take full advantage of all funding options available through financial aid.

## Insurance for Alternative Loans

Unlike Stafford loans, most alternative loans do not include a death/disability clause. This means that most alternative loans are not forgiven in the event of death or total disability. It is recommended that any student planning to borrow money from an alternative loan program consider securing adequate insurance coverage for the loan.

## Immigration Documents and Budget

When applying for a new visa document, international students may need to demonstrate sufficient financial support. This will usually be the case if:

- The student is requesting an I-20 upon admission;
- The student is asking for an extension of his/her stay;
- There is a change in funding;
- The student is asking for documentation for the first time for immediate family members and/or;
- Documents in the student's file are more than 12 months old.

The amount of financial support required will vary depending upon the number of dependents the student is supporting. Consult with the International Student Advisor for further information.

## Graduate Assistantships

Graduate assistantships are awarded annually to qualified doctoral students by disciplines and by the Graduate Council.

# 8 Student Life

## Division of Student Affairs

The Division of Student Affairs is a full institutional partner in promoting student learning. It supports co-curricular and extracurricular programming, activities and services to facilitate students' academic training, professional growth, and personal development. Additionally, the division assists the president of the health science center in interpreting students' needs, creating an atmosphere that stimulates learning, and integrates extracurricular experiences into the formal learning programs.

Through its administrative office and the offices of Academic Support, Financial Aid, the Registrar, Student Development, Founders' Activity Center, and International Student Services, the following goals are defined in support of the health science center's educational mission:

- Maximize resources for frontline support services
- Create a climate of excellence
- Exceed expectations of stakeholders
- Promote student success
- Support a culturally diverse environment
- Promote quality programs and services
- Promote community outreach and enrichment activities.

Personal, academic, and career counseling are available to students in the Office of Student Affairs. Professional counseling and psychiatric care for students and their families are available through the Student EAP.

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 policy interpretation and rights adjustment upon request, handles disciplinary and social adjustment issues, and provides self-development opportunities and enrichment activities.

## Student Affairs Departments

### Office of Student Affairs

The Office of Student Affairs provides the leadership and oversight for all the staff and offices within the Division of Student Affairs. Additionally, the staff encourages student participation in and contribution to all health science center programs. The chief student affairs officer establishes and coordinates the system of student conduct and discipline, interprets institutional regulations on academic and non-

academic matters as related to students, and acts as a student advocate when appropriate.

For more information on the Office of Student Affairs, or any office within the Division of Student Affairs, please refer to the Student Affairs Website located at: <http://www.hsc.unt.edu/departments/studentaffairs/> or contact the Office of Student Affairs at 817-735-2505. Additional information including the student Handbook is located at: <http://students.hsc.unt.edu>.

### Office of Academic Support Services (OASIS)

OASIS provides services designed to facilitate the academic success of all UNTHSC students. The staff works with faculty to offer direction and support to students in periods of academic difficulty.

The services offered include: counseling in learning skills, time management skills, test-taking skills, and peer-tutoring programs.

For more information, or to make an appointment for study skills counseling, or to request tutoring assistance, contact Academic Support Services at: 817-735-2409 or 817-735-2407, or visit our website at: [www.hsc.unt.edu/departments/Oasis/](http://www.hsc.unt.edu/departments/Oasis/)

### Office of Financial Aid

The Office of Financial Aid provides students with educationally related financial assistance through a combination of available federal, state, institutional, and private funds. Staff members administer and coordinate scholarship programs and federal work study programs, assist students with managing living expenses and the cost of education, provide financial aid certifications and resource verification letters to external agencies (upon student request only), and provide assistance, referrals and resources to students related to their financial status.

For more information about these services, please contact the Financial Aid Office at 817-735-2505, or visit the website at: [www.hsc.unt.edu/departments/financialaid](http://www.hsc.unt.edu/departments/financialaid).

### Office of the Registrar

The Office of the Registrar manages and maintains student academic records; insures the integrity, security and confidentiality of academic records; oversees the development and maintenance of student academic records, including transcript generation, grade processing, and degree certification; oversees the enrollment and registration process of all students; verifies enrollment, academic standing, completion of degrees; coordinates reports for internal and external compliance;

oversees functions related to Veteran's Affairs, commencement exercises, convocation; coordinates compliance with the Family Educational Rights and Privacy Act (FERPA); and provides institutional data to support campus initiatives.

The Office of the Registrar can be reached at 817-735-2201. All Registrar-related forms can be obtained by visiting [www.hsc.unt.edu/departments/studentaffairs](http://www.hsc.unt.edu/departments/studentaffairs) and clicking on "forms"

## Office of Student Development

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.

There are four student-elected government councils representing each educational program at the health science center. They are the Medical Student Government Association (MSGA); Graduate Student Association (GSA); Public Health Student Association (PHSA); and the Physician Assistant Student Association (PASA). For more information on these associations please refer to the Student Government description elsewhere in this academic catalog.

The Office of Student Development oversees two lounge areas located on the first floor of EAD. The student lounge in EAD 116 has an office for the four student government associations, organizational storage, a computer room with four computers and networked printer, a copy machine, a telephone for on-campus and local calls, a fax machine, a big screen television, couches and chairs. It is a great place for students to relax, study, eat, and meet with faculty or friends. The lounge in EAD 110 has vending machines (coin operated), an ice machine, a sink, complimentary coffee, microwave ovens, restrooms, , recreational equipment (pool table, ping-pong tables), and tables and chairs.

## International Student Services Office

The International Student Services Office conducts orientation programs for new students and offers assistance with administrative concerns, immigration advisement, and personal counseling. It provides referral to other campus agencies, if required, and gives international students the opportunity to participate in programs designed to introduce students to various aspects of U.S. culture and history.

For more information about these services, please contact the International Student Services Office at 817-735-2508.

## Recreational Facilities: Founders' Activity Center

The Founders' Activity Center, located on the north end of campus, is open seven days a week to students, faculty and staff. The center features aerobics classes, regularly scheduled recreational sports, a multipurpose outdoor court and recreational equipment. Cardiovascular exercise equipment is also available, as well as free-weights and weight machines. Exercise and nutrition programs can be tailored to the individual by the center's staff. For more information and a current schedule of activities, please visit <http://www.hsc.unt.edu/fac/> or contact the health promotion manager at 817-735-2209.

## Student Organizations

There are many student organizations on the health science center campus that represent a variety of interests within the health professions community. In cooperation with the Office of Student Development, they sponsor programs and activities that promote the intellectual, professional, social, physical and emotional development of all students. These organizations provide students with leadership opportunities at the local, regional and national levels. The Office of Student Development coordinates the student organization calendar and registration process.

The 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 and the state of Texas. All campus organizations that include enrolled students as members must be registered with the Office of Student Development and the Division of Student Affairs. Policies regulating the functioning, sponsorship and privileges of registered or recognized organizations are available in the Office of Student Affairs. For a list of active clubs and organizations please refer to the student handbook located at <http://students.hsc.unt.edu>.

## Scheduling Events

Student organizations are required to schedule events, seminars, programs and lectures through the Office of Student Development. Please contact the Office of Student Development at 817-735-5006 for more information.

## Campus Resources

### Health Services

Health care services are available to students through UNT Health Science Center's Central Family Practice Clinic in the Patient Care Center. The student is responsible for all appropriate fees and must provide proof of insurance. Referrals to specialty clinics must be approved by Student Health Services of the student's primary care physician. For more information, please contact the Central Family Practice Clinic at 817-735-2228.

### Housing

The health science center does not provide on-campus student housing. However, students will find a variety of housing opportunities in the area. Every student is responsible for making his or her own housing arrangement. Please visit <http://students.hsc.unt.edu> and click on "housing opportunities" to see a current list of possible housing options.

The health science center does not assume any responsibility in housing arrangements but does support the federal housing policies that housing owners not discriminate because of race, color, gender, age, disability, veteran status or national origin.

For more information about these services, please contact the Student Development Office at 817-735-5006, or visit the website at: [www.hsc.unt.edu/departments/sdo/](http://www.hsc.unt.edu/departments/sdo/).



## Food Service

Snack food is available from various on-campus vending machines and in the health science center gift shop, located on the second floor of the library lobby. Lunch is served daily in the Stairwell Café, located on the first floor of the library.

## Campus Police

The UNT Health Science Center Campus Police Department operates 24 hours a day, 7 days a week. Campus Police officers are fully licensed peace officers vested with all the powers, privileges, and immunities of peace officers in the State of Texas. They are authorized to function as the local law enforcement authority in all counties in which property is owned, leased, rented or otherwise under the control of the health science center.

The non-emergency phone number for Campus Police is 817-735-2210. **For emergencies, please dial 2600 from any campus phone.**

## Motor Vehicle Registration

Those who operate motor vehicles and bicycles on campus must comply with the Texas Uniform Traffic Code and the published regulations regarding vehicle and bicycle use, parking, display of permits, and penalties for violations. Details are available at <http://students.hsc.unt.edu> in the parking policies section of the Student Handbook.

## Policies Pertaining to Students

### General Administrative Policies

This catalog contains official academic and administrative regulations. General policies that apply to all programs are in this section of the catalog; specific policies for each program are in the respective sections of this catalog. Academic policies and scholastic regulations also are presented in other official health science center documents and specific program publications.

Each student enrolled at UNT Health Science Center is responsible for knowing current academic policies and scholastic regulations, general and specific requirements, and operational policies that apply to registration and instruction.

The health science center reserves the right to amend or add to the academic policies and scholastic regulations at any time, provided that such changes or additions are intended to improve the quality of education and are introduced in a fair and deliberate manner with appropriate notice provided to all students affected by the changes.

