

The University of Texas
MD Anderson Cancer Center
UTHealth Graduate School of
Biomedical Sciences

General Information Section
2018 – 2020 Catalog

THE UNIVERSITY OF TEXAS
MD Anderson
~~Cancer Center~~[®]



Graduate School of Biomedical Sciences

The University of Texas Health Science Center at Houston (UTHealth) is accredited by the Southern Association of Colleges and Schools Commission on Colleges to award certificate, baccalaureate, masters, doctoral, and professional degrees. Contact the Commission on Colleges at 1866 Southern Lane, Decatur, Georgia 30033-4097 or call 404-679-4500 for questions about the accreditation of The University of Texas Health Science Center at Houston.

The University of Texas MD Anderson Cancer Center is accredited by the Southern Association of Colleges and Schools Commission on Colleges (SACS) to award baccalaureate, masters, and doctoral levels. Contact the Commission on Colleges at 1866 Southern Lane, Decatur, Georgia 30033-4097 or call 404-679-4501 for questions about the accreditation of The University of Texas MD Anderson Cancer Center.

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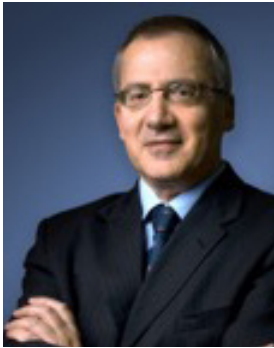
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Welcome from the UT Health Science Center President



Giuseppe N. Colasurdo, M.D.
President

Welcome to UTHealth and to this pivotal next step in your academic career. You have chosen an educational institution that places its value in your success and your fulfillment; that invests in you as a person. These next years will be both challenging and enriching, and will prepare you to make significant contributions in your chosen professional field.

UTHealth is the most comprehensive academic health center in The University of Texas System and educates more than 5,000 health professionals every year. Our School of Dentistry is more than 100 years old and rich in tradition; our Graduate School of Biomedical Sciences offers an innovative curriculum of postgraduate training in partnership with The University of Texas MD Anderson Cancer Center; our McGovern Medical School is one of the largest in the nation and is home to Houston's renowned faculty practice, UT Physicians; our School of Biomedical Informatics offers a first-of-its-kind curriculum critical to improving health delivery, quality and safety; our School of Public Health has a statewide presence with six campuses; and our Cizik School of Nursing is ranked among the top five percent in the nation.

Training at UTHealth will also provide you access to a broad patient population as well as opportunities to collaborate with students and faculty from all six of our schools, our affiliated partners and our neighboring institutions. Upon completion of your training, you will find that your classmates have become your lifelong friends and colleagues; your advisors and professors will have become your mentors.

As you join the UTHealth family, know that you have tremendous resources at your service. The faculty and staff are here to provide you with more than education – we are also here to support and guide you on your professional journey. In return, I ask that you give us your very best – for your benefit and for the benefit of your classmates. We need bright young minds like yours to provide innovative solutions to the most pressing health problems of our time. I know that you will make us proud.

Thanks to each of you for trusting us with your education and, again, welcome to UTHealth.

Sincerely,

Giuseppe N. Colasurdo, M.D.

President

The University of Texas Health Science Center at Houston

Welcome from the UT MD Anderson Cancer Center President



Peter WT Pisters, M.D.
President

Thank you for taking the next steps of your training and development journey with us at The University of Texas MD Anderson Cancer Center.

In partnership with our University of Texas System sister institution and Texas Medical Center neighbor, UTHealth, we are proud to offer an array of programs through the MD Anderson Cancer Center UTHealth Graduate School of Biomedical Sciences. This robust collaboration enables graduate students to pursue doctoral and master's degrees in diverse biomedical concentrations while benefitting from the experience and unique insights of scientists in the areas of greatest interest to them.

MD Anderson faculty members, in partnership with their UTHealth colleagues, augment a rich multidisciplinary learning environment that provides an array of resources as well as opportunities for expert mentorship. Because MD Anderson is home to so many talented professionals at the forefront of their fields and focused on a singular mission, graduate students here can readily access groundbreaking research, leading practices and our latest discoveries.

Our goal is to unlock the potential, creativity and passion of not only our 20,000 employees but also our students and trainees. Our Graduate School of Biomedical Sciences helps us to do just that. Please explore and tap into the incredible resources and pathways available to you, and our graduate school team and MD Anderson faculty will support you every step of the way.

I join Drs. Michelle Barton and Michael Blackburn, deans of the MD Anderson Cancer Center UTHealth Graduate School of Biomedical Sciences, in wishing you well as you pursue your degree and a productive, difference-making biomedical sciences career. We are pleased you're here.

Sincerely,

Peter WT Pisters, M.D.

President

The University of Texas MD Anderson Cancer Center

BOARD OF REGENTS

Officers

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Paul L. Foster
Vice Chairman

Jeffery D. Hildebrand
Vice Chairman

Francie A. Frederick
General Counsel to the
Board of Regents

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Terms Expire February 1, 2019

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El Paso

Jeffery D. Hildebrand
Houston

Ernest Aliseda
McAllen

Term Expires May 31, 2019

Brittany Jewell
(Student Regent), Houston
Student Regent serves a one-year term.

Terms expire February 1, 2021

R. Steven Hicks
Austin

David J. Beck
Houston

Sara Martinez Tucker
Dallas

Terms expire February 1, 2023

Janiece Longoria
Houston

James C. "Rad" Weaver
San Antonio

Kevin P. Eltife
Tyler

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Executive Vice Chancellor for Business
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Affairs

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Executive Vice Chancellor for
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Dean
School of Public Health

Barbara J. Stoll, M.D.
Dean
McGovern Medical School

Jiajie Zhang, Ph.D.
Dean
School of Biomedical Informatics

Michelle C. Barton, Ph.D.
Michael R. Blackburn, Ph.D.
Dean
UT MD Anderson Cancer Center
UTHealth Graduate School of
Biomedical Sciences

**Diane M. Santa Maria, Dr.P.H., M.S.N.,
R.N., A.P.H.N.-B.C.**
Ad interim Dean
Cizik School of Nursing

The University of Texas MD Anderson Cancer Center

Peter WT Pisters, M.D.
President

Giulio Draetta, M.D., Ph.D.
Ad interim Chief Scientific Officer
Senior Vice President,
“Therapeutics and Discovery”

Diane C. Bodurka, M.D., M.P.H.
Vice President for Education

Michelle C. Barton, Ph.D.
Michael R. Blackburn, Ph.D.
Dean
UT MD Anderson Cancer Center
UTHealth Graduate School of
Biomedical Sciences

**William Undie, Ed.D. and
Peter Hu, Ph.D.**
Ad Interim Co-Deans, School of
Health Professions

MISSION AND VISION STATEMENTS OF UTHealth

Teaching, Searching, Serving

Mission Statement

As a comprehensive health science university, the mission of The University of Texas Health Science Center at Houston (UTHealth) is to educate health science professionals, discover and translate advances in the biomedical and social sciences, and model the best practices in clinical care and public health.

We pursue this mission in order to advance the quality of human life by enhancing the diagnosis, treatment, and prevention of disease and injury, as well as promoting individual health and community well-being.

To fulfill our mission, UTHealth:

1. Educates health professionals and scientists in a diverse interdisciplinary academic community.
2. Creates and evaluates new knowledge – through basic science and applied research – as it relates to disease prevention, treatment, and cure.
3. Provides leadership and advances scholarship in biomedical sciences, health professions, health promotion, public health policy and health care delivery.
4. Models appropriate and compassionate clinical care.
5. Addresses the health needs of the community at large through public health expertise, information, outreach and service.
6. Develops the expanding field of health information science.

Vision Statement

“Excellence above all” in the quest to be an acknowledged leader in the collaboration to treat, cure, and prevent the most common diseases of our time through education, research and clinical practice.

The University of Texas Health Science Center at Houston aspires to be a leader in the collaborative effort to treat, prevent, and cure the most common diseases of our time by:

1. Utilizing the distinctive capabilities of its schools, clinics, institutes, and centers;
2. Collaborating with colleagues in The University of Texas System, the Texas Medical Center, and throughout the world;
3. Being an academic health science center that is nationally and internationally recognized in teaching, research, and service;
4. Serving as a home for the visionaries and scholars who will lead the way in defining and creating the future of the health sciences; and
5. Providing a diverse work environment that is ethically-based, service-oriented, and community-sensitive.

MISSION, VISION & CORE VALUES OF MD ANDERSON

Eliminating Cancer in Texas, the Nation and the World

Mission

The mission of The University of Texas MD Anderson Cancer Center (MD Anderson) is to eliminate cancer in Texas, the nation and the world through outstanding programs that integrate patient care, research and prevention, and through education for our undergraduate and graduate students, trainees, professionals, employees and the public.

Vision

We shall be the premier cancer center in the world, based on the excellence of our people, our research-driven patient care and our science. We are Making Cancer History™.

Core Values

Caring

By our words and actions we create a caring environment for everyone.

- We are sensitive to the concerns of our patients and our co-workers.
- We are respectful and courteous to each other at all times.
- We promote and reward teamwork and inclusiveness.

Integrity

We work together to merit the trust of our colleagues and those we serve.

- We hold ourselves, and each other, accountable for practicing our values.
- We communicate frequently, honestly and openly.
- By our actions, we create an environment of trust.

Discovery

We embrace creativity and seek new knowledge.

- We help each other to identify and solve problems.
- We seek personal growth and enable others to do so.
- We encourage learning, creativity and new ideas.

UTHEALTH GENERAL INFORMATION

History of The University of Texas System

The idea of a University of Texas is as old as the State. The Texas Declaration of Independence lists as one of its main indictments against the government of Mexico the fact that “it has failed to establish any public system of education...” Several early attempts were made to establish a state university, but they were not successful because of the Civil War and subsequent Era of Reconstruction. Establishment of a state university for Texas was provided first by act of the State Legislature in 1881. It provided for the location of the institution by popular vote and for appointment of a Board of Regents to be entrusted with its organization and governance. By results of an election in September 1881, the site of the main university was designated as Austin and Galveston was chosen as the location for the Medical Branch. An undergraduate college and law school was established and The University of Texas formally opened on September 15, 1883.

Educating students, providing care for patients, conducting groundbreaking basic, applied and clinical research, and serving the needs of Texans and the nation for more than 130 years, UT System is one of the largest public university systems in the United States. Numerous campuses, schools, colleges, divisions and branches have been added to The University of Texas System at several locations throughout the state. The System now includes academic campuses in Arlington, Austin, Dallas, El Paso, Midland/Odessa (UT Permian Basin), San Antonio, Rio Grande Valley, and Tyler. The health science centers are located at Dallas, Galveston, Houston, San Antonio and Tyler. The University of Texas MD Anderson Cancer Center is located in Houston.

Other components of the System include the Institute of Texas Cultures (UT San Antonio), the Institute for the Medical Humanities (UT Medical Branch, Galveston), the Environmental Science Park near Smithville (UT MD Anderson Cancer Center), the Marine Science Institute in Port Aransas (UT Austin), the McDonald Observatory at Fort Davis (UT Austin), and the Shriners Burn Institute (in conjunction with UT Medical Branch, Galveston).

The University of Texas Health Science Center at Houston

The University of Texas Health Science Center at Houston (UTHealth) was established in late 1972 to administer and provide for the operation of the several biomedical and health-related units located in the city through the integration and coordination of functions and activities. UTHealth presently includes, by order of establishment:

- 1905 School of Dentistry (originally as the Texas Dental College)
- 1963 UT MD Anderson Cancer Center UTHealth Graduate School of Biomedical Sciences (2016 name change)
- 1967 School of Public Health
- 1970 McGovern Medical School (2016 name change to John P. and Kathrine G. McGovern Medical School)
- 1972 Cizik School of Nursing (2017 name change to Jane and Robert Cizik School of Nursing)
- 1973 School of Biomedical Informatics (originally as the School of Allied Health Sciences)
- 1990 Harris County Psychiatric Center
- 1995 Brown Foundation Institute of Molecular Medicine for the Prevent of Human Diseases

As a component of The University of Texas System, UTHealth is subject to The University of Texas System Board of Regents -- Rules and Regulations for the governance of The University of Texas System.

The official name of the institution is The University of Texas Health Science Center at Houston. It is informally termed UTHealth or the Health Science Center.

Today, UTHealth employs approximately 2,000 faculty and 6,000 staff with more than 5,000 students enrolled in various health and biomedical disciplines at its component schools in Houston and at campuses located in Austin, Brownsville, Dallas, El Paso, and San Antonio.

UTHealth Addresses*

School of Dentistry

7500 Cambridge St.
Houston, TX 77054

McGovern Medical School

Medical School Building
6431 Fannin
Houston, TX 77030-1503

**UT MD Anderson Cancer Center
UTHealth Graduate School of
Biomedical Sciences**

6767 Bertner Ave., Rm 3.8344
Houston, TX 77030

School of Biomedical Informatics

(University Center Tower)
7000 Fannin, Suite 600
Houston, TX 77030

Cizik School of Nursing

6901 Bertner
Houston, TX 77030

**School of Public Health -
Houston Main Campus**

(Reuel A. Stallones Building)
1200 Herman Pressler
Houston, TX 77030-3900

Child Development Center

7900 Cambridge
Houston, TX 77054-5500

Jesse Jones HAM - TMC Library

1133 John Freeman Blvd.
Houston, TX 77030

Harris County Psychiatric Center

2800 S. MacGregor Way
Houston, TX 77021

**Brown Foundation Institute of
Molecular Medicine for the Prevention
of Human Diseases**

1825 Hermann Pressler St.
Houston, TX 77030

Recreation Center

7779 Knight Road
Houston, TX 77054

Registrar Office

(University Center Tower)
7000 Fannin, Suite 2250
Houston, TX 77030

Bursar Office

(University Center Tower)
7000 Fannin, Suite 2220
Houston, TX 77030

**Student Health and
Counseling Services**
6410 Fannin, Suite 1010
Houston, TX 77030

UTHealth Administrative Offices
(University Center Tower)
7000 Fannin
Houston, TX 77030

UT Police Department
7777 Knight Road
Houston, TX 77054

UTHealth Professional Building
6410 Fannin
Houston, TX 77030

*Unless otherwise clearly posted or expressed by an authorized official of The University of Texas Health Science Center at Houston (UTHealth), the various UTHealth facilities and locations are open only to persons with legitimate business purposes requiring presence at such facilities and locations. UTHealth allows only agents of UTHealth, employees acting within the scope of their employment with UTHealth, the Student InterCouncil, and other registered student, faculty, and staff organizations to solicit on the grounds, sidewalks, or streets of the UTHealth campus or in any building, structure, or facility owned, controlled, or operated by UTHealth.

On August 1, 2016 the “Campus Carry Law” went into effect permitting licensed holders to carry a concealed handgun on or about the license holder’s person while the license holder is on the campus, subject to certain restrictions as described in HOOP Policy 222, Concealed Handguns on Campus. “Open carry” of handguns is not permitted on the university campus or premises located on the campus.

Possession of firearms on university premises is strictly regulated.

- Long guns (i.e., rifles and shotguns) are prohibited in university buildings at all times except if carried by police officers.
- Texas law forbids the open carrying of handguns on university premises at all times except by police officers.
- Only holders of a Texas License to Carry a Handgun may carry concealed handguns on or about their person in limited areas at UTHealth, as specified in HOOP Policy 222 Concealed Handguns on Campus. Full policy found at uth.edu/hoop/policy.htm?id=aeb4da95-c86f-4e39-af0b-f7b6e4d228f2. All persons on UTHealth property are subject to the policy.

Institutional Governance

Institutional governance at The University of Texas Health Science Center at Houston is supported by a system of councils and standing committees. As a whole, these councils enhance communication both vertically and horizontally within the university; enable leaders and constituent representatives from each of the major mission areas to participate in exchange of information and decision making; and incorporate ideas and points of view from a variety of students, faculty and staff in the decision-making process. Deliberations and recommendations from councils provide assistance to executive leadership of the university as they make decisions about the university’s future and well-being. The University Executive Council is responsible for advising the President on key issues related to institutional governance and operations.

Development Board

The University of Texas Health Science Center at Houston Development Board consists of approximately 180 community leaders who have committed to advance the mission and vision of the health science center by increasing public awareness and philanthropic support through advocacy, service and investment.

UTHEALTH CENTERS, PROGRAMS AND INSTITUTES

A variety of interdisciplinary centers and programs have been created to enrich the academic and research efforts while the institutes provide opportunities for special multidisciplinary educational projects. These efforts reinforce UTHealth's commitment to providing a means through which the health professions may join with each other and with society to consider health-related issues.

A comprehensive listing can be found at uth.edu/index/institutes-centers.htm. Inquiries for more detailed information should be directed to the appropriate school.

John P. McGovern, M.D., Center for Humanities and Ethics

Established in 2004, The John P. McGovern, M.D. Center for Humanities and Ethics promotes excellence in scholarship and teaching in the medical humanities and ethics. It provides an interdisciplinary forum where scholars, students, physicians, and other health care professionals examine questions of value and meaning in search of ethically sound and spiritually informed patient care. Appropriately, the Center bears the name of John P. McGovern, M.D. (1921-2007) who founded the American Osler Society and throughout his lifetime championed the importance of the compassionate art of medicine.

The McGovern Center is housed in McGovern Medical School but serves all six schools at UTHealth. Drawing from bioethics, history, health law, spirituality, literature and the arts, the Center directs several required courses across the campus. It also organizes numerous elective courses, lectures, research seminars, and faculty workshops and provides consultation services. It provides opportunities for collaborative research and professional development for students, residents and faculty. The Center collaborates with other academic institutions in Houston including Rice University, UT MD Anderson Cancer Center, and the University of Houston, as well as the Museum of Fine Arts and the Jung Center.

In 2005 the Center created the Sacred Vocation Program (SVP) for the healthcare industry. This experiential program includes both personal and workplace transformational workshops with the goal of reconnecting healthcare professionals to the vocation and enabling workplaces to nurture their employees. To date the SVP has been implemented in health care systems and social service agencies throughout the United States. It has also become a required element in several McGovern Medical School residency programs.

In 2009, the Center launched a Campus-Wide Ethics Program to enhance the ethics and professionalism curricula at each of the six schools of UTHealth. Effective in 2011, all UTHealth students are required to take an introductory ethics and professionalism curriculum called "The Brewsters". The Brewsters, available online, is a choose-your-own adventure three-act experience where students immerse themselves as fictional characters caught up in ethical dilemmas.

The Center also sponsors a Postdoctoral Program which draws from a national pool of applicants. It welcomes two Postdoctoral Fellows for two years. The Fellows spend their time teaching and working in Center programs and pursuing their own research and scholarship.

Website: med.uth.edu/mcgovern/

The University of Texas Harris County Psychiatric Center

The University of Texas Harris County Psychiatric Center (HCPC) opened in 1986 and is the only acute care, public psychiatric facility in Harris County serving persons with debilitating chronic mental illness. It is fully accredited by The Joint Commission, which recognized HCPC as a Top Performer in Key Quality Measures for 2015.

HCPC is dedicated to excellence and leadership in the treatment of persons with mental illness. It shares UTHealth's additional missions of conducting research into the causes and cures of mental illness, providing education of professionals in the care of mental illness and acting as a community resource providing outreach to the community.

- HCPC and the McGovern Medical School Department of Psychiatry & Behavioral Sciences offers a comprehensive program of in-patient (HCPC) and outpatient (Department of Psychiatry & Behavioral Sciences) diagnostic and treatment services for:
- Adults 18 and up with bipolar disorder, depression, schizophrenia, dementia, psychosocial or personality disorders; and
- Children and adolescents, ages 3 through 17, with depression, bipolar disorder, schizophrenia, personality disorders, attention deficit disorders and hyperactivity disorders.

HCPC's treatment programs offer individualized treatment plans; individual and group counseling and therapy; family participation; discharge planning and community follow-up referrals. In 2015, HCPC established geriatric psychiatry and ECT services (including outpatient treatment). HCPC utilizes a multidisciplinary team approach, including, as needed, psychiatrists, nurses, residents, psychologists, social workers, clinical programming therapists, dietitians and clergy.

HCPC serves more than 9,000 in-patients annually. Additionally, approximately 2,000 students receive practical experience in the fields of medicine, psychiatry, psychology, nursing, social work, pharmacy, and recreational therapy.

HCPC, in cooperation with The Harris Center, formerly the Mental Health and Mental Retardation Authority of Harris County, also operates an active forensic competency restoration unit, providing care for those incarcerated by the Harris County Sheriff's Office in the Harris County Jail as well as other jail facilities throughout the area.

Website: hcpc.uth.edu/

THE UNIVERSITY OF TEXAS MD ANDERSON CANCER CENTER GENERAL INFORMATION

Celebrating more than seven decades of Making Cancer History®, The University of Texas MD Anderson Cancer Center (MD Anderson) is located in Houston on the sprawling complex of the Texas Medical Center. It is one of the world's most respected centers devoted exclusively to cancer patient care, research, education and prevention.

MD Anderson was created by the Texas Legislature in 1941 as a component of The University of Texas System, and has over 1,700 faculty (M.D. and Ph.D.). MD Anderson is one of the nation's original three Comprehensive Cancer Centers designated by the National Cancer Act of 1971 and, today is one of 47 Comprehensive Cancer Centers.

For 14 of the past 17 years, including 2018, MD Anderson has ranked No. 1 in cancer care in the "best hospitals" survey published by U.S. News & World Report.

Patient Care

Since 1944, more than 1 million patients have turned to MD Anderson for cancer care in the form of targeted therapies, surgery, chemotherapy, radiation and proton therapy, immunotherapy or combinations of these and other treatments. The multidisciplinary approach to treating cancer was pioneered at MD Anderson. This brings together teams of experts across disciplines to collaborate on the best treatment plan for patients. And because MD Anderson's experts focus solely on cancer, they're renowned for treating all types of cancer, including rare and uncommon diseases.

In Fiscal Year 2017, close to 37,000 patients, about one-third of them new patients, sought care at MD Anderson. About one-third of patients come to Houston from outside Texas, seeking the research-based care that has made MD Anderson so widely respected. MD Anderson's clinical trials that explore novel therapies and diagnostic tests continues to be one of the largest such programs in the nation..

MD Anderson holds accreditation from the Joint Commission on Accreditation of Healthcare Organizations (JCAHO) and has Magnet Nursing Services Recognition from the American Nurses Credentialing Center, the highest international award for nursing excellence.

Research

At MD Anderson, important scientific knowledge gained in the laboratory is rapidly translated into clinical care. Overall, MD Anderson's research program is considered one of the most productive efforts in the world aimed solely at cancer.

In FY17 MD Anderson invested more than \$844 million in research. The institution ranks first in the number of research grants awarded and total amount of grants given by the National Cancer Institute and holds 10 NCI Specialized Programs of Research Excellence (SPORE) grants.

Our Moon Shots Program was launched in 2012 to dramatically accelerate the pace of converting scientific discoveries into clinical advances that reduce cancer deaths. The program brings together multidisciplinary groups of researchers and clinicians to mount comprehensive attacks on cancers. They'll work as part of 13 moon shot teams: acute myeloid leukemia and myelodysplastic syndrome, B-cell lymphomas, chronic lymphocytic leukemia, breast cancer, colorectal cancer, glioblastoma, human papilloma virus-related cancers, lung cancer, melanoma, multiple myeloma, pancreatic cancer, prostate cancer, and ovarian cancers.

Ten moon shots platforms provide infrastructure, technology and expertise for the Moon Shots Program: Adaptive patient-oriented longitudinal learning and optimization (APOLLO), big data, cancer prevention and control, cancer genomics laboratory, center for co-clinical trials, immunotherapy, proteomics, Institute for Applied Cancer therapy, adoptive cell therapy, and Oncology research for biologics and immunotherapy translation (ORBIT).

Creation of the Institute for Applied Cancer Science has expanded MD Anderson's research endeavors. The institute's goal is to identify and validate new cancer targets, convert the scientific knowledge into new small-molecule cancer drugs, and advance the novel agents into innovative clinical trials through a streamlined collaboration between academic medicine and the biotechnology industry.

The new Sheikh Khalifa Bin Zayed Al Nahyan Institute for Personalized Cancer Therapy is an international center of clinical excellence focusing on using the latest advances in genetic information to develop safer, more effective treatments for patients on a case-by-case basis.

The McCombs Institute for the Early Detection and Treatment of Cancer comprises seven translational research centers focused on genomics, proteomics, screening, diagnostic imaging and drug development. They include the Cancer Metastasis Research Center, Center for Cancer Immunology Research, Robert J. Kleberg Jr. and Helen C. Kleberg Center for Molecular Markers, Proton Therapy Center, Center for Advanced Biomedical Imaging Research, Center for Targeted Therapy and Center for RNA Interference and Non-Coding RNAs.

In the Institute for Basic Science, researchers are working to better understand the makeup of healthy human cells, how they function under normal conditions and what happens when cancer develops. This knowledge will feed directly into clinical research, prevention, diagnosis and treatment.

Education

In FY17, more than 7,100 trainees, including physicians, scientists, nurses, and allied health professionals took part in MD Anderson educational programs. The institution's School of Health Professions offers 10 bachelor's programs and two master's programs in allied health disciplines.

More than 1,700 clinical residents and fellows come to MD Anderson each year to receive specialized training in the investigation and treatment of cancer. More than 400 graduate students are working on advanced degrees at the Graduate School of Biomedical Sciences, which MD Anderson operates with The University of Texas Health Science Center at Houston. The institution's laboratories provide training for 1,800-plus research fellows.

Thousands more participate in continuing education and distance learning opportunities sponsored by MD Anderson, sharing knowledge around the globe. The institution also provides public education programs to teach healthy people and at-risk populations about cancer symptoms and risk factors.

Prevention

MD Anderson continues to set the standard in cancer prevention research and the translation of new knowledge into innovative, multidisciplinary care.

The institution's Cancer Prevention and Population Sciences division is dedicated to:

- Ending cancer through pioneering research into the roles that biologic, genetic, environmental, economic, behavioral and social factors play in cancer development.
- Investigating various types of interventions to prevent or reduce cancer risk.
- Improving cancer care delivery, safety, availability and affordability.

Through the Duncan Family Institute for Cancer Prevention and Risk Assessment, the division invests in promising new research directions and integrating basic research and clinical studies to accelerate their translation from the clinic to the community.

The Department of Health Services Research focuses on studying health care costs, quality and access, and seeking ways to improve health care delivery, safety, availability and affordability.

The Lyda Hill Cancer Prevention Center provides cancer risk assessments, screening exams based on genetics, age and gender, and personalized risk-reduction strategies, including chemoprevention.

Human Resources

MD Anderson employs over 19,500 people, including more than 1,700 faculty. A volunteer corps of about 1,100 onsite and 2,000 off-site people supplements its workforce; these volunteers provide more than 120,000 hours of service each year. Faculty, staff and volunteers are dedicated to MD Anderson's mission of eliminating cancer as a major health threat.

The institution's faculty members are among the most esteemed in the nation, including one Nobel Laureate, ten members of the Health and Medicine Division of the National Academies of Sciences, Engineering and Medicine, four Academy of Arts and Sciences fellows and 48 American Association for the Advancement of Sciences fellows.

Facilities

With employees working in more than 50 buildings in the greater Houston area and in central Texas, MD Anderson is the largest freestanding cancer center in the world. Its facilities in the Texas Medical Center cover more than 15 million square feet and feature the latest equipment and facilities to support growing needs in outpatient and inpatient care, research, prevention and education.

MD Anderson is committed to facilitating the application of laboratory findings to cancer prevention, diagnosis, and treatment. Exchanges between basic scientists and clinical investigators are facilitated so discoveries may be applied to the clinic. In planning facilities, MD Anderson has placed clinical and basic science investigators in close proximity to further foster interdisciplinary collaboration.

Website: mdanderson.org/

MD Anderson Addresses

The University of Texas MD Anderson Cancer Center (Street Address)

1515 Holcombe Blvd.
Houston, Texas 77030

The University of Texas MD Anderson Cancer Center (Mailing Address)

P.O. Box 20334
Houston, Texas 77225-0334

**The University of Texas MD Anderson Cancer Center UTHealth
Graduate School of Biomedical Sciences**

Office of the Dean
6767 Bertner Ave.,
Rm 3.8344Houston, Texas 77030

MD ANDERSON CENTERS, PROGRAMS AND INSTITUTES

Center for Advanced Biomedical Imaging Research

Current imaging processes can identify diseased organs, but often not until the disease is advanced and harder to treat. Likewise, because small changes that reflect early response to therapy cannot be easily distinguished, it can be difficult to determine whether a treatment is effective early on.

The center's researchers and physicians will overcome these problems by developing and applying new, more sensitive molecular imaging agents for positron-emission tomography (PET), contrast computed tomography (CT), and magnetic resonance imaging (MRI) techniques.

Advances in imaging allow physicians to select appropriate treatments and determine within hours or days (instead of many months) the effectiveness of cancer therapy.

Website: mdanderson.org/education-and-research/research-at-md-anderson/early-detection-and-treatment/centers/center-for-advanced-biomedical-imaging/index.html

Center for Biological Pathways

The Center for Biological Pathways at MD Anderson focuses on laboratory research to understand how molecular pathways function and how their dysregulation causes cancer, and makes cancer cells spread.

Cancer is caused by the abnormal functioning of critical genes. The tools and methods of basic science research are the key to discovering and understanding how the fundamental processes that go wrong in cancer work. MD Anderson is well positioned to not only bring the key questions from the clinic to basic cancer research, but also to translate laboratory discoveries back into clinical trials. New information from basic science—such as studies of the underlying cellular and molecular structures and processes of life, DNA, genes and alterations, stem cells, cell metabolism and signaling pathways—bring together the pieces of the cancer puzzle when combined with clinical insights.

The Center for Biological Pathways coordinates the interaction of Center members, all of whom work to unravel novel molecular and cellular pathways within their oncologic specialty. This coordination expedites the translation of laboratory discoveries into clinical research. The Center provides state-of-the-art shared resources and an intellectual environment to facilitate interactions, stimulate genius, and expedite research outcomes.

Website: mdanderson.org/cbp

Center for Cancer Epigenetics

The Center for Cancer Epigenetics (CCE) brings together faculty members focused on epigenetics, the study of heritable and acquired changes that affect gene expression and cellular differentiation without DNA sequence alteration. Epigenetic changes are now thought to be just as important as gene mutations in cancer development. The ultimate goal of the center is to define the full spectrum of epigenetic changes that occur in cancers, to discover the molecular causes of these changes, and to translate that newly gained knowledge into the clinic in the form of novel, epigenetic based therapies. Members of the center include faculty from several basic research and clinical departments at MD Anderson, including our Smithville campus, as well as Baylor College of Medicine.

Website: mdanderson.org/cancer-epigenetics

Center for Cancer Immunology Research

The Center for Cancer Immunology Research (CCIR) is a one of a kind research program where laboratory and clinical immunologists work side by side to translate groundbreaking discoveries in basic immunology into the development of innovative immunotherapies that employ our immune system to eliminate cancer and prevent its recurrence.

CCIR investigators have made remarkable progress in the number of high-quality publications, level of research support, and number of investigator-initiated pre-clinical studies/clinical trials.

Website: mdanderson.org/ccir

Center for Environmental and Molecular Carcinogenesis

The Center for Environmental and Molecular Carcinogenesis (CEMC) provides state-of-the-art technologies and an intellectual framework to foster multidisciplinary research into the environmental, genetic and epigenetic factors that influence the initiation and progression of cancer. Environmental factors, which include diet and other lifestyle factors, are known to be involved in the etiology of most cancers. Aims are to define the step-wise molecular and cellular alterations that occur during the process of carcinogenesis; determine how environmental exposures cause key genetic mutations and epigenetic changes that underlie carcinogenesis, and discover the impact of environmental factors on the generation and maintenance of cancer stem cells. The overall goal of this research is to identify new targets and strategies for cancer prevention and treatment. This center fosters collaborations among researchers at the MD Anderson Smithville, Texas, and Houston campuses.

Website: mdanderson.org/cemc

Center for Genetics and Genomics

The Center for Genetics and Genomics focuses on establishing synergy in genetics and genomics research at MD Anderson.

One of the mechanisms to accomplish this is to bring together researchers to present and discuss current research, exchange ideas for future funding and goals and to disseminate pertinent data and genetic models that emphasize MD Anderson's unique research environment.

The Center for Genetics and Genomics is one of seven centers within the Institute for Basic Science at MD Anderson. Each center works on a research theme that encourages participation and interaction among basic, translational and clinical faculty members.

Website: mdanderson.org/cgg

Center for Inflammation and Cancer

The Center for Inflammation and Cancer (CIC) was established in late 2008 and is one of several interdisciplinary research centers in the MD Anderson Institute for Basic Science. Inflammation has been closely linked with various cancers. The goal of the CIC is to provide an interactive platform across MD Anderson and the Texas Medical Center to study cross-regulation of inflammatory cell types and tumor microenvironments and the underlying molecular mechanisms using both animal models and patient samples.