## ID Cards

Identification cards are issued after new student orientation. These must be worn at all times while the student is on campus or, if applicable, on preceptorships, internships, and clinical rotations or any other practical experience performed as a member of the UNTHSC community.

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

an 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 \$2,000 (Class C Misdemeanor).

Replacement ID cards may be purchased. Please contact Biomedical Communications at 817-735-2470 for more information. A lost or stolen card should be reported to Campus Police immediately.

## Immunizations

The Texas Department of Health requires all students in higher education institutions to show proof of immunizations before registration. Any validated document of immunization presented by a student is acceptable provided that it shows the day, month and year when each immunization was received. Proof of required immunizations must be submitted prior to matriculation.

Proof of immunization is not required for individuals who submit an affidavit or certificate signed by a physician licensed to practice in the United States stating that, in the physician's opinion, the required immunization would be injurious to the health and well-being of the student or any member of his or her family or household. Unless a lifelong condition is specified, the affidavit or certificate is valid for one year from the date signed by the physician and must be renewed every year for the exclusion to remain in effect.

The Texas Department of Health requires that certain immunization conditions be met. All students born after January 1, 1957, who are enrolled in health-related courses in medical care facilities, must show proof of two doses of measles vaccine, one dose of mumps vaccine or proof of immunity to these diseases; and two doses of chicken pox vaccine. Students who have had chicken pox may provide a written statement from their physician or a parent. (This is the only disease where a written statement from a parent can be considered proof of immunity.) All students enrolled in health-related courses must show proof of one dose of tetanus/diphtheria vaccine within the past 10 years. All students enrolled in health-related courses must show proof of either one dose of rubella vaccine administered on or after the first birthday or serologic proof of rubella immunity. All students, residents and interns will receive a complete series of hepatitis B vaccine or show proof of serologic immunity. All students will be skin tested for tuberculosis using the two-step testing procedure in accordance with Section X of the Tuberculosis Control Plan Policy 96.001.26 of UNT Health Science Center. This test will be done during the first month of classes.

Prospective students may be given provisional enrollment of up to one semester to attend classes while getting the required immunizations or documentation as long as no direct patient care is involved.

Student health care providers cannot be provisionally enrolled without the receipt of at least one dose of the MMR vaccine if direct patient contact will occur during the provisional enrollment period.

For additional information regarding student health issues (meningitis, needle stick, etc) please visit

<http://www.hsc.unt.edu/education/studenthealth/default.cfm>.

## Student Health Insurance

It is compulsory for all students to carry medical and hospitalization insurance while enrolled at the health science center. Proof of insurance in the form of a signed verification form must be completed prior to initial registration and enrollment. Insurance coverage must remain in effect throughout the duration of enrollment.

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

## Liability: Personal Property on Campus

UNT Health Science Center is not responsible for and does not assume any liability for loss or damage of personal property. Students may want to purchase personal insurance coverage for their possessions on campus.

## Student Rights and Consumer Rights

The institution will consider the impact of a caregiver's personal cultural values, ethics and religious beliefs as related to all services provided. However, in no instance will the mission of the institution be compromised. In accordance with applicable laws, treatment and care of our consumers will be provided to persons in need without regard to disability, race, creed, color, age, gender, religion or national origin. For the complete policy as it pertains to students of the health science center please see Human Resource Policy 5.13 under policies and Procedures on the institution's home page at [www.hsc.unt.edu](http://www.hsc.unt.edu), or in the human resources policy manual located in each department.

## Family Educational Rights and Privacy Act

The Family Educational Rights and Privacy Act (FERPA), 20 U.S.C. 1232G, grants students in institutions of higher education the right of access to their educational records with the exception of confidential letters and statements of recommendation that the student has waived the right to inspect.

Before disclosing any personally identifiable information, except directory information, the health science center must obtain written consent from the student unless the disclosure is allowed by law.

The Family Educational Rights and Privacy Act consider certain information to be "directory information," which is subject to disclosure without prior consent from the student. Directory information relating to students includes the following: the student's name, address, telephone listing, date and place of birth, hometown, major field of study, participation in officially recognized activities and sports, classification, degrees and awards received, the most recent educational agency or institution attended by the student, and dates of attendance.

Students who do not want all or part of their directory information to be released must submit a written request to the Office of the Registrar during the first 12 days of the

semester. Forms for submitting the written request to withhold directory information are available in the Office of the Registrar.

Students have a right to request amendment to their educational records to ensure their accuracy. Students also have the right to file a complaint with the U.S. Department of Education concerning alleged failures by the health science center to comply with the requirements of the Family Educational Rights and Privacy Act.

## Student Conduct

The health science center's primary concern is the student. It attempts to provide an environment that is conducive to academic endeavor, social growth and individual self-discipline for all students. Enrollment at the health science center is considered implicit acceptance of the rules, regulations and guidelines governing student behavior promulgated by the institution, and the student is responsible for being aware of these requirements. In addition, all students are expected to know and obey the requirements of all federal, state, and local laws. Any student who violates a provision of those laws is subject to disciplinary action, including expulsion, notwithstanding any action taken by civil authorities because of the violation. The health science center reaffirms to each student the privilege of exercising the student's rights of citizenship under the Constitution of the United States. Special care is taken to ensure due process and to identify the defined routes of appeal when students feel their rights have been violated. For complete policy information, consult the Student Code of Conduct in the Student Handbook or the health science center web site at [www.hsc.unt.edu](http://www.hsc.unt.edu).

## Fiscal Policies

UNT Health Science Center is a state-supported institution subject to state laws. Students have an option to pay tuition and fees by installment. All other financial obligations to the college must be paid in advance. Tuition and fees are subject to change by the Board of Regents, the Texas Legislature or legal rulings of the Texas attorney general.

## Tuition Refund

A tuition refund is based on the date of withdrawal. Upon official notification of withdrawal by the registrar, Student Financials will return the appropriate refund to the student or to the applicable federal loan program.

Payment plan fees, late fees and ID card fees are not refundable. By action of the Board of Regents, no part of the fees or tuition can be refunded to students, who withdraw, for any cause, after the 20<sup>th</sup> day during a fall or spring semester and 7 day during a summer term, except for those students who receive financial aid. Those students will receive a pro-rated refund based on the number of weeks remaining in the semester, provided they leave before the 60-percent-completion point of the semester. After the 60-percent-completion point, the schedule for refunds is 80 percent first week, 70 percent second week, 50 percent third week and 25 percent fourth week.

## 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.

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 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, 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, prejudice or harassment of any kind is inconsistent with the center's educational purpose.

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 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/or other verbal or physical conduct of a sexual nature constitute 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

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.

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 center at 817-735-2357.

## Jeanne Clery Disclosure of Campus Security Policy and Campus Crime Statistics Act

The Jeanne Clery Disclosure of Campus Security Policy and Campus Crime Statistics Act (formerly the Campus Security Act) is a federal law that requires institutions of higher education in the United States to disclose campus security information including crime statistics for the campus and surrounding areas. It was first enacted by Congress in 1990 and amended in 1992, 1998, and 2000.

In 1986, Jeanne Clery, a freshman at Pennsylvania's Lehigh University, was murdered and sexually assaulted in her campus residence hall room by another student she did not know. Lehigh University had not informed students about 38 violent crimes on campus in the three years preceding her murder. Clery's parents led the crusade to enact the original Campus Security Act. Congress formally named the law in memory of Clery in 1998.

The law was most recently amended in 2000 to require schools to notify the campus community about where public "Megan's Law" information about registered sex offenders on campus could be obtained. The information for UNT Health Science Center is available on the Campus Police website: [http://www.hsc.unt.edu/departments/police/crime\\_stats.htm](http://www.hsc.unt.edu/departments/police/crime_stats.htm)

## Substance Abuse & Self Reporting

The Health Science Center does not condone the abuse of alcohol or illegal drugs. Its administrative policies, in accordance with Texas state law, provide the penalty of suspension or dismissal of any student who abuses alcohol or uses illegal drugs on property owned or affiliated with the Health Science Center. However, the Health Science Center recognizes that students may develop substance abuse problems that can be treated successfully before critical incidents occur (e.g., arrests, usage on campus property, or intoxication in the classroom or health professions setting). Therefore, the Health Science Center encourages students who have developed substance abuse problems to voluntarily identify themselves and to seek immediate treatment. Complete listings of all health science center policies related to substance use or abuse can be found on the institution's web page [www.hsc.unt.edu](http://www.hsc.unt.edu) on the Human Resource Services Policy page and in the [Student Handbook](#).

# 9 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.

### **5010. Scientific Communications.**

3 hours. The purpose of this course is to develop skills and gain experience in the types of scientific writing required for: submitting articles for publication; grant applications; preparing presentations for lectures and seminars; preparing posters for meetings. Offered Fall and Spring semesters.

### **5100. Clinical Practice Preceptorship.**

2 hours. The goal of this course is to provide exposure to clinical practice conducted by osteopathic physicians and educational experiences within the private sector emphasizing the totality of community-based family practice. A preceptor will be assigned to each student. This course is open only to students in the medical science discipline. Offered each Summer.

### **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 lamins, DNA replication, transcription, DNA damage and repair, ribonucleoprotein particles, spliceosomes, and macromolecular interactions in heterochromatin and euchromatin (interphase chromatin). Offered each Spring.

### **5150. Principles of Epidemiology and Evidence-based Medicine.**

3 hours. This course is intended to introduce students to the fundamental elements of epidemiology, with relevant emphasis on clinical applications and evidence-based medicine. The course consists of lectures, biomedical journal article discussions, student presentations, and other activities as assigned. Lectures emphasize the basic concepts of epidemiology and clinical research design, and their applications to clinical medicine and public health. Biomedical journal articles emphasize the practical application of concepts covered in lectures. Group presentations provide students an opportunity to enhance their communication skills, while also demonstrating mastery of course content. Offered each Fall.

### **5200. Biostatistics for Biomedical Sciences.**

4 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.

### **5300. Tools for Teaching Science.**

2 hours. Workshop format to prepare students to serve as resources and teachers in secondary schools. Offered each Summer.

### **5310. Evaluation & Instruction in Teaching.**

3 hours. A distributed learning course designed to provide students with an overview of the teaching-learning process as it relates to the systematic design and assessment of instruction and student learning in graduate health professions education. Offered each semester.

**5320. Issues in Higher Professional Education.**

1 hour. A distributed learning course designed to provide students with an overview of the institutional and leadership issues that create the environment for instruction and curricula implementation in graduate health professions education. Offered each semester.

**5400. Regulation of Human Subject Research.**

2 hours. Regulations, policies and procedures associated with the conduct of human subjects research will be presented both from historical and contemporary perspectives. Principles and practical aspects of research involving human subjects will be described, including operational training in protocol development. Case studies will be presented and relevant Institutional Review Board processes will be explored. Prerequisite: BMSC 5960 preferred. Offered each Fall and Spring.

**5500. Topics in Biomedical Sciences.**

2 hours. This course is an introduction to the core integrated biomedical sciences curriculum required for all first-year biomedical sciences graduate students at the health science center. It is not intended to be all-encompassing or comprehensive but it does aim to provide the student with an overview of some seminal concepts in areas ranging from biochemistry to pharmacology and neuroscience. It will become apparent at the conclusion of the course, if not before, that division of biomedical science into traditional disciplines is no longer valid, because, as future scientists, students must become familiar with basic information that transcends all subjects. The goal of this course is to start the student on the path toward the integration of certain important concepts into his/her learning and understanding regardless of final choice of discipline. Offered each Summer.

**5510. Introduction to Clinical Research and Studies.**

3 hours. Course covers drug development process, ethical and scientific principles of clinical research, clinical trial preparation, study design, informed consent forms, clinical coordinator responsibility and regulatory considerations. Conducting clinical trials from initiation to implementation. Offered each Spring.

**5520. Ethical, Legal, and Social Issues for Responsible Clinical Research.**

1 hour. Regulations involved with human subject research will be discussed both from an historical and contemporary perspective. Case studies will be presented and students will attend an Institutional Review Board meeting. Offered each Spring

**5530. Introduction to Health Disparities Issues in the United States**

2 hours. An examination of the disparities and issues surrounding the treatment of several health problems in the United States, particularly as related to minority populations. Each health condition is approached from the clinical, cultural and scientific aspect so that the student will understand the etiology and treatment of the disease, the cultural characteristics of various populations that may contribute to the disproportionate presence of the disorder in a particular population, and the underlying science involved with each health problem. The latter understanding will aid the student to better approach research, both in the clinical and basic science venues, directed towards better management of the health problems. Offered each Fall.

**5540. Introduction to Laboratory Techniques for Biomedical Sciences.**

2 hours. An introduction to basic laboratory techniques used in the biomedical science disciplines. Topics include lab safety and biochemical calculations, buffers and detergents, principles of centrifugation and spectrophotometry, working with proteins, and molecular and cell signaling applications. Offered each Fall; limited enrollment.

**5550. Laboratory Management.**

2 hours. This course will introduce students to the tools businesses use everyday to increase efficiency, improve operations, and succeed. These tools can be used in the laboratory to improve turn-around time, lower costs, introduce new testing services, and help to increase quality. There are no prerequisites for this course, however a financial calculator is strongly recommended. Offered each Fall and Spring semester.

**5600. Integrative Biomedical Sciences I: Principles of Biochemistry.**

4 hours. A broad introduction to the fundamentals of biochemistry, especially those relating to thermodynamics, molecular pathways and regulation. Discussion of important techniques that contribute to our present understanding of biochemistry. Offered each Fall. Prerequisite: Concurrent enrollment in BMSC 5600 or consent of the department.

**5610. Integrative Biomedical Sciences II: Molecular Cell Biology.** 4 hours. The fundamentals of cell and molecular biology, concentrating on understanding of the experimental basis of these disciplines as well as the current state of knowledge. Offered each Fall. Prerequisite: Concurrent enrollment in BMSC 5610 or consent of the department.

**5650. Laboratory Rotations.** 1 hour. 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 III: Physiology.**

3 hours. Emphasis on integrative physiology of human organ systems. Offered each Spring. Prerequisites: BMSC 5600, BMSC 5610 or consent of the department.

**5705. Integrative Biomedical Sciences IV: Pharmacology.**

2 hours. Emphasis on fundamental principles of pharmacology that include pharmacodynamics, pharmacokinetics, ligand-receptor interactions and their consequent biological effects. Offered each Spring. Prerequisites: BMSC 5600, BMSC 5610 or consent of the department.

**5710. Integrative Biomedical Sciences IV: Immunology and Microbiology.**

3 hours. A general exploration of basic concepts of immunology, microbiology and virology including study of genomics, proteomics and gene therapy. Offered each Spring. Prerequisites: BMSC 5600, BMSC 5610 or consent of the department.

**5720. Novel Macromolecules that Regulate the Cell Cycle.**

2 hours. This course focuses on the cellular signaling pathways involved in endogenous active peptides interacting with their receptors. In particular, ocular peptides that may have a role in normal homeostatic function and pathophysiology of the eye are featured. Prerequisites: 5600, 5610, 5700, and 5710.

**5730. Current Topics in Glaucoma.**

2 hours. Course reviews and emphasizes current research articles in glaucoma-related fields. Students are required to participate in presentation and discussion of current articles. Faculty and research staff members may participate in presentations. Offered each semester.

**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. Internship Practicum**

6 hours. The candidate must complete an internship at an approved site. At the completion of the practicum, the student will write a report detailing the activities of the internship. 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.

**5935. Introduction to Faculty Research Programs.**

1 hour. This course is designed to introduce new graduate students to the research programs conducted by the faculty of the Graduate School of Biomedical Sciences. It is also expected that this exposure will promote student-faculty interactions and introduce students to participation in oral scientific presentations and preparation of written reports and manuscripts. This course is graded on a pass/fail basis. Offered each Fall and Spring.

**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. Prerequisite: Approved thesis research proposal. 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 Fall.

**5965. Introduction to Industry Practices.**

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. Course graded on pass/fail basis. Offered each Spring.

**5970. Techniques in Biomedical Sciences.**

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 each semester.

**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. Prerequisite: Approved dissertation research proposal. May be repeated for credit. Offered each semester.

## **Biochemistry and 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 every other Fall (odd years).

**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 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. Offered each Fall.

**5540. Advanced Lipoprotein Metabolism.**

2 hours. Presentation and discussion of recent research findings and literature reports in lipoprotein metabolism and related areas. Offered each Fall and Spring.

**5560. Current Topics in Cancer Biology.**

1 hour. Course reviews and emphasized current research articles in cancer-related fields including apoptosis, cell cycle regulation, and metastasis. Students are required to participate in presentation and discussion of current articles. Faculty and research staff members may participate in presentations. 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 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 contraction, 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.

**6020. Cellular and Molecular Fluorescence.**

2 hours. Basic and advanced topics of fluorescence spectroscopy and microscopy of biological objects. Students attend lecture and laboratory. Prerequisite: BMSC 5600 and BMSC 5610. Offered each Spring.

**6040. Molecular Biology of Lipid Transport.**

2 hours. Steroid-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 Biology 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: BMSC 5600, 5610, 5700, 5710. Offered each Spring.

**6060. Advanced Biophysics.**

3 hours. Proteins, nucleic acids, bioenergetics and photosynthesis, electrophysiology, thermodynamics, topics in cell biophysics (including muscle and contractility, membrane proteins, channels, receptors and transporters) and biophysical methods (including x-ray crystallography, diffraction and scattering, magnetic resonance, spectroscopy and hydrodynamics) will be addressed. Special attention will be given to skeletal muscle. Prerequisites: BIOC 5010, 5520 and 5530. Offered on demand.

## **Cell Biology and Genetics (CGEN)**

**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.**

7 hours. A study of the gross morphological and histological structures of the human body (excluding those areas taught in CGEN 5000 and 6000). Lecture material and dissections in the gross anatomy laboratory are organized by systems. The course begins with study of the Cardiorespiratory system, then followed by the Digestive system, and ends with the study of the Genitourinary system. Students will explore the embryology, histology, and anatomy of these particular system in full. Laboratory activities will require students to participate in gross dissections of the thorax, abdomen, pelvis, and perineum. In addition, both lecture and laboratory sessions will emphasize clinical significance. Prerequisites: Must have taken or currently be enrolled in BMSC 5600, 5610, 5700, and 5705. Offered each Spring.

**5015. Embryology and Developmental Biology.**

3 hours. This course consists of lectures and laboratory sessions and will include the development of a research project related to embryology and developmental biology. This course is designed to provide the necessary foundation for graduate students in biomedical science through discussion and thorough literature searches regarding current topics in the field. The students will learn the basic language of embryology and the fundamental concepts of the ever-growing field of developmental biology. By the end of the course, students will be able to 1) understand the developmental pathways of the embryo, 2) know how all organs develop, and 3) understand the genetics of development and the effects of mutation of genes during human development. Prerequisites: BMSC 5600, 5610, plus two of the following: BMSC 5700, 5705 and 5710. Offered alternating spring semesters.

**5020. Structural and Developmental Anatomy of the Human Genitourinary System.**

3 hours. Designed to familiarize the student with the development and the gross and microscopic structures of the human genitourinary system. Lecture materials on the gross and histological morphology of the organs and structures associated with the human genitourinary system will be supported by detailed dissections of those structures in human cadavers. Completion of a mentor-directed research project utilizing knowledge of the genitourinary system and dissection skills acquired in the laboratory is required. Offered each spring. Requires prior approval from course director.