Website: mdanderson.org/cic

Center for RNA Interference and Non-Coding RNAs

The Center for RNA Interference and Non-Coding RNAs (RNA Center), established under the Red and Charline McCombs Institute for the Early Detection and Treatment of Cancer, is a unique collaborative initiative among MD Anderson Cancer Center, Baylor College of Medicine, the University of Texas Health Science Center at Houston, Rice University and the University of Houston that will focus on gaining insights into the roles of newly discovered RNAs in cancer initiation, progression and dissemination. The Center drives discovery of molecular markers of cancer by evaluating, co-developing facilitating and disseminating novel ncRNA technology.

Website: mdanderson.org/rnacenter

Center for Stem Cell and Developmental Biology

The Center for Stem Cell and Developmental Biology (CSCDB) provides a platform for interactions between researchers interested in the biology of normal and aberrant (cancer) stem cells, regeneration and differentiation. The members of the center take diverse approaches toward a thorough understanding of stem cells, with an ultimate goal of therapeutic attack on cancers. These efforts are not limited to the 40-plus laboratories across 15 different departments of the UT MD Anderson Cancer Center, but are being coordinated across the Texas Medical Center to include researchers at Baylor College of Medicine and the UTHealth Institute for Molecular Medicine.

The Center for Stem Cell and Developmental Biology has three major goals: to understand how tumor-derived stem cells become aggressive cancers, to develop stem cells for use in regenerative therapies, and to determine basic mechanisms of differentiation and development.

Website: mdanderson.org/scdb

Center for Targeted Therapy

The center's goal is to produce or identify drugs that treat the carcinogenic, genetic and molecular changes that lead to cancer. Designer drugs are developed to attack defects in cancerous and pre-cancerous cells. Molecular and genetic defects in cancer cells can reveal targets specific

to each patient, which will be the object of drugs designed to destroy the malignant cells. These targets will also be the next frontier in cancer prevention, allowing physicians to correct or destroy cells with defects before they become a health threat.

Progress in technologies such as genomics and proteomics and sophisticated bioinformatics analyses has provided the tools and knowledge needed to enhance the design and application of novel cancer therapeutics.

Some of the genetic “abnormalities” found in individual tumors and blood can serve as “cancer markers” that will help researchers identify the genetic profile of each patient’s cancer and develop an individualized approach that will be both more effective and less toxic.

Website: mdanderson.org/ctt

Duncan Family Institute for Cancer Prevention and Risk Assessment

The Duncan Family Institute for Cancer Prevention and Risk Assessment, formed in 2008 through a generous gift from the Duncan Family, is advancing the science and practice of cancer prevention by accelerating the discovery and translation of new knowledge about cancer risk factors and developing innovative ways to reduce risk and prevent cancer while expanding our studies to attack multiple risk factors using complementary strategies. The Duncan Family Institute serves to foster collaboration aimed at breaking new ground in cancer prevention. Scientists affiliated with the Institute are discovering the roles and effects of the interaction of biologic, genetic, environmental, behavioral and social factors in cancer development, investigating new medical and lifestyle interventions and the effect of the combination of these on reducing cancer risk, and increasing the pace of translation of discovery to the clinic and the community so that, ultimately, the benefits of our discoveries help reduce the overall burden of cancer.

Website: mdanderson.org/duncanfamilyinstitute

Institute for Applied Cancer Science

MD Anderson is known for providing cancer patients with exceptional care, which includes early access to innovative new treatments through clinical trials. The Institute for Applied Cancer Science (IACS) is a new hybrid model that uniquely combines the drug discovery capabilities of the biopharmaceutical industry and the extensive knowledge of biology found in academia with the expertise of MD Anderson’s top clinicians to develop new therapeutic options.

IACS executes programs with the highest probability of clinical success in a rigorous, goal-oriented, data-driven manner. Employing the Bench at the Bedside approach IACS uniquely integrates three key components:

- Access to insights gained from the largest set of cancer patients and some of the best physician scientists in the nation
- Highly experienced team of drug discovery and development scientists
- Clinically informed, patient-oriented research focused on the endpoint of delivering impactful clinical responses

Website: mdanderson.org/applied-cancer-science

Institute for Basic Sciences

The Institute for Basic Sciences' goal is to accelerate scientific discoveries by recruiting outstanding laboratory scientists and creating a collaborative environment in which our faculty have access to state-of-the-art core facilities and participate in theme- and/or disease-oriented symposia and retreats. The Institute serves as a catalyst for faculty to exchange ideas and to solve critical problems that apply to fundamental aspects of cancer biology and lead clinical aspects in treating patients.

The director, co-directors and members of the Centers for Research Excellence are faculty in basic science departments at MD Anderson, including the Departments of Cancer Biology, Epigenetics and Molecular Carcinogenesis, Genetics, Immunology, and Molecular and Cellular Oncology.

Institute investigators are also actively involved in graduate education programs at The University of Texas MD Anderson Cancer Center UTHealth Graduate School of Biomedical Sciences (GSBS).

Website: mdanderson.org/basicsci

The Institute for Cancer Care Innovation

The Institute for Cancer Care Innovation studies new and existing models of cancer care delivery and reimbursement. Its programs are based around the principles of value-based health care delivery that focuses on the outcomes and costs of care. The Institute, formerly known as the Institute for Cancer Care Excellence, was created in 2008 to demonstrate the value of MD Anderson's research-driven multidisciplinary care. The Institute has been at the forefront nationally and internationally for its innovative approaches to measurement of the value of our cancer care delivery system.

With programs designed to measure the outcomes and costs of the care we provide, the Institute provides essential strategies for maintaining MD Anderson's preeminent position as the nation's No. 1 provider of cancer care in the United States.

Website: mdanderson.org/education-and-research/research-at-md-anderson/cancer-care-innovation/index.html

Sheikh Khalifa Bin Zayed Al Nahyan Institute for Personalized Cancer Therapy

The MD Anderson Cancer Center Sheikh Khalifa Bin Zayed Al Nahyan Institute for Personalized Cancer Therapy was created to support preclinical research and clinical trials in which a patient's tumor biopsy is assayed for abnormal genes and gene products to select therapy with agents targeting the product of those particular abnormal genes. This integrated research and clinical trials program is aimed at implementing personalized cancer therapy and improving patient outcomes. A number of events have converged creating a "perfect storm" offering the opportunity to make a bold leap forward in personalizing cancer care. Personalized cancer therapy includes all aspects of individualized patient management driven by characterization of tumor, microenvironment and host characteristics including diagnosis, surgery, chemotherapy, targeted therapy, radiation therapy, and immunological manipulation either alone or in concert.

Website: mdanderson.org/education-and-research/research-at-md-anderson/cancer-care-innovation/index.html

The Red and Charline McCombs Institute

The McCombs Institute brings together leaders in biomedical research to focus on molecular-based approaches to cancer diagnosis and management.

The research centers in the McCombs Institute and throughout MD Anderson generate vast amounts of data on the relationships of specific genes and gene abnormalities with the development and progression of specific cancers. This data, coupled with the expertise and analysis provided by our Division of Quantitative Sciences, enables identification of critical steps in the cancer development process and the development of new diagnostic tests and cancer drugs to target them.

The McCombs Institute is bringing together thought leaders in six key areas of biomedical research to focus on molecular-based approaches to cancer diagnosis and treatment.

- Metastasis Research Center
- Center for Cancer Immunology Research
- Center for Radiation Oncology Research
- Center for Advanced Biomedical Imaging
- Center for Targeted Therapy
- Center for RNA Interference and Non-coding RNAs

Website: mdanderson.org/education-and-research/departments-programs-and-labs/programs-centers-institutes/mc-combs-institute-for-the-early-detection-and-treatment-of-cancer/index.html

Metastasis Research Center

The Metastasis Research Program (MRP) advances knowledge and research in the progression and spread of cancer. The Metastasis Research Center (MRC) is a multidisciplinary center run in parallel to MRP. The MRP/MRC consists of 30+ members from diverse departments contributing their knowledge to the field of metastasis biology. All major tumor sites are included in the MRP/MRC and members of the MRP/MRC are also members of other centers and programs throughout the institute; this leads to cross-fertilization of ideas and resources.

The main objectives are to 1) provide educational opportunities in the biology of metastasis, and 2) to provide support for novel research ideas. The MRP/MRC sponsors an annual retreat that is held in early December of each year.

The MRP/MRC examines subthemes including: 1) the tumor microenvironment, 2) genomics and genetics of metastasis, and 3) cancer stem cells and EMT.

Proton Therapy Center

Proton therapy benefits patients whose tumors are solid with defined borders, meaning the cancer has not spread to other parts of the body. The noninvasive treatment does not require surgery to remove the cancer, making it ideal for inoperable tumors.

The advantage of proton treatment is that the physician can control where the proton releases the bulk of its cancer-fighting energy. As the protons move through the body, they slow down and interact with electrons, and release energy. A physician can designate the location of the highest energy release, causing the most damage to the targeted tumor cells. A proton beam conforms to the shape and depth of a tumor, while sparing healthy tissues and organs.

The team at MD Anderson Proton Therapy Center continues to expand ways to use proton therapy to benefit patients. The team pioneered pencil beam proton therapy, also called scanning beam, and intensity modulated proton therapy (IMPT). We are one of the few centers worldwide offering these types of proton therapy to our patients.

Website: mdanderson.org/proton

Robert J. Kleberg, Jr. & Helen C. Kleberg Center for Molecular Markers

The overall research objective of the Robert J. Kleberg, Jr. & Helen C. Kleberg Center for Molecular Markers will be to identify the molecular markers that will allow a cancer specialist to diagnose cancer early and predict the response to a particular treatment. The plan is to eventually be able to create a personalized treatment for each individual patient.

A major focus of the research is characterizing the molecular changes in cancer patients' tumors by analyzing DNA, RNA and proteins in the tumors and in the blood. Molecular markers will help identify those at risk for cancer and provide information for screening and prevention measures. Doctors will also use the markers to select the best treatment with the fewest side effects for each patient.

TEXAS MEDICAL CENTER

The Texas Medical Center (TMC) is the largest comprehensive medical complex in the world. It was organized in 1945 as a means for coordinating medical and health education, patient care, and related research in a not-for-profit setting. Today it stands as the leading health care destination globally with an average of 10 million patient visits a year.

TMC comprises 21 renowned hospitals containing a total of more than 9,200 licensed beds, 14 support organizations, ten academic institutions, eight academic and research institutions, seven nursing programs, three public health organizations, three medical schools, two pharmacy schools, and a dental school. A high school for the health professions and a community college specializing in health careers training plus other graduate and post-graduate schools and programs provide training in the allied health professions. Nearly 72,000 students work and study within the TMC.

More than 160 permanent buildings, not including Rice University, occupy nearly 1,000 acres that include 15 patient care facilities and 21 academic and research institutions, housing 20,000 advanced-degreed professionals in the life sciences. There are approximately 12,000 volunteers who assist with a wide variety of tasks benefiting the TMC.

The Texas Medical Center Library (TMC Library), which serves as the accredited library for most of the TMC institutions, is recognized as one of the largest academic health sciences libraries in the U.S. In addition, research expenditures of the Texas Medical Center member institutions total about \$1.8 billion annually.

One of the most distinctive and visited locations in the Texas Medical Center is The John P. McGovern Texas Medical Center Commons amenities building, which is the central meeting and gathering place for thousands of staff, patients and visitors who frequent the campus daily. It features an exterior 64-foot waterwall; Waterside Court, which provides eight diverse food concepts; Third Coast restaurant for fine dining, meetings and special events; and a 500-space parking garage. The Graduate School of Biomedical Sciences is located next door to the Commons.

A major part of this “biomedical city” is UTHealth, the most comprehensive and diverse of the academic health institutions in the Texas Medical Center with six schools, three faculty practice plans, five institutes, myriad centers of excellence and a psychiatric hospital.

LIBRARIES

Texas Medical Center Library

The Texas Medical Center Library (TMC Library) serves as the accredited library for most Texas Medical Center institutions and is the primary library for The University of Texas Health Science Center at Houston (UTHealth) faculty and students. The Library is also home to the John P. McGovern Historical Collections and Research Center, consisting of rare books ranging from the 1500s to the early 20th century, and digital and manuscript collections related to healthcare. The mission of the library is to bring together resources, information, and expertise to provide innovative support for the acquisition, management, and delivery of biomedical knowledge to the institutions of the Texas Medical Center.

Currently, the library subscribes to 275 electronic databases, over 21,000 electronic journals, and 64,000 e-books, which are available through the library’s website after registration through the library. Major subscription databases include: Clinical Key, Psychiatry Online, Access Medicine, CINAHL, JAMA Evidence, and Visual DX. Additionally, the library provides access to an index of over 200 Open Access databases.

The library occupies substantial space in the Jesse Jones Library Building, adjacent to the McGovern Medical School and within close proximity to the other UTHealth schools. The library is open seven days, 89 hours per week. The library contains group study spaces, an open computer lab, and quiet study spaces. Library computers are equipped with Microsoft Office applications, and Wi-Fi access is available throughout the library. Liaison librarians are available to answer library-related questions, provide instruction regarding access to library resources, assist with literature search strategies, and teach classes on database and literature searching, citation management, evidence-based practice, and systemic reviews.

Website: library.tmc.edu/

Research Medical Library of MD Anderson

The Research Medical Library provides information resources and specialized services to MD Anderson faculty, staff, and all GSBS students to further the institution's programs in patient care, research, education, and prevention. The main Library is located on the 21st floor of the Pickens Academic Tower.

Research librarians provide expert searching services and consultations for a variety of projects including original research, systematic reviews, clinical guideline updates, and author metrics. Our education librarians offer webinars and face-to-face classes on best practices for searching biomedical databases, using EndNote, and current technology and tools to track citations and promote research profiles.

Collections and access librarians ensure that our robust collection of print and electronic books; electronic journals; and online databases are available both on- and off-campus including our free interlibrary loan service for those materials that fall outside our collection.

The Library is home to the Historical Resources Center (HRC), which was established in 2000 as the official archival repository for institutional records, personal papers, photographs, videos, oral history interviews, and other materials that document MD Anderson's role in advancing cancer medicine, science, and public policy. It also encompasses the History of Cancer Collection of rare books, journals, monographs, and other published material.

Website: mdanderson.org/library

ACADEMIC GENERAL INFORMATION

Degrees Offered at The University of Texas Health Science Center at Houston

School/Program	Degree	Cert.	Bach.	Mast.	Doc.
School of Dentistry	D.D.S.				X
	Oral and Maxillofacial Surgery Certificate (4 years post-DDS)	X			
	Oral and Maxillofacial Surgery Certificate/MD* (6 years post-D.D.S.) *MD degree conveyed by McGovern Medical School	X			X
	Advanced Education Programs General Practice Residency (GPR) Advanced Education in General Dentistry (AEGD) (certificate only):	X			
	M.S.D* . Endodontics, Periodontics, Prosthodontics (*M.S.D. is required in these programs in addition to the certificate); Orthodontics, Pediatric Dentistry (certificate program, M.S.D. is optional)	X			X
	B.S. in Dental Hygiene			X	
	Dental Hygiene Certificate Program	X			
MD Anderson UTHealth Graduate School of Biomedical Sciences	M.S. in Biomedical Sciences (with concentrations in Biomedical Sciences; Biochemistry and Cell Biology; Cancer Biology; Genetics and Epigenetics; Immunology; Microbiology and Infectious Diseases; Neuroscience; Quantitative Sciences; and Therapeutics and Pharmacology; Specialized MS Programs: Genetic Counseling and Medical Physics)			X	

School/Program	Degree	Cert.	Bach.	Mast.	Doc.
MD Anderson UTHealth Graduate School of Biomedical Sciences	Ph.D. in Biomedical Sciences (with concentrations in Biomedical Sciences; Biochemistry and Cell Biology; Cancer Biology; Genetics and Epigenetics; Immunology; Medical Physics; Microbiology and Infectious Diseases; Neuroscience; Quantitative Sciences; and Therapeutics and Pharmacology)				X
	Certificate (in Medical Physics)	X			
School of Biomedical Informatics	Certificate (in Public Health Informatics)	X			
	M.S. in Biomedical Informatics (Focus areas in Applied Biomedical Informatics, Biomedical Engineering, Clinical Informatics, Computational Biomedicine, Learning and Technology and Public Health Informatics)			X	
	Ph.D. in Biomedical Informatics (Focus areas in Biomedical Engineering, Clinical Informatics, Computational Biomedicine, Learning and Technology and Public Health Informatics)				X
	D.H.I. (In Health Informatics) (A new practice doctorate in health informatics will be implemented in Fall 2019. Information regarding this new doctoral degree will be posted on the school website)				
McGovern Medical School	M.D.				X
	M.S. in Clinical Research			X	
Cizik School of Nursing	B.S.N.		X		
	M.S.N.			X	
	Ph.D. (in Nursing)				X
	D.N.P.				X
School of Public Health	M.P.H. (in Public Health)			X	
	M.S. (in Public Health)			X	
	Dr.P.H. (in Public Health)				X
	Ph.D. (in Public Health)				X
	Certificate in Public Health	X			
	Certificate in Public Health Informatics	X			

Accreditation at UTHealth

The University of Texas Health Science Center at Houston is accredited by the Southern Association of Colleges and Schools Commission on Colleges to award certificate, baccalaureate, masters, doctorate and professional degrees. Contact the Commission on Colleges at 1866 Southern Lane, Decatur, Georgia 30033-4097 or call 404-679-4500 for questions about the accreditation of The University of Texas Health Science Center at Houston.

While SACS accredits the total institution, many of the academic degree programs offered at UTHealth also undergo accreditation by specialized accrediting bodies, including: *

School	Degree or Certificate	Accrediting agency
School of Dentistry	D.D.S.	American Dental Association Commission on Dental Accreditation
	M.S.	American Dental Association Commission on Dental Accreditation
	Advanced Education Certificate Program	American Dental Association Commission on Dental Accreditation
	B.S. (Dental Hygiene)	American Dental Association Commission on Dental Accreditation
	Dental Hygiene Certificate Program	American Dental Association Commission on Dental Accreditation
	Oral and Maxillofacial Surgery Certificate Program	American Dental Association Commission on Dental Accreditation
MD Anderson UTHealth Graduate School of Biomedical Sciences	M.S. with specialization in Genetic Counseling	American Board of Genetic Counseling
	M.S. with specialization in Medical Physics	Commission on Accreditation of Medical Physics Education Programs
	M.S.	
	Ph.D.	
McGovern Medical School	M.D.	American Medical Association/ Association of American Medical Colleges Liaison Committee on Medical Education (LCME)
		Accreditation Council for Graduate Medical Education (ACGME)
		Accreditation Council for Continuing Medical Education (ACCME)
	M.S. in Clinical Research	
School of Biomedical Informatics	M.S.	
	Ph.D.	

School	Degree or Certificate	Accrediting agency
Cizik School of Nursing	B.S.N.	Commission on Collegiate Nursing Education
	M.S.N.	Commission on Collegiate Nursing Education
	Nurse Anesthesia	Council on Accreditation of Nurse Anesthesia Educational Programs
	D.N.P.	Commission on Collegiate Nursing Education
	Ph.D. (Nursing)	
School of Public Health	M.P.H.†	Council on Education for Public Health
	M.S.†	Council on Education for Public Health
	Dr.P.H.	Council on Education for Public Health
	Ph.D.	Council on Education for Public Health
	M.P.H. (Industrial Hygiene)	The Applied Science Accreditation Commission of the Accreditation Board for Engineering and Technology

* The University of Texas Health Science Center at Houston is also accredited by the Accreditation Council for Continuing Medical Education (ACCME) to sponsor continuing medical education for physicians.

† The Industrial Hygiene Curriculum in the MPH and MS degree programs is accredited by the Applied Science Accreditation Commission (ASAC) of Accreditation Board for Engineering and Technology (ABET), 111 Market Place, Suite 1050, Baltimore, MD 21202-4012, telephone: (410) 347-7700.

Degrees Offered at The University of Texas MD Anderson Cancer Center

School/Program	Degree	Cert.	Bach.	Mast.	Doc.
MD Anderson UTHealth Graduate School of Biomedical Sciences	M.S. in Biomedical Sciences (with concentrations in Biomedical Sciences; Biochemistry and Cell Biology; Cancer Biology; Genetics and Epigenetics; Immunology; Microbiology and Infectious Diseases; Neuroscience; Quantitative Sciences; and Therapeutics and Pharmacology; Specialized MS Programs: Genetic Counseling and Medical Physics)			X	
MD Anderson UTHealth Graduate School of Biomedical Sciences	Ph.D. in Biomedical Sciences (with concentrations in Biomedical Sciences; Biochemistry and Cell Biology; Cancer Biology; Genetics and Epigenetics; Immunology; Medical Physics; Microbiology and Infectious Diseases; Neuroscience; Quantitative Sciences; and Therapeutics and Pharmacology)				X
	Certificate in Medical Physics	X			
School of Health Professionals	Clinical Laboratory Science		X		
	Cytogenetic Technology		X		
	Cytotechnology		X		
	Diagnostic Imaging		X		
	Diagnostic Medical Sonography		X		
	Health Care Disparities, Diversity and Advocacy		X		
	Histotechnology	X			
	Medical Dosimetry	X	X		
	Molecular Genetic Technology		X		
	Radiation Therapy	X	X		
	Diagnostic Genetics			X	
	Radiologic Sciences			X	

Accreditation at MD Anderson

The University of Texas MD Anderson Cancer Center is accredited by the Southern Association of Colleges and Schools Commission on Colleges to award baccalaureate, masters, and doctoral levels. Contact the Commission on Colleges at 1866 Southern Lane, Decatur, Georgia 30033-4097 or call 404-679-4500 for questions about the accreditation of The University of Texas MD Anderson Cancer Center.

Many of the academic degree programs offered at MD Anderson undergo accreditation by specialized accrediting bodies* as follows:

School/Program	Degree	Accrediting Agency
The University of Texas MD Anderson Cancer Center School of Health Professions		
Cytogenetic Technology	B.S.	National Accrediting Agency for Clinical Laboratory Sciences
Clinical Laboratory Science	B.S.	National Accrediting Agency for Clinical Laboratory Sciences
Diagnostic Imaging	B.S.	Joint Review Committee on Education In Radiologic Technology
Histotechnology	B.S.	National Accrediting Agency for Clinical Laboratory Sciences
Cytotechnology	B.S.	Commission on Accreditation of Allied Health Education Programs
Medical Dosimetry	B.S.	Joint Review Committee on education in Radiologic Technology
Molecular Genetic Technology	B.S.	National Accrediting Agency for Clinical Laboratory Sciences
Radiation Therapy	B.S.	Joint Review Committee on Education in Radiologic Technology

The University of Texas MD Anderson Cancer Center UTHealth Graduate School of Biomedical Sciences

M.S. with specialization in Genetic Counseling	American Board of Medical Genetics
M.S. and Ph.D. with specialization in Medical Physics	American Association of Physicists in Medicine

*The University of Texas MD Anderson Cancer Center is also accredited by the Accreditation Council for Continuing Medical Education (ACCME) and the Accreditation Council for Graduate Medical Education (ACGME).

UTHealth Academic Qualifications

In accordance with federal Department of Education guidelines, in order to receive Title IV financial aid funds, a student must be qualified to study at the postsecondary level. A student qualifies if he/she:

- Has a high school diploma;
- Has the recognized equivalent of a high school diploma, typically a general education development GED certificate;
- Has completed home schooling at the secondary level; or
- Has an academic transcript of a student who has successfully completed at least a two-year program that is acceptable for full credit toward a bachelor's degree.

In addition to these qualifications, please refer to the school catalog section for specific admissions criteria for academic degree program in each of the UTHealth schools.

Academic Fresh Start

If a student who enrolls under the Texas Fresh Start program completes a prescribed course of study, earns a baccalaureate degree, and applies for admission to a postgraduate or professional program, the institution, in considering the applicant for admission into the postgraduate or professional program, shall consider only the grade point average of the applicant established by the course work completed after enrollment under the Texas Fresh Start program, along with any other criteria the institution uses in evaluating applications for admission.

Academic Common Market

The Academic Common Market (ACM) is an interstate agreement among southern states participating in the Southern Regional Education Board (SREB). The ACM is a tuition-savings program for college students in participating states who want to pursue degrees that are not offered by their in-state institutions. Participating states arrange for their residents who qualify for admission to enroll in specific programs in other states on the in-state tuition basis. More information on the ACM can be found on the ACM website at sreb.org/academic-common-market.

Tuition and Fees

Tuition and fees are subject to change and become effective on the date enacted. The Texas Legislature does not set the specific amount for any particular student fee. The Student fees are authorized by state statute; the specific fee amounts and the determination to increase fees are made by the university administration and The University of Texas System Board of Regents.

Please refer to the Office of Registrar website at uth.edu/registrar/current-students/registration/tuition--fee-schedule.htm for the current Tuition and Fee Schedules. Information regarding the mandatory fees (charged to all UTHealth students) listed below are also found on this website.

Audit Fee: \$25 per course (when applicable)

Credit Card Use Fee: Currently at 2.5%

Graduation Fee: \$100.00 billed in the last academic year of degree program.

Information Technology Access Fee: \$108/year or \$36/semester

Installment Use Fee: \$20.00

Late Payment Fee: \$25.00

Late Registration Fee: \$25.00

Return Check Fee: \$25/per check

Reinstatement Fee: \$200

Student ID Replacement Fee: \$10/per ID card

Student Records Fee: \$5/semester, \$15/year for DDS and MD

Student Services Fee: \$566.25 per 12-month (full time student rate)

For additional tuition and fee information go to the Office of the Registrar's website under Current Students/Student Information for a list of general information helpful to all students. This website reflects current information regarding tuition and fee exceptions and/or waivers, Veterans' education benefits, and the Policy for Texas Resident Tuition. Please refer to the Office of the Registrar website at uth.edu/registrar/current-students/student-information/general-information.htm to view this information.

Tuition and Fees Payment Policy

Payment of tuition and fees is due no later than payment due date. Due dates are listed on the charges tab of the student "MyUTH" account or are available on the Registrar's website at uth.edu/registrar/current-students/registration/payment-methods.htm.

Students must pay 50% of tuition and fees before the 12th day of the term for fall and spring and before the 4th day of the term for summer or their enrollment will be cancelled for that term. Students whose registration is cancelled because of non-payment by issuing an insufficient funds check will be charged a \$200 Reinstatement Fee if they are reinstated by the School's Dean. Students who are dropped and reinstated must bring their accounts current by the 20th day of the term for fall/spring and by the 15th day of the term for summer. No students will be reinstated after the 20th day of the term for fall/spring or after the 15th day of the term for summer..

A returned check fee of \$25.00 will be assessed for each returned check (including "e-checks").

Students who have fees billed to a sponsor are financially responsible for any charges determined to be uncollectible by the Bursar's Office. Furthermore, extended delays in collection of receivables from sponsors will require the student to make the uncollected payment. Student payments will be refunded upon receipt of payment from the sponsor.

Payment of tuition and fees may be paid in full or in installments for the fall, spring and summer 12-week semester. A nonrefundable Installment Use Fee of \$20 will be assessed for the use of the installment plan. A \$25 Late Payment Fee will be assessed if the initial payment is late; a \$25 charge will be assessed for each subsequent delinquent installment payment. Certain fees, such as health insurance, liability insurance and the installment use fee are not installable and must be paid in full at the initial payment and may not be paid in installments. Check with the Bursar's Office for a complete list of fees.

A student who fails to provide full payment of tuition and fees, including late fees assessed by the university, when the payments are due, is subject to one or more of the following actions:

- Prohibited from registration in future terms until full payment is made,
- Withholding of degree and/or official transcript,
- May be denied credit for the work done during the academic year, and
- Subject to all penalties and action authorized by law.

For more information regarding tuition and fee payment, installment plans and payment methods please contact:

Bursar's Office
The University of Texas Health Science Center at Houston
University Center Tower
7000 Fannin, Suite 2240
713-500-3380

Bursar Website: inside.uth.edu/finance/bursars/student/tuition-and-fees.htm

Adding, Dropping and Withdrawing Courses

For all programs other than McGovern Medical School (MD) and Dentistry (DDS), students may add and drop classes after initial enrollment period during the first twelve days of the fall and spring semesters and during the first four days of the summer term. Students withdrawing from classes after the initial drop/add period must submit a drop form that may be obtained from the Student Affairs Office in each school or from the Office of the Registrar.

Classes dropped on or before the 12th class day of a semester or 4th class day of a summer term will not appear on a student's transcript. Classes dropped after the 12th class day of a semester or the 4th class day of a summer term will appear on the student's transcript with a "W", "WP" or "WF" grade, depending upon the school's grading policy.

Students should check with their school advisor(s) to ensure that the appropriate specific program approvals, guidelines and deadlines for add, drop or withdrawals from courses are followed.

Refunds for classes dropped will be credited in strict accordance to the schedule specified by state law and will depend on the number of days that have elapsed since the beginning of the semester or term. Please see Refund Policy section for additional information.

Class Schedule Contents with add/drop and information can be found on MyUTH class search.

Refund Policy

All programs at UTHealth follow a standard Refund Policy based on the first day of the semester term. Provided the student remains enrolled at the institution, refunds of applicable tuition and fees collected for courses from which a student drops will be made after the add/drop period closes. Add/drop ends after the 12th day of the term for the fall and spring semesters and after the 4th day of the summer term for each session.

All refunds will be based on the day the student drops the course(s) electronically through MyUTH (uth.edu/registrar/myuth.htm) or the date the official withdrawal form is received in the Registrar's Office.

Refunds of tuition and mandatory fees shall be made to the students withdrawing completely from UTHealth during a semester according to the following schedules. The percent refunded is based upon the full payment of all tuition and fees. If full payment has not been made, it is possible that a balance may be due. Not all fees are refundable beyond the first day of the term. Tuition reassessment refunds will be made after the 20th class day.

(fall, spring, 12 week summer semesters)

Prior to the first day of the session	100%
During the first five class days of the term	80%
During the second five class days of the term	70%
During the third five class days of the term	50%
During the fourth five class days of the term	25%
After the fourth five class days of the term	None

(6 week summer semester)

Prior to the first day of the session	100%
During the first, second, or third class days of the session	80%
During the fourth, fifth, or sixth class days of the session	50%
After the seventh day of class and thereafter	None

All policies regarding the payment or refund of tuition, fees and charges are approved by The University of Texas System Board of Regents and comply with all applicable state statutes. Students should contact the Bursar's Office on any clarification of matters relating to payment or refunds of all tuition, fees and other charges associated with their enrollment at UTHealth.

Bursar Office
 The University of Texas Health Science Center at Houston
 University Center Tower
 7000 Fannin, Suite 2240
 Houston, Texas 77030
 713-500-3380

UTHealth Teaching Affiliations

UTHealth continually strives to increase the number of formal educational affiliation agreements with other institutions and agencies in the greater Houston area and the state, including a dozen major hospitals, city and neighborhood clinics, public schools, and other sites that provide settings for clinical services. These agreements allow students a multiple array of opportunities for educational growth in health-related fields.

Memorial Hermann Hospital is the primary teaching affiliate of McGovern Medical School and the School of Dentistry. Memorial Hermann Hospital and UTHealth work toward the goals of exemplary patient care, innovative teaching, community service, and productive research. The School of Dentistry operates general practice, pediatric dentistry, and oral and maxillofacial surgery clinics in conjunction with Memorial Hermann Hospital as part of the advanced dental education programs.

Lyndon B. Johnson General Hospital is a 332-bed full service general hospital staffed by faculty and residents of McGovern Medical School and the School of Dentistry (oral surgery only). The hospital, owned and operated by the Harris County Hospital District, is medically staffed by

Affiliated Medical Services, an organization formed through an agreement between McGovern Medical School and Baylor College of Medicine.

The University of Texas MD Anderson Cancer Center and UTHealth, together with the Texas A&M Institute of Biosciences and Technology, collaborate extensively in research and education. Many of the MD Anderson Cancer Center faculty have joint appointments in most UTHealth units, and UTHealth students and residents gain clinical experience at MD Anderson Cancer Center in a variety of medical, dental and nursing specialties.

McGovern Medical School has affiliations with more than fifteen institutions where residents rotate for their training, including the Memorial Hermann Hospital system for most of the 110 training programs; Lyndon B. Johnson Hospital; MD Anderson Cancer Center; Harris County Psychiatric Center; The Methodist Hospital; Shriners Hospitals for Children–Houston; Texas Children’s Hospital; and Woman’s Hospital for Texas.

The UTHealth School of Dentistry at Houston has affiliations with institutions for dental student, dental hygiene student, and resident rotations, and training. Hospital affiliations include Ben Taub General, LBJ General, Memorial Hermann, The Methodist Hospital, Shriners Hospital, St. Luke’s Hospital, Texas Children’s Hospital, The Institute for Rehabilitation and Research, MD Anderson Cancer Center, and the Veterans Affairs Medical Center. Community clinics and organizations include: Bering-Omega Clinic, CHRISTUS Foundation HealthCare, City of Houston, Communities in Schools-Houston, ECHOS-Houston, Epiphany Charities, Harris County, Harris County Hospital District, Healthcare for the Homeless-Houston, Holly Hall Retirement Center, Houston ISD, Jasper-Newton County Health Services, Mission of Yahweh, Orange (TX) Christian Services, San Jose Clinic, and TOMAGWA HealthCare Ministries Clinic.