**5025. Basic and Clinical Histology.**

3 hours. This course consists of lectures and laboratories sessions and will include presentations by students on current clinical correlations related to histology. This course is aimed at providing a basic working concept of human histology that can be used by the graduate student as a foundation for research and to encourage an appreciation for and comprehension of the clinical aspects of tissue and organ systems. Students will be expected to 1) understand the 3-dimensional orientation of tissues and the specific stains that are used to label cell components, 2) acquire a basic skill level and appreciation of tissue and cell preparation for light and electron microscopic investigations, and 3) examine and photograph tissue sections with the light and electron microscope. Prerequisites: BMSC 5600, 5610, plus two of the following: BMSC 5700, 5705 and 5710. Offered alternating spring semesters (even years).

**5030. Structural and Developmental Anatomy of the Human Cardiorespiratory System.**

3 hours. Designed to familiarize the student with the development and the gross and microscopic structures of the human cardiorespiratory system. Lecture materials on the gross and histological morphology of the human cardiovascular and respiratory organs and associated structures will be supported by detailed dissections of those structures in human cadavers. Completion of a mentor-directed research project utilizing knowledge of the cardiorespiratory system and dissection skills acquired in the laboratory is required. Offered each spring. Requires prior approval from course director.

**5040. Structural and Developmental Anatomy of the Human Digestive System.**

3 hours. Designed to familiarize the student with the development and the gross and microscopic structures of the human digestive system. Lecture materials on the gross and histological morphology of the organs and structures associated with the human digestive system will be supported by detailed dissections of those structures in human cadavers. Completion of a mentor-directed research project utilizing knowledge of the digestive system and dissection skills acquired in the laboratory is required. Offered each Spring. Requires prior approval from course director.

**5050. Methods in Forensic Molecular Biology.**

4 hours. An intensive laboratory course designed to give student experience and expertise in the basic molecular biology techniques currently utilized in forensic DNA analysis. Techniques will include multiple methods of extraction of nucleic acids from various sources; DNA quantitation methods; design and process of PCR amplification; agarose gel electrophoresis; capillary electrophoresis theory and methods; analysis of microsatellite DNA; mitochondrial DNA sequencing and analysis; single nucleotide polymorphism analysis methods. Offered each Summer.

**5060. Forensic Biology: The History and Science of Human Identification.**

2 hours. This course is open to all graduate students but is specifically intended for first year students in the Forensic Genetics program. There are no prerequisites but familiarity with concepts in immunology protein biochemistry and genetics are helpful. The focus of this course is to familiarize the student with the science and history of human identification and analysis of biological evidence prior to the advent of PCR-STR analysis. The course will cover the use of science to analyze evidence associated with crimes from the early 19th to the later part of the 20th century. Topics to be covered include identification and speciation of bloodstains, forensic serology and bloodtyping, electrophoretic analysis of serum proteins and red cell alloenzymes, the science and genetics of fingerprint identification, anthropometry and the Bertillon system of personal identification. RFLP DNA Analysis and the early use of PCR technology. This course will not only cover the science and development of the various analytical methods and assays used, but will also cover the first use of those technologies in crime solving and the criminal justice system. This course will also be used to serve as an introduction to concepts in population genetics, electrophoresis, immunology, molecular biology, criminal investigations and the intersection of law and science that students will need in their future coursework and careers. Offered each Spring.

**5100. Biological Evidence Evaluation.**

4 hours. Course topics include collection and preservation of biological evidence, chain of custody, evidence screening for biological components (blood, seminal fluid, saliva, hairs, etc.), presumptive and confirmatory testing, and an overview of historical testing procedures. Training will also include DNA extraction procedures, RFLP, ASO and STR analysis. Prerequisites: CGEN 5050, concurrent enrollment in CGEN 5310. Offered each Fall.

**5101. The Applications of Y-Chromosome Analysis in Forensic and Genealogical Investigations.**

2 hours. This course is specifically designed as an elective for second-year students in the Forensic Genetics discipline. The purpose of this course is to introduce the student to the specialized field of Y chromosome analysis and its use in human molecular identity testing. Lecture material will include the following: biology, evolution and genetics of the Y chromosome, Y STR and Y SNP genetic markers, use of the Y chromosome in evolutionary, anthropological and forensic studies, statistical interpretation of Y-chromosome test results and validation of

Y STR kits in forensic testing laboratories. The laboratory portion of this course will be concurrent with the laboratory portion of CGEN 5100. It will include the DNA extraction of mock case samples that would be appropriate for Y STR testing, PCR amplification, and genetic analysis of those samples using commercially available Y STR kits. Offered each Fall. Prerequisites: CGEN 5050, concurrent enrollment in CGEN 5100.

**5200. Expert Testimony in Forensic Science.**

3 hours. This course is intended to provide students with training in forensic testimony in the courtroom. Students will be required to provide testimony in a moot court setting. Discussions of admissibility standards, visual aids and trial preparation will be covered. Offered each Spring.

**5300. Population Genetics.**

3 hours. Course topics will include the evaluation and characterization of genetic and phenotypic variation, population substructure, selection and random drift models, molecular processes of genetic change, quantitative genetics, and processes and modes of speciation, and organismal zoogeography. Offered each Spring.

**5310. Genetic Data Analysis.**

4 hours. Methodological approaches to evaluating genetic data for population analysis, phylogenetic analysis, and genetic evaluation of quantitative trait loci. Emphasis on the statistical evaluation of microsatellite DNA, SNP panels and DNA sequences as applied to forensic DNA evaluations. Several software packages will be utilized for processing diploid and haploid genetic data sets. Offered each Fall. Prerequisite: CGEN 5300 or prior approval from course director.

**5400. Non-Human Forensic Genetics.**

1-3 hours. Course content and methods discussed will concentrate on identification of biological evidence that is from non-human sources. Emphasis on biological methods for identifying and individualizing materials from microbial, botanical and vertebrate organisms of economic and environmental concern. Prerequisite: CGEN 5300. Offered every other Summer 2 semester (even years).

**5500. Forensic Laboratory Quality Assurance.**

1 hour. Principles of quality assurance, current industry standards for quality systems in forensic DNA and other forensic disciplines. Creating, maintaining and improving quality systems.

**5600. Current Topics in Forensic and Molecular Genetics.**

1 hour. Seminar course in which new and advanced methods in the genetic evaluation of biological forensic evidence will be discussed to expand the training of students in the Forensic Genetics program and students interested in clinical genetics. Topics to be discussed will include statistical analysis, microarray technology, bioinformatics, genomics and legal testimony. Offered each Fall and Spring.

**5700. Forensic Hair Analysis.**

1 hour. Introduction to the microscopic analysis of hair for forensic evidence evaluation. Offered each Spring.

**5800. Blood Spatter Pattern Analysis.**

1 hour. Introduction to the analysis of blood spatter patterns for forensic evidence and crime scene evaluation. 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.

**5950. Forensic Anthropology.**

3 hours. Human identification techniques with emphasis on identification from human skeletal remains. Fundamental biology of osseous and dental tissues; forensic botany and entomology; genetics of human variability; serotyping; HLA typing; analysis of hair and dermatoglyphic lines; DNA fingerprinting. Offered each Spring.

**6000. Structural and Developmental Anatomy of the Musculoskeletal/Skin System.**

3 hours. A course designed to familiarize the student with the development and gross and microscopic structures of the human musculoskeletal/skin system. Lecture materials on the gross and histological morphology of human muscles and skin and associated bones, nerves, arteries, veins, ligaments and tendons will be supported by detailed dissections of those structures on human cadavers. Completion of a mentor-directed research project utilizing knowledge of musculoskeletal/skin system and dissection skills acquired in the laboratory is required. Offered each Fall. Requires prior approval from course director.



**6020. Functional Genomics and Proteomics.**

3 hours. The purpose of this course is to introduce students to concepts and methods used in defining a database of tissue specific and disease specific protein expression. Topics to be discussed include: 1) genome mining; 2) transcriptome mining and validation; 3) proteome mining by 2-dimensional gel electrophoresis, mass spectrometry and protein chips; 4) protein structure determination; 5) protein structure prediction based on gene sequence; 6) protein function prediction and analysis; 7) protein-protein interactions; and 8) protein localization. Cross-listed with PSIO 6010. Offered each 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 Summer.

**6040. Advances in Ocular Biology.**

2 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.

**6060. Clinical Human Anatomy.**

4 SCH. An online (distributed learning) anatomy course offered through WebCT Vista. This course will have laboratories based on digital images taken from cadavers at the UNTHSC anatomy facilities. The course is divided into eight regions and topics covered will include the following: 1) back and suboccipital triangle; 2) upper extremity; 3) lower extremity; 4) head and neck I; 5) head and neck II; 6) thorax; 7) abdomen; and 8) pelvis and perineum. Clinically significant topics for each region will be addressed with an emphasis on the neurological feature of the particular manifestation. Offered each Fall and Spring semester. Limited enrollment. Cross-listed as PSY 6060.

**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.

**6100. Mitochondrial DNA Analysis.**

2 hours. Laboratory course covering the analysis and interpretation of mitochondrial DNA sequence data currently used to augment forensic DNA investigations. Offered each Spring. Prerequisites: CGEN 5050, 5100, and 5310 or approval of course director.

**6200. Human Genetics.**

3 hours. The goal of this course is to introduce students to the role of human genetics in medicine and to introduce students to the databases that have resulted from the human genome project. Topics to be discussed include: the chromosomal basis for heredity; tools for studying the patterns of single gene inheritance; molecular and biochemical basis for genetic disease; organization and instability of the human genome; genetic mapping; common genetic diseases; and genetics of complex diseases with special focus on metabolic syndrome, cancer and the immune system. Offered on demand.