The University of Texas Harris County Psychiatric Center has affiliations or program agreements with the UTHealth School of Nursing; Alvin Community College (nursing); Chamberlain College (nursing); College of the Mainland (nursing); DeBakey High School for Health Professions (preceptorship program); Galveston College (nursing); Grand Canyon University (nursing); Houston Baptist University (psychology and nursing); Houston Community College (Emergency Medical Technician (EMT) and nursing); Lee College (EMT and nursing); Prairie View A&M (nursing); San Jacinto College South (nursing); San Jacinto College North (nursing); San Jacinto College Central (nursing); Stephen F. Austin State University (nursing); Texas Southern University (social work, and health information management); Texas Woman’s University (nursing); University of Houston (nursing, psychology, and social work); University of Houston-Clear Lake (psychology and counseling/educational psychology); University of Houston Sugar Land (nursing); University of St. Thomas (nursing); UT Arlington (nursing); UT Austin (social work); UT Medical Branch-Galveston (nursing); Texas A&M University (psychology); Sam Houston State (psychology); Texas Tech University (psychology); and Wayland Baptist University (nursing). HCPC trains psychology interns from a variety of institutions.

UTHealth has academic affiliations with numerous universities in Latin America, Europe, and Asia that permit interested students to arrange, on an individual basis, periods of study or research abroad. We recognize that health and biomedical sciences are global in scope and encourage academic exchange with other countries and cultures.

Concurrent/Inter-Institutional Enrollment

UTHealth, along with The University of Houston, Texas Woman’s University, UT Rio Grande Valley, UT El Paso, UTMB Galveston, UTHSC at San Antonio, UT Austin, and UT Southwestern

Medical Center have concurrent enrollment agreements that allow students enrolled in one institution to enroll for support courses in another institution. Additionally, UTHealth has inter-institutional agreements with Rice University, Baylor College of Medicine, Texas A&M HSC-IBT and the Gulf Coast Consortia.

The mechanism for payment of tuition and fees varies according to the individual institution. Consult the Registrar's Office for specific details at the following website: uth.edu/registrar/current-students/student-information/concurrentinter-institutional-enrollment.htm or call 713-500-3388.

STUDENT GENERAL INFORMATION

Student Government

UTHealth authorizes the existence of a student government body that has the jurisdictions and powers delegated to it by The University of Texas System Board of Regents. The official UTHealth student governance body is the Student InterCouncil (SIC), which is comprised of representatives from each of UTHealth's six schools and includes representatives from traditionally underrepresented minority and international student constituencies.

The SIC contributes to the quality of student life at the university by participating in the development and implementation of policies and procedures affecting students, providing funds to support special projects of other student groups, representing student interests on external and internal committees, providing feedback to university administration on tuition and fee proposals, improving communication among the schools through the publication of an on-line student newsletter, Student Pulse, and planning and implementing activities that address the special needs of students.

Learn more about the Student InterCouncil at its website.

Website: uth.edu/sic/

Student Organizations

UTHealth encourages its students, faculty, and staff to develop collegial relationships, and has established specific policies that govern organizations formed by those affiliated with the university.

Pursuant to policy, membership in a UTHealth registered student organization is limited to only students, faculty, and staff of UTHealth. The organization may not suggest or imply that it is acting with the authority or as an agency of UTHealth or UT System.

UTHealth requires all student organizations to register annually with the university under Handbook of Operating Procedures (HOOP) Policy 110, Student Organizations (uthouston.edu/hoop/policy.htm?id=1448068).

A Student Organization Manual-Guidelines and Procedures is available at inside.uth.edu/academics/organizations.htm. The manual was created to provide easy access to important information for student leaders, advisors and student affairs staff. The information in the manual will assist students in creating new student organizations and understanding the requirements for annual registration at UTHealth.

Students should contact their respective school's Office of Student Affairs for application instructions for student organization registration and/or renewal. The manual, instructions and online applications can be found at inside.uth.edu/academics/organizations.htm.

Student Fee Advisory Committee

The Student Fee Advisory Committee is established pursuant to state law and is charged with reviewing proposed tuition, student services, incidental, laboratory and other fee changes, and making recommendations to the university Deans and/or President before submission of new fee proposals to UT System for approval by the Board of Regents. Each UTHealth school will convene a School Student Fee Advisory Committee that will review the proposed changes for that school. A University Student Fee Advisory Committee will convene to address any student services or incidental fees that are charged across all six schools.

UTHEALTH STUDENT SERVICES

Registrar

The UTHealth Registrar's Office provides a central computer-based student record system and web registration activities and other services for schools on this campus. The goals of the office are to provide an effective and efficient application process; to direct an accurate, facile registration process; and to maintain a computerized applicant, student, and alumni record system.

Additional services provided by the Registrar's Office include the issuance of transcripts, certification of student status, degree verification, Veteran's Administration counseling and verification, residence determination, and enrollment verification. The office, in conjunction with the Office of International Affairs, assists foreign students in maintaining their student status.

For further information, contact:

Office of the Registrar
The University of Texas Health Science Center at Houston
P.O. Box 20036
7000 Fannin, Suite 2250
Houston, Texas 77225
(713) 500-3388
email: registrar@uth.tmc.edu
Website: uth.edu/registrar/

Student Financial Services

Types of Aid

UTHealth offers financial support that includes federal grants and loans, state grants and loans, school-based scholarships and institutional loans based on the most current regulations or guidelines in effect at the time of award.

Applications

To be considered for financial aid, a student must complete the Free Application for Federal

Student Aid (FAFSA) using the school code 013956. Information provided on the student's FAFSA will be used to determine financial need. There is no priority deadline to submit the FAFSA application as awards are processed on a first come, first serve basis. However, students are encouraged to complete the FAFSA by March 15th of each year to meet the State's priority filing deadline.

Veterans and Service Members

To initiate the application process for Veteran's Benefits such as Post 9/11 GI Bill, Vocational Rehab and Veterans Education Assistance Program (VEAP), we recommend all veterans contact the Veterans Coordinator in the Office of the Registrar at (713) 500-3351.

Veterans and Service Members applying for federal financial aid funds are encouraged to contact their assigned financial aid counselor prior to the beginning of the award process.

Eligibility

To receive federal aid, students must be enrolled in an eligible degree-seeking program or certificate program (not all certificate programs at UTHHealth are eligible). Financial aid is available only for courses that are required of the program and for which students will receive credit toward completion of their degree. Additionally, students must be U.S. citizens or eligible non-citizens; have registered with Selective Service between the ages of 18 and 26 if male; not owe refunds on federal grants or be in default on federal education loans; have a valid social security number; and must maintain satisfactory academic progress and course credit compliance. (Half-time enrollment in required courses per semester in which aid is received. Eligible Pell Grant students may receive an award if enrolled less than half-time.) State Aid Mandatory Requirement: Males (any person assigned the sex of male at birth) subject to selective service registration must be registered or qualify for an exemption from selective service registration in order to be eligible to receive state financial assistance.

Contact Information

Financial aid counselors are available Monday-Friday from 8:00 a.m. to 5:00 p.m. to provide counseling on financial assistance programs available to students. The Office of Student Financial Services is located on the 22nd floor of the University Center Tower (UCT), 7000 Fannin.

Office of Student Financial Services
The University of Texas Health Science Center at Houston
P.O. Box 20036
7000 Fannin, Suite 2220
Houston, Texas 77225
(713) 500-3860
email: sfaregis@uth.tmc.edu
Website: uth.edu/sfs/

Office of the Bursar

The Bursar's Office (also known as the Cashier's Office) is responsible for assessment and collection of tuition and fees, processing institutional deposits, remission of tuition, fees and sales tax to the State, financial reporting, issuing 1098T tax forms, reconciliation of various revenue accounts and providing quality customer service to students, faculty and staff. The primary purpose of this office is to assess and collect tuition and fees from students and

third party sponsors, including providing and maintaining multiple installment payment plans, distributing financial aid, emergency loans and refunds. This office works closely with the Registrar and Student Financial Service offices to support the needs of the students.

The Bursar's Office is also responsible for distributing special compliance notifications to students, such as set aside funds from designated tuition to be used for local institutional aid assistance programs and how the student can apply for those funds.

The Office is located in the UTHealth University Center Tower (UCT) room 2240 at 7000 Fannin, Houston, Texas 77030. Office hours are Monday-Friday, 8:00 a.m. to 5:00 p.m. For questions regarding student accounts, tuition and fee payments, refunds, or installment plans, students may call 713-500-3088.

Bursar's Website: inside.uth.edu/finance/bursars/

Office of International Affairs

The Office of International Affairs (OIA) serves as the internal institutional resource to facilitate and oversee institutional compliance with state, local and federal laws and regulations regarding the immigration status of all non- U.S. citizens who participate in the academic, research, and clinical endeavors of The University of Texas Health Science Center at Houston.

Services and programs offered include:

- Advice on immigration issues to university units wishing to host or employ international visitors;
- Institutional compliance with immigration regulations;
- Processing of non-immigrant and immigrant visa applications sponsored by the institution;
- Acting as a liaison among institutional departments, government agencies, and private organizations; and
- Coordinating educational and cultural programs and activities that promote the well-being of international visitors, students, trainees, faculty, and staff.

To ensure compliance with federal, state, and local regulations as well as institutional policies, all non-U.S. citizens must check-in with the Office of International Affairs prior to registering for classes in order to obtain the appropriate clearance to begin studies. All non-U.S. citizen students located at School of Public Health campuses outside Houston must check in with the Regional Coordinator located at each campus.

The Office of International Affairs is located in the University Center Tower, Suite 130 (first floor). Office hours are Monday - Friday, 8:00 a.m. to 5:00 p.m. (with the exception of Thursdays when the office is closed from 2:00 p.m. to 5:00 p.m.). Appointments are strongly encouraged to ensure that an International Visitor Advisor is available to assist in answering student questions or concerns.

For further information and/or to make an appointment, contact:

Office of International Affairs
7000 Fannin St., Suite 130 (first floor)
Houston, Texas 77030

Mailing Address:
P. O. Box 20336
Houston, Texas 77225

(713) 500-3176 FAX (713) 500-3189
(713)200-1825 (after hours emergency pager)
email: utoiahouston@uth.tmc.edu
Website: uth.edu/international-affairs/

Office of Diversity & Equal Opportunity

The Diversity & Equal Opportunity Office (EO) within Human Resources upholds UTHealth's commitment to equal educational opportunity. Key functions of this office that provide services to students include:

Facilitating the reasonable accommodation process for:

- Qualified students of the university community and individuals who access services or programs of the university
- Students seeking accommodations based on sincerely held religious beliefs that conflict with a university policy, procedure, or other academic requirement.

Responding to claims of discrimination and harassment based on race, color, religion, national origin, sex (including pregnancy), age, sexual orientation, gender identity and expression, mental or physical disability, genetic information, veteran's status or any other basis prohibited by law or university policy.

Supporting the Title IX Coordinator and the Deputy Title IX Coordinator in their efforts to provide a positive learning and teaching environment free from sex discrimination.

For additional information, contact:
Office of Diversity & Equal Opportunity
7000 Fannin, Suite 150
Houston, Texas 77030
(713) 500-2255
Website: uth.edu/hr/department/equal-opportunity/

Student Health and Counseling Services

Student Health and Counseling Services serves as the medical home for all UTHealth students and provides both medical and mental health services. A portion of the student services fee funds the programs.

Medical Services

Medical services are available for all UTHealth students and their dependents. Services available include immunizations, tuberculosis screening, physical examinations, well woman

examinations, flu shots, travel medicine, treatment of acute and chronic medical problems, and referrals to specialists as necessary. The clinic manages a 24-hour a day hotline for needlesticks and other exposures to hazardous body fluids. Students may report occupational exposures to our hotline at 713-500-OUCH. An on-site Class D pharmacy offers many prescription medications for common illnesses and oral contraceptives. The clinic is staffed by physicians who are board certified both in Internal Medicine and Pediatrics.

Psychiatric and Counseling Services

Balancing personal life with the demands of academia can be challenging. Psychiatric and counseling services are available for all UTHHealth students at no additional cost. Available services include psychiatric evaluation treatment and psychotherapy for a wide variety of concerns including depression, anxiety, ADHD, academic difficulties, alcohol/substance abuse, eating disorders, eating disorders, insomnia, relationship concerns, smoking cessation, and suicidal/self-injurious thoughts. Referrals are not required and students requesting these services are strongly encouraged to call and make an appointment.

Records are confidential, subject to federal and state law and university policy. Staff is available for outreach and prevention programs for all UTHHealth schools.

Student Health Services is located in the UT Professional Building, Suite 130. Office hours are 8:00 a.m. - 5:00 p.m. Appointments are preferred but not required for acute illness and emergencies.

For more information, contact:

UT Student Health and Counseling Services
The University of Texas Professional Building
6410 Fannin, Suite 130
Houston, Texas 77030
(713) 500-5171 FAX (713) 500-0605
Website: uth.edu/studenthealth/

Student Health Insurance

The University of Texas System Board of Regents mandates health insurance for students enrolled in the UT System health components. The Board of Regents has authorized the assessment of a health insurance fee for each semester to each student who cannot provide evidence of continuing coverage under another approved plan

In addition, the Board of Regents requires all international students holding any non-immigrant visa to have coverage that complies with the provisions of the Patient Protection and Affordable Care Act (PPAAC). Enrollment in the student health insurance plan (SHIP) is automatic at the time of registration. Students interested in waiving the SHIP can submit policy information online at uthouston.myahpcare.com during the open enrollment period.

Student health insurance is offered to registered students through a private company selected by The University of Texas System. This plan is designed to supplement student health services. In addition, it also assists with expenses not covered by the student services fee such as prescriptions, hospitalization, etc. Students have the option of enrolling their families in this plan at additional cost.

For further information, contact:

Auxiliary Enterprises
The University of Texas Health Science Center at Houston
7779 Knight Road
Houston, Texas 77054
(713) 500-8400 FAX (713) 500-8409
email: student-insurance@uth.tmc.edu
Website: uth.edu/auxiliary-enterprises/insurance/

Child Development Center

UTHealth operates a Child Development Center (CDC) for children ages six weeks through kindergarten, located within the University Housing complex at 7900 Cambridge. The Center offers a safe, enriching and explorative environment where children enjoy learning and playing. The educational environment for infants is designed to provide visual and auditory stimulation in a warm, wholesome and nurturing setting. The program for toddlers and older children features open learning centers that provide for individual instructional activities with large and small group interaction. All children are encouraged to develop according to their own unique abilities, interests and growth rates.

In addition to being licensed by the State of Texas, the CDC is nationally accredited by the Southern Association of Colleges and Schools (SACS). The CDC program was the first nationally accredited center in the Texas Medical Center. The CDC offers a structured, full day kindergarten program with before- and after-school care available, and also participates in the Texas School Ready Program through the UTHealth Children's Learning Institute. The CDC is open from 6:00 a.m. to 6:00 p.m., Monday through Friday, and is closed on all UTHealth holidays.

Parents are encouraged to participate in various projects involving their children and in the activities of the Building Blocks Committee, which acts as a support group for the CDC. Regularly scheduled parent/teacher conferences apprise parents of their child's growth and development.

Enrichment classes (e.g., karate, dance, soccer, gymnastics) are available during the school year, while swimming is offered during the summer months. These extra enrichment classes are optional and available at additional cost.

Tours are available by appointment on Tuesday, Wednesday and Thursday from 9:00 a.m. until 4:00 p.m.

Child Development Center
The University of Texas Health Science Center at Houston
7900 Cambridge
Houston, Texas 77054
(713) 500-8454
Website: uth.edu/child-development-center/

University Housing

University Housing consists of three unique apartment communities. Each apartment is carpeted and equipped with an all-electric kitchen. The Phase I complex was built in 1982 and features first and second floor units in one-, two-, and three-bedroom floor plans. Phase I offers coin-operated washers and dryers housed in three laundry rooms.

The Phase II property, built in 2005, is a contemporary style living environment with four stories of one and two bedroom apartments and a four-story parking garage located in the middle of the complex. Each unit in Phase II has its own washer and dryer.

Phase III, opened in May 2014, was built in the same style and offers the same amenities of the Phase II property as well as granite countertops in the bathrooms and kitchen with wood flooring in the kitchen, living and bathroom areas. The entrance to all three properties is monitored by a 24-hour guard. Residents enjoy the amenities of a commons room, swimming pool and close proximity to the Child Development Center, the UT Recreation Center and the UTHealth shuttle.

Leasing office hours are from 8:30 a.m. to 5:30 p.m. Monday through Friday.

Affiliated students, faculty, and staff are encouraged to apply for a place on the waiting list for available vacancies.

For further information, contact:

University Housing
The Leasing Office
1885 El Paseo
Houston, Texas 77054
(713) 500-8444 FAX (713) 500-8448
Website: uth.edu/housing/

Transportation

UTHealth provides a circulator shuttle for all UTHealth students, faculty and staff. UTHealth identification badges are required for access onto the shuttle. The shuttle service is contracted through Groome Transportation and operates from 6:00 a.m. to 8:30 p.m. Monday through Friday, excluding official university holidays. During peak operating hours (6:00 a.m. to 9:00 a.m. and 3:00 p.m. to 6:00 p.m.), the shuttle runs every 10-15 minutes. Shuttle stops are located at: University Housing, Recreation Center, University Center Tower, Cizik School of Nursing, Graduate School of Biomedical Sciences, McGovern Medical School, School of Public Health, School of Dentistry and the Research Park Complex. The real-time location of each shuttle can be tracked online at uthealth.doublemap.com or by downloading app DoubleMap and searching for UTHealth (for mobile devices). For information regarding shuttle services or routes, please contact Auxiliary Enterprises at shuttle@uth.tmc.edu or visit the website at uth.edu/shuttle/.

In addition to the UTHealth Shuttle, the Texas Medical Center (TMC) operates a free shuttle. For information about TMC shuttle service, see tmc.edu/contact/parking/ or call the TMC Parking Office at (713) 791-6161.

General Parking Information for UTHealth Students

Students may obtain contract parking from UTHealth or the Texas Medical Center (TMC). For UTHealth student parking information, call 713/500-3405 or visit uth.edu/parking/. For TMC information, call 713/791-6161 or visit tmc.edu/contact/parking/ (under the Parking & Transportation tab click on Contract Parking). Reduced rate parking is available at these remote lots: UT South Campus Lot, TMC South Extension Lot, TMC Smith Lands and TMC South Main Lot. Some remote parking lots offer free shuttle service to the main campus and/or “after hours”

privileges to park in the main campus garages.

Vehicles parking or driving on property controlled by UTHealth are subject to enforcement of state vehicle inspection laws.

UTHealth On-Campus Parking Available to Students:

University Center Tower (UCT) Garage (7000 Fannin at Pressler): Full-access contract parking at the UCT garage is available only to employees in the UCT and Institute of Molecular Medicine (IMM) buildings. However, after-hours parking contracts are available to all students (see below). In addition, all currently enrolled students who visit UCT for student-related business (i.e., Registrar, financial aid, and Bursar's office) are granted complimentary parking validation for one and a half hours upon presenting a valid current student ID badge and parking ticket to the Parking Office on the first floor of UCT (parking in excess of 1-1/2 hours is at the student's expense).

University Professional Building (UPB) Garage (6414 Fannin): Full-access contracts are not available to students at the UPB Garage. However, after-hours contracts are available (see below). The Prairie View A&M University (PVAMU) Garage at 6436 Fannin (next to UPB Garage) offers 24/7 month-to-month parking contracts to UTHealth students on a first-come, first-serve basis. Students may purchase a parking contract for the PVAMU Garage by presenting a valid student ID at the UPB Parking Office.

UT South Campus Lot: The UT South Campus Lot, located across from the UT Recreation Center, is available to all students 24/7 at a rate of \$40 per month. The UTHealth Shuttle picks up directly in front of the South Campus Lot and stops at key points around campus. The South Campus Lot is also within walking distance to the UTHealth School of Dentistry (SOD). South Campus contracts include after-hour access to the Research Park Complex (RPC) Lot located directly in front of SOD.

Research Park Complex (RPC) Lot: The RPC Lot, located across from the UTHealth School of Dentistry, is not available for full access student contract parking. However, after-hours and weekend access to the RPC Lot is included with the purchase of contract parking at the UT South Campus Lot.

SON/SPH Lots: The SON/SPH lots adjacent to the UTHealth Cizik School of Nursing and the UTHealth School of Public Health are not available for full access student contract parking. However, after-hours contracts are available (see below).

After-Hours Parking Contracts are available for UCT Garage, UPB Garage and SON/SPH lots. These contracts allow parking at the designated facility lots Monday through Friday from 5:00 pm to 8:00 am, or any time on weekends. The cost for an after-hours parking contract is \$30 per six-month period (January-June and July-December) plus a one-time non-refundable parking card activation fee of \$10. (After-hours parking at the RPC Lot is included with the purchase of a full-access contract at UT South Campus.)

For further information, contact:

UTHealth Parking Services UCT
7000 Fannin (UCT)
Houston, Texas 77030
(713) 500-3405 (UCT)
email: Parking@uth.tmc.edu
Website: uth.edu/parking/

UTHealth Parking Services UPB
6414 Fannin (UPB)
Houston, TX 77030
(832) 325-7655

Alternative Transportation Options

Van Pool Info: METRO Star offers a monthly subsidy per van pool riders who ride at least twelve times per month round trip. The subsidy is provided direct to the van pool driver's account and the savings passed on to the rider. To form or join a van pool, register on METRO's online website at ridemetro.org or call METRO at (713) 224-RIDE (7433).

METRO: METRO offers a 50% discount off the full fare for all local Park and Ride or METRO Rail rides for students. Student must obtain a letter showing you are a registered student of the university. The letter can be obtained by presenting a current UTHealth Student ID Badge at one of the UTHealth Parking Offices: UCT Lobby - 7000 Fannin or UTPB Garage - 6414 Fannin. The letter and student ID must be presented to the METRO Ridestore, 1900 Main Street, 1st floor, to obtain a picture ID METRO Q Card. METRO is open Monday through Friday, 8:00 am to 5:00 pm, and can be reached by riding the METRO Rail Line to Downtown Transit Center stop. Contact METRO at (713) 739-6968 for more information.

For additional information, please contact UTHealth Parking/Shuttle Services at
email: Parking@uth.tmc.edu
Website: uth.edu/parking

Bookstores

Follett Higher Education Group operates three UTHealth campus bookstores – at McGovern Medical School, the School of Dentistry and the Cizik School of Nursing.

A student of this institution is not under any obligation to purchase a text-book from a university-affiliated bookstore. The same textbook may also be available from an independent retailer, including an online retailer.

Each campus store carries textbooks, professional references, review books and study guides. The UTHealth campus stores offer special ordering of books, book rentals (select titles) and a Price Match Program on adopted textbooks. Please contact your campus store for details on the Price Match Program.

Students will find a wide selection of medical supplies, diagnostic equipment, and a large variety of scrubs and lab coats in stock at the UTHealth campus stores. UTHealth gift items, emblazoned apparel and discounted Microsoft Office™ suites (PC and MAC) are also available. Diploma frames are available year-round, including the option to place custom orders online at framingsuccess.com using the site's Frame Creator Feature.

UTHealth campus stores also partner with Club Colors to fill special order items for groups or individuals. Visit clubcolors.com to browse their selection of customizable products. Please contact your campus store for details regarding special orders through Club Colors.

For further information, contact:

McGovern Medical School Campus Store #1393
6431 Fannin, Suite B600
Houston, TX 77030
(713) 500-5860 FAX (713) 500-0540
Website: bkstr.com/utmedicalstore/home/en
Hours of operation: 8:30 am to 5:00 pm Monday to Friday

School of Dentistry Campus Store #1394
7500 Cambridge, Rm 2202
Houston, Texas 77054
(713) 846-4450 FAX (713) 486-4449
Website: bkstr.com/utdentalstore/home/en
Hours of operation: 8:00 am to 4:30 pm Monday to Friday

Cizik School of Nursing Campus Store #1392
6901 Bertner, Room 280
Houston, Texas 77030
(713) 500-9561 FAX (713) 500-0982
Website: bkstr.com/utnursingstore/home/en
Hours of operation: 8:30 am to 5:00 pm Monday to Friday

University Dining and Catering Services

Food Service locations are provided at the Cizik School of Nursing, School of Dentistry and McGovern Medical School buildings. Catering is available through the School of Nursing location. Vending machines are also located throughout the UTHHealth campus.

Phone: 713-500-8405
Catering: 713-500-9103
Website: uth.edu/dining-catering

Cizik School of Nursing The cafeteria is located on the first floor of the Cizik School of Nursing Building at 6901 Bertner Avenue. A variety of dining choices are available for your convenience. Call for catering needs throughout the university. Phone: 713-500-9103

School of Dentistry The grab-n-go is located on the ground floor of the School of Dentistry at 7500 Cambridge. A limited variety of dining choices are available along with a selection of specialty coffee drinks.

McGovern Medical School The grab-n-go is located on the ground floor of the McGovern Medical School Building at 6431 Fannin. A limited variety of dining choices are available along with a selection of specialty coffee drinks.

Hours of Operation (excluding university holidays): Monday - Friday 7:00 a.m. - 3:00 p.m.

Recreation Center Facilities and Programs

The UT Recreation Center, adjacent to University Housing offers high quality recreational and athletic facilities featuring a variety of programs and equipment designed for health, fitness, fun and relaxation.

Programs consist of personal training, motivational and incentive programs, group fitness classes, American Heart Association CPR/AED and First Aid Certifications, team and individual recreational sports and seasonal swim lessons all centered upon the facilities:

- Heated outdoor Olympic size pool
- Strength training equipment
- Cardiovascular equipment w/individual TVs, personalized tracking programs and Wi-Fi
- Leisure games – Table Tennis and Billiards
- Racquetball Court
- Outdoor basketball courts
- Tennis courts
- Sand Volleyball courts
- Athletic fields – softball, football, soccer and recreational activities (seasonal)
- Outdoor Jogging/Walking Trail and fitness stations

Membership is open to all Texas Medical Center faculty, staff, residents and students, UT System Alumni and families. For current UTHealth students, membership is included in the student service fees. A valid TMC institutional ID or proof of alumni status is required at time of purchase and renewal of any services offered. Memberships are offered on a monthly, quarterly or yearly basis for individuals or families. Family memberships extend to the eligible member's spouse and all dependents up to the age of 20 (children under 16 must be accompanied and supervised by a parent or guardian at all times while using the facilities). Summer Family Packages are available for pool use.

The facility is open seven days a week, closing only for major university holidays. For minor holidays, hours may be reduced, but will be announced in advance. Hours are Monday through Friday, 5:30 am to 10:00 pm, Saturday 8:00 am to 8:00 pm, and Sunday 10:00 am to 8:00 pm. The pool closes 30 minutes prior to the facility's closing time.

For further information, please contact:

UTHealth Recreation Center
1832 West Road
Houston, Texas 77054
(713) 500-8420
Website: uth.edu/recreation-center/

MD ANDERSON CANCER CENTER OFFICE OF RESEARCH TRAINEE PROGRAMS

The Office of Research Trainee Programs in the Division of Education & Training serves as an institutional resource for Graduate School of Biomedical Sciences students who are approved for graduate research assistant appointments at MD Anderson.

The Office guides students through the educational appointment process and communicates policy and operational changes. It also provides leadership, guidance and support to more than 200 departments and programs at MD Anderson that appoint students. The Office also maintains student appointment records and databases, and processes requests for verification

of educational appointments. Finally, the Office conducts new student onboarding sessions and conducts checkout for exiting students.

For more information, contact:

Office of Research Trainee Programs – GSBS
6767 Bertner Avenue
BSRB S3.8423
Houston, Texas 77030
(713) 745-5257 or FAX (713) 790-1529

UTHEALTH AND MD ANDERSON POLICY INFORMATION FOR GSBS STUDENTS

Policy Information for Students

All students are admitted into The University of Texas MD Anderson Cancer Center UTHealth Graduate School of Biomedical Sciences (GSBS), rather than into departments at UTHealth or MD Anderson Cancer Center. During their first and subsequent years of study, students take classes in the GSBS taught by faculty who hold both an appointment in the GSBS and also hold a faculty appointment in either UTHealth or MD Anderson. Also in their first year, PhD students take three tutorial rotations selected from among all GSBS faculty.

As both MD Anderson and UTHealth are State of Texas agencies and sister academic institutions in The University of Texas System, the academic policies governing students and faculty are fundamentally similar. GSBS faculty and both institutions' administrations have agreed that students in the GSBS will be governed in academic matters by the policies in the UTHealth Handbook of Operating Procedures and The University of Texas Board of Regents' Rules and Regulations.

GSBS students who hold a Graduate Research Assistantship must follow the employment policies of the academic institution in which they have their appointment. When students rotate at MD Anderson or select a faculty supervisor who holds an appointment at MD Anderson there are some all-employee policies at MD Anderson, for example the immunization policy, that may differ from those of UTHealth and that do apply to GSBS students at MD Anderson.

The following excerpts and policy descriptions from the UTHealth Handbook of Operating Procedures (HOOP) relate to student life. Additional student policies can be found in the HOOP located at uth.edu/hoop/.

University policies, promulgated under the authority of The University of Texas System Board of Regents' Rules and Regulations (utsystem.edu/board-of-regents/rules) implement governance and administrative procedures for UTHealth within those guidelines.

STUDENTS (INCLUDING RESIDENTS AND FELLOWS) ARE CHARGED WITH THE RESPONSIBILITY FOR KNOWLEDGE OF AND COMPLIANCE WITH ALL UTHEALTH POLICIES, REGULATIONS AND PROCEDURES, INCLUDING, AS APPROPRIATE, POLICIES, REGULATIONS, AND PROCEDURES UNIQUE TO THE INDIVIDUAL SCHOOL OR PROGRAM IN WHICH THE STUDENT IS ENROLLED OR PARTICIPATES

For additional information on policies specific to individual schools, contact the Student Affairs Office in your school or access the individual school's website from links provided on the UTHealth home page at uth.edu/.

Educational Records and Family Educational Rights and Privacy Act (FERPA)

UTHealth complies with the Family Educational Rights and Privacy Act of 1974 (FERPA), which protects the privacy of educational records and establishes the rights of students to access of their educational records. The Registrar will annually notify students of their rights and the procedures for exercising these rights.

The full policy can be found in HOOP Policy 129, Educational Records at uth.edu/hoop/policy.htm?id=1448106.

The link to the full text of the FERPA notice can be found on the on the Registrar's website at uth.edu/registrar/current-students/student-information/ferpa.htm.

All research papers, theses, and dissertations authored by degree candidates are available to interested members of the general public upon request

Student Complaints

UTHealth encourages fair, efficient and equitable solutions for problems or disputes arising out of the educational process in accordance with applicable university or school policies and procedures. This policy applies to formal academic and non-academic complaints and is applicable to all students, including those enrolled in online and/or distance education courses or programs. The policy informs students of procedures in regard to the following complaints:

- Complaints regarding the general or academic misconduct of another student;
- Complaints regarding discrimination and/or harassment, including sexual misconduct;
- Complaints regarding disability accommodations;
- Complaints regarding student educational records;
- Complaints regarding grades or grading
- Complaints regarding other issues related to central student services; and
- Complaints regarding other issues related to individual schools.

The university policy can be found in HOOP Policy 220, Student Complaints, at uth.edu/hoop/policy.htm?id=2553c1c1-c490-4ad0-a570-e263e12e0dff.

University Emergency Communications

UTHealth is committed to protecting its personnel, property, and the surrounding community from the effects of spontaneous and predicted emergency situations by maintaining procedures to assist students, employees and visitors in responding to emergencies.

The various means of UTHealth Emergency Communications along with the current campus status can be found at uthealthemergency.org/. The website is designed to provide the UTHealth community with the most current information regarding potentially hazardous

weather or other emergency conditions along with building, school, and information systems status.

UTHealth ALERT is the instant text message emergency notification system that provides the campus community information about imminent threat, crisis or harm, or university status updates if weather conditions dictate a “controlled access” situation. Students who enter a cell phone number in the appropriate field during school registration are automatically enrolled in the UTHealth ALERT notification system. Students can verify their enrollment in the UTHealth ALERT system by following instructions in myUTH to add or update a personal cell phone number.

For more information regarding UTHealth emergency procedures, please refer to HOOP Policy 85, Controlled Access Status for Emergency, Disaster or Severe Weather at uth.edu/hoop/policy.htm?id=1448018; HOOP 141, Emergency Management and Business Continuity Plans and HOOP 2, Campus Security.

Campus Security

UTHealth is committed to a safe and secure learning and working environment. To that end, the university strives to assure that its buildings and contents are secure and that members of the university community are properly identified and are given appropriate access to university facilities and amenities. Information about campus security can be found online in HOOP Policy 2, Campus Security (uth.edu/hoop/policy.htm?id=1447852).

Possession of firearms on university premises is strictly regulated.

- Long guns (e.g., rifles and shotguns) are prohibited in university buildings at all times except if carried by police officers.
- Texas law forbids the open carrying of handguns on university premises at all times except by police officers.
- Holders of a Texas License to Carry a Handgun may only carry concealed handguns on or about their person in limited areas as specified in HOOP Policy 222 Concealed Handguns on Campus at uth.edu/hoop/policy.htm?id=aeb4da95-c86f-4e39-af0b-f7b6e4d228f2. All persons on UTHealth property are subject to the policy.