**6210. Molecular Evolutionary Genetics.**

3 hours. The analysis of DNA and/or protein sequences at the gene, population, and species level has become a powerful tool for studying molecular evolution and understanding the effects of genetic change. Statistical and computational methods to effectively evaluate and interpret the data obtained from molecular level investigations have become more involved. The goal of this course is to introduce appropriate theory and methods needed to effectively analyze nucleotide and protein sequence data. Topics covered will include: measurement of sequence divergence, models of evolution, various approaches to phylogenetic evaluation and tree construction, statistical tests for detection of selection and evolutionary rates, inference of ancestral amino acid sequences, and the evolutionary significance of genetic polymorphism. Emphasis is given to practical methods of data analysis using multiple software packages designed to appropriately evaluate genetic data. Prerequisites: BMSC 5600, 5610 (Recommended: BMSC 5200 or equivalent, CGEN 5300, BMSC 5710). Offered every other Fall semester (even years).

**6599. Current Topics in Cell Biology and Genetics.**

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 Cell Biology and Genetics.**

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.

## **Family Medicine (FMED)**

**5540. Family Medicine Colloquium.**

3 hours. This colloquium course will explore the practical issues of clinical research in family medicine and is presented in a seminar format. Speakers will include UNTHSC faculty, invited guests and student participants. Offered each semester.

**5900-5910. Special Problems in Family Medicine.**

3 hours. An individualized problem under the direction and supervision of a graduate faculty mentor. Offered each semester.

## **Health Psychology (PSY)**

**6010. Geriatric Health Psychology.**

3 hours. Examination of general and cellular theories of aging and general age-related changes in various body systems including neurological, immunological, cardiovascular, and endocrine systems. An empirical understanding is provided to permit distinction between physical health and aging, normal age-related changes and common chronic illnesses associated with old age. Students will focus on methods of evaluating the health status and needs of the elderly in relation to planning and evaluating multidisciplinary programs. Prerequisite(s): UNT PSYC 5070 or consent of department. Offered each Spring.

**6060. Clinical Human Anatomy.**

4 SCH. An online (distributed learning) anatomy course offered through WebCT Vista. This course will have laboratories based on digital images taken from cadavers at the UNTHSC anatomy facilities. The course is divided into eight regions and topics covered will include the following: 1) back and suboccipital triangle; 2) upper extremity; 3) lower extremity; 4) head and neck I; 5) head and neck II; 6) thorax; 7) abdomen; and 8) pelvis and perineum. Clinically significant topics for each region will be addressed with an emphasis on the neurological feature of the particular manifestation. Offered each Fall and Spring semester. Limited enrollment. Cross-listed as CGEN 6060.

**6820/6830. Health Psychology Preceptorship.**

3 hours. Practical experience that will focus on the integration of the Health Psychologist with the Primary Care Physician, where the Health Psychologist functions as an important member of the primary care team in a manner that overcomes managed care barriers to this integration. The goal is for the student-doctor to achieve an advanced degree of competence in skills, knowledge, judgment, and ethics that will allow for the development of a greater understanding and identification with the role of the professional Clinical Health Psychologist. Offered each semester.

**6110. Developmental Neurobiology.**

3 hours. Molecular and cellular events underlying neuronal differentiation, axon guidance, synapse formation, neurotrophic factors, and neural death, with special emphasis on activity-dependent plasticity and its role in generating and maintaining transient or long-lasting and precise connections and circuits as found in the nervous system.

**6210. Clinical Neuropsychology and Cognitive Rehabilitation.**

4 hours. An overview of neurocognitive disorders including methods for diagnostic differentiation, theoretical foundations, research methodology, clinical methods, clinical applications, and current issues. Recent advances and research in the theoretical models of neurocognitive rehabilitation will be considered, along with the development of methods for targeted interventions, monitoring progress and treatment outcomes. Prerequisite(s): UNT PSYC 6420 or consent of department. Offered each Spring.

**6250. Human Neuroanatomy.**

3 hours. Introduction to the anatomical organization and basic functional principles of the major sensory, motor, associational, and modulatory systems of the human brain. Students learn to identify visually specific structures on slides, magnetic resonance images (MRI), and dissected brain specimens in relation to neural pathways and system interconnections. This course provides an understanding of the function of each major brain system in relation to the organization and synaptic connections of their principal nuclei as well as to neurological disorders associated with disease or lesions at specific locations.

**6410. Basic and Clinical Pharmacology.**

4 SCH. Medical Pharmacology is a course designed for graduate students in the biomedical sciences and presents an introduction to major drugs used for the treatment and prevention of disease. The course begins with an overview of the general principles of pharmacology, including major concepts of pharmacodynamics (drug action) and pharmacokinetics (drug time course, dosing). The remainder of the course examines the major classes of drugs that modify the functioning of the autonomic, cardiovascular, central nervous, hematopoietic, and endocrine systems; antibiotics and NSAIDs are also covered. Emphasis is placed on the therapeutic use and mechanism of action of major drugs by class. The format of the course is student self-directed study supported by interactive sessions with faculty. Cross-listed with PHRM 6410. Offered each Fall.

**6610. Psychology Research Seminar and Practicum.**

4 hours. Will focus on the initiation, conduct and consummation of advanced research projects, as well as dialogues related to the art and practice of publishing. The purpose of the practicum is twofold: to engender an appreciation for scholarship and to engage students in research projects that have a high probability of resulting in journal publications. Prerequisite(s): doctoral standing in psychology. May be repeated for credit. Offered each semester.

**6710. Neurobehavioral Toxicology.**

3 hours. This course is an examination of a range of environmental determinants that can be toxic to the human condition. It will consider recent advances and research on the implications of chemical exposure, nutrition, radiation, and various pollutants to neuropsychological, behavioral, and other processes and health risks. Offered each Spring.

**6720. Psychophysiological Processes.**

4 hours. A review of current psychophysiological methods, principles and research. Emphasis is on electrodermal, cardiovascular, electromyographic and electrocortical measurement in research on arousal, attention, stress, adaptation, emotion, personality and health. Prerequisite(s): UNT PSYC 5790 or consent of department. Offered each Fall.

**6770. Biofeedback Methods and Behavioral Medicine.**

4 hours. An introduction to and overview of biofeedback and self-regulation, including experimental foundations, research methodology, clinical methods, clinical applications and current issues. Laboratory work includes supervised practice in the design and implementation of biofeedback training programs for individuals from both normal and deviant populations. Prerequisite(s): PSYC 6720 or consent of department. Offered each Spring.

**6780. Cardiovascular Behavioral Medicine.**

3 hours. An in-depth examination of current issues and research in cardiovascular behavioral medicine, emphasizing cardiovascular measurement, research methods, individual differences and biobehavioral perspectives on the pathophysiology, assessment and treatment of cardiovascular diseases. Prerequisite(s): PSYC 6720 or consent of department. Offered each Spring.

**6810. Treatment Outcomes in Health Care.**

3 hours. This course provides students with the basic knowledge and skills to effectively design and implement treatment outcome measurement strategies in health care settings. The course will also provide computer instruction to facilitate the effectiveness of treatment outcome measurement. Students will learn about the various settings in which outcome measurement occurs, such as family medicine clinics, pain centers, hospitals, pharmaceutical industries, and psychiatric facilities. Database management, quality control, and analysis of health care data will be demonstrated. Students will develop and analyze a simulated treatment outcome database of their own and present their findings in class. Offered each Fall.

**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.

**6920. Functional Human Anatomy.**

3 hours. Introduction to anatomical organization and physiological mechanisms in humans. The focus will emphasize physiological and structural factors in major medical disorders.

**6950. 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.

## **Integrative Physiology (PSIO)**

### **5100. Cardiovascular Physiology I.**

3 hours. Designed to familiarize the student with current concepts and progress in human cardiovascular function with an emphasis on the heart. Topics include molecular basis of myocardial contraction, electrochemical coupling, regulation of myocardial mechanics and ventricular performance, the coronary circulation, myocardial ischemia, cardiac failure, and neural control of the heart and coronary circulation. Course format includes lectures, student presentations, term paper, and examinations. Prerequisite: BMSC 5600, 5610, 5700, 5710. Offered every other Fall (even years).

### **5110. Cardiovascular Physiology II.**

3 hours. Continuation of PSIO 5100 with emphasis on the circulation. Topics include capillary and lymphatic dynamics, control of blood pressure, splanchnic blood flow, regulation of cardiac output and specific cardiovascular perturbations. Prerequisites: BMSC 5600, 5610, 5700, 5710 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 include pulmonary mechanics and blood flow. Respiratory blood gases and neurohumoral control of ventilation. Course format includes lectures, student presentations, term paper, and examinations. Prerequisite: BMSC 5600, 5610, 5700, 5710. 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. Course format includes lectures, student presentations, term paper, and examinations. Prerequisite: BMSC 5600, 5610, 5700, 5710. Offered every other Spring (even years).

### **5400. Molecular Genetics of Cardiac and Vascular Disease.**

3 hours. 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. Course format includes lectures, student presentations, term paper, and examinations. Prerequisites: BMSC 5600, 5610, 5700, 5710. 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.

### **6010. Functional Genomics and Proteomics.**

3 hours. The purpose of this course is to introduce students to concepts and methods used in defining a database of tissue specific and disease specific protein expression. Topics to be discussed include: 1) genome mining; 2) transcriptome mining and validation; 3) proteome mining by 2-dimensional gel electrophoresis, mass spectrometry and protein chips; 4) protein structure determination; 5) protein structure prediction based on gene sequence; 6) protein function prediction and analysis; 7) protein-protein interactions; and 8) protein localization. Cross-listed with CGEN 6020.