In compliance with the Jeanne Clery Disclosure of Campus Security Policy and Campus Crime Statistics Act, UTHealth collects specified information on campus crime statistics and makes timely reports to the university community on crimes considered to be a threat to students and employees. The University of Texas at Houston Police Department provides a link to crime statistics on its website at utph.org/index/reports. Information about fire safety procedures and statistics can be found in the same report. Guidance on reporting criminal activity on campus can be found online in HOOP Policy 87, Reporting Criminal Activity to Campus Police, uth.edu/hoop/policy.htm?id=1448022.

Additionally, students residing in University Housing may designate a confidential contact person who will be contacted upon a determination that the student is missing. Information regarding how to designate a confidential contact person and other missing student notification procedures can be found in HOOP Policy 207, Missing Student Notification of uth.edu/hoop/policy.htm?id=3401787.

Making a False Alarm or Report

A person commits a felony offense under Texas law if he or she knowingly initiates, communicates or circulates a report of a present, past, or future bombing, fire, offense, or other emergency that he or she knows is false or baseless and that would ordinarily: (1) cause action by an official or volunteer agency organized to deal with emergencies; (2) place a person in fear of imminent serious bodily injury; or (3) prevent or interrupt the occupation of a building, room, place of assembly, place to which the public has access, or aircraft, automobile, or other mode of conveyance. The offense of making such a false alarm or report involving a public or private institution of higher education is a state jail felony. An individual adjudged guilty of a state jail felony shall be punished by confinement in a state jail for any term of not more than two years or less than 180 days and, in addition to confinement, an individual adjudged guilty of a state jail felony may be punished by a fine not to exceed \$10,000.

Conduct and Discipline

All UTHealth students are expected and required to obey federal, state, and local laws, university policy, and to comply with the directives issued by UTHealth or UT System administrative officials acting in the course of their authorized duties, and to obey standards of conduct appropriate for an academic institution. Any student who engages in conduct that violates UTHealth or UT System policies or rules, or federal, state, or local laws is subject to discipline whether the conduct takes place on or off campus and whether or criminal penalties are imposed for such conduct.

The full student conduct and discipline policy can be found online in HOOP Policy 186, Student Conduct and Discipline (uth.edu/hoop/policy.htm?id=1448220).

Copyrighted Material and Software

All UTHealth employees and students must comply with United States Copyright Law of 1976, as amended, (Title 17, United States Code) ("Copyright Act") including UTHealth policies and guidelines governing the use of copyrighted materials. All students are responsible for knowing the laws that govern copyrighted materials which are summarized in HOOP Policy 47, Classroom and Research Use of Copyrighted Material (uth.edu/hoop/policy.htm?id=1447942).

Both uploading and downloading files can potentially violate copyright laws and put UTHealth information resources at risk. Students must be cautious and research whether the source provides material licensed by a copyright owner.

Information regarding Peer-to-Peer file sharing and potential copyright infringement can be found in HOOP Policy 180, Acceptable Use of University Information Resources at uth.edu/hoop/policy.htm?id=1448208.

UTHealth must also comply with copyright laws pertaining to computer software and with software license agreements. Students and employees utilizing university network resources, computers and/or computer peripherals for unauthorized duplication of copyrighted or licensed works are subject to appropriate disciplinary action as well as those civil remedies and criminal penalties provided by federal and state laws. Detailed information on Software Copyright Compliance can be found in ITPOL-018, Software Copyright Compliance Policy, inside.uth.edu/it/cio/policies/policy.htm?id=21d32398-2570-4078-9ca2-e3503be1d8c5&catVar=itPol.

Criminal Background Checks - Students

UTHealth is committed to providing a safe environment for its students and employees. The university obtains criminal background information regarding applicants for security sensitive positions. The university has determined all positions (whether employee or student) within the university are security sensitive. Individuals who are unable to meet the university's criminal background standards may be denied admission or continued enrollment in the program.

Enrolled students may be required to consent to additional criminal background checks for clinical placement or other purposes at the discretion of the Dean of each school.

The full policy can be found online in HOOP Policy 160, Criminal Background Checks

(uth.edu/hoop/policy.htm?id=1448168).

Disability Accommodation

UTHealth is committed to providing equal opportunities for qualified disabled employees, applicants, students, trainees and other members of the university community and individuals who access services or programs of the university. Student applicants and enrolled students can obtain information concerning program-related accommodations from the school's Section 504 Coordinator (usually found in the Student Affairs office of each school). The Disability Coordinator (in Diversity and Equal Opportunity) and the Section 504 Coordinators can provide information and referrals regarding campus accessibility, disabled parking permits, transportation services, and other resources.

The university's policy can be found online in HOOP Policy 101, Disability Accommodation (uth.edu/hoop/policy.htm?id=1448050).

Equal Opportunity

UTHealth endeavors to foster an educational environment and working environment that provides equal opportunity to all members of the university community. No person shall be excluded from participation in, denied the benefits of, or be subject to discrimination under, any program or activity sponsored or conducted by the university or any of its component entities on the basis of race, color, religion, sex, sexual orientation, national origin, age, disability, genetic information, gender identity or expression, veteran status or any other basis prohibited by law.

Any student or potential students who has a complaint of discrimination should contact the Office of Diversity & Equal Opportunity in Human Resources. Reports received by other offices of the university must be forwarded to Diversity & Equal Opportunity.

The university's policy can be found online in HOOP Policy 183, Non-Discrimination, Anti-Harassment and Equal Opportunity uth.edu/hoop/policy.htm?id=1448214 and HOOP Policy 59, Sexual Misconduct uth.edu/hoop/policy/htm?id=1447966.

Hazing

Hazing is prohibited by both state law and university policy. Individuals or organizations engaging in hazing could be subject to fines and charged with criminal offenses. Additionally, the law does not affect or in any way restrict the right of the University to enforce its own rules against hazing.

The term “hazing” is broadly defined by statute to mean any intentional, knowing, or reckless act, occurring on or off UTHealth property, by one person alone or acting with others, which endangers the mental or physical health or safety of a student for the purpose of pledging, being initiated into, affiliating with, holding office in, or maintaining membership in any organization whose members are or include students at the university. Hazing with or without the consent of the student is prohibited and violations may render both the person inflicting the hazing and the person submitting to the hazing subject to criminal prosecution and disciplinary action by UTHealth.

AIDS, HIV, HBV, AND HCV Infection

UTHealth works to help safeguard the health and safety of students, employees, patients, and the general public against the contact and spread of infectious diseases. UTHealth is also sensitive to the needs and rights of any of its employees or students who have contracted diseases that might be infectious. In recognition of the Human Immunodeficiency Virus (HIV), Hepatitis B Virus (HBV), and Hepatitis C Virus (HCV) as serious public health threats, UTHealth has adopted policy and procedural steps to both prevent the spread of HIV, HBV, and HCV infections and to protect the rights and well-being of employees and students. The university’s policy, which defines terms and addresses general principles, voluntary counseling and testing, work-related exposure, and educational efforts, can be found in Hoop Policy 158, Bloodborne Pathogen Infection Control (uth.edu/hoop/policy.htm?id=1448164).

Student Immunizations and Health Records

All students registering at UTHealth are required to furnish an immunization record signed by a health care provider. An immunization hold is automatically placed on an applicant’s record at the time an application for admission is submitted. If admitted to the university, this hold will block registration. Student Health and Counseling Services will release all immunization holds after proof of immunizations is provided.

The following immunizations and screening tests are required for all students admitted to UTHealth:

- Tuberculin Skin Test must be done within the past 12 months, even for those who have received BCG vaccine as a child. If PPD test is positive, a chest x-ray documenting no active tuberculosis must be submitted with immunization form;
- Measles – proof of two doses of measles vaccine administered on or after the first birthday and at least 30 days apart or a positive rubeola titer confirming immunity or evidence of prior infection;
- Mumps – proof of one dose of mumps vaccine administered on or after the first birthday or a positive mumps titer confirming immunity or evidence of prior infection;
- Rubella – proof of one dose administered on or after the first birthday or a positive rubella titer confirming immunity or evidence of prior infection;
- Tetanus/Diphtheria and Pertussis – proof of one “booster” dose within the past 10 years; Td/DPT/Dtap does not satisfy this requirement;
- Hepatitis B virus (HBV) – proof of serologic immunity to HBV or certification of immunization with a complete series of hepatitis B vaccine. Students must be vaccinated to most current status possible prior to registering for classes;

- Varicella (chickenpox) – proof of two dose vaccine series or lab report of positive varicella titer. If varicella titer is negative, varicella vaccine series is required; and,
- Meningococcal (Meningitis) – Documentation of one dose of meningitis vaccine if younger than 22 prior to the beginning of classes. The vaccine must be administered within 5 years and at least 10 days prior to enrollment. (Students 22 and older are NOT required to have meningitis immunization).

****Important information regarding the Meningococcal Vaccine****

Texas law mandates that Texas universities and health science centers require all new and transfer students to show proof of vaccination against bacterial meningitis. The law does not apply to new and transfer students who are age 22 or older at the time of enrollment or who are enrolled only in distance learning classes.

The only exceptions permitted by law are for:

1. Students who can provide proof that a health care provider has determined that it would be a health risk for the student to have the vaccine; or,
2. Students who use the Exemption Form issued by the Texas Department of State Health.

Obtaining the required form from the Texas Department of Health Services to establish an exemption for reasons of conscience is a time-intensive process that takes approximately a month. A student anticipating using this exemption should start this process early. An online exemption request form can be found on the Texas Department of State Health Services website at dshs.texas.gov/immunize/school/exemptions.aspx.

For more information on immunizations or how to obtain certain required immunization exemptions, contact Student Health & Counseling Services at (713) 500-5171 or visit its website at uth.edu/studenthealth/.

The university policy, listing required immunizations and procedures for requesting exemptions from required immunizations, can be found in HOOP Policy 55, Student Immunizations and Health Records (uth.edu/hoop/policy.htm?id=1447958).

Determination of Resident Status

Before an individual may register at UTHHealth and pay Texas resident rate tuition, the individual must provide required information regarding their residency status. The Registrar is the Residency Determination Official for the university. The university policy regarding residency can be found online in HOOP Policy 58, Determination of Resident and Non-Resident Tuition Status (uth.edu/hoop/policy.htm?id=1447964).

Information about the Petition for Resident Tuition and a link to the Core Residency Questionnaire can be found on the Registrar's Website (uth.edu/registrar/current-students/student-information/policy-for-texas-resident-tuition.htm).

Absences

Observance of a Religious Holy Day: Students who wish to observe a religious holy day that interferes with classes, examinations or completion of assignments, must inform the instructor of each class to be missed and/or of the planned absences(s) not later than the fifteenth day

of the semester. The notification must be in writing and may either be delivered by the student personally to each instructor, with receipt of the notification acknowledged and dated by each instructor, or mailed by certified mail, return receipt requested, to each instructor. Pursuant to Texas law, a request to observe a religious holy day may be denied if the student's absence will interfere with assigned clinical care.

A student who follows these procedures and is excused from class for a religious holy day may not be penalized, but the instructor may respond appropriately if the student fails to satisfactorily complete a missed assignment or examination within a reasonable time after the absence. The university policy can be found in HOOP Policy 112, Observing Religious Holy Days (uth.edu/hoop/policy.htm?id=1448072).

Military Obligations: For any academic term that begins after the date a student is released from active military service (except for Texas National Guard training exercises) but not later than the first anniversary of that date, a school shall readmit the student, without requiring reapplication or charging a fee for readmission, if the student is otherwise eligible to register for classes. On readmission of the student under these circumstances, the School shall provide to the student any financial assistance previously provided by the institution to the student before the student's withdrawal if the student meets current eligibility requirements for the assistance, other than any requirement directly affected by the student's service, such as continuous enrollment or another similar timing requirement; and allow the student the same academic status that the student had before the student's withdrawal, including any course credit awarded to the student by the institution. The university may require reasonable proof from a student of the fact and duration of the student's active military service.

If a student enrolled in a school fails to attend classes or engage in other required activities because the student is called to active military service that is of a reasonably brief duration and the student chooses not to withdraw from school, the school shall excuse a student from attending classes or engaging in other required activities, including examinations, in order for the student to participate in active military service to which the student is called, including travel associated with the service. A student whose absence is excused under this provision may not be penalized for that absence and shall be allowed to complete an assignment or take an examination from which the student is excused within a reasonable time after the absence. An instructor may appropriately respond if the student fails to satisfactorily complete the assignment or examination with a reasonable time after the absence. Students enrolled in distance learning, self-paced, correspondence, and other asynchronous courses will receive equivalent considerations for the purposes of determining acceptable duration of excused absences and time limits for the completion of course work following an excused absence under this section.

A graduate or professional student who withdraws from or defers admission to the institution to perform active military service in a combative operation will be readmitted to their program, previously earned coursework will be applied toward the program, and any standardized test score previously submitted will be accepted.

Military Service Withdrawal: A student who withdraws as a result of being called to active military service may choose: (1) to receive a refund of tuition and fees for the semester; (2) if eligible, to be assigned an "incomplete" ("I") in each course; or (3) at the instructor's discretion, to receive a final grade in the courses where the student has completed a substantial amount of course work and has demonstrated sufficient mastery of the course material.

Sexual Misconduct

Title IX of the Education Amendments of 1972 prohibits discrimination based on sex in educational programs or activities. UTHealth is committed to providing an environment free from discrimination and inappropriate conduct, which includes all forms of sexual misconduct, including sexual harassment, sexual assault, sexual violence, stalking, domestic violence and/or dating violence. Sexual misconduct will not be tolerated, and individuals who engage in such conduct shall be subject to disciplinary action.

In accordance with this commitment, UTHealth has developed policies to ensure that all members of the university community receive education and understand UTHealth's policies and procedures. The university's policy on sexual misconduct, contact information for UTHealth's Title IX Coordinator, additional resources, and procedures for reporting a complaint of sexual misconduct can be found online in HOOP Policy 59, Sexual Misconduct (uth.edu/hoop/policy.htm?id=1447966).

Nondiscrimination, Anti-Harassment and Equal Opportunity

UTHealth has established procedures for dealing with allegations of discrimination and/or harassment on the basis of race, color, religion, sex, sexual orientation, national origin, age, disability, genetic information, gender identity or expression, veteran status or any other basis prohibited by law. Any student who believes that he or she has been discriminated against should use the appropriate process outlined in HOOP Policy 183. This policy applies to the conduct of all members of the UTHealth community, including, but not limited to administrators, faculty, staff, students, residents, fellows and other trainees, volunteers, vendors, consultants, observers and visitors.

The university's policy can be found online in HOOP Policy 183, Nondiscrimination, Anti-Harassment and Equal Opportunity (uth.edu/hoop/policy.htm?id=1448214).

Substance Abuse – Students

UTHealth is committed to maintaining an environment that is free from substance abuse. The university expects impaired students to seek help voluntarily and to assume responsibility for their professional and personal conduct. UTHealth recognizes that substance abuse is a treatable condition and, as an institution dedicated to health, facilitates the treatment and rehabilitation of this condition. Such assistance may be provided through Student Health and Counseling Services, the Medical School Department of Psychiatry and Behavioral Sciences, private physicians or community agencies with expertise in treating chemical dependence.

The university's policy on Substance Abuse can be found online in HOOP Policy 173

(uth.edu/hoop/policy.htm?id=1448194).

Student Travel

UTHealth supports the educational, research, and service activities of its students by sponsoring and reimbursing certain approved travel activities and expenditures. All student travel funded or to be reimbursed by the university must use contracted agencies to purchase airfare or rent a car as provided by Auxiliary Enterprises, University Travel.

Enrolled students can find more detailed student travel information and requirements for international travel at inside.uth.edu/travel/student-travel/index.htm.

The university's policy on Student Travel can be found online in HOOP Policy 61 uth.edu/hoop/policy.htm?id=1447874.

Solicitation on Campus

No solicitation shall be conducted on UTHealth property unless permitted under HOOP Policy 165. Auxiliary Enterprises is the responsible office at UTHealth for coordinating the review and approval for solicitation on campus. Solicitation requests can be submitted by going to uth.edu/auxiliary-enterprises/solicitation-form.htm.

The university's policy on Solicitation on Campus can be found online at uth.edu/hoop/policy.htm?id=1448178.

Other Important Policies Affecting Students

The UTHealth Handbook of Operating Procedures (HOOP) lists other important policies affecting students and is divided into a Table of Contents by subject, alphabetical order and policy number. Students are charged with knowledge of and compliance with all applicable UTHealth policies.

Some additional important HOOP Policies not outlined above with which students should be familiar are:

Policy Number:

109 Standards of Conduct
uth.edu/hoop/policy.htm?id=1448066

9 Alcoholic Beverages
uth.edu/hoop/policy.htm?id=1447866

8 Use of University Name, Logo or Seal
uth.edu/hoop/policy.htm?id=1447864

11 Use of University Facilities
uth.edu/hoop/policy.htm?id=1447870

174 Speech and Assembly
uth.edu/hoop/policy.htm?id=1448196

167 Student Employment Appointments
uth.edu/hoop/policy.htm?id=1448182

56 Student Financial Aid
uth.edu/hoop/policy.htm?id=1447960

121 Student Loan Collections
uth.edu/hoop/policy.htm?id=1448090

57 Tuition, and Fees Payment, Refunds and Student Debt
uth.edu/hoop/policy.htm?id=1447962

60 Student Services
uth.edu/hoop/policy.htm?id=1447968

85 Controlled Access Status for Emergency, Disaster or Severe Weather
uth.edu/hoop/policy.htm?id=1448018

86 Medical Emergencies, Minor Injuries/Illnesses
uth.edu/hoop/policy.htm?id=1448020

87 Reporting Criminal Activity to Campus Police
uth.edu/hoop/policy.htm?id=1448022

168 Conduct of Research
uth.edu/hoop/policy.htm?id=dd4f2609-f36b-41b0-923e-8cbff479fa1f

202 Research Misconduct
uth.edu/hoop/policy.htm?id=1702018

The University of Texas
MD Anderson Cancer Center
UTHealth Graduate School of
Biomedical Sciences

2018 - 2020 Catalog

THE UNIVERSITY OF TEXAS
MD Anderson
~~Cancer Center~~[®]



Graduate School of Biomedical Sciences

The University of Texas Health Science Center at Houston (UTHealth) is accredited by the Southern Association of Colleges and Schools Commission on Colleges to award certificate, baccalaureate, masters, doctoral, and professional degrees. Contact the Commission on Colleges at 1866 Southern Lane, Decatur, Georgia 30033-4097 or call 404-679-4500 for questions about the accreditation of The University of Texas Health Science Center at Houston.

The University of Texas MD Anderson Cancer Center is accredited by the Southern Association of Colleges and Schools Commission on Colleges (SACS) to award baccalaureate, masters, and doctoral levels. Contact the Commission on Colleges at 1866 Southern Lane, Decatur, Georgia 30033-4097 or call 404-679-4501 for questions about the accreditation of The University of Texas MD Anderson Cancer Center.

This catalog is a general information publication only. It is not intended to nor does it contain all regulations that relate to students. Applicants, students, and faculty are referred to the respective UTHealth School catalogs. The provisions of the General Information section or the School-specific information in each School catalog, student handbook or School policy or regulations do not constitute a contract, expressed or implied, between any applicant, student or faculty member and UTHealth or The University of Texas MD Anderson Cancer Center (MD Anderson) or The University of Texas System. UTHealth and MD Anderson reserve the right to withdraw courses at any time, to change fees or tuition, calendar, curriculum, degree requirements, graduation procedures, and any other requirement affecting students. Changes will become effective whenever the proper authorities so determine and will apply to both prospective students and those students already enrolled.

To the extent provided by applicable law, no person shall be excluded from participation in, denied the benefits of, or be subject to discrimination under any program or activity sponsored or conducted by UTHealth on the basis of race, color, national origin, religion, sex, sexual orientation, gender expression or gender identity, age, veteran status or disability.

MESSAGE FROM THE DEANS



Welcome to The University of Texas MD Anderson Cancer Center UTHealth Graduate School of Biomedical Sciences (GSBS). Our school is built around the scientific expertise of two major institutions in the Texas Medical Center, MD Anderson Cancer Center and UTHealth, which are both members of The University of Texas System. In addition, our students have access to graduate courses offered at nearby Rice University and Baylor College of Medicine. This breadth offers amazing opportunities in basic and translational scientific programs, leading the way in research and discoveries.

Our vision for the graduate school is to create a collaborative and innovative academic environment that inspires and lays the foundation for new generations of biomedical scientists to realize their potential, commit to success and have major impact on treatment of diseases worldwide.



Within this catalog you will find valuable information concerning our curriculum, research programs, academic activities and key policies and procedures for our graduate school. In addition, we encourage you to make full use of our website (gsbs.uth.edu) where you may access additional information to help you develop your strategy for completing your MS or PhD degrees at our institution.

Now is an incredible time to be training in the biomedical sciences. The technologies and information available today are unprecedented and provide opportunities for outstanding training and the ability to make discoveries that impact humanity. We look forward to partnering with you on your journey to achieve your goals in science and beyond.

Sincerely,
Michelle C. Barton, PhD
Dean

Michael R. Blackburn, PhD
Dean

ACADEMIC CALENDAR 2018-19*

Fall Term 2018

August 20	New Student Orientation Begins
August 27	Fall Semester Begins
September 3	Labor Day Holiday – no classes
September 17	First Tutorial Begins
November 22-23	Thanksgiving Holiday – no classes
December 7	Last Day of Classes
December 7	First Tutorial Ends
December 10-14	Final Examinations
December 14	End of Fall Semester

Spring Term 2019

January 2	Second Tutorial Begins
January 14	Spring Semester Begins
January 21	MLK Holiday – no classes
March 8	Second Tutorial Ends
March 11	Third Tutorial Begins
March 18-22	Spring Break – no classes
May 3	Last Day of Classes
May 6-10	Final Examinations
May 10	End of Spring Semester
May 17	Third Tutorial Ends
May 18	Formal Commencement

Summer Term 2019

May 20	Summer Term Begins
May 27	Memorial Day Holiday – no classes
July 3	Second 6-Week Session Begins
July 4	Independence Day Holiday – no classes
August 12	Last Day of Classes
August 13-14	Final Examinations
August 14	End of Summer Semester

**This academic calendar is subject to change – the latest version is available on the GSBS website in the Academics section*

ACADEMIC CALENDAR 2019-20*

Fall Term 2019

August 19	New Student Orientation Begins
August 26	Fall Semester Begins
September 2	Labor Day Holiday – no classes
September 16	First Tutorial Begins
November 28-29	Thanksgiving Holiday – no classes
December 6	Last Day of Classes
December 6	First Tutorial Ends
December 9-13	Final Examinations
December 13	End of Fall Semester

Spring Term 2020

January 6	Second Tutorial Begins
January 6	Spring Semester Begins
January 20	MLK Holiday – no classes
February 17	Presidents' Day Holiday – no classes
March 6	Second Tutorial Ends
March 9	Third Tutorial Begins
March 16-20	Spring Break – no classes
April 24	Last Day of Classes
April 27-May 1	Final Examinations
May 1	End of Spring Semester
May 9	Formal Commencement
May 15	Third Tutorial Ends

Summer Term 2020

May 18	Summer Term Begins
May 25	Memorial Day Holiday – no classes
June 30	Second 6-Week Session Begins
July 3	Independence Day Holiday – no classes
August 7	Last Day of Classes
August 10-11	Final Examinations
August 11	End of Summer Semester

**This academic calendar is subject to change – the latest version is available on the GSBS website in the Academics section*

ADMINISTRATION

Michelle C. Barton, PhD

Dean

(713) 500-9855

mbarton@mdanderson.org

Michael R. Blackburn, PhD

Dean

(713) 500-9880

Michael.R.Blackburn@uth.tmc.edu

Patricia Cruz Bruesch, MS

Associate Dean of Management

(713) 500-9878

Patricia.Cruz@uth.tmc.edu

William Mattox, PhD

Associate Dean of Graduate Education

(713) 500-8802

wmattox@mdanderson.org

Eric C. Swindell, PhD

Associate Dean of Graduate Education

(713) 500-9881

Eric.C.Swindell@uth.tmc.edu

Diane C. Bodurka, MD, MPH

Assistant Dean, MD Anderson Cancer Center

(713) 745-3358

dcbodurka@mdanderson.org

Ellen R. Richie, PhD

Assistant Dean, Science Park

(512) 237-2403

erichie@mdanderson.org

VISION STATEMENT

To create a collaborative and innovative academic environment that inspires and lays the foundation for new generations of biomedical scientists to realize their potential, commit to success and make discoveries that have major impact on treatment of diseases worldwide.

MISSION STATEMENT

The mission of The University of Texas MD Anderson Cancer Center UTHealth Graduate School of Biomedical Sciences (GSBS) is to maintain an innovative and diverse environment that provides an unprecedented breadth of opportunities for outstanding graduate students to train with leading biomedical scientists at The University of Texas MD Anderson Cancer Center and UTHealth.

The combined strengths of these institutions provide students with access to basic and translational scientific programs that are at the cutting edge of the fight to treat all major diseases. The curriculum is designed to provide students with a rigorous exposure to critical thinking strategies, area-specific scientific skills, and career development initiatives. This curriculum, together with an emphasis on research training and scientific productivity, is designed to position our students for an outstanding and successful career in the biomedical sciences.

The educational objectives are achieved through programs leading to the Doctor of Philosophy (PhD) and Master of Science (MS) degrees. These academic activities are carried out in research laboratories and classrooms under the guidance of GSBS faculty members from the schools of UTHealth and MD Anderson. As a comprehensive health science university, UTHealth's mission is to educate health science professionals, discover and translate advances in the biomedical and social sciences, and model the best practices in clinical care and public health. UTHealth pursues this mission in order to advance the quality of human life by enhancing the diagnosis, treatment, and prevention of disease and injury, as well as promoting individual health and community well-being. MD Anderson Cancer Center's mission is to eliminate cancer in Texas, the nation, and the world through outstanding programs that integrate patient care, research and prevention, and through education for our undergraduate and graduate students, trainees, professionals, employees, and the public. The Community Outreach program and other GSBS faculty and student public service activities are aimed at educating the public about the biomedical sciences, as well as promoting an interest in careers in science, particularly among elementary and secondary school students.

History and Purpose

In 1963, the 58th Session of the Texas Legislature authorized the Board of Regents of The University of Texas System to establish a Graduate School of Biomedical Sciences (GSBS) at UTHealth. The creation of the GSBS, with the approval of the Texas Commission on Higher Education, included the following general charge:

"The GSBS will conduct graduate programs at the masters and doctoral levels and postdoctoral programs in the sciences and related academic areas pertinent to medical education and research."

The GSBS is an important academic bridge between UTHealth components and the UT MD Anderson Cancer Center. The GSBS is linked to the intellectual resources of the thousands of

faculty associated with MD Anderson Cancer Center and the UTHealth Schools of Medicine, Dentistry, Public Health, Nursing, and Biomedical Informatics.

From its beginning, the GSBS adopted an interdisciplinary approach to biomedical sciences education in contrast to more traditional departmentalized models focused on particular disciplines. The graduate programs offer areas of concentration at the leading edge of education in the biomedical sciences. As a result, the GSBS has attracted large numbers of outstanding faculty and students. The GSBS faculty has grown to 600 members, and currently there are about 400 degree-seeking students. Students frequently conduct their research in newly developing interdisciplinary or multidisciplinary areas in basic and translational research.

The challenge to health sciences universities in the 21st century is to integrate the academic and clinical aspects of biomedical research in order to understand and prevent illness, promote health, and restore normal function. The GSBS is in a unique position to meet that challenge by capitalizing on its distinguished faculty and its contemporary approach to graduate biomedical education.

The GSBS is an integral and essential part of the academic activities not only of UTHealth but also of MD Anderson Cancer Center. Together, MD Anderson and UTHealth provide the supporting academic framework for the GSBS. The Texas Education Code stipulates that MD Anderson and UTHealth "...jointly prescribe courses and jointly conduct graduate programs at the masters and doctoral levels." It is self-evident that graduate education in biomedical research is a key ingredient in the development of increased institutional excellence and is essential to the maintenance of national research excellence. Similarly, the GSBS is absolutely dependent upon UTHealth and MD Anderson because courses are taught by faculty members drawn from the two parent institutions, and because of the need for financial and administrative support. Thus, the relationship between UTHealth and MD Anderson is fundamental and symbiotic.

THE FACULTY

Faculty at the GSBS is drawn from several UTHealth academic units (Medical, Dentistry, Biomedical Informatics and Public Health), and from MD Anderson including the Science Park-Research Division at Smithville and Science Park-Veterinary Division in Bastrop.

The research interests of the faculty span the entire range of the biomedical sciences. Individual faculty profiles are available on the GSBS website at gsbs.uth.edu/faculty/faculty-directory/.

GSBS STRUCTURE AND DEGREE PROGRAMS

Recognizing that contemporary biomedical research often involves interdisciplinary approaches, the faculty has developed its educational programs to make its vast resources available to students with minimal constraints. Major emphasis is placed on studies leading to the PhD degree, but all PhD students may elect to complete an MS degree prior to starting dissertation studies. Students with specific interests in acquiring technical and specific professional skills may be admitted to courses of study for the MS degree. The GSBS also offers two certificate programs. In addition, persons who wish to take courses and/or conduct research, but not as part of a formal degree program, may be admitted as non-degree students. Degree, certificate and non-degree programs offered at the GSBS are described in the following sections.

DOCTOR OF PHILOSOPHY DEGREE IN BIOMEDICAL SCIENCES

The PhD degree program is designed to offer students the opportunity to complete didactic and laboratory studies through which they may gain the expertise to conduct independent and creative research that contributes new knowledge in an area of the biomedical sciences.

Programs

Faculty members have established formal programs of study to provide students with a structured curriculum within an area of research or a department. The Programs, approved by the Texas Higher Education Coordinating Board, provide students with a recommended series of courses appropriate for the area, collective advice on research training from the faculty members of the program, and an opportunity for interaction between students and faculty who have similar research interests.

PhD students matriculating in Fall 2012 or thereafter are required to affiliate with a Program by the end of their first year of study.

The curricular recommendations developed within the Programs provide sufficient flexibility to permit students to develop an individualized program of study within the Program's framework. After a reorganization of GSBS Programs in 2017, the current organized PhD Programs of study (including those that are being phased-out) are as follows:

Biochemistry and Cell Biology
Biochemistry and Molecular Biology (in phase-out)
Biostatistics, Bioinformatics and Systems Biology (in phase-out)
Cancer Biology
Cell and Regulatory Biology (in phase-out)
Clinical and Translational Sciences (in phase-out)
Epigenetics and Molecular Carcinogenesis (in phase-out)
Experimental Therapeutics (in phase-out)
Genes and Development (in phase-out)
Genetics and Epigenetics
Human and Molecular Genetics (in phase-out)
Immunology
Medical Physics
Microbiology and Infectious Diseases
Microbiology and Molecular Genetics (in phase-out)
Neuroscience
Quantitative Sciences
Therapeutics and Pharmacology

Further information about PhD Programs and the faculty affiliated with them may be obtained from the GSBS website (gsbs.uth.edu) or the Office of Academic Affairs.

Curriculum

Successful students in this degree program will develop the necessary skills to conduct novel research at a professional level, learn the theoretical background for their particular area of study, and become familiar with the issues of biomedical ethics that interface with their chosen fields of study. To this end, the faculty has developed a challenging seven-step curriculum that gives the student the opportunity to attain the skills necessary to pursue a career in biomedical research. The seven steps of the curriculum include:

1. **Tutorial laboratory experiences:** This experience is primarily designed to offer a student the opportunity to select an area of research for the student's research dissertation and a mentor to guide this research. This phase of the curriculum occupies approximately one-half of the student's day for the first two semesters of study. During this time, the student must develop competence in research in three different tutorial laboratories.
2. **Breadth in the biomedical sciences:** Each student is required to develop a broad awareness of several different areas in the biomedical sciences. Most first-year PhD students are required to take a one-semester Core Course entitled Foundations of Biomedical Research (GS211017) to satisfy the breadth requirement. The remaining PhD students take Program-specified courses to address breadth of knowledge.
3. **Depth in the biomedical sciences:** Students are required to join a GSBS Program and demonstrate knowledge in the Program area by meeting Program-specific course requirements.
4. **Appreciation of the ethical issues in biomedical research:** Each student is required to demonstrate knowledge in biomedical ethics by passing a course entitled The Ethical Dimensions of the Biomedical Sciences (GS211051). The course will provide students with a framework to recognize, examine, and resolve ethical conflicts in their professional lives. In addition, two online modules, "Data Acquisition and Management" and "Responsible Authorship and Publication" must also be successfully completed by all students.
5. **Scientific writing ability:** Each student is required to demonstrate knowledge in scientific writing either by passing a course entitled Scientific Writing (GS211152) or by passing an approved scientific writing course.
6. **Capability to formulate a significant research problem and to formulate a rigorous scientific plan for addressing it:** Through completion of the course curriculum, each student is given the opportunity to develop the skills needed to identify a significant research problem in their chosen area of research concentration and to write a research proposal aimed at rigorously investigating the problem. The attainment of this skill is demonstrated by the student's passing a candidacy examination, which includes the evaluation of the student's ability to produce a written research proposal and to defend this proposal in an oral examination. The examination tests the student's depth of preparedness for undertaking a research problem and knowledge of the pertinent scientific background.
7. **Ability to perform research that significantly contributes to the scientific body of knowledge:** The student performs research and writes a dissertation under the guidance of an Advisory Committee. Students must demonstrate competence in the formulation and performance of original research. After completing the research and writing the dissertation, the student must present a public seminar of the research findings and successfully defend the dissertation.

The seven steps in the curriculum of the PhD program described above represent the general GSBS academic requirements. Additional course work included in a student's program of study is selected by the student and a faculty Advisory Committee. The program of study should be

selected to provide the student with educational experiences appropriate to the scientific disciplines with which the dissertation research is concerned.

General Requirements

The University of Texas MD Anderson Cancer Center UTHealth Graduate School of Biomedical Sciences requires a minimum of 72 credit hours to obtain the degree of Doctor of Philosophy (PhD). Note, however, that due to the extensive course requirements of the Medical Physics area of concentration, students specializing in Medical Physics must complete a minimum of 82 semester credit hours. Students are required to register as full-time students each term, for a total of 24 credit hours earned each year. The average time to completion of the PhD degree is 5.4 years. Thus, PhD students, on average, complete 135 credit hours by the completion of their degree requirements. The 72 credit-hour minimum includes:

- 1 credit hour of The Ethical Dimensions of the Biomedical Sciences (GS211051)
- 6 credit hours of Tutorial Research Experience (GS001514)
- 7 credit hours of Foundations of Biomedical Research (GS211017) or required Program-specific courses
- 2 credit hours of Scientific Writing (GS2111152) or another approved scientific writing course, any required Program-specific coursework, and
- A minimum of one year of registration for research, which includes Research in Biomedical Sciences (GS001520) and Dissertation for Doctor of Philosophy (GS001920).

Any exceptions to this minimum credit-hour requirement must be approved by the Dean upon recommendation by the Academic Standards Committee. The majority of these 72 credit hours (i.e., over 50%), plus the majority of any additional coursework required by the Academic Standards Committee or the student's Advisory Committee, must be taken in residence at the GSBS, at other UT schools, or at an institution with which a consortium arrangement exists (i.e., Rice University, the University of Houston, Baylor College of Medicine, Texas A&M Health Science Center-Institute of Biosciences and Technology, and the Gulf Coast Consortium).

Tutorial Laboratory Requirements

PhD students must complete, with a grade of "Pass", three different tutorial laboratory rotations under the supervision of three different GSBS faculty members.

The tutorials are each worth two credit hours (10 weeks per tutorial, 20 hours per week, or other arrangements resulting in a total of 200 hours in the laboratory) and are normally taken during the first two semesters. The tutorial laboratory experience serves the dual role of introducing the incoming student to a variety of research environments and allowing the student the opportunity to select an advisor to supervise future dissertation research.

One tutorial requirement may be waived at the discretion of the Dean of Academic Affairs if:

1. The student has an MS degree from another institution, provided the MS degree involved laboratory research and the preparation of a thesis; or
2. The student has had post-baccalaureate laboratory research experience judged to be equivalent to a tutorial rotation; or
3. The student has authored peer-reviewed publications in the biomedical sciences.

Waiver of more than one tutorial requirement will not be permitted except in extraordinary circumstances. Students wishing a tutorial waiver must submit a written request for waiver to the Dean of Academic Affairs. Tutorial waivers will be considered only for students who have identified the laboratory in which they will remain for their dissertation research. Therefore, the request must also be accompanied by a letter from the student's proposed advisor supporting the waiver. Students who are allowed to waive a tutorial requirement on the basis of their GSBS MS degree may not complete a tutorial in the MS thesis advisor's lab, i.e., they must complete their remaining tutorials in two other labs.

Advisory Committee

Upon the completion of the tutorial rotations, the student identifies a research Advisor. The student, with the assistance of the Advisor, proposes an Advisory Committee and submits the proposal to the Academic Standards Committee for its approval. Upon approval by the Academic Standards Committee and the Dean, the Advisory Committee members are notified of their appointment. The student must meet with the Advisory Committee at least every 6 months to keep them apprised of progress toward the degree. As the student's research progresses, a change in focus may necessitate a change in committee membership. This change must be approved by the Academic Standards Committee.

Breadth Requirement

Most PhD students are required to pass a one-semester Core Course entitled Foundations of Biomedical Research (GS211017). This course provides incoming graduate students with a broad overview of modern biomedical sciences, spanning historical perspectives to cutting edge approaches. The course combines traditional didactic lectures and interactive critical thinking and problem solving exercises to provide students with a strong background in fundamental graduate-level biological topics including genetics, molecular and cellular biology, biochemistry, physiology, developmental biology and biostatistics. The remaining PhD students are required to pass Program-specific courses that are approved by the GSBS Curriculum Committee to meet this requirement.

The breadth requirement must be met before the student petitions to take the PhD candidacy examination. The goals of this requirement are to:

- Provide students with a breadth of knowledge in relevant areas of biomedical sciences,
- Enhance their critical thinking and communication skills, and
- Facilitate creative collaboration between biomedical scientists trained in depth in different disciplines.

A description of the Core Course is posted on the GSBS website (gsbs.uth.edu) and is available in the Office of Academic Affairs. A listing of Program-specified breadth courses is also posted on the GSBS website and available in the Office of Academic Affairs.

Recognition of Previous Graduate Course Work to Substitute for GSBS Required Courses

Students may petition to substitute previous graduate coursework taken at another institution for any course requirement by providing documentation that the course is equivalent to the required GSBS course. Such requests must be approved by the Dean of Academic Affairs. Undergraduate-level courses are unacceptable as substitutes for GSBS courses.

Ethics Course Requirement

All students are required to pass a course entitled The Ethical Dimensions of the Biomedical Sciences prior to petitioning for candidacy. The aim of the course is to provide students with a framework to recognize, examine, and resolve ethical conflicts in their professional lives. The course explores such issues as the commitment to truth and its breakdown; the ethics of authorship; experimentation with human and animal subjects; management of scientific data; mentor and trainee responsibilities; collaborative research peer review; conflicts of interest; biosafety and biosecurity; and the relationships of scientists to industry, society at large, and future generations. In addition, two online modules, "Data Acquisition and Management" and "Responsible Authorship and Publication" must also be successfully completed by all students.

Scientific Writing Requirement

All PhD students are required to pass a course entitled Scientific Writing (GS211152), or another approved scientific writing course, prior to petitioning for candidacy.

MS Degree Bypass

Students will be considered for a bypass of the MS degree only after satisfactory completion of the PhD candidacy examination. A recommendation from the Examination Committee that the student should be permitted to bypass the MS degree will be reviewed by the Academic Standards Committee.

Completion of the Master of Science degree is recommended for students:

1. With little experience in laboratory research;
2. Who have not written research papers or literature reviews;
3. Who would benefit from the opportunity to pursue a research project under close supervision;
4. Who need significant improvement in written and oral communication; or
5. Who have not determined which biomedical problem(s) they intend to pursue independently.

The PhD Candidacy Examination: Its Purpose

The purpose of the candidacy examination is to test the breadth and depth of knowledge in the biomedical sciences. The examination is meant to be an evaluation of the student's ability to construct a hypothesis, to design the means by which to test it, and to critically analyze obtained results. The oral candidacy examination gives the student the opportunity to demonstrate:

- An understanding of the research area in which he or she is being tested;
- The ability to formulate a research problem and to comprehend its significance; and
- The ability to design appropriate experimental approaches to solve the problem.

A student's performance will be regarded as satisfactory only if the student:

- Demonstrates an adequate knowledge of the field and the research specialty in which he or she is being tested;
- Identifies a significant research problem, the solution of which will make a substantial contribution to our existing knowledge;

- Makes sound judgments in formulating a rigorous experimental design and can interpret critically the results anticipated; and
- Demonstrates that the experimental design and methods proposed are appropriate to solving the problem.

Petition for the PhD Candidacy Examination

Students are required to petition for PhD candidacy by the end of the second year following matriculation.

Before submitting the petition for the candidacy exam, the student must have eliminated all deficiencies identified by the student's Advisory Committee and completed the tutorials, scientific writing and ethics requirements, and either the Core Course or Program-specific required courses to meet the breadth requirement.

PhD students must pass a candidacy exam in the format required by the student's Program. Program exam requirements and guidelines are posted on the GSBS website in the "Programs" section.

PhD Candidacy Examination

All PhD students must prepare and defend a written research proposal as part of their candidacy examination. The candidacy examination tests breadth and depth of the student's understanding of a defined research area. The examination includes both written and oral components.

The candidacy examination must take place before the end of the first semester of the third year following matriculation and after the petition is approved by the Academic Standards Committee. Completion of PhD candidacy and either the bypass (or completion) of the MS degree must be achieved by the end of the third year of enrollment. PhD students who fail to do so will be placed on academic probation and their progress reviewed by the Academic Standards Committee to determine if further action is needed.

It is the student's responsibility to select the date, time, and place of the examination. If a member of the Examining Committee is unable to attend the examination, a substitute who meets the same criteria (e.g., outside the student's major interest) should be added. The new member must be approved by the Dean of Academic Affairs.

Results of the PhD Candidacy Examination

The Chair of the Examining Committee is responsible for submitting the results of the examination to the Office of Academic Affairs for review by the Academic Standards Committee. The results of the examination will be one of the following (students are recommended to candidacy by the Academic Standards Committee and admitted to candidacy by the Dean only after review and approval of the examination results):

- Student passes unconditionally. The Examining Committee, where appropriate, also may recommend that a student who receives an unconditional pass may bypass the MS degree.
- Student passes conditionally, with the conditions clearly stated, i.e., the exact nature of the deficiency(ies) along with a suggested mechanism to repair the deficiency(ies). The Examining Committee may choose to formulate the final mechanism for removing the

deficiency(ies), or the Examining Committee may at its discretion assign this responsibility to the student's Advisory Committee. Conditions must be fulfilled within one year of the exam date. The Chair of the Examining Committee must write a letter of certification to the Office of Academic Affairs when the student has resolved the conditional pass. The Chair of the Examining Committee must serve as a member of the Advisory Committee, at least until the conditional pass has been resolved. Requests for an extension of the one-year deadline, with justification by the Advisory Committee, must be submitted to the Academic Standards Committee for its approval. In all cases, conditions must be fulfilled before the student requests the defense of the PhD dissertation.

- Student is to be re-examined at some future date before the Examining Committee will render a decision. Results of the first exam (where it was determined that the student would be re-examined) must be submitted to the Office of Academic Affairs immediately following the exam. Specifically, in a memo to the student and the Academic Standards Committee, the Chair of the Examining Committee should describe areas that need improvement, areas of strength, conditions for re-exam and a deadline for the re-exam (maximum one year after original exam). The Exam Committee for the re-evaluation must be composed of the same faculty members that conducted the first exam. Upon re-examination, the Committee may only elect to Unconditionally Pass or Fail the student. Students may be re-examined only once. The Chair of the Examining Committee must separately communicate to the Office of Academic Affairs the result of the re-exam. If the student fails to successfully complete the re-examination prior to the deadline determined by the Examining Committee (not to exceed one year from the first examination), the Academic Standards Committee will dismiss the student from the PhD program.
- Student fails. Failure of the examination means the Examining Committee has determined the student has not demonstrated the requisite potential to complete the PhD program, and the Academic Standards Committee will dismiss the student from the PhD program. The Academic Standards Committee may, at its discretion, determine that the student will be permitted to continue towards a terminal MS degree. Subsequent to dismissal, the student may re-apply to the School; the application will be considered in competition with other applications pending at the time.

Registration for PhD Dissertation

After being admitted to candidacy for the PhD degree, the student is permitted to register for Dissertation for Doctor of Philosophy (GS001920). The student must register for at least one semester of Dissertation before becoming eligible for the PhD dissertation defense. The student must be registered for Dissertation in the final semester in which requirements are completed.

Expectations for the PhD Dissertation

The following are expectations for the PhD dissertation, established by the GSBS Faculty. They are based on the Council of Graduate Schools' publication, Requirements for the PhD: A Policy Statement (Washington: Council of Graduate Schools in the United States, 1979 – used with permission of the CGS).

Nature and Purpose

The doctoral dissertation is the final and most important component of the series of academic experiences, which culminate in the awarding of the PhD degree. Four major functions are

fulfilled by the dissertation experience:

- It is a work of original research or scholarship which makes a contribution to existing knowledge;
- It is an educational experience which demonstrates the candidate's mastery of research methods and tools of the specialized field;
- It demonstrates the student's ability to address a major intellectual problem and arrive at a successful conclusion; and
- It demonstrates that the student possesses the potential to function as an independent researcher.

In view of the wide range of fields of knowledge in which the PhD degree is awarded, it is not feasible to set specific requirements and standards for this degree. Nevertheless, there is a general -- and usually explicitly stated -- agreement among American universities that the doctoral dissertation should be a distinct contribution to knowledge, and of sufficient value to warrant its publication in a reputable journal, or as a book or monograph.

Relationship with MS Thesis

GSBS students may utilize an MS degree project as the basis of the hypotheses to be tested by the doctoral research. The PhD dissertation must not include data that are part of the MS thesis. Data from the MS thesis may be included in the dissertation as part of the Introduction or as an appendix. In all cases, data from the MS thesis must be identified clearly as originating from the previous work. Furthermore, the PhD dissertation must have a title that is distinct from the MS thesis.

Defense of the PhD Dissertation

At a time deemed appropriate by the Advisory Committee, the student will submit a complete draft of the dissertation to each member of the Advisory Committee, together with the form requesting to defend the PhD dissertation. The completed defense form and a one-page summary of the research must be submitted to the Office of Academic Affairs. The dissertation defense will be held no sooner than two weeks nor later than three months after the request form is received by the Office of Academic Affairs and approved by the Dean.

- Prior to the defense, students who matriculated prior to Summer 2014 must submit at least one first-authored paper related to their education and research at GSBS to a peer-reviewed journal for publication.
- Students who matriculated in Fall 2014 and thereafter must also submit at least one first-authored paper related to their education and research at GSBS to a peer-reviewed journal for publication prior to the defense, and the paper must be accepted for publication prior to graduation.
- The student's Advisory Committee must approve the quality of the journal for the required publication.
- A request for exception to these policies must be recommended by the Advisory Committee or the Academic Standards Committee and approved by the Dean.

Guidelines for the PhD Dissertation Defense

The purpose of the dissertation defense is to provide a consistent and complete evaluation of the dissertation and the student's understanding of the research, as well as the student's ability to report information to the scientific community in a well-organized and interesting form.

An announcement of the defense will be distributed by electronic mail to all GSBS students and faculty.

Guidelines for the defense are:

- The student will deliver a 45- to 60-minute public presentation, including a detailed description of the background, rationale, materials and methods, results, and conclusions appropriate to the research. Following the presentation, the student will respond to questions from the audience.
- Immediately thereafter, and at a location announced at the end of the seminar, the Advisory Committee will examine the student on the dissertation. Any member of the GSBS Faculty who attends the public presentation may participate in the examination to the extent described below. Others wishing to attend must be approved by the Advisory Committee.
- The student's Advisor will serve as moderator of the examination. The student will be expected to respond to questions from those attending on any aspect of the written dissertation or the material presented at the public presentation.

After the examination, the student will meet privately with the Advisory Committee to discuss the results. Finally, the Advisory Committee will determine what recommendation to make to the Dean and the Academic Standards Committee. The Committee may conclude that the student has passed, or it may require additional research, modifications to the dissertation, and/or another defense. The results of this meeting will be communicated through the Office of Academic Affairs to the Dean and the Academic Standards Committee for their information and approval.

Within one week of the dissertation defense, any member of the GSBS Faculty who has read the student's dissertation and has attended the defense may write directly to the Dean to provide an evaluation of the student's performance. In reaching a final decision on whether to award the PhD or require further work and/or another defense, the Dean will take into consideration the recommendation of the Advisory Committee and other comments received from GSBS Faculty. In particular cases, the Dean may solicit additional evaluations of the dissertation from experts in the field either within or outside the GSBS Faculty. Should a concern be raised by a GSBS faculty member about a student's performance, the decision of the Dean will be communicated to the student and the Advisory Committee within one month of the dissertation defense.

Approval of the Dissertation

All members of the Advisory Committee are expected to sign the student's dissertation to demonstrate their approval of the document. If any member refuses to sign the dissertation, the Academic Standards Committee will consider the matter. In deciding whether to approve the dissertation, the Dean will take into consideration the recommendations of the Advisory Committee and the Academic Standards Committee. In particular cases, the Dean may solicit additional evaluations of the dissertation from experts in the field either within or outside the GSBS Faculty.

Completion of the PhD Requirements

The PhD degree is not awarded until the student has completed the following requirements:

- Successfully defended the dissertation;
- The unbound dissertation, approved by the Advisory Committee, is submitted to the Office of Academic Affairs for the Dean's signature;
- The first-authored paper requirement has been met, if applicable, and
- All exit forms are completed and submitted to the Office of Academic Affairs.

The student must be registered for Dissertation in the final semester in which requirements are met.

Students must also complete a form indicating the dissertation-related research areas to be listed on the diploma. Students may request to list none, one or two areas on the diploma. If areas are listed, the first must be the Program with which the student is affiliated. The second area must correspond to one of the other GSBS Programs approved by the Texas Higher Education Coordinating Board and must overlap with the student's dissertation research topic. Any areas listed on the diploma must be approved by the director of the corresponding Program.

The degree will be issued as of the final day of the semester in which all degree requirements have been met. The PhD degree must be completed within seven years of first registration in GSBS. Students may continue registration in GSBS after the seven-year limit only with the express written permission of the Dean.

DOCTOR OF MEDICINE/DOCTOR OF PHILOSOPHY DUAL DEGREE PROGRAM

The UTHealth McGovern Medical School and The University of Texas MD Anderson Cancer Center UTHealth Graduate School of Biomedical Sciences participate in a combined program leading to both MD and PhD degrees. This program is sponsored and supported by UTHealth and MD Anderson Cancer Center and provides a stipend, tuition and fees, and health insurance support during MD and PhD training. Extensive basic and translational research opportunities and participation of more than 500 faculty members from both institutions provide a unique environment and resources for training combined-degree students. The MD/PhD program training structure is also unique and is organized to train physician scientists. Students complete the first three years of medical school training prior to starting their dissertation research. Thus, the students enter the GSBS with a comprehensive understanding of human disease that can inform and direct their dissertation research. Requirements of both degrees are typically completed in seven years. The program is administered by an MD/PhD Committee, which is comprised of faculty at both institutions.

Students must meet the admissions requirements of the GSBS and the McGovern Medical School to qualify for admission to the MD/PhD program. The program is restricted in size and provides stipend support for exceptional MD/PhD candidates. For information, visit the website at gsbs.uth.edu/mdphd/.

Application for admission to the MD/PhD Program may be made by submitting an application online through the American Medical College Application Service (AMCAS) and a mandatory secondary application online at gsbs.uth.edu/mdphd/apply-here.htm. Three letters of recommendation (two general letters and an additional letter from a research mentor) are also required and should be submitted through AMCAS. The deadline is November 1st.

MASTER OF SCIENCE DEGREE IN BIOMEDICAL SCIENCES

Students enrolled in MS degree programs are provided the opportunity to gain mastery of the scientific background of their discipline and their specific research problem. Such mastery is acquired from didactic instruction and individual study of the scientific literature. Laboratory studies provide opportunities to gain technical facility with the methods required for investigation. The preparation of the MS thesis provides experience in stating a research problem within the framework of contemporary knowledge, presenting the rationale for the technical approach to be taken in solving the problem, presenting valid and reproducible results obtained by the application of methodology appropriate to the problem, and providing a coherent analysis of the results and the conclusions drawn from this analysis.

The acquisition of technical expertise should be the major objective of students at the MS degree level, and the MS thesis should evidence the student's mastery of the knowledge and technology required for the solution of the research problem. While studies at the MS level may place less emphasis than those at the PhD level on the scope and magnitude of the intellectual contribution, the MS thesis should demonstrate the student's creativity and critical thinking in the solution of a scientific problem. The thesis should be an original document written by the student.

The MS degree is an important component of the GSBS educational program. Although many students currently bypass the MS portion of the PhD program, the Faculty continues to recognize the value of studies for the MS degree for some PhD students, as well as for students seeking graduate training available through individualized or specialized MS programs.

General Course Requirements

The MS program of work must consist of 36 credit hours (minimum) of coursework, which must include one credit hour of The Ethical Dimensions of the Biomedical Sciences plus the two online Ethics modules, at least six credit hours of Thesis for Master of Science and a minimum of six credit hours of Research in Biomedical Sciences. A minimum of 12 credit hours of didactic courses, graded A/F, must be taken. Other didactic courses, Literature Survey, Special Project: Course, and Special Project: Research may be used toward the remaining required credit hours. The majority (i.e., over 50%) of the 12 credit hours of graded coursework and the 36 total credit hours, plus the majority of any additional coursework required by the Academic Standards Committee or the student's Advisory Committee, must be taken in residence at GSBS.

Students in an MS degree program who have completed graduate courses in the general area of biomedical sciences at another institution may request that credit hours earned elsewhere be used toward the GSBS requirement. Approval of these requests are at the discretion of the Dean. The student must have received at least a B (if the course awards letter grades of A, B, C or F) or P (if the course was graded pass/fail) in the course to be awarded GSBS credit hours. The grades from such courses taken at other institutions will not be used in the calculation of the cumulative grade point average.

The following rules apply to registration for *Special Project: Course*, *Special Project: Research*, and *Literature Survey*:

- *Special Projects* should not exceed four hours per semester and Literature Surveys should not exceed two hours per semester.

- No more than 6 credit hours of *Special Project (or Tutorial Research Experience)* plus *Literature Survey* may be accepted toward meeting the 36 credit hours required for completion of the MS degree.
- If more than one *Special Project: Research* is included in the MS program of work, the projects must be supervised by different instructors.
- Degree students will not be permitted to use credit hours in *Special Project: Research* taken while they were non-degree students toward meeting the 36 credit hours required for completion of the MS degree.

Ethics Course Requirement

All MS students (including those completing an MS in a specialized area) are required to pass a course entitled The Ethical Dimensions of the Biomedical Sciences. The aim of the course, taught by the GSBS Faculty, is to provide students with a framework to recognize, examine, and resolve ethical conflicts in their professional lives. The course explores such issues as the commitment to truth and its breakdown; the ethics of authorship; experimentation with human and animal subjects; management of scientific data; mentor and trainee responsibilities; collaborative research peer review; conflicts of interest; biosafety and biosecurity; and the relationships of scientists to industry, society at large, and future generations. This course, and two online ethics modules, “Data Acquisition and Management” and “Responsible Authorship and Publication,” must be completed before the student petitions for candidacy.

Petition to Candidacy for the MS Degree

A petition to candidacy for the Master of Science degree must be submitted to the Academic Standards Committee for approval. The petition consists of the program of work, an abstract of the proposed research, and the members of the Advisory Committee. The program of work should indicate the courses that will be used to fulfill the minimum 36 semester credits for the MS; for purposes of the petition to candidacy this may include courses taken, in progress, and/or planned. The petition must be approved by the Academic Standards Committee and the student admitted to candidacy before the student can receive credit for the first semester of Thesis. The petition should be submitted within one year of admission to the MS program or within two years of admission to the PhD program, or for MD/PhD students, after the first full year of enrollment in the GSBS. If an extension is requested, written justification must be provided to the Academic Standards Committee for its approval.

Defense of the MS Thesis

During the final semester of Thesis, the student must submit for approval by the Dean a form to request the defense of the MS thesis. The form, with a one-page summary of the research, must be submitted to the Office of Academic Affairs at least 14 days before the scheduled thesis defense. The Office of Academic Affairs checks to be certain that all courses included in the program of work have been completed. If all is in order, an announcement of the thesis defense will be distributed by electronic mail to all GSBS students and faculty. If the program has not been completed, the student and the Committee are notified and the thesis defense will not be permitted until the required courses have been completed.

Completion of the MS Requirements

The MS degree is not issued until the student has successfully completed the defense; the unbound thesis, approved by the Advisory Committee, is submitted to the Office of Academic Affairs for the Dean's signature; all grades are received; and all exit forms are completed and submitted to the Office of Academic Affairs. The MS degree is awarded on the last day of the semester in which all requirements are completed. The student must be registered for Thesis in the final semester in which requirements are met.

All requirements for the MS degree must be completed within three years of first registration in the GSBS. Students may continue registration in GSBS after the three-year limit only with the express written permission of the Dean. Students admitted to the GSBS for the express purpose of obtaining only an MS degree and who wish to complete a PhD must reapply for admission to a PhD program. Admission to the PhD program is contingent upon completion of all MS requirements prior to the start of the PhD program.

Operating within this general framework for the MS degree in Biomedical Sciences are the individualized MS degree option and two specialized programs, Genetic Counseling and Medical Physics. All degrees awarded will be termed Masters of Science in Biomedical Sciences.

Individualized MS Degree

Qualified students may be admitted to the GSBS to pursue an MS degree in Biomedical Sciences or, with approval of the Program Director, in a Program area. With the advice and consent of an Advisory Committee, the student will construct a plan of study, including didactic coursework and a thesis topic appropriate to his or her particular interests. The degree can sometimes be completed in two years of full-time study, although students are permitted three years for completion of degree requirements.

Specialized MS Degree Program: Genetic Counseling

The specialized Master of Science degree in Genetic Counseling is designed for individuals who seek a terminal MS degree with requisite education in genetic counseling. The program's objective is to provide comprehensive training in genetic counseling, with graduating students demonstrating proficiency in genetic counseling competencies and having accrued a substantial and diverse clinical case experience in order to sit for the American Board of Genetic Counseling credentialing exam. The program's challenging curriculum provides training in medical genetics and genomics, cancer genetics, prenatal genetics, psychosocial counseling, and genetic counseling research. Students receive an in-depth exposure to a variety of genetics clinics. In addition to the aforementioned general MS requirements, the more stringent and specific Genetic Counseling Program requirements include the successful completion of specialized courses, clinical rotations, a Master of Science thesis, and an oral comprehensive exam. The program is fully accredited by the Accreditation Council for Genetic Counseling, located at 4400 College Boulevard, Suite 220, Overland Park, KS 66211. Telephone: 913.222.8668; Fax: 913.222.8606; Website: gceducation.org.

Curriculum

Genetic Counseling students take classes in the areas of cancer genetics, prenatal genetics, medical genetics, research methodology, ethics, and psychosocial counseling. The majority of course work is completed by the end of the first year. Clinical rotations and the completion of a Master of Science thesis research project dominate the second year. Required course work includes (credit hours in parentheses):

Introduction to Genetic Counseling (2)
Embryology (1)
Topics in Medical Genetics I (2)
Topics in Medical Genetics II (2)
Approaches to Genetic Counseling Research I (2)
Approaches to Genetic Counseling Research II (2)
Psychosocial Issues in Genetic Counseling I (2)
Psychosocial Issues in Genetic Counseling II (2)
Psychosocial Genetic Counseling Practicum (1)
The Ethical Dimensions of the Biomedical Sciences (1)
Cancer Genetic Counseling (2)
Prenatal Genetic Counseling (2)
Contemporary Issues in Genetic Counseling (1) x2
Introductory Clinical Rotations (3)
Advanced Clinical Rotations (4) x3
Research in Biomedical Sciences (2)
Masters Thesis Research (5)

MS Thesis

Students are expected to propose and complete a clinically-oriented or laboratory research question that includes study design, data collection, data analysis, and a written thesis. A written thesis in publication-ready format and an oral defense of the thesis are required for graduation.

Clinical Rotations

Clinical experience is an essential aspect of genetic counseling training. Students at UTHealth receive cases of significant depth and breadth in the genetic counseling arena. Typically, students see over 150 clinical cases, well above the minimum standard of 50 logbook cases needed to sit for the board examination offered by the American Board of Genetic Counseling. After completing their clinical training, students should be well-prepared, flexible genetic counselors, familiar with the needs of an increasingly diverse clientele.

Oral Comprehensive Exam

In order to assess a student's ability to synthesize didactic classroom experiences for application in the clinical setting, students must pass an oral comprehensive examination. Students who are not able to demonstrate adequate skills will be required to complete remediation. Failure by a student to pass two attempts at the oral competency exam will require the student to undertake extended remediation. Extended remediation could likely delay graduation; unsuccessful remediation will result in dismissal from the program.

Prerequisites

Admissions requirements are those established by the GSBS for the MS program. The GRE is required. A cumulative undergraduate GPA of 3.0 or greater is needed for consideration.

Successful applicants generally have a GPA of 3.5 or better, and GRE scores in the 75% range. However, the Genetic Counseling Program considers the entire application when selecting applicants to interview.

The following background is strongly recommended:

- Client advocacy experience (crisis counseling/Planned Parenthood)
- Volunteer experience (e.g., working with individuals with disabilities)
- Genetic counseling internship/shadowing/exposure
- Undergraduate or graduate coursework in
 - Biology
 - Psychology
 - Genetics
 - Chemistry
 - Biochemistry
 - Calculus
 - Statistics

An interview at the GSBS is required for admission to the program. On average, the program receives 150 applications each year and interviews approximately 40 candidates. Offers to interview are extended in late February after the applications are reviewed.

Further information concerning the prerequisites or academic requirements for this program may be obtained by writing to:

Claire N. Singletary, MS, CGC
Department of Pediatrics
The UTHealth McGovern Medical School
P.O. Box 20708
Houston, Texas 77225
Claire.N.Singletary@uth.tmc.edu

Specialized MS Degree Program: Medical Physics

The Specialized Master of Science in Medical Physics Program prepares students for a clinically-oriented career in medical physics in a healthcare environment, a clinical support research laboratory or a clinical support industry. A graduate of the program would also be prepared for entry into a PhD program in medical physics or into a clinical medical physics residency program. The program curriculum educates the student in the areas of radiation oncology physics, diagnostic imaging physics, and medical health physics related to both ionizing and non-ionizing radiation. The area of radiation oncology physics emphasizes radiotherapy; the area of diagnostic imaging physics includes both diagnostic radiology and nuclear medicine; and the area of medical health physics includes protection from ionizing and non-ionizing radiation. The program requirements entail coursework, thesis research and clinical rotations. The MS Program in Medical Physics is accredited by the Commission on Accreditation of Medical Physics Education Programs, Inc., located at 1631 Prince Street, Arlington, VA 22314-2818. Telephone: 517-298-1239 Fax: 571-298-1301; Website: campep.org.

Coursework

1. The student must complete a minimum of 39 hours of required courses:

Required Courses (semester hours in parentheses)

- Imaging Science (2)
- Statistics for Medical Physicists (2)
- Introduction to Medical Physics I: Basic Interactions (3)
- Introduction to Medical Physics II: Medical Imaging (4)
- Introduction to Medical Physics III: Therapy (4)
- Introduction to Medical Physics IV: The Physics of Nuclear Medicine (4)
- Introduction to Clinical Medical Physics (2)
- Electronics for Medical Physicists (3)
- Radiation Detection, Instrumentation, and Data Analysis (3)
- Fundamental Anatomy, Physiology and Biology for Medical Physics I (3)
- Fundamental Anatomy, Physiology and Biology for Medical Physics II (3)
- Introduction to Radiation Protection (3)
- Medical Physics Seminar (3 semesters x 1 hour/semester; 3)
- The Ethical Dimensions of the Biomedical Sciences (1)

2. The student must complete a minimum of two hours of electives:

Available electives (semester hours in parenthesis):

- Principles of Magnetic Resonance Imaging (2)
- Physics of Positron Emission Tomography (2)
- Special Radiation Treatment Procedures (2)
- Biological and Biophysical Principles of Molecular Imaging & Therapeutics (4)
- Various Medical Physics Special Project Courses (2 each)
- Other electives from the GSBS, Rice University, or the University of Houston

MS Thesis

A thesis of a quality sufficient for the work to be publishable in a refereed journal is required. The student is admitted to candidacy upon approval by the Program and the GSBS Academic Standards Committee of the planned program of coursework, the abstract of the proposed research, and a list of proposed members of the Advisory Committee. The student must be admitted to candidacy before receiving credit for the first semester of Thesis. The student must register for Thesis credit for at least one semester. The MS thesis is considered complete when the final written version is signed by all members of the student's Advisory Committee and after the student has presented a public seminar and passed an oral examination on the thesis by the members of the Advisory Committee and other interested faculty. The student is expected to submit at least one manuscript based on the thesis work to an appropriate peer-reviewed scholarly journal.

Prerequisites

A bachelor's degree in physics or in another basic science or in engineering with the equivalent of a minor in physics is required. The physics background may be demonstrated by completion of upper-level courses in atomic and nuclear physics, electromagnetism, quantum mechanics, classical mechanics, and thermodynamics. Additional requirements are calculus and differential equations. A year of chemistry and a semester of biology are highly desirable. Applicants are

expected to have a grade point average of at least 3.0 on a scale of 4.0 on all undergraduate and graduate level work taken previously, particularly in the prerequisite areas.

The General Test of the Graduate Record Examinations is required; the specialty test in physics is optional, but could be of benefit to the applicant. Foreign nationals whose native language is not English and who have not attended an English-speaking university must take the Test of English as a Foreign Language (TOEFL).