### **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. Course format includes lectures, student presentations, term paper, and examinations. Prerequisites: BMSC 5600, 5610, 5700, 5710. 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. Course format includes lectures, student presentations, term paper, and examinations. Offered every other Summer (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. Course format includes lectures, student presentations, term paper, and examinations. Prerequisites: BMSC 5600, 5610, 5700, 5710 and PSIO 5100. 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 and fuel selection; ATP synthesis, intracellular transport and utilization; myocardial ischemia-reperfusion injury; cardiac stunning and hibernation; mechanisms of cardiac cell death and cardioprotection; free radical biochemistry in the heart. Course format includes lectures, student presentations, term paper, and examinations. Prerequisites: BMSC 5600, 5610, 5700, 5710. 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 and 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 on demand.

**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.

**5900-5910. Special Problems.**

1-3 hours. 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.

**6300. Advanced Molecular Biology.**

3 hours. Course designed for students familiar with basic molecular biology. Lectures emphasize modern paradigms in molecular biology.



## Osteopathic Manipulative Medicine (OMM)

### **5510. Introduction to Osteopathic Research and Studies.**

3 hours. This course is intended to introduce the student to clinical research project design, institutional procedures for review and approval of research involving human subjects, ethical principles of clinical research, and proper implementation and conduct of clinical trials. Prerequisite: BMSC 5960. Offered Fall and Spring semesters.

### **5540. Clinical Research Colloquium.**

1 hour. This colloquium course will explore the practical issues of clinical research, review of journal articles and is presented in a seminar format. Speakers will include UNTHSC faculty, invited guests and student participants. Offered Fall and Spring semesters.

### **5900. Special Problems in Clinical Research.**

3 hours. An individualized problem under the direction and supervision of a graduate faculty mentor. Offered each semester.

### **5910. Special Problems in Clinical Education.**

3 hours. An individualized problem under the direction and supervision of a graduate faculty mentor. Offered each semester.

### **5940. Seminar in Current Topics.**

1 hour. Topics are selected for in-depth study by the student's major professor and graduate advisor. Topics may cover clinical, mechanistic, and educational aspects of manual/manipulative and musculoskeletal medicine in human and animal models. Students are expected to complete a concept or literature review paper on the topics. May be repeated for credit. Offered Fall and Spring.

### **6000. Current Topics in Musculoskeletal Medicine.**

1 hour. Topics are selected by the student's major professor and graduate advisor. Topics include basic science and clinical research and education aspects of manual/manipulative and musculoskeletal medicine in human and animal models. May be repeated for credit. Offered each semester.

## Pharmacology and Neuroscience

### **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).

### **5100. Neurobiology of Aging.**

3 hours. This course will serve as an introduction to the aging nervous system and age-related nervous system diseases. The course will include lectures by experts in the field of neurobiology of aging and discussion of selected topics in the field. By the completion of the course, the student should have a working knowledge of major issues that drive research in the neurobiology of aging. Prerequisites: 5600, 5610, 5700, and 5710. Offered every other Fall (odd years).

### **5200. Intracellular Calcium Signaling.**

1 hour. The course is intended for senior graduate students and will cover recent advances in physiology, anatomy, cell biology and molecular biology relevant to intracellular calcium signaling. By the completion of the course, students will have a working knowledge of current areas of interest in research into intracellular calcium signaling. Offered each fall and 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.

**6000. Functional Neuroscience.**

4 hours. Intended for second year and more senior graduate students, this course will cover all major areas of neuroscience research. By the completion of the course, students will have a working knowledge of all major disciplines of neuroscience providing the basis for advanced courses. Offered each Fall.

**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. 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).

**6040. Psychiatric Disorders: From Bench to Bedside (including Substance Use).**

3 hours. This advanced course will focus on the neurological basis of psychiatric disorders. A primary goal of the course is to integrate basic research and clinical findings. All disorders will be discussed at the molecular, cellular, systems and behavioral levels. Each lecture, following the introduction, will focus on a specific neuropsychiatric disorder, including Schizophrenia, Attention Deficit Hyperactivity Disorder, Autism, Tourette's Syndrome, Obsessive Compulsive Disorder, Unipolar Depression and Bipolar Disorder. Other lecture specific topics may include various forms of substance use/abuse (e.g., nicotine, alcohol, cocaine/methamphetamine, hallucinogens and marijuana). A college level knowledge of basic chemistry, cell physiology and anatomy is required. The format of the course will be a formal lecture followed by an informal discussion. Participation in class discussion is essential. Offered every other Fall (even 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 (odd years).

**6410. Basic and Clinical Pharmacology.**

4 hours. Medical Pharmacology is a course designed for graduate students in the biomedical sciences and presents an introduction to major drugs used for the treatment and prevention of disease. The course begins with an overview of the general principles of pharmacology, including major concepts of pharmacodynamics (drug action) and pharmacokinetics (drug time course, dosing). The remainder of the course examines the major classes of drugs that modify the functioning of the autonomic, cardiovascular, central nervous, hematopoietic, and endocrine systems; antibiotics and NSAIDs are also covered. Emphasis is placed on the therapeutic use and mechanism of action of major drugs by class. The format of the course is student self-directed study supported by interactive sessions with faculty. Cross-listed with PSYC 6410. Offered each Fall.

**6500. Botanical Medicines and Biotechnology.**

1 hour. This advanced course will focus on the use of chemicals isolated from plants and other natural sources for medicinal purposes. A primary goal of the course is to integrate basic research and clinical/industrial findings. Each lecture, following the historical introduction will focus on a specific aspect of natural products research: identification of botanicals, isolation and characterization of chemical components, methods of testing, industry regulations and market barriers, and uses. A college level knowledge of basic biology, chemistry, physiology and pharmacology is recommended. The format of the course will be a formal lecture for the first half an hour followed by an informal discussion for the last half hour. Participation in class discussion is an essential part of the course. The reading assignments will vary from week to week, but can include textbook chapters, review articles, journal articles, and seminal or current peer-reviewed research reports. Offered on demand.

**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 and Spring.

# 10 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 at publication date.

[Click here](#) to search the faculty database by keyword.

## Faculty

**ALVAREZ-GONZALEZ, RAFAEL**, Associate Professor of Biomedical Sciences. PhD, University of North Texas. (III)

**ANDERSON, WARREN**, Associate Professor of Education. EdD, Indiana University. (I)

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

**AVILA, MATTHEW**, Assistant Professor of Health Psychology, Ph.D. University of Maryland Baltimore County. (II).

**AWASTHI, SANJAY**, Professor of Molecular Biology & Immunology. M.D., University of Texas Southwestern. (III)

**AWASTHI, YOGESH**, Professor of Molecular Biology & Immunology. Ph.D., University of Lucknow, India. (III)

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

**BERG, RANCE**, Assistant Professor of Molecular Biology and Immunology. PhD, University of Colorado Health Science Center. (III)

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

**BUCHANAN, STEVE**, Associate Professor  
2006-07 Catalog

Obstetrics and Gynecology. D.O., Texas College of Osteopathic Medicine. (I)

**BUDD, MICHAEL**, Assistant Professor of Education, PhD, Michigan State University. (I)

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

**CALANDER, NILS**, Research Associate Professor of Molecular Biology & Immunology. Ph.D., Chalmers University of Technology. (I)

**CAMMARATA, PATRICK**, Professor of Cell Biology and Genetics. PhD, Hunter College, City University of New York. (III)

**CARDARELLI, ROBERTO**, Assistant Professor of Family and Community Medicine. D.O., Texas College of Osteopathic Medicine. (I)

**CARROLL, JOAN**, Assistant Professor of Integrative Physiology. PhD, University of Florida. (III)

**CRUSER, DES ANGES**, Associate Professor of Manipulative Medicine. PhD, Oklahoma State University (II)

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

**DIBAS, ADNAN**, Research Assistant Professor in Pharmacology and Neuroscience. PhD, University of North Texas Health Science Center at Fort Worth. (I)

**DILLON, GLENN H.**, Professor of Pharmacology and Neuroscience. 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)

**FAIRCHILD, THOMAS**, Associate Professor of School of Public Health. PhD, Wayne State University.

**FLING, JOHN A.**, Associate Professor of Allergy/Immunology. MD, University of North Texas Health Science Center at Fort Worth. (II)

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

**FRANKS, SUSAN**, Assistant Professor of Family Medicine. PhD, University of North Texas. (III)

**FULDA, KIMBERLY**, Research Instructor of Family Medicine, DrPH, University of North Texas Health Science Center at Fort Worth. (I)

**GATCH, MICHAEL B.**, Research Assistant Professor of Pharmacology and Neuroscience. PhD, Utah State University. (I)

**GLADUE, Brian**, Director, Office for the Protection of Human Subjects. PhD, Michigan State University. (II)

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

**GRYCZYNSKI, IGNACY**, Professor of Cell Biology and Genetics. PhD, University of Gdansk, Institute of Experimental Physics. (III)

**GRYCZYNSKI, ZYGMUNT**, Professor of Molecular Biology and Immunology. PhD, University of Gdansk, Institute of Experimental Physics. (III)

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

**HALL, JAMES R.**, Associate Professor of Internal Medicine. PhD, University of Nevada-Reno. (III)

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

**HODGE, LISA**, Research Assistant Professor of Molecular Biology and Immunology. PhD, University of North Texas Health Science Center at Fort Worth. (II)

**HUANG, REN-QI**, Research Assistant Professor of Pharmacology and Neuroscience. PhD, Shanghai Institute of Physiology. (I)

**JIANG, YI WEI**, Associate Professor of Cell Biology & Genetics. Ph.D., University of Utah . (III)

**JONES, HARLAN**, Assistant Professor of Molecular Biology and Immunology. PhD, University of North Texas Health Science Center at Fort Worth. (II)

**JUNG, MARIANNA**, Research Assistant Professor of Pharmacology and Neuroscience. Ph.D. University of North Texas Health Science Center at Fort Worth (II)

**KAMAN, ROBERT**, Professor of Biomedical Sciences. JD, Texas Wesleyan University. PhD, Virginia Polytechnic Institute (II)

**KIM, MYOUNG**, Research Assistant Professor of Molecular Biology and Immunology. PhD, University of North Texas Health Science Center at Fort Worth.