Further information may be obtained by writing to:

Richard E. Wendt III, PhD
Director, Graduate Program in Medical Physics
The University of Texas MD Anderson Cancer Center
Department of Imaging Physics, Unit 1352
PO Box 301439
Houston, Texas 77230-1439
rwendt@mdanderson.org

Graduate Certificate Program: Medical Physics

The Graduate Certificate Program in Medical Physics provides medical physics education to students who already have earned doctorates in physics or a related discipline and who wish to retrain as medical physicists.

In order to become a practicing medical physicist who is recognized by the American College of Radiology (ACR) as a Qualified Medical Physicist, one must become certified by the American Board of Radiology (ABR). Board certification is also necessary in order to become a Licensed Medical Physicist in the State of Texas. The ABR requires that those it examines for certification have completed a residency program that is accredited by the Commission on the Accreditation of Medical Physics Education Programs (CAMPEP). In order to enter such a residency, one must have graduated from a CAMPEP-accredited graduate program. CAMPEP has recognized that PhDs who wish to retrain need not take the gamut of graduate education, some of which is common to all subjects, and thus accredits certification programs, such as this one, which teach only the core topics of medical physics in a well-defined curriculum.

Accreditation by the Commission on Accreditation of Medical Physics Education Programs, Inc., is pending. Website: campep.org.

Coursework

The student must complete a minimum of 27 semester credit hours of required courses:

- Introduction to Medical Physics I: Basic Interactions (3)
- Introduction to Medical Physics II: Medical Imaging (4)
- Introduction to Medical Physics III: Therapy (4)
- Introduction to Medical Physics IV: The Physics of Nuclear Medicine (4)
- Radiation Detection, Instrumentation, and Data Analysis (3)
- Fundamental Anatomy, Physiology and Biology for Medical Physics I (3)
- Fundamental Anatomy, Physiology and Biology for Medical Physics II (3)
- Introduction to Radiation Protection (3)

Prerequisites

1. A doctoral degree (typically a PhD or a DSc) in physics or a closely related scientific or engineering discipline, and
2. Present or past pre-doctoral or post-doctoral research experience related to medical physics at The University of Texas MD Anderson Cancer Center or The University of Texas Health Science Center at Houston, which are the parent institutions of The University of Texas MD Anderson Cancer Center UTHHealth Graduate School of Biomedical Sciences.
3. Information for applicants is available on the GSBS website at gsbs.uth.edu/admissions/nondegree.htm.

Further information may be obtained by writing to:

Richard E. Wendt III, PhD
Director, Graduate Program in Medical Physics
The University of Texas MD Anderson Cancer Center
Department of Imaging Physics, Unit 1352
PO Box 301439
Houston, Texas 77230-1439
rwendt@mdanderson.org

Graduate Certificate Program: Cancer Research Grant Administration and Management

This Graduate Certificate Program in Biomedical Sciences for Cancer Research Grant Administration and Management is intended for students who are interested in or currently pursuing a career in Biomedical Science Research Administration, and for working professionals with aspirations of working as a research administrator in a biomedical research institution.

The curriculum is based upon the Research Administrators Certification Council (RACC) "Body of Knowledge" and will assist students learning about Research Administration and prepare them to take the national Certified Research Administration® licensing exam. Elements of the curriculum include understanding the environment and context within which biomedical research administration is conducted, fiscal management, regulatory compliance, sponsored program administration, grant proposal and budget development and an emphasis on pre- and post-award management.

Coursework

The Certificate requires a minimum of 12 semester credit hours of formal GSBS credit as follows: Six credit hours of the following GSBS coursework:

- GS21 1723 Cancer Research Administration and Management, Pre-award (3)
- GS21 1733 Cancer Research Administration and Management, Post-award (3)

Three credit hours of lab/practicum work in Central Administration Office, mentorship, etc.:

- GS21 1743 Cancer Research Administration and Management, Lab/Practicum (3)

Successful completion of at least one of the following elective courses:

GS21 1613 Translational Cancer Research (3)

GS21 1232 Translational Sciences: From Bedside to Bench and Back (3)

GS04 1235 Basic and Translational Cancer Biology (5)

Prerequisites

The certificate may be awarded to students enrolled in formal GSBS degree programs (i.e., MS or PhD) or to students admitted for non-degree study. Permission of the instructor is required in order to enroll in the Cancer Research Administration and Management courses.

Further information may be obtained by writing to:

Robert C. Bast, Jr., MD
The University of Texas MD Anderson Cancer Center
Department of Experimental Therapeutics
rbast@mdanderson.org

Non-Degree Study

Qualified individuals who hold a bachelor's degree in science, have a demonstrated interest in a career in research, and wish to take courses at the graduate level without enrolling in an MS or PhD degree program may be admitted to the GSBS as non-degree students. No commitment to eventual admission to a degree program is implied by admission as a non-degree student. Non-degree students will pay regular (per credit) tuition and will receive transcripts indicating the appropriate grades and credit for work completed. Non-degree students will not be eligible for GSBS-based or sponsored financial aid, but may be eligible for other types of financial aid from UTHealth. Further information about non-degree study is included in the section on admission.

RESOURCES FOR GRADUATE EDUCATION

By virtue of its location in the Texas Medical Center and the excellence of its distinguished faculty, the GSBS affords qualified students extraordinary opportunities for basic and clinical research. Didactic teaching and training activities are conducted in lecture rooms and laboratories of component UT institutions where faculty members hold their primary academic appointments. In addition to the resources available within UT institutions, cooperative arrangements with Baylor College of Medicine, Rice University, Texas Woman's University, the University of Houston and the Gulf Coast Consortium provide GSBS students excellent opportunities for developing educational and research programs appropriate to their academic backgrounds and future career interests.

Excellent library facilities are available to provide resource material for course work and research. Students have access to the Texas Medical Center Library (see GSBS General Catalog) as well as the specialized GSBS, School of Dentistry, School of Public Health, and MD Anderson libraries. The Houston Public Library, Rice University (Fondren) Library, University of Houston MD Anderson Memorial Library, and numerous private library facilities also are available for use.

GSBS students have access to a wide range of resources supported by UTHealth, subject to all UTHealth policies governing such access. Resources range from secure Wi-Fi access points throughout campus, online file storage with unlimited space, online collaboration tools, a learning management system to access course materials through the internet, and virtual

private network access to securely connect to the university network off campus. Within the school itself, is a computing facility that students can access 24/7 that provides computer workstations, scanners and printers. The Texas Medical Center Library and the Research Medical Library at MD Anderson provide GSBS students off-campus access to online journals, e-books, databases and instructional videos as well as offering classes and webinars on how to effectively utilize library technology for research. Students can also arrange access to the Texas Advanced Computing Center (TACC) in Austin. The TACC designs and operates some of the world's most powerful supercomputing and cloud computing resources. The TACC's mission is to enable discoveries that advance science and society through the application of advanced computing technologies.

ADMISSION

Admissions Statement

The mission of The University of Texas MD Anderson Cancer Center UTHealth Graduate School of Biomedical Sciences (GSBS) is to maintain an innovative and diverse environment that provides an unprecedented breadth of opportunities for outstanding graduate students to train with leading biomedical scientists at The University of Texas MD Anderson Cancer Center and UTHealth.

The GSBS strives for diversity in its student population to enrich the overall educational experience for all students. All applicants will be evaluated holistically according to criteria outlined below.

Applicants for the MS and PhD Degree Programs

Applicants must have a bachelor's degree from an accredited institution or its equivalent. A solid background in the basic sciences is recommended. An MS degree is not required for admission into the PhD program.

Applicants are expected to have a grade point average of at least 3.0 on a scale of 4.0 on undergraduate and graduate level coursework.

Applicants to the umbrella biomedical sciences MS and PhD programs are not required to take the General Test of the Graduate Record Exam (GRE). However, applicants to the programs in Medical Physics and Genetic Counseling are required to take the GRE General Test. A Subject Test is not required. Applicants to the programs in Medical Physics and Genetic Counseling typically score at least in the 50th percentile on the GRE.

A student admitted to the GSBS MS degree program may not matriculate into a GSBS PhD degree program prior to the completion of the requirements for the MS degree. An exception to this policy may be granted with approval from the Dean.

Applicants may submit only one application per year for a particular degree program. If an application is rejected, the applicant may reapply to that degree program after one calendar year. For reapplication, the applicant is expected to complete a new application for admission and supply any additional materials to update their application.

Applicants for MS and PhD degree programs will be evaluated holistically according to factors outlined below.

Factors Considered in Admissions Decisions

The GSBS Admissions Committee may consider the following factors in evaluating applicants for admission:

- Previous research experience and accomplishments, including participation in science fairs, enrollment in laboratory and research-based courses, and involvement in research projects, presentations of research findings and publications;
- Expressed commitment to a career involving biomedical research;
- Undergraduate grade point average;
- Performance in undergraduate courses in the biological and physical sciences and mathematics;
- Trends in academic performance;
- Degree of difficulty of undergraduate academic program;
- Previous graduate-level study;
- Honors and awards for academic achievement;
- Performance on the Graduate Record Examination and GRE Subject Test (and for international applicants, the Test of English as a Foreign Language [TOEFL]);
- Success in overcoming socio-economic and educational disadvantages;
- Multilingual proficiency;
- Region of residence;
- Non-academic responsibilities, such as employment and child-rearing;
- Involvement in community activities; and
- Race and/or ethnicity.

Application Procedures

Applications must be submitted electronically. A link to the online application form can be found in the Admissions section of the GSBS website.

All components of the application must be submitted electronically for both domestic and international applicants. Please note that there is no need to submit official transcripts or test scores as part of the preliminary application process. This information will be self-reported by the applicant. Copies of transcripts and test scores are to be uploaded into the application system.

- **Online application form.**
- **Grade Point Average** – GPAs must be converted to a 4.0 scale.
- **Unofficial transcripts** – An unofficial copy of the transcript from each college and university attended is required.
- **GRE scores** – For applicants to the programs in Medical Physics and Genetic Counseling, GRE scores must be available and submitted prior to the application due date. The applicant should upload a copy of the ETS score report. Scores must be from an exam taken within the last 5 years.

- **TOEFL scores (International applicants)** – The applicant should upload a copy of the ETS score report.
- **Application fee** – A \$50 application fee is required. Fee waivers are available by request.
- **CV/Resume** – A CV or resume is required and should include academic honors, awards received in college, employment history, internships, summer research programs, education history, etc.
- **Personal statement** – The personal statement should be one page in length and should be a discussion of the applicant’s motivation and rationale for pursuing a graduate degree. The statement should specifically address objectives in seeking advanced education, professional goals, areas of study in which the applicant wishes to specialize, reasons for seeking admission to GSBS, and how the applicant’s professional goals may be met in the GSBS.
- **Research statement** – Students must describe their research background and experience relevant to their application to GSBS. In this statement, students should include a detailed description of at least one independent research project, what they did, what they learned and the significance of this work. Students without previous research experience should explain other experiences that make the student a suitable candidate for graduate school. The research statement is required for PhD applicants and optional for MS applicants.
- **Presentations and publications listing with abstracts** – List of all publications. List the full citation giving the abstract for each in chronological order. For presentations (poster and oral presentations), indicate the type of presentation, the forum in which the presentation was made, the date of the presentation and the abstract.
- **Optional Essay** – A brief statement detailing any disadvantages or adversity (e.g., socioeconomic, educational) the applicant has overcome.
- **Three letters of recommendation** – Three letters of recommendation are required to be submitted via the online system by persons well qualified to evaluate the applicant’s scholastic performance, scientific ability, research interests and motivation, and personal attributes such as character and personality; contact information for these reference writers must also be provided. If the applicant is currently enrolled in, or has completed, a graduate program, one of the recommendations should be from the applicant’s academic advisor or mentor.

Admitted applicants with degrees from foreign institutions must submit a transcript evaluation indicating the degree is equivalent to a U.S. baccalaureate degree prior to matriculation. Only a general evaluation is required.

Personal interviews may be requested by the GSBS Admissions Committee and all admitted applicants to the PhD program must be interviewed by GSBS faculty. Final admission requires receipt of official transcript and ETS score report documents (if required), and is contingent upon a satisfactory completion of the criminal background check.

Applications to the accredited programs in Genetic Counseling and Medical Physics are reviewed by program-level admissions committees who make recommendations to the Dean regarding admission.

Special Information for Foreign and Non-English-Speaking Applicants

Applicants who are not U.S. citizens or permanent residents, and who have not obtained a bachelors or master's degree from a U.S. school will submit the same application materials described above. However, all foreign nationals whose native language is not English, and who have not attended an English-speaking university, must take the Test of English as a Foreign Language (TOEFL) which is administered by the Educational Testing Service and used as a measure of the applicant's proficiency in English at the time of application.

All international students admitted to the GSBS, who do not have a degree from an English-speaking institution will be required to take a diagnostic English language skills test administered in the GSBS before the start of Fall semester classes. The test will evaluate the student's ability in the areas of listening and speaking, reading and writing, and grammar and vocabulary. Admitted students whose English skills are thought to require help for successful performance in the GSBS will be asked to take an English language skills course during the first year at the GSBS. This course is taught at the GSBS each year.

Application Deadline

Complete applications, containing all application materials, must be submitted by a specific deadline which is posted on the GSBS website in the Admissions section.

Enrollment of Graduate Students from Affiliated Institutions

Through reciprocal agreements, students at other components of The University of Texas System, as well as graduate students from Rice University, Baylor College of Medicine, Texas Woman's University, the University of Houston, Texas A&M Health Science Center-Institute of Biosciences and Technology, and the Gulf Coast Consortium may take graduate courses for credit at the GSBS, subject to the approval of the instructor. In addition, GSBS students may take courses for credit at any of the above institutions. The mechanisms for payment of tuition and registration fees vary according to the individual institution. Consult with the Office of the Registrar for specific details.

Non-Degree Students

Qualified individuals who hold a bachelor's degree in science, who have a demonstrated interest in a career in research, and who wish to take courses at the graduate level without enrolling in an MS or PhD degree program may be admitted to the GSBS as non-degree students. Application to be a non-degree student requires:

- Online application form.
- Personal statement – A one-page statement that explains the applicant's motivation for pursuing enrollment as a non-degree seeking student, including a proposed course of study.
- Unofficial transcript(s) – from each college and university attended.
- Application fee - A \$50 application fee is required. Fee waivers are available by request.
- CV or Resume – Include academic honors, awards received in college, employment history, internships, summer research programs, education history, etc.
- Three letters of recommendation – Three letters of recommendation are required to be submitted via the online system by persons well-qualified to evaluate the applicant's scholastic performance, scientific ability, research interests and motivation, and personal

attributes such as character and personality; contact information must also be provided. If the applicant is currently enrolled in, or has completed a graduate program, one of the recommendations must be from the applicant's academic advisor or mentor.

- **Deadline** – The deadline to apply as a non-degree student is two months prior to the start of the semester.

Students admitted as non-degree seeking students must submit immunization records and have a background check performed prior to enrollment. Instructions regarding these and other pre-enrollment requirements will be sent by email once admitted.

A non-degree student will be admitted for one year. No commitment to eventual admission to a degree program is implied by admission as a non-degree student. Re-admission for additional periods of study as a non-degree student will be considered by the Dean, and is dependent in part on the student maintaining at least a 3.0/4.0 grade point average in GSBS courses. Application for re-admission requires a written statement by the applicant reviewing past performance and future goals.

Employees

Employees of institutions within the Texas Medical Center may, with consent of the instructor and the employee's supervisor, and with permission of the Dean, register for GSBS courses each semester. Registration forms for this purpose are available from the Office of the Registrar. Employees must submit an official transcript from their undergraduate institution verifying that they have earned a bachelor's degree or the equivalent prior to enrollment.

Website: <https://gsbs.uth.edu/academics/policies/registration-non-degree.htm>

Guidelines for Employees Who Wish to Pursue a PhD Degree

Any employee of an institution in the Texas Medical Center may, with consent of the instructor and the employee's supervisor, and with permission of the Dean, register for GSBS non-research courses. If the employee is eventually admitted to the GSBS, courses taken while an employee will appear on the student's transcript and may be used to meet GSBS degree requirements, with the approval of the student's Advisory Committee and the Academic Standards Committee.

FINANCIAL SUPPORT

It is the expectation of the GSBS that each student in the PhD program be supported by a graduate research assistantship (GRA) or by a fellowship/traineeship. Funding of the GRA is contingent upon maintaining good academic standing and satisfactory progress towards degree completion. The award of a GRA includes:

- A stipend of \$32,000 per annum;
- Payment of the student's GSBS tuition and required fees; and
- Health insurance

Stipends awarded to GSBS students are intended to assist in meeting educational and living costs so that students devote full time to their studies. It is the expectation of the GSBS that PhD students holding a GRA will not undertake activities, including employment of any kind, that will interfere with their educational program or delay their progress toward the degree. An

exception to this policy will be made by the Dean only if the activity proposed by the student can be justified as contributing to the student's training as a researcher/teacher and involves no more than 80 hours of effort over the course of an academic year.

No PhD student may hold more than one training position at a time. That is, PhD students hold the Graduate Research Assistant (GRA) training position during their tenure as graduate students, and may not hold other training positions (e.g., post-doctoral fellow) concurrently with the GRA position.

Students who are awarded approved, competitive, external Fellowships are eligible, at their advisor's discretion, to be supplemented up to 130% of the standard GSBS graduate research assistantship. To qualify, the fellowship must be made explicitly under the student's name.

GSBS assistantships normally are not awarded to students in the individualized or specialized MS degree programs, although financial aid may be available from individual faculty members or the specialized MS programs. Students in MS programs are eligible to receive a stipend (not to exceed the current GRA level) for the duration of their degree training. MS students who do not receive Graduate Research Assistant stipends may pursue outside employment. If a student is employed in the laboratory in which the student is also performing MS thesis work, experiments performed and data generated in the normal work associated with employment may not be included in the MS thesis.

All degree students may be eligible for the many endowed scholarships and fellowships that are administered by the Deans' Office. The scholarships and fellowships are awarded on a competitive basis by the Student Scholarship Committee using criteria specific to each award. Factors taken into consideration include the student's academic performance, research progress and faculty recommendations. Applications are solicited from students twice a year using a common application. The GSBS also provides travel awards to help students defray the costs of attending scientific meetings. Further information may be obtained from the GSBS website or the Office of Academic Affairs.

The GSBS maintains a list of active institutional training grants and can assist students in preparing applications for external fellowships and awards. More information can be found on the GSBS website under the Training Grant Navigator Program.

In addition to the types of financial aid mentioned above, other sources of support are available through UTHHealth's Office of Student Financial Services (see GSBS General Catalog).

FEES AND EXPENSES

Tuition for Fall and Spring Semesters

Texas law provides for exemption from or the waiver of tuition and/or fees for students under certain conditions. For specific information, contact the Office of the Registrar. Under Texas law, UTHHealth may charge a resident doctoral student who has in excess of 100 credit hours, tuition at the rate charged non-resident doctoral students. For specific information, contact the Office of the Registrar.

For 2018-19, Resident tuition is \$182 per semester credit hour; Non-resident tuition is \$553 per semester credit hour. For 2019-20, Resident tuition is \$215 per semester credit hour; Non-resident tuition is \$637 per semester credit hour. Tuition and fees are subject to change by legislative

or Regental action and become effective on the date enacted. The student fees assessed are authorized by state statute; however, the specific fee amounts and the determination to increase fees are made by the university administration and The University of Texas System Board of Regents. Tuition for residents is at a semester credit hour rate without a minimum.

To maintain full-time student status, a student must register for at least 9 credit hours of GSBS coursework in the Fall and Spring semesters.

The Tuition and Fee Schedules can be found on the Office of Registrar website at uth.edu/registrar/current-students/registration/tuition-fee-schedule.htm.

Tuition for Summer Sessions

For 2018-19, Resident tuition is \$182 per semester credit hour; Non-resident tuition is \$553 per semester credit hour. For 2019-20, Resident tuition is \$215 per semester credit hour; Non-resident tuition is \$637 per semester credit hour. If students register for additional courses during the second summer term, tuition and fees will be automatically adjusted.

To maintain full-time student status, a student must register for at least 6 credit hours of GSBS coursework in the Summer semester.

Fees and Charges

Student fees are authorized by state statute; however, specific fee amounts and the determination to increase fees are made by UTHealth administration and The University of Texas System Board of Regents.

Please refer to the website of the Office of the Registrar at uth.edu/registrar/current-students/registration/tuition-fee-schedule.htm for the current Tuition and Fees Schedules. This site reflects current information regarding tuition and fee exceptions and/or waivers, Veterans education benefits, and the Policy for Texas Resident Tuition.

Fees and Charges:

- Application Fee: \$50.00
- Audit Course Fee: \$25.00/course
- Graduation Fee¹: \$100.00
- Health Insurance²: \$2,504.00
- Information Technology Access Fee (Semester): \$36.00
- Installment Use Fee: \$20.00
- Late Payment Fee: \$25.00
- Late Registration Fee: \$25.00
- Medical Evacuation/Repatriation (Annual -- international students only): \$96.00
- Medical Liability Insurance (Annual – genetic counseling students only): \$14.50
- Student Services Fee³ (Annual – full-time student): \$566.25

¹. A graduation fee of \$100 payable at registration for the final academic term is required of all students. This fee does not include regalia rental.

2. Health insurance is required of all UTHealth students. If students have a health insurance policy (including the insurance provided to GSBS Graduate Research Assistants), they may provide proof of comparable insurance to Auxiliary Enterprises no later than the 12th class day to have this charge waived. Details on the insurance plan are available through the Auxiliary Enterprises Office.
3. The Student Services Fee, required of all students, provides for student activities, outpatient care by Student Health and Counseling Services, student counseling, student government, a shuttle service, and recreational facilities. Optional family coverage is available. The fee varies depending on the number of hours for which a student is enrolled.

GENERAL REGULATIONS

Following is a summary of general GSBS regulations. Complete and specific regulations and requirements are included in the GSBS Policies and Procedures available on the GSBS website, developed under the auspices of the Academic Standards Committee. The provisions that apply to a particular student are those in the GSBS Catalog, the GSBS General Information Catalog and the GSBS Policies and Procedures in effect at the time the student is admitted to a GSBS degree program. However, the student may choose to be guided by the provisions of the Catalog and GSBS Policies and Procedures of any subsequent year in which he or she is in residence.

Degree Requirements

The general requirements for the PhD and MS degrees are described in previous sections of this catalog. The specific requirements for the degrees and the timetable for meeting the requirements are presented in the GSBS Policies and Procedures.

All research papers, theses, and dissertations authored by degree candidates are available to interested members of the general public upon request.

Registration

Full-time students must be registered for each term (Fall, Spring, Summer) of the academic year unless approved for an official leave of absence. Students who are not registered for a term or on an approved leave of absence are considered to have withdrawn from school. Once having withdrawn, a student who wishes to continue formal studies must apply and be readmitted to the GSBS. A student must be enrolled through the semester in which he or she completes all requirements for graduation.

Transfer Credit

No record of courses taken at other institutions prior to admission to the GSBS will appear on a student's GSBS transcript. However, with approval from the Academic Standards Committee and the Dean of Academic Affairs, students who entered the GSBS may transfer credit from previous graduate work taken at another accredited institution provided the credit was not earned toward a completed degree or certificate program. Transfer credits cannot exceed in number those earned in GSBS coursework toward any degree. For the program of work that a student submits in the petition for admission to candidacy for the MS degree, a maximum of two courses taken elsewhere may be included and counted toward the credit hour minimum for degree. Particular courses taken at the graduate level at another institution, if approved by the Dean of Academic Affairs, may be considered as meeting individual degree requirements.

Grading System

Graduate students must be assigned letter grades (A, B, C, F) for completion of formal courses listed in the GSBS Catalog. For computation of the GPA: A = 4, B = 3, C = 2, and F = 0.

A grade received in an approved course taken at another institution will be recorded as submitted by the institution but will not be calculated in the GSBS GPA unless the course is cross-listed as a GSBS course.

Literature Surveys, Special Project: Research, Seminars, The Ethical Dimensions of the Biomedical Sciences, Tutorials, and other research courses listed in the GSBS Catalog are assigned grades of Pass (P) or Fail (F). A grade of P will not be included in the computation of a student's GPA.

For Special Project: Course, the instructor may assign either a letter grade (A, B, C, F) or a Pass/Fail grade. However, the grading system must be the same for all students in the course. A letter grade will be included in the computation of a student's GPA; a grade of P will not.

Thesis for Master of Science and Dissertation for Doctor of Philosophy will be listed as Pass (indicating sufficient progress) or Fail.

A grade of Incomplete (I) may be issued by the Course Director whenever a student is unable to complete all course requirements by the end of the semester due to unavoidable circumstances. The grade of Incomplete cannot be given for poor performance or for the purpose of avoiding the issuance of a regular grade to a student who has performed poorly. Before the end of the following semester, the student must turn in the required work for a regular grade or else the Incomplete will be replaced with a grade of F. In instances where unavoidable circumstances prevent the student from completing the work in the following semester, the student may apply for an extension of the Incomplete until the next time the course is offered. Such extensions must be approved by both the Course Director and the Dean of Academic Affairs.

The symbol WP is given when a student with satisfactory course performance withdraws from a course within the first nine weeks of class with the consent of the instructor. A WP, by itself, will not prevent the student from withdrawing from GSBS in good standing. The symbol WF is given if the student has unsatisfactory course performance up to the date of withdrawal. A WF grade is equivalent to an F in the calculation of the GPA. There will be no withdrawal after the last day of the ninth week of class.

A failing grade in any course taken while a student at the GSBS is grounds for dismissal from the GSBS. The student may request that the Dean allow him or her to retake the course the next time it is offered (usually within one year) rather than being subject to dismissal. If the request is granted, the student must earn a grade of A or B in that course; a grade of C when the course is retaken will result automatically in dismissal. During the interim, the student will be on academic probation. If the student passes the course, the F will remain on the transcript, but only the new grade will be calculated in the student's GPA.

Students may retake a GSBS course, in which case both the new and previous grades will appear on the transcript, but only the second grade will be calculated in the GPA. Students whose GPA is less than 3.0 may not retake courses in which they received a B in an effort to raise their GPA to 3.0 or above.

Grade Grievance Procedure

In attempting to resolve any student grievance regarding grades or evaluations, it is the obligation of the student first to make a good faith effort to resolve the matter with the faculty member involved. Individual faculty members retain primary responsibility for assigning grades and evaluations. The faculty member's judgment is final unless compelling evidence suggests discrimination, differential treatment or mistake. If the evidence warrants appeal, the student must submit a request in writing with supporting evidence to the Dean. The determination of the Dean is final.

Probation

Causes — Any of the following actions or conditions can cause the student to be placed on academic probation by the Dean:

- Failure of any course;
- Failure to maintain a GSBS cumulative grade point average of 3.0 or better;
- Failure of the student to meet with their Advisory Committee within a six-month period;
- Failure to meet the particular requirements for the MS or PhD degree in the time periods specified by the GSBS; or,
- Failure to make satisfactory progress toward the degree or perform academically in a satisfactory manner, as determined by the student's Advisory Committee.
- Release of the student by the Research Advisor due to the student's unsatisfactory progress toward the degree.

Procedures

The Dean may place a student on academic probation for any of the reasons given above. Written notification will be provided to the student, his or her Advisor or Advisory Committee, and Program Director (if applicable). Within one month of notification, the student, in consultation with the Advisor or Advisory Committee and Program Committee (if appropriate), will submit to the Academic Standards Committee a proposed course of action to resolve the student's academic difficulties. The Academic Standards Committee will review the proposal, approve it or suggest modifications and forward its recommendations to the Dean. The Dean will make the final decision on the student's proposal and inform the student of the conditions to be met.

Students who are released by their Research Advisor for unsatisfactory progress toward the degree may be placed on probation after review by the Academic Standards Committee of the specific reasons for the release. In conducting this review, the committee has the option to receive input from the student, advisor and other GSBS faculty members. The student must consult with the GSBS Office of Academic Affairs to identify a new advisor and begin a six-week trial period within one month of the release. For students on probation, the plan for degree completion and new Research Advisor must be approved by the Academic Standards Committee prior to the student's formal affiliation with the Advisor.

Consequences — Any student on probation will not be allowed to stand for the MS final oral thesis examination, petition for the PhD candidacy examination (except when probation is due to failure to submit a petition), or stand for the defense of the PhD dissertation. Students on probation are not eligible to receive GSBS Scholarships or Fellowships.

More severe actions, up to and including dismissal, may be considered by the Academic Standards Committee for a student's failure to make satisfactory progress toward the degree.

Dismissal

Causes – The following list describes the most common conditions or circumstances in which the Dean may dismiss a student from the GSBS:

1. If the student fails any course; or
2. If the student's academic deficiencies are not resolved within the time period specified in policy or by the Dean; or
3. A student displays substantial deficiencies in his or her ability to perform effectively in a laboratory, or other research or training environment (as determined by one or more GSBS faculty members); or
4. If the student fails the PhD candidacy examination.

Procedures – The Academic Standards Committee will consider any questions concerning a student's academic progress in which dismissal is a possible outcome, and will make the decision concerning the dismissal of the student. If the student wishes to appeal the decision of the Academic Standards Committee, he or she may appeal to the Dean, who will consider the evidence and the decision of the Academic Standards Committee and render a decision on the appeal. The Dean's decision is final.

Student Conduct and Discipline

Students are responsible for knowledge of and compliance with University policies concerning student conduct and discipline as set forth in UTHHealth HOOP Policy 186, Student Conduct and Discipline. The GSBS Code of Conduct pledge must be signed by all students in GSBS degree programs when they first enroll and when they petition for MS and PhD candidacy. HOOP 186 is found online at uth.edu/hoop/policy.htm?id=1448220.

Leaves of Absence, Time Away from Duties, and Withdrawals

The GSBS allows students to request an official Leave of Absence (LOA) for up to one year. During an official LOA, the student cannot be paid by the advisor or the GSBS, but may work at outside employment. Students may request an official LOA from the Office of Academic Affairs. Students must state a date when they will return from LOA. If they do not return by that date, and they have not been granted an extension of the LOA, they will be considered to have withdrawn from the GSBS.

Students may return prior to the date indicated on the LOA form. Students returning from LOA do not need to re-apply for admission, but they must notify the Office of Academic Affairs that they are returning at least 30 days prior to the semester in which they wish to re-enroll. Extensions of the official LOA for a maximum of up to one additional year may be requested through the Office of Academic Affairs, and must have the approval of the Dean. Requests for extensions must be submitted at least 30 days before the end of the initial leave.

Any student who fails to register for any semester and who has not been granted an official leave

of absence or been approved as a non-registered candidate for a degree will be considered to have withdrawn from the GSBS. Once having withdrawn, a student who wishes to continue formal studies must apply and be readmitted to the GSBS.

Time Away from the Lab

Students receive their stipends as employees from one of the GSBS parent institutions, each of which has its own employment policies and procedures with which the student must comply. UTHealth and MD Anderson Cancer Center each has its own policies on several issues, such as the amount of time graduate students are permitted to be away from their lab or workplace for purposes such as sick leave, vacation, family-related leave, etc., and the policy of the institution at which the student is employed shall apply. In all cases, however, the student should remember that he/she is under the supervision of the advisor, and the advisor sets the standards for work ethic and policies of the lab, including attendance standards and expectations. The student and advisor should always explicitly discuss the advisor's expectations before they make a mutual commitment. In all cases, it is the student's responsibility to request time away from the lab (or expected lab activities; in advance, when possible) and to keep the advisor, or the advisor's designee, informed in a timely manner of any unanticipated absences, e.g., for illness, family emergencies, etc.

GSBS REGISTERED STUDENT GROUPS

Association of Minority Biomedical Researchers

The Association of Minority Biomedical Researchers (AMBR) supports students by offering valuable academic resources during their graduate education. AMBR hosts professional development events that address the specific needs of graduate trainees. This student-led group is dedicated to enriching scientific training through a community of solidarity and support.

First Generation

The First Generation Student Group is a community of graduate students who are the first generation in their family to obtain a degree. This supportive peer community is focused on connecting students with a range of professional development and personal resources to enhance the graduate school experience and support student success. The group meets monthly with an agenda driven entirely by student interests that includes seminars/workshops, mentoring opportunities, and career discussions with senior scientists across diverse fields.

Graduate Student Association

The purpose of the Graduate Student Association (GSA) is to provide a student forum for discussion of common needs and it functions as the official student governance body at the GSBS. The group works cooperatively with faculty and administration to address issues of importance to students.

Community Outreach

Community Outreach is a volunteer student organization program that organizes events to raise science literacy and enthusiasm for science in our community. It helps plan lab tours, career seminars, research talks, science fairs, and much more at the GSBS and at local schools. The main goal of Community Outreach is to enhance scientific literacy and an appreciation of the scientific method in the community.

LGBT Student Alliance

The LGBT Student Alliance aims to promote a sense of community among its members as well as an awareness of issues affecting the LGBT community in the graduate school. The group sponsors regular social events to promote networking, takes part in community service events and hosts educational workshops.

Association of Scientific Communication

The Association of Scientific Communication (ASC) supports students by working on building specific skills such as, but not limited to, public speaking, writing for a non-scientific audience, learning basic programming and coding techniques, and creating graphical abstracts and diagrams.

COURSE OFFERINGS OF THE GENERAL FACULTY

GS00 1020 *Practicum in Teaching.* **Variable credit**

Maximum of 3 sem. hrs. Prerequisite: None. This course is for the GSBS student who is appointed as a teaching assistant through the GSBS and provides for the student a record of that appointment.

GS00 1021 *Special Project Internship.* **1 sem. hr.**

Prerequisite: By permission of instructor only. All GSBS students who plan to carry out an internship outside the school are required to register for this class. Interested students should contact the instructor at least two months in advance to make specific arrangements.

GS00 1410 *USMLE Exam Preparation.* **Variable credit**

Maximum of 4 sem. hrs. Prerequisite: Open only to MD/PhD students. MD/PhD students who will commit greater than 90 hours to independent preparation for USMLE board examinations should register for this course which will be supervised by the MD/PhD Program Directors.

GS00 1514 *Tutorial Research Experience.* **2 sem. hrs.**

Enrollment is required of all PhD students, usually during the first two semesters of residence. Not open to MS or non-degree students. During each ten-week rotation, students will spend the equivalent of five afternoons per week in the laboratory (20 hours per week for 10 weeks for a total of 200 hours). In consultation with their faculty advisors, students will select the research areas that best support their educational programs.

GS00 1520 *Research in Biomedical Sciences.* **Variable credit**

Maximum of 9 sem. hrs. Primarily intended for MS and PhD students who have selected their advisors and thesis projects.

GS00 1530 *Special Project: Research.* **Variable credit**

Maximum of 4 sem. hrs. Short-term research project intended to expose students to a research area or set of laboratory techniques. May be used by MS or non-degree students to obtain the equivalent of a Tutorial Research Experience.

GS00 1610 *Special Project: Course.* **Variable credit**

Maximum of 4 sem. hrs. For courses not listed in the GSBS Catalog or courses presented in a different format from that listed in the Catalog.

GS00 1620 *Literature Survey.* **Variable credit**

Maximum of 2 sem. hrs.

GS00 1910 *Thesis for Master of Science.* **Variable credit**

Maximum of 9 sem. hrs. For students who have successfully petitioned for MS candidacy. Enrollment for a minimum of one semester required for MS degree.

GS00 1920 *Dissertation for Doctor of Philosophy.* **Variable credit**

Maximum of 9 sem. hrs. For students who have passed the PhD oral candidacy examination. Enrollment for a minimum of one semester required for PhD degree.

COURSE OFFERINGS IN BIostatISTICS, BIOINFORMATICS AND SYSTEMS BIOLOGY

GS01 1013 *Bayesian Data Analysis.* **3 sem. hrs.**

Prerequisites: Calculus, linear algebra, prior probability and statistics course (or permission of instructor). This course will cover Bayesian methods for analyzing data. The emphasis will be on applied data analysis rather than theoretical development. A variety of models, including linear regression, hierarchical models, and models for categorical data will be considered.

GS01 1023 *Survival Analysis.* **3 sem. hrs.**

Prerequisite: Introduction to Biostatistics and Clinical Trials (GS011033), or permission of instructor. Survival data are commonly encountered in scientific investigations, especially in clinical trials and epidemiologic studies. In this course, commonly used statistical methods for the analysis of failure-time data will be discussed. One of the primary topics is the estimation of survival function based on censored data, which include parametric failure-time models, and nonparametric Kaplan-Meier estimates of the survival distribution. Estimation of the cumulative hazard function and the context of hypothesis testing for survival data will be covered. These tests include the log rank test, generalized log-rank tests, and some non-ranked based test statistics. Regression analysis for censored survival data is the most applicable to clinical trials and applied work. The Cox proportional hazard model, additive risk model, other alternative modeling techniques, and new theoretical and methodological advances in survival analysis will be discussed.

GS01 1031 *Quantitative Sciences Student Seminar Series.* **1 sem. hr.**

Prerequisite: None. This series is held bi-weekly for students to present their research project in front of their peers and program faculty. The focus of the session is for the students to practice presenting their project to a varied audience of peers and mentors. Attendees should be prepared to ask questions of the speaker and to provide constructive criticism. Participation is mandatory.

GS01 1033 *Introduction to Biostatistics and Clinical Trials.* **3 sem. hrs.**

Prerequisites: Calculus and linear algebra. This course is a one-semester overview of statistical

concepts most often used in the design and analysis of biomedical studies. It provides an introduction to the analysis of biomedical and epidemiological data. The focus is on non-model-based solutions to one sample and two sample problems. The course also includes an overview of statistical genetics and bioinformatics concepts. Because this course is primarily for statistics majors, the applied methods will be related to theory wherever practical. Students will be given the opportunity to gain experience in the general approach to data analysis and in the application of appropriate statistical methods. Emphasis will be on the similarity between various forms of analysis and reporting results in terms of measures of effect or association. Emphasis will also be given to identifying statistical assumptions and performing analyses to verify these assumptions. Because effective communication is essential to effective collaboration, students will have the opportunity to gain experience in presenting results for statistically naive readers.

GS01 1041 *Computational Approaches for Single-Cell Data Analysis.* **1 sem. hr.**

Prerequisite: None. Audit permitted. This course aims to provide the central concepts and background knowledge required for experimental design and analysis of single-cell studies. The format combines journal club and seminar series formats, with an organized reading of landmark papers in single-cell omics technologies, high-dimensional data analysis (including transformation, visualization, and clustering), statistical inference, statistical modeling, and phylogenetics, among other possible topics. There will be participant presentations and discussion sessions. At the end of the course, students will be able to think critically about single-cell studies and understand their applications in cancer research and other disciplines.

GS01 1083 *Mathematical Statistics I.* **3 sem. hrs.**

Prerequisites: Advanced undergraduate course in probability and statistics (300 level); probability theory and the central concepts and methods of statistics. A review of probability theory, including generating functions, common families of distributions, multivariate distributions, and hierarchical modeling. Foundations of statistical inference, including sampling distributions, principles of data reduction, maximum likelihood methods, point and interval estimation, hypothesis testing, and decision theory. Applications to advanced statistical problem sets. The course is cross-listed at Rice University (Stat 519). The venue of the course will be at Rice University.

GS01 1113 *Introduction to Mathematical Statistics.* **3 sem. hrs.**

Prerequisite: Introduction to Mathematical Probability (GS011213), or permission of instructor. This course is the second of two courses intended to establish a theoretical foundation for the biostatistics and biomathematics curriculum. The material introduced in this course is a necessary prerequisite for GSBS courses in informatics, survival analysis, and advanced Bayesian inference. The focus will be on integrating both classical and Bayesian methods in a comprehensive but elementary survey. This course will discuss the general approach to statistical inference for data arising from an unknown probability distribution. Students will learn methods for characterizing specific properties of the distributions and use them in making future predictions. The course will discuss statistical inferential methods for data arising from continuous or discrete distributions. The course is cross-listed at Rice University (Stat 532). The venue of the course will be at Rice University.

GS01 1143 *Introduction to Bioinformatics.* **3 sem. hrs.**

Prerequisite: None. This course is intended to be an introduction to concepts and methods in bioinformatics with a focus on analyzing data merging from high throughput experimental pipelines such as next-gen sequencing. Students will be exposed to algorithms and software

tools involved in various aspects of data processing and biological interpretation. Though some prior programming experience is highly recommended, it is not a requirement.

GS01 1223 *Practical Computational Genetics and Bioinformatics.* **3 sem. hrs.**

Prerequisites: Genetics and statistics; permission of instructor. This course is designed as a training of necessary computational and bioinformatics skills used in everyday analysis of biological data, especially DNA sequence and polymorphism data. Topics include basic Unix/Linux command line, programming (Python), human sequence/polymorphism databases, and DNA sequence/polymorphism analysis.

GS01 1233 *GLM and Categorical Data Analysis.* **3 sem. hrs.**

Prerequisite: STAT 519, STAT 615, or STAT 410 (Rice courses) or permission of instructor. This course is devoted to the theory and methodology of categorical data analysis with an introduction to Generalized Linear Models. There will be analyses of real data sets using R. The course is cross-listed at Rice University (STAT 545). The venue of the course will be at Rice University.

GS01 1263 *Bayesian Statistics.* **3 sem. hrs.**

Prerequisites: STAT 519, STAT 615 and STAT 605 (Rice courses); permission of instructor. This course covers Bayesian Inference and methods of analyzing data. The emphasis will be on applied data analysis rather than theoretical development. We will consider a variety of models, including linear regression, hierarchical models, and models for categorical data. The course is cross-listed at Rice University (STAT 525). The venue of the course will be at Rice University.

GS01 1273 *Modern Nonparametrics.* **3 sem. hrs.**

Prerequisites: Mathematical Statistics (GS011083 or equivalent) and Linear Regression or permission of instructor. This course seeks to introduce students to the many developments in modern nonparametrics, including resampling methods, nonparametric and semiparametric regression models that have occurred over the last several decades. Topics include the bootstrap, jackknife, cross-validation, permutation tests, classification tree, random forests, nonparametric smoothing and regression, spline regression, and functional data analysis. While the course will focus on applications, time will be devoted to derivations and theoretical justifications of methods. The statistical software R will be used for the homework exercises.

GS01 1723 *Biostatistics Consulting and Collaboration.* **3 sem. hrs.**

Prerequisites: Introduction to Biostatistics (STAT514/GS011033), Linear Regression (GS011053), GLM and Categorical Data Analysis (STAT545/GS011233). Students will gain experience by working on real collaborative projects that biostatisticians encounter every day. The goal of the course is to introduce students to projects where statistics and science meet and interact to produce knowledge. The students will learn to work with clinical/basic science collaborators to elicit the scientific question of interest, design studies, identify the correct statistical analyses tools, communicating results in both oral and written form. We will also address important topics related to developing productive collaborations such as building trust and mutual respect, effective communication, participating in multidisciplinary teams and reproducible research.

COURSE OFFERINGS IN MEDICAL PHYSICS

GS02 1011 *Radiation-Induced Late Effects and Survivorship Journal Club* **1 sem. hr.**

Prerequisite: Medical Physics Program or consent of instructor. Students will meet weekly to present and discuss a contemporary publication on the subject of late effects, cancer survivorship, and dosimetry following medical radiation exposures. Publications may include scientific articles, books, reports, review papers, etc. The late effects of interest to the participants of this course are radiation-induced second cancers, infertility, organ dysfunction, cardiovascular effects, lung damage, pregnancy and neonatal outcomes, cognitive deficit, auditory impairment, dental abnormalities, diabetes, other chronic disease, and other long-term radiogenic effects and public health concerns. Medical radiation exposures include those related to radiotherapy and diagnostic imaging. Radiation dosimetry, late effects, and survivorship publications will be based on radiological measurements, analytic calculations, Monte Carlo calculations, predictive risk models, epidemiological data, and any related studies. The presentation outline comprises 25 minutes of prepared slides and 25 minutes of discussion. Each student will be required to present at least once during the semester and will be expected to actively participate in the discussion period. A minimum of 80% attendance is required for a passing grade. Students and faculty will not present their own work. This course is intended for Medical Physics students but is open to students from other programs with instructor consent.

GS02 1012 *Physics of Positron Emission Tomography.* **2 sem. hrs.**

Prerequisites: Radiation Detection, Instrumentation, and Data Analysis (GS021053) and Introduction to Medical Physics II: Medical Imaging (GS021093) or Introduction to Medical Physics IV: The Physics of Nuclear Medicine (GS021193). This course will focus on advanced Positron Emission Tomography (PET) physical principles, image formation and processing, and image correction techniques, as well as lay the foundations for understanding tracer kinetic modeling. Students will have the opportunity to obtain hands on experience with PET imaging and data analysis. The use of PET imaging in various medical and research applications will be presented.

GS02 1022 *Special Radiation Treatment Procedures.* **2 sem. hrs.**

Prerequisite: Introduction to Medical Physics I (GS021093), Introduction to Medical Physics III: Therapy (GS021113), and Introductory Radiation Therapy Physics Rotation (GS021154). The main goal of this course is to introduce students to special radiation therapy and image-guided therapy procedures that are considered “non-routine” or in “advanced” form relative to the current clinical practice and may require special consideration in the preparation and execution. Special procedures are important clinical services which are usually provided directly by the clinical medical physicist. The special procedures selected in this course may change overtime. Currently, the following topics are included: image-guided radiotherapy procedures; total skin and total body irradiation techniques; fetal and pacemaker dosimetry; commissioning of IMRT planning systems; 4D CT imaging procedures; CyberKnife treatments; and tomotherapy treatment techniques.

GS02 1032 *Principles of Magnetic Resonance Imaging.* **2 sem. hrs.**

Prerequisite: Introduction to Medical Physics II (GS021103) or consent of instructor. The goal of this course is to provide a comprehensive understanding of the physics involved in magnetic resonance imaging (MRI), and prepare the students to carry out research or practice medical physics in this area. The topics include basic spin physics, contrast mechanisms, hardware,

data acquisition, image reconstruction, and artifact recognition. Emphasis will be placed on practical issues encountered in research and clinical applications.

GS02 1052 *Imaging Science.* **2 sem. hrs.**

Prerequisites: Calculus, Linear Algebra. This course provides a concise and coherent review of some commonly-encountered topics in applied mathematics, with a particular emphasis on their applications and relevance to medical imaging. The course covers and is equally divided into two major sections: 1. Optimization methods and algorithms, 2. Fourier and wavelet transforms.

GS02 1053 *Radiation Detection, Instrumentation, and Data Analysis.* **3 sem. hrs.**

Prerequisites: Introduction to Medical Physics I (GS021093) or equivalent, and permission of instructor. This course encompasses a study of the characteristics and applications of charged particle, photon, and neutron detectors. Modular analog and digital electronics required for signal processing and data recording will be used. Techniques of data analysis and error propagation of counting statistics will be introduced. The course will include two lectures and one laboratory exercise weekly. The applications of radiation detectors in radiotherapy, health physics, nuclear medicine, and radiobiology will be emphasized.

GS02 1062 *Introduction to Clinical Medical Physics.* **2 sem. hrs.**

Prerequisite: None. This course will provide an introduction to the clinical practice of medical physics in radiology and radiation oncology clinics. The Imaging Track will cover the history of diagnostic imaging, basic clinical applications, clinical roles, patient workflow, an introduction to imaging informatics, fundamental imaging principles and system design for each imaging modality, imaging physicist duties, and safety. The Therapy Track will cover an overview of cancer, treatment options, simulation, treatment planning and delivery, as well as an introduction to oncology for specific disease sites. Both tracks will cover radiation safety, radiation detection surveys, radiation protection, accreditation, regulations and an introduction to quality control and quality assurance.

GS02 1063 *Fundamental Anatomy, Physiology, and Biology for Medical Physics I.* **3 sem. hrs.**

Prerequisites: Introduction to Medical Physics III: Therapy (GS02 1113). This is Part I of a two-part course that covers the fundamental biological principles that are essential for medical physicists, presenting them in an integrated progression from the molecular level to the organismal level. This course may also be of interest for graduate students of biophysics, radiation biology, and biomedical engineering. Beginning with a review of basic biochemistry, the course proceeds through molecular biology then cellular biology and physiology. Applications of these principles to radiation biology are covered, then the course moves to cell-cell and cell-matrix interactions, tumor growth and development, and radiation carcinogenesis. The course concludes with the language of anatomy

GS02 1072 *Statistics for Medical Physicists.* **2 sem. hrs.**

Prerequisites: Calculus, Linear Algebra. This course is a one-semester overview of statistical concepts in biomedical and imaging studies. The material is intended to provide an introduction to applied methods of biostatistics that are prevalent in an engineering curriculum but are now increasingly encountered in medical physics literature and various areas of medical physics research, including non-model-based solutions to one sample and two sample problems. Students will gain experience in general understanding of the underlying statistical principles, the general approach to data analysis and interpretation of appropriate statistical methods.

GS02 1073 *Fundamental Anatomy, Physiology, and Biology for Medical Physics II.* **3 sem. hrs.**

Prerequisites: Introduction to Medical Physics III (GS021113); Fundamental Anatomy, Physiology, and Biology for Medical Physics I (GS021063). This is Part II of a two-part course that covers the fundamental biological principles that are essential for medical physicists, presenting them in an integrated progression from the molecular level to the organismal level. This course may also be of interest for graduate students of biophysics, radiation biology, and biomedical engineering. Part II builds on the concepts from Part I of the course, and focuses on systems biology, including anatomy, physiology, and oncology, with special focus on the use of radiotherapy to treat cancer. This course has a unique focus on radiologic anatomy, and students will learn to identify normal anatomic structure in medical images acquired using radiography, computed tomography, and magnetic resonance imaging. Molecular and functional imaging and cancer biology are also introduced in this course.

GS02 1083 *Biological and Biophysical Principles of Molecular Imaging.* **3 sem. hrs.**

Prerequisites: Undergraduate biochemistry and cell biology. This course will provide an introduction to pre-clinical and clinical molecular imaging modalities as well as the biochemical principles that govern contrast agent design and function. Topics include optical imaging, bioluminescence imaging, PET, SPECT, CT, MRI, MRS, photoacoustic imaging, and radiomics. The goal of the course is to provide students with the concepts and techniques necessary to integrate pre-clinical imaging, cell biology, and biochemistry into their own research and the intellectual foundation for a career in molecular imaging research.

GS02 1093 *Introduction to Medical Physics I: Basic Interactions.* **3 sem. hrs.**

Prerequisite: Permission of instructor. This semester covers the basic interactions of ionizing and non-ionizing radiation important in medicine. Topics include production of radiation; photon, charged-particle, and neutron interactions; cavity theory; radiation interactions with solids; and ultrasound interactions.

GS02 1104 *Introduction to Medical Physics II: Medical Imaging.* **4 sem. hrs.**

Prerequisite: Introduction to Medical Physics I (GS021093). This course includes the production of x-rays, conventional x-ray radiology, fluoroscopy, mammography as well as digital x-ray imaging modalities, computed tomography, ultrasound and picture archiving and communication systems (PACS). It covers the basic principles of medical imaging physics, the fundamental characteristics of each imaging modality, the major components of medical imaging systems, the principles of image formation and reconstruction, the attributes used to assess the performance and image quality of an imaging system, and the radiation dose to patients and personnel.

GS02 1114 *Introduction to Medical Physics III: Therapy.* **4 sem. hrs.**

Prerequisite: Introduction to Medical Physics I (GS021093). The physics of treatment modalities to include external beam radiotherapy, brachytherapy, and internal emitters will be discussed. The necessary therapy equipment will be described with methods of calibration, dose specification, and dose prescription. The effects of machine geometry and patient anatomy on dose calculations will be discussed. Machine calibration and quality assurance procedures are emphasized.

GS02 1133 *Introduction to Radiation Protection.* **3 sem. hrs.**

Prerequisite: Radiation Detection, Instrumentation, and Data Analysis (GS021053) or permission of instructor. The science of radiation protection including terminology, biological effects, shielding dose limits, and dose measurement will be studied. The role of state and federal

enforcement agencies will be discussed. The application of radiation protective concepts in a medical environment will include room design, isotope handling, instrumentation calibration, and room surveys.

GS02 1154 *Introductory Radiation Therapy Physics Rotation.* **4 sem. hrs.**

Prerequisite: Introduction to Medical Physics III (GS021113) or permission of instructor. This course provides the student the opportunity to obtain first clinical exposure to radiotherapy. The student will observe and participate in dosimetry clinics and be asked to perform routine duties in dosimetry. The student will calibrate radiation beams, perform quality assurance tests, observe patient treatments, and do treatment planning in both brachytherapy and external beam.

GS02 1174 *Introductory Diagnostic Imaging Rotation.* **4 sem. hrs.**

Prerequisites: Introduction to Medical Physics II (GS021103); Introduction to Medical Physics IV (GS021193); Radiation Detection, Instrumentation and Data Analysis (GS021053); and Introduction to Radiation Protection (GS021153). Introduction to Radiation Protection (GS02 1153) may be taken concurrently. Registration requires permission of instructor. This rotation provides the student the opportunity to obtain clinical and practical exposure to diagnostic imaging and medical physics practices. The student will observe patient diagnostic studies in radiology (e.g., general radiography, fluoroscopy, mammography, CT, MRI, ultrasonography) and nuclear medicine, will observe the process of radiological diagnosis, and will perform calibration and quality-assurance tests on diagnostic imaging equipment. The comprehensive oral final examination is patterned after the national board certification examination for diagnostic radiological physicists.

GS02 1194 *Introduction to Medical Physics IV: The Physics of Nuclear Medicine.* **4 sem. hrs.**

Prerequisites: Introduction to Medical Physics I (GS021093), Radiation Detection, Instrumentation, and Data Analysis (GS021053) (may be concurrent) and permission of instructor. This course introduces graduate students to the basic science and instrumentation of nuclear medicine and magnetic resonance imaging. It presents scientific principles underlying quantitative radionuclide organ imaging methods for dosimetry and treatment planning.

GS02 1202 *Electronics for Medical Physicists.* **2 sem. hrs.**

Prerequisite: Undergraduate electronics course covering basics of analog and digital circuits, or permission of instructor. This course emphasizes the analog and digital electronics associated with scientific instrumentation, particularly as related to medical physics. Topics include analog DC and AC circuits and circuit analysis, transformers, and basic semiconductor devices such as diodes, transistors, and operational amplifiers; electrical safety; the use of filters and voltage regulators; digital logic; digital circuits, and the interface between analog and digital domains; and an overview of the electrical characteristics of systems that are used in the practice of medical physics.

GS02 1731 *Medical Physics Seminar.* **1 sem. hr.**

Prerequisite: None. In the Fall term, students present talks on selected topics in general medical physics, therapy, and medical imaging. The objectives are to acquaint students with a wide range of medical physics topics, and to develop public speaking skills. In the Spring term, students learn the fundamentals of Medical Physics professionalism and ethics. The objectives are to familiarize the students with several professional and ethical concerns within the field and provide them with lectures from subject area experts on each topic.

COURSE OFFERINGS IN BIOCHEMISTRY

GS03 1011 *Emerging Fields in Biochemistry and Molecular Biology: RNA Biology.* **1 sem. hr.**

Prerequisite: None. The goal of this mini-course is to learn cutting edge RNA biology within a historical context. This course will focus on recent research in RNA biology: differential RNA processing and stability (splicing, polyadenylation, and turnover), the functional significance of various classes of non-coding RNAs (microRNAs, lncRNAs, cRNAs, ceRNAs, eRNAs, etc.), the CRISPR/Cas9 system, and RNA epitranscriptomics (RNA methylation and terminal uridylation). Class lectures and discussions will be predominantly student led with assistance of topic area experts. Overall, there will be 12 class meetings (two meetings per week) at 1.25 hours each.

GS03 1021 *Emerging Fields in Biochemistry and Molecular Biology: Translational Science and Molecular Medicine.* **1 sem. hr.**

Prerequisite: None. The goal of this mini course is for students to develop grant writing and peer review skills in the context of learning cutting edge Translational Science. The class will be divided into 11 modules (twice per week) that are each 1.25 hours-long focused on new topics in Molecular Medicine: hemolytic disorders, hypertension and autoimmunity, aneurysms, Lyme disease, and pulmonary disorders. The fourth and eleventh classes will be discussion-based and run primarily by a teaching assistant with some guided input from the course director or guest lecturer. The first of these two discussions will focus on what constitutes writing a successful proposal and peer review. The last class will be a "mock study section" moderated by the teaching assistant and instructors to review proposals. Students are required to write a 2-page, NIH-style proposal based upon the papers discussed in class. After the students turn in their proposals, the instructors will de-identify and redistribute the proposals back to the students. The students will then be required to write short critiques on two, randomly-assigned proposals (1/2 page each) and present them at the peer review held during the last class. Students receive a letter grade, which is contingent on the completion of the required written proposal and written critiques. When taken with GS031011, this course satisfies the GSBS Scientific Writing requirement.

GS03 1023 *Current Methods in Biochemistry and Cell Biology.* **3 sem. hrs.**

Prerequisite: Foundations of Biomedical Research (GS21 1017) or two semesters of undergraduate biochemistry. The goal of this course is to instruct students in cutting edge methodologies that relate to both structural and molecular biology. The class will consist of 43 1-hour lectures held on Monday, Wednesday, and Friday. Individual lecturers are chosen from multiple GSBS Graduate Programs based on their expertise in the relevant technologies. The lectures will provide a sound foundation in the principles, appropriate applications, and limitations of a repertoire of techniques ranging from qRT-PCR to metabolomic profiling to basic recombinant protein expression and analysis. The course is designed to act synergistically with techniques covered in the Core Course.

GS03 1111 *Scientific Writing for Grant Proposals.* **1 sem. hr.**

Prerequisite: Foundations of Biomedical Research (GS211017). The goal of this mini-course will be to learn how to write an effective grant proposal. There will be formal lectures on the components of an NIH grant followed by writing workshops. The course will also include a mock study section with peer review of the written proposals. This course fulfills the GSBS writing requirement.

GS03 1711 *Seminars in Biochemistry and Molecular Biology.* **1 sem. hr.**

Prerequisite: General knowledge of biochemistry. This course will consist of formal seminars given by staff and visiting scientists in the broad disciplines of biochemistry and molecular biology.

COURSE OFFERINGS IN CELLULAR, MOLECULAR AND DEVELOPMENTAL BIOLOGY

GS04 1022 *Vascular Biology: Basic Science to Clinical Research.* **2 sem. hrs.**

Prerequisite: None. Open to all GSBS students. The blood vessels constitute the largest tubing system that transports blood between the heart and other organs and tissues. Vascular diseases are the leading cause of death and disability. This advanced biomedical science course is designed to explore modern concepts of vascular biology and human vascular diseases, and will introduce and discuss current basic and clinical advances in the field. The course will emphasize molecular aspects of vascular biology, physiopathological processes, and the development of advanced therapeutic technology in vascular disease. A unique feature of the course is its integration of basic and clinical research, with a focus on translational research. The aspects of vascular biology to be covered include development, cell biology, genomics, disease processes, and therapeutic approaches. Lecturers will be drawn from researchers and clinicians in the field from several institutions in the Texas Medical Center, including UTHealth, MD Anderson Cancer Center, Baylor College of Medicine, and Rice University. The focus on current research directions will provide excellent opportunities for students interested in vascular biology as they plan their own research careers.

GS04 1032 *Molecular Epidemiology.* **2 sem. hrs.**

Prerequisite: None. The causes of most chronic diseases in the general population involve the interaction of inherited genotypes, somatic genetic damage, exogenous exposures, and endogenous metabolic pathways. A complete understanding of disease etiology may therefore require a multidisciplinary approach that draws on methods from epidemiology, statistics, classical genetics, and molecular biology. In addition to an overview of molecular biology and epidemiology, this course will present methods and techniques for molecular epidemiology studies. Emphasis will be placed on the application of biomarkers. Advantages and limitations of using biomarkers in epidemiologic studies will be discussed.

GS04 1043 *Molecular Principles of Virology.* **3 sem. hrs.**

Prerequisite: None. This general virology course places emphasis on both DNA and RNA animal viruses in terms of their properties, identification, classification, virus-host cell interactions, mechanisms of virus replication, and virus-induced transformation. The involvement of tumor viruses in the neoplastic disease process also is presented.

GS04 1051 *Fluorescence and Electron Microscopy: Imaging Cells and Molecules.* **1 sem. hr.**

Prerequisites: General knowledge of microbiology and biochemistry and consent of instructor. Fluorescence and electron microscopes permit the examination of cellular features at high magnification. This laboratory-based course is designed to provide the theory, fundamental operating principles, specimen preparation techniques of fluorescence microscopy, transmission electron microscopy, and cryo-electron microscopy. At the end of the course, students with no prior experience will be able to prepare specimens, operate the instruments, and collect and interpret data. In addition, students will also learn how to write part of manuscripts. While

this course is intended for students in the Microbiology and Infectious Diseases Program, other GSBS students are encouraged to enroll as these advanced microscopic techniques are broadly used.

GS04 1072 *Principles of Stem Cell Biology.* **2 sem. hrs.**

Prerequisite: None. Stem cells, be they embryonic or somatic, play crucial roles in the development and functional maintenance of individual organ systems and complete organisms. As has already been well demonstrated for the blood-forming system through bone marrow transplantation, stem cells can be utilized clinically for treatment of genetic or acquired diseases. The ensuing decades will undoubtedly provide many more successful clinical applications of stem cells in regenerative medicine. Stem cells may also play critical roles themselves in the initiation and maintenance of certain diseases, such as cancer. This course will provide a present-day understanding of the precise definition, molecular characterization, and biological function of stem cells. The course focus will primarily be on fundamental issues regarding stem cells, and less on their wide range of potential future applications. Completion of this course should adequately prepare students to both identify and understand fundamental issues in current stem cell research, as well as to permit students themselves contribute to advancing this field through research.

GS04 1073 *Developmental Biology.* **3 sem. hrs.**

Prerequisite: Permission of instructor. Developmental Biology is one of the fundamental modern biological disciplines. This course provides an in-depth examination of the basic cellular, molecular, and genetic mechanisms by which a fertilized zygote transforms into an organism with fully differentiated and functioning tissues. Topics covered will include cell-to-cell communication, patterning of the embryo, tissue morphogenesis, cell differentiation and stem cells, advantages and disadvantages of classical and genetic model organisms for analyzing development, postembryonic development and regeneration, and the profound implications of developmental biology for medicine and evolution. The course is lecture-based but will emphasize the experimental evidence underlying the basic principles of Developmental Biology and will discuss current debates and recent findings that have yet to be simplified for textbook presentation.

GS04 1081 *Stem Cells in Biomedicine.* **1 sem. hr.**

Prerequisite: Permission of instructor. A stem cell is a cell from the embryo, fetus, or any adult organ, that has the ability to reproduce itself for long periods of time, and at a given signal, give rise to many specialized cell types in the body. Apart from embryonic stem cells, adult stem cells maintain this capability throughout the life of an organism. In recent years, scientific advances have suggested that stem cells could be of great potential use in the treatment of a variety of diseases. The objective of this graduate school course is to provide the students with information about stem cell origin, their role in early development, their isolation and therapeutic promises for the future. The course will also offer students a great opportunity to take part in recent and ground breaking advances in stem cell biology. All in all, the material presented is intended to evoke more interest in the field of stem cell biology, both for the student, the layman, as well as for the bench scientist. Ultimately, the long term goal is to encourage future research in finding alternative therapeutic modalities in stem cell-related diseases, such as cancer, Parkinson's, diabetes, atherosclerosis, congenital diseases, and Alzheimer's disease. This course is taught by a group of high profile scientists with a broad expertise in stem cell biology, biochemistry, clinical applications, and ethics.

GS04 1093 *The Biology of Cancer Metastasis.* **3 sem. hrs.**

Prerequisite: Consent of instructor. This is a didactic introductory-level course entirely dedicated to the study of the cellular biological processes that underpin cancer metastasis. This course will cover basic, translational, and clinical knowledge, with specific emphases on the metastatic cascade: seed and soil hypothesis, organ-specific metastasis, cell cycle and metastasis, multiple therapies for various metastatic cancers, and will address the process of taking basic research to the clinic ("bench-to bedside") for major metastatic human cancers. This is a prerequisite course for Cancer Biology Program students in the Cancer Discovery track.

GS04 1103 *Principles of Therapeutics.* **3 sem. hrs.**

Prerequisite: Basic understanding of biochemistry and cell biology. This course will establish a foundation of the principles of therapeutics and will introduce students to the principles and history of therapeutics the current state of drug development. The course is structured so that students are introduced to human genome and causes of disease. A session will focus on target identification, protein crystallography, molecular modeling, and structure-based drug design and medicinal chemistry that will include drug design, synthesis, optimization, lead product identification, and chemical synthesis of lead product. Other sessions will focus on how chemicals serve as genetic modifiers and will introduce students to high throughput drug screening and siRNA screening. Toxicity and pharmacology play major roles in drug design, drug dosing, drug schedule, and route of administration. The role of biomarkers, genomics, and proteomics will be included with an emphasis on therapeutics. Students will be introduced to diverse strategies for therapy that include natural products, immunotherapy, gene therapy, and blood and marrow transplantation. A review of the process of moving a drug from laboratory to clinic will finish the course and will introduce students to translational and clinical research.

GS04 1183 *Molecular Methods and Bioinformatics.* **3 sem. hrs.**

Prerequisite: One semester of core coursework. This course will introduce graduate students, at an early stage of their research careers, to a wide variety of methods and techniques especially applicable to research in modern molecular biology. The course will feature a diverse group of instructors, and each of them has a specialized research knowledge of a particular group of molecular methods and bioinformatics. Each instructor will combine classroom lecture with a practical look at advanced instrumentation applicable to different analysis techniques. The class sessions cover structural analysis, methods for analysis of gene expression and chromatin modification, metabolomics, proteomics, and imaging. Students will learn about the theoretical basis of modern methods and techniques for research in molecular biology, about the different types of information that can be gained by application of different techniques to a problem, which techniques are most appropriate in a given situation, and data interpretation.

GS04 1213 *Mechanisms in Cancer Therapeutics.* **3 sem. hrs.**

Prerequisite: Basic understanding of biochemistry and cell biology. This course will establish a foundation of the principles of cancer therapy, including pharmacologic rationales, consideration of biological targets, and mechanism-based approaches to combinations. A major emphasis will be placed on agents that damage DNA, and the response of tumor cells to such insults. In depth presentations will consider all classes of chemotherapeutic agents, their metabolism, and mechanisms of action, and the resistance mechanisms of tumor cells. Mechanistic rationales for other therapeutic modalities used for cancer treatment such as radiotherapy, gene therapy, and immunotherapy will also be covered. Students will have the opportunity to learn to identify novel therapeutic targets, and the procedures used to develop new agents for clinical evaluation.