**KING, GEORGE**, Research Associate Professor of Pharmacology and Neuroscience. PhD, SUNY at Stony Brook.

**KING, HOLLIS**, Associate Professor of Family Medicine and Osteopathic Manipulative Medicine. D.O., Texas College of Osteopathic Medicine; PhD, Louisiana State University (II)

**KNEBL, JANICE**, Associate Professor of Internal Medicine. DO, Philadelphia College of Osteopathic Medicine. (II)

**KOULEN, PETER**, Professor of Pharmacology and Neuroscience. PhD, Max-Planck-Institute for Brain Research. (III)

**KRISHNAMOORTHY, RAGHU R.**, Research Assistant Professor of Pharmacology and Neuroscience. PhD, University of Bombay. (I)

**KUDCHODKAR, BHALCHANDRA J.**, Research Associate Professor of Molecular Biology and Immunology. PhD, University of Saskatchewan. (II)

**LACKO, ANDRAS G.**, Professor of Molecular Biology and Immunology. PhD, University of Washington. (III)

**LEMKE, HENRY**, Assistant Professor of Family Medicine. PA, Saint Francis College. (I)

**LICCIARDONE, JOHN**, Professor of Family Medicine. DO, Kirksville College of Osteopathic Medicine. (III)

**LUEDTKE, ROBERT R.**, Associate Professor of Pharmacology and Neuroscience. PhD, University of Pennsylvania. (III)

**MA, RONG**, Assistant Professor of Integrative Physiology. MD, PhD, University of Nebraska Medical Center (III)

**MACHU, TINA**, Associate Professor of Pharmacology and Neuroscience. PhD, University of Texas at Austin (III)

**MALLET, ROBERT T.**, Associate Professor of Integrative Physiology. PhD, George Washington University. (III)

**MARTIN, MICHAEL W.**, Assistant Professor of Pharmacology and Neuroscience. PhD, University of Texas at Houston. (III)

**MATHEW, PORUNELLOOR**, Associate Professor of Molecular Biology and Immunology. PhD, University of Poona. (III)

**MATHEW, STEPHEN**, Research Assistant Professor of Molecular Biology and Immunology. PhD, University of Jabalpur. (II)

**McCLAIN, ROBERT**, Department of Biomedical Sciences. Ph.D, University of North Carolina at Chapel Hill. (I)

**NAIR, MAYA**, Research Assistant Professor of Molecular Biology and Immunology. PhD, University of Kerala. (I)

**NIZZI, FRANK**, Associate Professor of Pathology. D.O., Texas College of Osteopathic Medicine. (I)

**OGLESBY, MICHAEL W.**, Professor of Pharmacology and Neuroscience. PhD, State University of New York at Buffalo. (III)

**PESKA, DON**, Associate Professor of Surgery. DO, University of Osteopathic Medicine Health. (I)

**PLANZ, JOHN**, Associate Professor of Pathology and Anatomy. PhD, University of North Texas. (III)

**PROKAI, LASZLO**, Welch Professor of Molecular Biology and Immunology. PhD, University of Veszprem. (III)

**PROKAI-TATRAI, KATALIN**, Research Assistant Professor of Pharmacology & Neuroscience. PhD, University of Veszprem (II).

**RAVEN, PETER B.**, Professor of Integrative Physiology. PhD, University of Oregon. (III)

**REEVES, RUSTIN**, Assistant Professor of Cell Biology and Genetics. PhD, University of North Texas Health Science Center at Fort Worth. (II)

**ROSALES, ARMONDO**, Instructor of Cell Biology and Genetics. M.D., University of Santo Thomas. (I)

**ROUTH, ROBERT**, Assistant Professor of Cell Biology & Genetics. PhD, Louisiana State University Health Science Center. (II)

**RUBIN, BERNARD**, Professor of Medicine. DO, Chicago College of Osteopathic Medicine. (II)

**RYBALCHENKO, VOLODYMYR**, Research Assistant Professor of Pharmacology and Neuroscience. PhD, Academy of Sciences of Ukraine (II)

**SCHALLER, FREDERICK**, Associate Professor of Internal Medicine. DO, Michigan State University, College of Osteopathic Medicine. (I)

**SCHETZ, JOHN**, Associate Professor of Pharmacology and Neuroscience. PhD, University of Florida (III)

**SCHRANZ, DAMON**, Assistant Professor in Family Medicine. D.O., University of North Texas Health Science Center, Texas College of Osteopathic Medicine. (I)

**SHEEDLO, HAROLD**, Assistant Professor of Cell Biology and Genetics. PhD, Memphis State University. (III)

**SHI, XIANGRONG**, Associate Professor of Integrative Physiology. PD, Yale University. (III)

**SIEDE, WOLFRAM**, Associate Professor of Cell Biology and Genetics. PhD, University of Frankfurt (III)

**SIMECKA, JERRY W.**, Professor of Molecular Biology and Immunology. PhD, University of Alabama at Birmingham. (III)

**SIMPKINS, JAMES**, Professor of Pharmacology and Neuroscience. PhD, Michigan State University. (III)

**SINGH, MEHARVAN**, Assistant Professor of Pharmacology and Neuroscience. PhD, University of Florida. (III)

**SMITH, MICHAEL L.**, Associate Professor of Integrative Physiology. PhD, University of North Texas. (III)

**SMITH-BARBARO, PEGGY**, Assistant Professor of Family Medicine. PhD, Rutgers University. (II)

**SPELLMAN, CRAIG**, Associate Professor of Internal Medicine. DO, Texas College of Osteopathic Medicine, Ph.D. University of North Texas (I)

**STOKELY, MARTHA**, Research Assistant Professor of Pharmacology & Neuroscience. PhD, University of North Texas Health Science Center. (II)

**STOLL, SCOTT**, Associate Professor of Manipulative Medicine. DO, PhD, University of North Texas Health Science Center at Fort Worth. (III)

**SUMIEN, NATHALIE**, Research Assistant Professor of Pharmacology and Neuroscience. PhD (I)



**TROUTMAN, MONTE E.**, Associate Professor in Department of Medicine. D.O., Chicago College of Osteopathic Medicine. (II)

**VIRGILIO, RICHARD**, Assistant Professor of Family Medicine. DO, Des Moines University – Osteopathic Medical Center. (II)

**VISHWANATHA, JAMBOOR**, Professor of Molecular Biology and Immunology. PhD, University of South Carolina (III)

**WARREN, JOSEPH**, Assistant Professor of Pathology and Anatomy. PhD, University of North Texas. (II)

**WEIS, STEPHEN**, Professor of Internal Medicine. DO, College of Osteopathic Medicine-DesMoines. (III)

**WILLIAMS, STUART**, Assistant Professor of Manipulative Medicine. DO, University of North Texas Health Science Centeat Fort Worth. (I)

**WILLIAMSON, PHILLIP**, Assistant Professor of Pathology and Anatomy. PhD, University of North Texas (I)

**WORDINGER, ROBERT**, Professor of Cell Biology and Genetics. PhD, Clemson University. (III)

**YANG, SHAOHUA**, Assistant Professor of Pharmacology and Neuroscience. PhD, University of North Texas Health Science Center. (III)

**YORIO, THOMAS**, Professor of Pharmacology and Neuroscience. PhD, Mt. Sinai School of Medicine. (III)

**YURVATI, ALBERT**, Professor of Surgery. DO, University of North Texas Health Science Center at Fort Worth. (II)

**GRYCZYNSKI, IGNACY**, Professor of Cell Biology and Genetics. PhD, University of Gdansk, Institute of Experimental Physics. (III)

**CLARK,**

**ABBOTT**, Adjunct Faculty in Molecular Biology and Immunology. PhD, Case Western Reserve University. (III)

**COLLIER, ROBERT**, Adjunct Faculty in Cell Biology and Genetics. PhD, University of Rochester. (III)

**COURTNEY, JOHN**, Adjunct Faculty in Family Medicine. PsyD, Illinois School of Professional Psychology. (I)

**CRIDER, JULIE**, Adjunct Faculty in Biomedical Sciences. PhD, University of North Texas Health Science Center at Fort Worth. (I)

**DOSTER, JEANNETTE**, Adjunct Faculty in Family Medicine. PhD, University of Georgia. (I)

**FAZIO, RONALD**, Adjunct Faculty in Cell Biology and Genetics. MBA, University of Texas at Arlington. (I)

**GARNER, MARGARET**, Associate Professor of Cell Biology and Genetics. PhD, Indiana University. (III)

**GARNER, WILLIAM**, Adjunct Faculty in Cell Biology and Genetics. PhD, Indiana University. (I)

**HAYES, CHRISTOPHER**, Adjunct Faculty in Biomedical Sciences. PA-C, Chicago City College, Cook County Hospital. (I)

**JAMISON, JEFFREY**, Adjunct Faculty in Cell Biology & Genetics. PhD, University of Michigan. (I)

**L ICHTMAN, DAVID**, Adjunct Faculty in Cell Biology & Genetics. MD, State University of New York Downstate Medical Center. (I).

**McCARTNEY, MITCHELL**, Adjunct Faculty in Cell Biology and Genetics. PhD, Dalhousie University. (I)

**MOTLEY, TRAVIS**, Adjunct Faculty in Cell Biology & Genetics. DPM, Des Moines University – College of Podiatric Medicine and Surgery. (I)

**NANA, A RVIND**, Adjunct Faculty in Cell Biology & Genetics. MD, University of Texas Medical Branch. (I)

**PANG, IOKHOU**, Adjunct Faculty in Pharmacology and Neuroscience. PhD, University of Texas Southwestern Medical Center at Dallas. (III)

**PRASANNA, GANESH**, Adjunct Faculty in Pharmacology & Neuroscience. PhD, (II)

**RAJAGOPALAN, MALINI**, Adjunct Faculty in Biomedical Sciences. PhD, (III)

**RATKA, ANNA**, Adjunct Faculty in Pharmacology & Neuroscience. PhD., Poznan University of Medical Sciences (III)

**REDDIX, ROBERT**, Adjunct Faculty in Cell Biology & Genetics. MD, Baylor College of Medicine. (I)

## Adjunct Faculty

**ARR RENDONDO, LACHELLE**, Adjunct Faculty in Biomedical Sciences. PhD, Rice University. (I)

**BENS, ANNITA VERSTAPPEN**, Adjunct Faculty in Biomedical Sciences. PhD, University of North Texas at Denton. (II)

**BERGAMINI, MICHAEL**, Adjunct Faculty in Pharmacology and Neuroscience. PhD, Mt. Sinai School of Medicine. (III)

**BUNATA, ROBERT**, Adjunct Faculty in Cell Biology & Genetics. MD, Northwestern Univeristy Medical School. (I)

**ROQUE, ROUEL**, Associate Professor of Cell Biology and Genetics. MD, University of the Philippines. (III)

**SHARIF, NAJ**, Adjunct Faculty in Pharmacology and Neuroscience. PhD, University of Southampton. (III)

**SHEPARD, ALLAN**, Adjunct Faculty in Cell Biology and Genetics. PhD, University of Iowa. (III)

## Emeritus Faculty

**Coy, Marion E., D.O.**  
Professor Emeritus, Manipulative Medicine

**Elko, Edward E., Ph.D.**  
Professor Emeritus, Pharmacology

**Harris, Elizabeth, Ph.D.**  
Associate Professor Emeritus  
Molecular Biology and Immunology

**Jenkins, William R., D.O.**  
Professor Emeritus, Surgery

**Korr, Irvin M., Ph.D.**  
Professor Emeritus, Manipulative Medicine

**Lal, Harbans, Ph.D.**  
Professor Emeritus, Pharmacology

**Ogilvie, Charles D., D.O.**  
Professor Emeritus, Medical Humanities

**Schunder, Mary, Ph.D.**  
Professor Emeritus, Anatomy and Cell Biology

**Stern, Paul A., D.O.**  
Professor Emeritus, Anesthesiology

**Walker, Lee J., D.O.**  
Professor Emeritus, Obstetrics and Gynecology

**Wilkins, Frederick M., D.O.**  
Professor Emeritus, Radiology

**Zachary, Eugene T., D.O.**  
Professor Emeritus, Family Medicine

## Professional Library Faculty

**Broyles, Kathy, M.L.S., A.H.I.P.**  
Reference Librarian;  
B.S. Texas A&M, Commerce,  
M.L.S. Texas Woman's University

**Burgard, Daniel E., M.S.L.I.S., A.H.I.P.**  
Senior Director for Public Services; Assistant Professor, Medical Education;  
B.S. and M.S.L.I.S. University of Illinois at Urbana-Champaign

**Carter, Bobby R., M.S.(L.S.)**  
Associate Vice President for Information Resources;  
Executive Director, Lewis Library; Associate Professor, Medical Education;  
B.S. University of Houston,  
M.S. Louisiana State University

**Crenshaw, Clayton**  
Access Services Librarian;  
M.S.L.S. University of North Texas,  
M.M. and B.M.E. Baylor University

**Elam, Craig S., M.L.S., A.H.I.P.**  
Senior Director for Technical Services; Assistant Professor, Medical Education;  
A.B. Stanford University,  
M.L.S. University of California at Berkeley

**Jamie L. Furrh, M.I.S.**  
Digital Projects Librarian  
MIS University of North Texas  
BA University of Texas at San Antonio

**Mason, Timothy D., M.L.S.**  
Technical Services Librarian; Instructor, Medical Education;  
B. A. University of Cincinnati,  
M.L.S. University of North Texas

**Smith, Lisa, M.L.S.**  
Outreach Librarian for Public Services; Assistant Professor, Medical Education;  
B.A. Texas Tech University,  
M.L.S. University of North Texas

**White, Sherry, M.L.S.**  
Serials Librarian; Instructor, Medical Education;  
B.A. Southwest Texas State University,  
M.L.S. University of Texas at Austin

# Officers and Staff

## Board of Regents

**Gayle W. Strange**, Chair, Denton  
**Charles D. Mitchell**, Dallas  
**Marjorie Craft**, Desoto  
**Robert A. Nickell**, Dallas  
**Burle Pettit**, Lubbock  
**John Robert "Bobby" Ray**, Plano  
**Al Silva**, San Antonio  
**C. Dan Smith**, Plano  
**Rice M. Tilley, Jr.**, Fort Worth  
Diana Schulz, Student Regent, Fort Worth

## University of North Texas System

**Lee Jackson, M.P.A.**, Chancellor  
**Daniel M. Jensen**, Vice Chancellor for Governmental Affairs  
**Richard Escalante**, Vice Chancellor for Administrative Services

## Administration

**Scott Ransom, D.O.**  
President

**Steve R. Russell**  
Executive Vice President, Finance and Administration

**Thomas Yorio, Ph.D.**  
Executive Vice President, Academic Affairs and Research

**J. Warren Anderson, Ed.D.**  
Dean, School of Health Professions

**Marc B. Hahn, D.O.**  
Dean, Texas College of Osteopathic Medicine  
Vice President for Health Affairs

**Richard Kurz, Ph.D.**  
Dean, School of Public Health

**Jamboor Vishwanatha, Ph.D.**  
Dean, Graduate School of Biomedical Sciences

**Greg Upp**  
Vice President, Institutional Coordination  
Interim Vice President, Institutional Advancement

**Randall Jones, MPA, FACHE, CMPE**  
President, UNT Health

**Stephen R. Oeffner, CPA**  
Associate Vice President, Finance

**Thomas Fairchild, Ph.D.**  
Associate Vice President for Strategic Management

**Thomas Moorman, Ph.D.**  
Associate Vice President, Student Affairs

**Pam McFadden**  
Associate Vice President  
Professional and Continuing Education

**Bobby R. Carter, MLS**  
Associate Vice President  
Information Resources & Director, Library

**Glenn Dillon, Ph.D.**  
Associate Vice President, Research

**Rand Horsman**  
Assistant Vice President, Human Resource Services

## Graduate Council

### **Jamboor K. Vishwanatha, Ph.D., Chair**

Dean  
Graduate Advisor, Biomedical Sciences, Clinical Research  
Management, Biotechnology and Medical Science

### **Robert Kaman, J.D., Ph.D.**

Associate Dean and Director of Outreach

### **Patricia Gwartz, Ph.D.**

Assistant Dean  
Graduate Advisor, Clinical Research Management,  
Biotechnology and Medical Science

### **Alakananda Basu, Ph.D.**

Graduate Advisor, Cancer Biology

### **Rance Berg, Ph.D.**

Graduate Advisor, Microbiology and Immunology

### **Roberto Cardarelli, M.P.H., D.O.**

Graduate Advisor, Primary Care Clinical Research

### **Christine des Anges Crusier, Ph.D.**

Graduate Advisor, Clinical Research and Education  
(Osteopathic Manipulative Medicine)

### **Fred Downey, Ph.D.**

Graduate Advisor, Integrative Physiology

### **Richard Easom, Ph.D.**

Graduate Advisor, Biochemistry & Molecular Biology

### **Michael Forster, Ph.D.**

Graduate Advisor, Neurobiology of Aging

### **Susan Franks, Ph.D.**

Graduate Advisor, Health Psychology

### **Robert Mallet, Ph.D.**

Graduate Advisor, Cardiovascular Science

### **John V. Planz, Ph.D.**

Graduate Advisor, Forensic Genetics

### **Wolfram Siede, Ph.D.**

Graduate Advisor, Cell Biology and Genetics

### **Meharvan "Sonny" Singh, Ph.D.**

Graduate Advisor, Pharmacology and Neuroscience

### **Robert Wordinger, Ph.D.**

Graduate Advisor, Visual Science

### **Diana Schulz**

Graduate Student Association President

### **Reem Arafeh**

Graduate Student Association Vice President

## Ex-Officio Members

### **Bobby Carter**

Director of the Library

### **Carla J. Lee**

Director of Biomedical Sciences Admissions and Services

## Graduate School of Biomedical Sciences

### Office of the Dean

**Jamboor K. Vishwanatha, Ph.D.,** Dean

**Patricia Gwartz, Ph.D.,** Assistant Dean

**Carolyn Polk,** Academic Curriculum Coordinator

**Annie Mathew,** Administrative Specialist

### Office of Admissions and Services

**Carla J. Lee,** Director

**Jan Sharp,** Sr. Admissions Associate

**Amanda Griffith,** Admissions Associate

### Office of Outreach

**Robert Kaman, J.D., Ph.D.,** Associate Dean and Director of  
Outreach

**Elizabeth Davis, M.Ed.,** Associate Director of Outreach

**Nicki McGee,** Project Coordinator for MKITS

**Minnie Zavala,** Executive Assistant