GS04 1223 *Fundamental Mechanisms of Cancer Development.* **3 sem. hrs.**

Prerequisite: None. Cancer is defined by a series of abnormal events in the cell that lead to the formation of a tumor with the ability to spread to distant sites. Some hallmarks of cancer include aberrant proliferation, genomic instability, evasion of cell death and immune responses, and activation of a variety of cell growth signaling pathways. This course is organized into weekly modules consisting of 2 lectures and a journal club. Each module is organized to first describe each of these events as they occur during normal development or homeostasis followed by a lecture on how these processes or pathways go awry to develop cancer. The last lecture of each module consists of a journal club with class-wide discussions of a recent or classic paper in the field. Module topics will be fundamental, timely, and cutting edge including signaling pathways, cancer genomics, non-coding RNAs and metabolism in cancer and therapy. The teaching philosophy emphasizes development of critical thinking and understanding of central concepts through class discussion and weekly journal clubs.

GS04 1231 *Advanced Topics in Epigenetics.* **1 sem. hr.**

Prerequisite: Foundations of Biomedical Research (GS211017/18). The purpose of this course is to facilitate student learning, at an early stage of their research careers, regarding the development of basic approaches and techniques in epigenetics, as well as highlighting major discoveries which will cover current and advanced topics in epigenetics. This 5-week course covers 5 weekly publication-based discussions and data analysis sessions that will take place in two 1.5-hour weekly sessions at The University of Texas MD Anderson Cancer Center, Smithville Campus. Each class will consist of a 90-minute discussion of a primary epigenetic paper from the literature, with the student leading the discussion, moderated by course co-organizers. There will be no pre-prepared slides or specified presenters. Instructors will be faculty from the Department of Epigenetics and Molecular Carcinogenesis.

GS04 1235 *Basic and Translational Cancer Biology.* **5 sem. hrs.**

Prerequisite: None. Audit permitted. The Cancer Biology Core course will synthesize knowledge of critical aspects in human cancer biology for understanding disease development, multidimensional molecular signatures, diagnostics, and therapeutics.. This course will draw upon Dr. Robert Weinberg's seminal textbook, *The Biology of Cancer* (2nd Edition), and integrate expertise from GSBS Faculty to disseminate fundamental knowledge and current progress on basic, translational and clinical cancer research. Students enrolled in this course will be expected to perform the following activities each week: (1) Read, process, and review (study) material from 1-2 book chapters, (2) Read 2 research articles (e.g., primary research and review articles); (3) Write 2 one-page literature synopses for the assigned research articles; (4) Prepare for and take course quizzes based on course readings/lectures; and (5) Participate in and contribute to course discussions during lecture, review sessions and through written formats. Students are expected to complete all assigned reading material (book chapters and research literature) prior to class. While students may work and discuss all course materials and assignments in groups, all writing assignments must be the students' own work. Plagiarism and failure to properly cite scientific literature and other sources will not be tolerated and are grounds for dismissal from the course and further GSBS disciplinary action.

GS04 1241 *Advanced Topics in DNA Repair.* **1 sem. hr.**

Prerequisite: Foundations of Biomedical Research (GS211017/18). This 5-week course is designed for students to explore the hypotheses, logic, principles and approaches that best exemplify the field of DNA repair. Each week there will be a one-hour open format discussion of a DNA repair topic led by a faculty member and a two-hour journal club discussion of recent papers

that highlight the weekly topic, moderated by at least two faculty members. The course will take place at The University of Texas MD Anderson Cancer Center, Smithville Campus and will be videoconferenced to the main campus (Houston), with the exception of one week when the campus and videoconference sites will be reversed. There will be no specified presenters or pre-prepared slides for the journal club. The course will cover: Nucleotide Excision Repair and Human Disease, DNA Repair in the Context of Chromatin, Meiosis and Homologous Recombination, Antibody Generation as a Model for DNA Repair, and Targeting DNA Repair for Cancer Therapy. Instructors will be faculty in the Epigenetics and Molecular Carcinogenesis Department.

GS04 1251 *Practical Bioinformatics.* **1 sem. hr.**

Prerequisite: Foundations of Biomedical Research (GS211017/18). The purpose of this course is to facilitate student learning, at an early stage of their research careers, regarding the basis and implementation of bioinformatics techniques that are especially applicable to research in modern molecular biology. This 5-week course will provide introductory tools in bioinformatics in six areas. This course will cover 5 weekly publication-based discussions and data analysis sessions that will take place in a three-hour weekly session at The University of Texas MD Anderson Cancer Center, Smithville Campus. Each lecture period will start with a one-hour discussion of a primary bioinformatics paper from the literature, with student-led discussion, moderated by course co-organizers. The class will then work from computers to analyze some of the data and understand how figures were generated. Instructors will be faculty from the Department of Epigenetics and Molecular Carcinogenesis.

GS04 1253 *Principles of Genetics and Epigenetics.* **3 sem. hrs.**

Prerequisite: Foundations of Biomedical Research (GS211017/18). Audit permitted. This course is designed for students who have a major interest in the aspects of epigenetics, experimental and human genetics. This class will provide in-depth instruction on four areas (1) Experimental Genetics, (2) Human Genetics, (3) Epigenetics, and (4) Functional Bioinformatics. The class will be held three times a week for one hour and students are expected to actively participate in the course by initiating discussions, asking questions, and providing constructive comments. Students will be evaluated by attendance, participation, and performance on a mid-term and final examination. This course is designed to prepare the student to generate novel hypothesis-driven projects in the areas of genetics and epigenetics.

GS04 1751 *Design and Delivery of Advanced Research Seminar.* **1 sem. hr.**

Prerequisite: None. This course has two major objectives. The first objective is to familiarize students with current research in regulatory biology with particular emphasis on molecular mechanisms of cell regulation and signaling. The second objective is to teach students how to give outstanding research seminars. Weekly 90-minute meetings involve alternate faculty and student presentations on current problems in regulatory biology. Faculty presentations introduce each topic and provide a broad and critical overview of approaches used to tackle research problems. Student presentations cover recent articles from leading journals on the same topic. Students are instructed in the preparation of slides/overheads, seminar organization and techniques of oral presentation and are given detailed feedback by faculty and fellow students following their presentations. Three to four topics are covered each year and the topics discussed vary annually. Students can, and often do, register for the course multiple times during their graduate careers.

GS04 1811 *G & E Scientific Writing.* **1 sem. hr.**

Prerequisites: Permission of instructor and student must be at least in their second year to take this course. This course is designed for second-year students who have already chosen their thesis lab. Students will be taught how to write scientific papers. The goal of this class will be for each student to write a review of the literature of their field of research for submission and publication. This course satisfies the GSBS Scientific Writing requirement.

GS04 1813 *History of Biology and Cancer Science.* **3 sem. hrs.**

Prerequisite: None. This course is designed to have students experience the history of biology and cancer science as it evolved. Seminal papers in the last 100 years will be reviewed in a chronological fashion to have students appreciate seminal discoveries that advanced our fundamental understanding of human biology and the disease called cancer. Through this journey, students will be able to experience how techniques and tools to study biology evolved and how such knowledge was applied to understand and unravel new information about cancer. The course will highlight how such fundamental biology helped translate science and help generate drugs to combat cancer.

GS04 1821 *G & E Oral Scientific Presentations.* **1 sem. hr.**

Prerequisite: Student must be at least in their second year to take this course. This course is designed for second-year students who have already chosen their thesis lab and are preparing for their candidacy exam. The students will use their thesis project as a template to develop a 20-minute scientific presentation. All aspects of the presentation will be covered including title and introduction slides, organizing your data into a story, model slides and conclusions, and answering questions. In addition to the 20-minute presentation, students will also give two elevator talks: one to a scientific group and one to a non-scientist group. This course is designed to prepare the student for the oral defense portion of their candidacy exam.

COURSE OFFERINGS IN IMMUNOLOGY

GS06 1013 *Fundamental Immunology.* **3 sem. hrs.**

Prerequisites: Undergraduate-level Biology and Biochemistry courses plus a basic knowledge of Cellular and Molecular biology. Topics covered in this lecture series include anatomy and development of the immune system; structure, function and genetics of antibodies; T-cell antigen receptors; functions and cooperative interactions of lymphoid cells; structure and function of molecules encoded by the Major Histocompatibility Complex (MHC); lymphokines and their receptors; cellular interaction molecules; and specific immunological tolerance. Medically related subjects that will be covered from a basic science perspective include immunopathology, immunodeficiency, allergy and other hypersensitivities, autoimmunity, organ transplantation, tumor immunology, and AIDS.

GS06 1102 *Emerging Concepts in Immunology.* **2 sem. hrs.**

Prerequisite: Fundamental Immunology (GS061013) or consent of instructor. Topics will include antigen processing, lymphokines, development of T and B lymphocytes, antigen recognition by T lymphocytes, cellular activation, and cell interactions. Each student will read selected papers in cellular immunology and make several oral presentations.

GS06 1132 *Application of Tumor Immunology in the Clinical Setting.* **2 sem. hrs.**

Prerequisite: Previous immunology course such as Fundamental Immunology (GS061013) or permission of instructor prior to enrollment. This course builds upon basic immunology to provide a foundation for tumor immunology as it is applied in the clinical setting. Graduate students, postdoctoral fellows, and medical residents/fellows who participate in this course will gain an understanding of immune surveillance, tumor markers, human tumor immune responses, novel cancer immunotherapeutics, and regulatory process and clinical trial design for cancer immunotherapeutics.

GS06 1611 *Advanced Topics in Immunology.* **1 sem. hr.**

Prerequisites: Fundamental Immunology (GS061013) and Foundations of Biomedical Research (GS211017) or permission of instructor. This course is an analysis of current topics in immunology. Weekly oral presentations of an assigned topic will be made by participating students. Course emphasis is on the development of communication skills and analysis of current research areas.

COURSE OFFERINGS IN MICROBIOLOGY AND INFECTIOUS DISEASES

GS07 1011 *Topics in Biodefense and Emerging Infections.* **1 sem. hr.**

Prerequisite: None. The broad impact of bioterrorism and emerging infectious diseases on scientific research and public health, the role of scientists in preparedness and response will be addressed in a series of seminar presentations. Speakers with expertise in diverse areas, including public health response, select agent biology, diagnosis and disease management, and public policy, will present talks followed by group discussion.

GS07 1015 *Microbial Genetics and Physiology.* **5 sem. hrs.**

Prerequisite: Foundations of Biomedical Research (GS211017) or permission of instructor. The objective of this course is to provide second-semester, first-year students with a broad knowledge of genetics and physiology as they pertain specifically to prokaryotic and eukaryotic microbes. Topics covered include genetics, gene expression, cell division, cell structure and biogenesis, energy and metabolism, signaling and development, stress response, and pathogenesis (virulence factors and host response). The class will be divided into 15, one-week units in which at least two faculty-led lectures and two student-led, roundtable presentations of the primary literature will take place.

GS07 1092 *Topics in Microbiology and Infectious Diseases.* **2 sem. hrs.**

Prerequisites: Previous coursework in molecular microbiology or permission of instructor. This course provides cutting-edge information on selected topics in Microbiology and Infectious Diseases and develops the student's ability to critically review research and develop a research program. The course primarily consists of student presentations and discussion of recent scientific articles. The list of articles for each session will be provided in advance. Students will also be required to develop and write a full NIH-style grant proposal. This course satisfies the GSBS Scientific Writing requirement.

GS07 1731 *Seminar in Infectious Diseases.* **1 sem. hr.**

Prerequisite: Coursework or work experience in microbiology. A small group discussion course examining the biologic and clinical basis of infectious diseases. Students will attend

and analyze infectious disease grand rounds presentations, tour a clinical microbiology laboratory, participate in group discussions with infectious disease physicians, and critically analyze clinically-related articles in the general areas of microbial pathogenesis, host-parasite interactions, diagnosis, therapy and prevention.

GS07 1741 *Literature Survey in Microbiology and Infectious Diseases.* **1 sem. hr.**

Prerequisite: None. This is a required course for all MID Program students except for those in their final thesis/dissertation writing semester. Students will present and critically evaluate recent journal articles. The specific articles will be chosen by the presenter from the literature in the fields of microbiology and infectious diseases. Students will be evaluated on their presentation and participation in discussions.

GS07 1751 *Microbiology and Molecular Genetics Seminar Series.* **1 sem. hr.**

Prerequisite: None. This is a required course for all MID Program students except for those in their final thesis/dissertation writing semester. Students will attend the weekly departmental seminars series in the Department of Microbiology and Molecular Genetics.

COURSE OFFERINGS IN HUMAN GENETICS

GS11 1011 *Embryology.* **1 sem. hr.**

Prerequisite: 1st year Genetic Counseling students. This course provides an introduction to normal human embryologic development of the major body systems. The presented topics will create a foundation on which students can receive information on abnormal development relevant to genetic disease. In addition, students are expected to consider how these concepts can be communicated to a patient in a clear, concise manner. This course is coordinated by two board certified genetic counselors with lectures from the McGovern Medical School faculty.

GS11 1012 *Cancer Genetics (Genetic Counseling).* **2 sem. hrs.**

Prerequisite: Permission of instructor. This course is taught by the faculty and staff of UT MD Anderson Cancer Center and includes lectures by experts in basic science cancer research, clinical oncology, pathology, and cancer genetic counseling. Some of the topics covered include overview of cancer biology and clinical oncology, hereditary colon cancer syndromes, hereditary breast cancer syndromes, rare cancer syndromes, management of high risk patients, collecting a cancer-focused family history, hereditary cancer risk assessment models and tools, and psychosocial aspects of cancer risk assessment and counseling. Students will expand and refine the knowledge and skills learned in this course during their clinical cancer genetics rotation.

GS11 1013 *Genetics and Human Disease.* **3 sem. hrs.**

Prerequisite: Permission of instructor; general genetics and statistics recommended. This course introduces principles and methods of human genetic analysis with special reference to the contribution of genes to our burden of disease. Although molecular, biochemical, and morphogenic processes controlled by genes will be briefly surveyed, the course objective is to provide descriptions of the analytical processes whereby genetic mechanisms are inferred and genes located on chromosomes.

GS11 1021 *Psychosocial Genetic Counseling.* **1 sem. hr.**

Enrollment required of all Genetic Counseling MS students. Open only to Genetic Counseling MS students. This is a two-year course focusing on psychosocial issues in genetic counseling comprised of various units focusing on psychosocial issues in genetic counseling. Topics surrounding cultural competency are also included. Students will have the opportunity to participate in various in-class activities, discussions and role-plays. Role-plays allow students to consider different counseling techniques, to learn how personal biases may affect the counseling session, and to practice how to employ empathy, advanced empathy, confrontation, active listening, reflecting, etc. This course is coordinated by two board certified prenatal genetic counselors and is facilitated by the Genetic Counseling Program faculty.

GS11 1031 *Contemporary Issues in Genetic Counseling.* **1 sem. hr.**

Prerequisites: Psychosocial Issues in Genetic Counseling I (GS111082); Ethical Dimensions of the Biomedical Sciences (GS211051). This course provides a platform for exploration of the complex ethical and moral issues that arise in genetic counseling. The format varies weekly and includes presenting and discussing advanced psychosocial topics, debating ethical case scenarios, and participating in seminars for continued professional development. Genetic counseling students in their second year are eligible for this course.

GS11 1033 *Quantitative Methods in Genetic Epidemiology.* **3 sem. hrs.**

Prerequisite: Genetics and Human Disease (GS111013). This course offers practical experience in the analysis of genetic marker data. The course will cover the basic theory behind genetic analysis, study designs, and will focus on learning analysis techniques and computer packages.

GS11 1053 *Data Mining Methodology.* **3 sem. hrs.**

Prerequisites: Introductory statistics and inference, basic math and algebra skills, linear regression, and statistical programming. In this course we will introduce new concepts of Data Science and Big Data analytics. We will cover application of various novel statistical and machine learning, data mining and artificial intelligence methods used to do the analysis, integration and predictions of large complex data from health sciences, industries and other disciplines. The emphasis will be on creative thinking, problem-solving skills, and hands-on data exploration to generate and address important scientific and business questions from a variety of complex data. Among other methods, sparse regression, feature construction and feature set reduction, classification, clustering, tree-based approaches and dependency modeling will be detailed. This course is cross-listed at UTHealth School of Public Health (PH 1998). The venue of the course will be at the SPH.

GS11 1073 *Introduction to Genomics and Bioinformatics.* **3 sem. hrs.**

Prerequisites: Calculus, statistics, and consent of instructor. This course introduces basic concepts, statistical methods and computational algorithms and tools for the creation and maintenance of databases of biological information, DNA sequence analysis, modeling of evolution, genetic studies of complex diseases including linkage analysis, linkage disequilibrium and association studies, gene expression data analysis, and identification of biological networks. Students will be introduced to the basic concepts behind bioinformatics and computational biology tools. Hands-on sessions will familiarize students with the details and use of the most commonly used online tools and resources.

GS11 1082 *Psychosocial Issues in Genetic Counseling I.* **2 sem. hrs.**

Prerequisites: Genetics and Human Disease (GS111013) and Topics in Medical Genetics I (GS111622). Psychosocial aspects of genetic counseling combines didactic lectures and role-play to teach psychosocial issues associated with genetic disease. Topics include basic counseling skills, interviewing skills, giving a family a diagnosis, breaking difficult news, disabilities, multicultural issues, and counseling for chronic disease. This course is taught by the program directors.

GS11 1092 *Genetic Epidemiology of Chronic Disease.* **2 sem. hrs.**

Prerequisite: None. This course will expose students to the evidence and logic involved in inferring the contribution of genetic mechanisms to those diseases of public health importance. Emphasis will be on developing a framework for assessing the impact of genes on common disease, but will not include detailed methodological developments or statistical techniques. The format will be a weekly two-hour session in which a single disease will be examined. In this way students will be exposed to a broad spectrum of diseases and see both the uniqueness and the similarities of the problems inherent to each.

GS11 1093 *Clinical Genetics in Epidemiology.* **3 sem. hrs.**

Prerequisite: Recent college biology or equivalent. The intent of this course is for students to understand the role clinical genetics plays in the practice of epidemiology, and the relationship between epidemiology and medical genetics. Emphasis will be on the practice of medical genetics as it may be encountered by professionals in public health. Teaching will be by didactic classroom instruction in which subject material covers basic biology of clinical genetics, genetic diseases and birth defects as seen in a medical genetics clinic; the provision of genetic services in Texas; and public policy issues relating to the practice of medical genetics. The course is cross-listed at UTHealth School of Public Health (PH2830). The venue of the course will be at the SPH.

GS11 1103 *Evolution of DNA and Protein Sequences.* **3 sem. hrs.**

Prerequisites: Calculus, statistics, and consent of instructor. This course will provide basic principles for understanding factors that govern the evolution of DNA and protein sequences. Students will be provided with the opportunity to learn about the formation and evolution of multigene families and other evolutionary phenomena. They will also be introduced to statistical methods and computer programs for analyzing DNA and protein sequence data. There will be computer demonstrations of some topics. The application of these principles and methods to genome-wide epidemiology will be discussed.

GS11 1113 *Introduction to Statistical Genetics.* **3 sem. hrs.**

Prerequisites: Genetics, calculus, statistics, and permission of instructor. This course is designed as an introduction to statistical genetics/computational biology, and serves as the entry point to several courses in this area. It reviews the key statistical concepts and methods relevant to statistical genetics, discusses various topics that have significant statistical component in genetics, particularly in population and quantitative genetics. Topics include estimation of gene frequencies, segregation analysis, test of genetic linkage, genetics of quantitative characters, inheritance of complex characters, forensic science and paternity testing, phylogeny and data mining.

GS11 1132 *Introduction to Genetic Counseling.* **2 sem. hrs.**

Prerequisite: Permission of instructor; course is intended for students admitted to the specialized master of science program in Genetic Counseling. In this course, students learn the foundation of the genetic counseling profession, including the history of the profession, intake and pedigree skills, ethnic carrier screening, and basic prenatal, pediatric, and cancer genetic counseling concepts. Material is delivered in small group presentation and discussion format, as well as via lecture and practice-based role-play. Multiple genetic counseling faculty contribute to this course. Students in the first semester of the genetic counseling program are eligible for this course.

GS 11 1142 *Approaches to Genetic Counseling Research I.* **2 sem. hrs.**

Prerequisite: Introduction to Genetic Counseling (GS111132). This course provides an introduction to basic concepts in epidemiology, statistics and research instruction on how to use STATA to perform univariable statistical analysis. Students will also receive instruction on concepts in human research and rationale for IRB reviews. Group discussions during this course will help students polish their research questions and methodology. Genetic counseling students in their first year of study are eligible for this course.

GS11 1152 *Approaches to Genetic Counseling Research II.* **2 sem. hrs.**

Prerequisite: Approaches to Genetic Counseling Research I (GS111142). This course provides an introduction to advanced concepts in epidemiology and statistics and instruction on how to use STATA to perform advanced multivariable statistical analysis. Genetic counseling students in their second year of study who have passed Approaches to Genetic Counseling Research I (GS111142) are eligible for this course.

GS11 1172 *Prenatal Genetic Counseling.* **2 sem. hrs.**

Open only to Genetic Counseling MS students. This course provides an in depth review of current topics in prenatal genetic counseling, including screening and diagnostic testing, ultrasound findings, and teratogens. Students are expected to gain an appreciation for more complex prenatal issues that impact prenatal practice and to work on critical thinking skills. This course is coordinated by two board certified prenatal genetic counselors with lectures by the Genetic Counseling Program faculty.

GS11 1173 *Introductory Clinical Rotation in Genetic Counseling.* **3 sem. hrs.**

Prerequisite: Introduction to Genetic Counseling (GS111132). This course provides genetic counseling students with the opportunity to become familiar with each clinical setting, including clinical operations, patient population, and other members of the health care team. Students learn how to obtain general and specialty-focused family, pregnancy, and medical histories. They also provide the evaluation and assessment of cases including medical record and literature review. Differential diagnoses are discussed and students observe counseling sessions as well as some diagnostic and medical procedures. As the semester progresses, students begin assuming some of the roles of the genetic counselor during the session, focusing on accurate risk assessment and patient education, and progressing to conducting an entire session. Genetic counseling students in their first year are eligible for this course.

GS11 1174 *Advanced Clinical Rotation in Genetic Counseling.* **4 sem. hrs.**

Prerequisite: Introductory Clinical Rotation - Genetic Counseling (GS111173). This course provides genetic counseling students with the opportunity to provide the majority of the genetic counseling during sessions, focusing on refining their clinical counseling skills and further

developing their psychosocial counseling skills. Students are encouraged to tackle even the most complex cases coupled with appropriate supervisor support. At the conclusion of the advanced rotations, students will be expected to be fully trained genetic counselors. Genetic counseling students in their second year are eligible for this course.

GS11 1182 *Psychosocial Issues in Genetic Counseling II.* **2 sem. hrs.**

Prerequisite: Psychosocial Issues in Genetic Counseling I (GS111082). This course builds upon the baseline psychosocial issues in genetic counseling taught in the fall semester and is comprised of various units focusing on psychosocial issues in genetic counseling such as cultural competency, mental illness, grief and end of life are included. Students will have the opportunity to participate in various in-class activities, discussions and role-plays. This course is coordinated by the program directors and facilitated by the Genetic Counseling Program faculty.

GS11 1622 *Topics in Medical Genetics I.* **2 sem. hrs.**

Prerequisite: None, however, Genetics and Human Disease (GS111013) may be taken concurrently. The first-semester course focuses on the fundamentals of Medical Genetics. It combines didactic lectures and discussions. The human genetics faculty teach this "state of the art" course.

GS11 1642 *Topics in Medical Genetics II.* **2 sem. hrs.**

Prerequisite: Topics in Medical Genetics I (GS111622) and consent of instructor. The second-semester course focuses on individual topics related to the practice of Medical Genetics. Topics include biochemical conditions, molecular genetics, and cytogenetics, evaluation of organ systems with emphasis on genetic pathogenesis of malformations, and dysmorphology. This course is a combination of didactic lectures and discussions. The lecturers are experts in their respective fields.

GS11 1711 *Seminar in Genetics and Population Biology.* **1 sem. hr.**

Prerequisite: Second year graduate standing or higher. Presentation and analysis of individual topics of research.

COURSE OFFERINGS IN PHYSIOLOGY AND PATHOLOGY

GS12 1011 *BCB Research in Progress.* **1 sem. hr.**

Prerequisite: None. This class is a forum in which students, postdoctoral fellows and occasionally faculty present their ongoing research to facilitate discussion, learning and scientific interactions. Areas of research that are discussed include both fundamental and translational cell biology and biochemistry, touching on topics in cancer, muscle and kidney physiology, neuroscience, protein structure/function, as well as cardiovascular and circadian physiology. All students will be expected to attend lectures and participate in discussions. Post-candidacy students will be expected to present a 45-minute seminar describing their thesis research.

GS12 1013 *Histology for Graduate Students.* **3 sem. hrs.**

Prerequisite: None. The purpose of this course is to provide a comprehensive overview of the structure of organ systems and tissues as it relates to their normal function. Students will gain a working knowledge of tissue fixation, sectioning and processing, basic histological staining, and immunohistochemical staining. Light microscopy will be employed to understand the relationship between tissue morphology and function. Comparative studies of mouse, rat, and human tissue will be performed where applicable. Students will also gain “hands-on” experience cutting frozen tissue sections, fixing sections to slides, and performing hematoxylin and eosin and antibody-based staining. Novel technologies for whole tissue imaging will also be discussed. By the end of the course students should have a solid understanding of normal tissue structure, and should be able to apply this knowledge to their own translational research projects.

GS12 1041 *Seminars in Experimental Pathology.* **1 sem. hr.**

Prerequisite: None. The course will consist of lectures given by faculty and visiting scientists on current research in experimental pathology. Students will attend weekly seminar presentations and meet, as a group, with visiting lecturers to discuss research and career development.

GS12 1051 *Seminars in Life Sciences.* **1 sem. hr.**

Prerequisite: None. With the goals of continuing education, being up to date with novel techniques, and expanding the breadth of knowledge in life science, students are asked to attend one weekly seminar. Attendance at any TMC seminar is acceptable as long as one Faculty can attest to the student’s attendance. Seminars organized by the Departments of Integrative Biology/Pharmacology and Biochemistry/Molecular Biology will be held weekly during the academic year and will contain a logbook, while other seminars will be logged online. The presentations from both Departments are typically at a level appropriate for graduate students. Speakers will include faculty from outside departments (both on- and off-campus) and departmental faculty. The seminars will consist of a formal presentation, followed by a discussion, i.e., question-and-answer session. The seminars will provide a balanced breadth of topics covering scientific sub-disciplines presented in the department and outside the main field of the departmental faculty.

GS12 1164 *Human Pathobiology.* **4 sem. hrs.**

Prerequisite: None. This course is designed to provide a comprehensive introduction to human health and disease at the molecular, cellular, tissue and system levels for each human organ system. Lectures will highlight the key elements routinely covered in medical school: histology, anatomy, physiology and pathophysiology courses with an emphasis on the understanding of the mechanisms of cell injury and death, inflammation and repair, immunopathology, vascular disturbances and carcinogenesis. The course will include two two-hour lectures/practical periods. Students will have opportunities to examine histological and pathological specimens (using multi-headed microscopes), be introduced to human anatomy and physiology and spend time integrating knowledge into clinical scenarios.

GS12 1233 *Integrative and Molecular Physiology.* **3 sem. hrs.**

Prerequisite: Foundations of Biomedical Research (GS211017). In order to understand etiology and consequences of disease and interpret related research results, one must have a fundamental understanding of normal mammalian physiology. This course will cover selected current topics in physiology with sets of lectures designed to introduce students to system-level mammalian physiology while emphasizing normal and dysregulated molecular events

underlying physiological control and integration of organ function. Instructions will highlight recent advances in understanding of physiology at the molecular level and interpretation of animal experiments designed to analyze physiological function.

GS12 1262 *Cellular Basis of Cardiac Function.* **2 sem. hrs.**

Prerequisite: None. This course will provide a comprehensive review of mechanisms of energy transfer in a highly specialized organ.

GS12 1442 *Principles of Experimental Mouse Pathology.* **2 sem. hrs.**

Prerequisite: None. This course conveys the fundamental knowledge needed to perform valid and interpretable research using mouse models. This course will feature lectures covering basic concepts of mouse biology, developmental biology, and genetics (including basics of genetically engineered mice, inbred backgrounds and nomenclature); animal study design; mouse models of cancer; toxicology; ante mortem and post mortem pathological characterizations (including background strain lesions). Some classes will include a short demonstration (e.g., microscopy, necropsy, or imaging procedures), peer discussions and literature review. The course will feature a diverse group of instructors with a strong background on the subjects presented. This course is taught at the UT MD Anderson Cancer Center Science Park in Smithville, Texas and will be available elsewhere via videoconference

COURSE OFFERINGS IN PHARMACOLOGY AND TOXICOLOGY

GS13 1011 *Computer-Aided Drug Design.* **1 sem. hr.**

Prerequisite: None, but a basic knowledge of chemistry (2D chemical structures, amino acids, etc.) is recommended. This course gives introductory knowledge of computer-aided drug design, including both cheminformatics and bioinformatics. All drug discovery stages will be discussed with emphasis on the application of computational approaches in the pipeline, consisting target identification and validation, hit and lead discovery and optimization, and ADME/Toxicity studies. The objectives of this course are to introduce the participants to different computational methods for drug discovery and development. After finishing this course, the students are expected to be familiar with modern cheminformatics and bioinformatics approaches, including QSAR, pharmacophore modeling, molecular docking, virtual screening, ADME/Toxicity predictions, sequence alignment, homology modeling, and protein structure prediction.

GS13 1024 *Molecular Basis of Cell Signaling.* **4 sem. hrs.**

Prerequisite: Background in biochemistry and cell biology; Permission of the instructor. This course provides a detailed exploration of the molecular basis of cell signaling with emphasis on recent developments, structure-function, and quantitation. The course will include both the regulation of second messenger systems (GPCRs, G proteins, cAMP, IP3 and lipid), ion channels, growth factor-regulated tyrosine kinases, small G proteins (ras, GEFs, Gaps), kinase/phosphatase pathways, steroid hormones/transcription, and the modeling of these systems.

GS13 1063 *Toxicology I: Principles of Toxicology.* **3 sem. hrs.**

Prerequisites: Prior biological science coursework required (i.e., biology, chemistry or physiology) and permission of instructor. This course presents basic principles of toxicology and their applications to the understanding of xenobiotic-induced target organ toxicity. Topics

covered include toxicant disposition, mechanisms of toxicity and target organ responses to toxic agents. A broad overview of various classes of toxic agents will be presented in the context of their exposure routes, disposition, toxicologic sequelae, and mechanisms of toxicity. This course is designed to provide a foundation for understanding the complex interactions between toxicants and biologic systems. The course is cross-listed at UTHealth School of Public Health (PH 2175). The venue of the course will be at the SPH.

GS13 1083 *Toxicology II: Toxic Agents.* **3 sem. hrs.**

Prerequisites: Toxicology I (GS131063) preferred; permission of instructor. Guided readings will provide the basis for in-class discussions on current topics in toxicology. The discussions include the historical context for our understanding of toxicant-induced adverse health effects. Class activities will be based on discussions of books designed for the lay public and the scientific literature on which the books are based. Principle mechanisms of toxicity as they relate to the understanding of environmentally-induced disease form the framework for the course. In-depth reviews of various classes of environmental contaminants and their adverse health effects will be presented. The course is cross-listed at UTHealth School of Public Health (PH 2177). The venue of the course will be at the SPH.

GS13 1111 *Case Studies in Drug Development.* **2 sem. hrs.**

Prerequisite: None. This course will introduce students to the basic principles of drug discovery and development, including how such research is conceived, conducted, evaluated, explained to patients, and applied to patient care. Students will then apply these principles to analyze and discuss specific and current drug discovery and development projects both at UTHealth and at pharmaceutical companies. These cases will each have associated questions to be explored so students may learn to identify optimal patient targets for new drugs, while ensuring the safety of their subjects. Each discussion will include issues of science, ethics, conflict of interest, and intellectual property.

COURSE OFFERINGS IN NEUROSCIENCE

GS14 1021 *Current Topics in Neurobiology of Disease.* **1 sem. hr.**

Prerequisite: None. Grading System: Pass/Fail. This course is an integrated approach to neurological diseases, which includes background information as well the diagnosis, the treatment, and the biological mechanisms of the diseases under study. The course is open to graduate and medical students, postdoctoral fellows, and residents.

GS14 1024 *Systems Neuroscience.* **4 sem. hrs.**

Prerequisite: Permission of instructor. This course covers the key concepts in systems neuroscience that allow students to understand how individual neurons and circuits process information and how they modulate behavior. Emphasis is placed on the basic structure and function of cells and networks residing in the nervous system. The course covers the major available techniques to examine the operation of neurons and networks in vivo. The principles of functional neuroanatomy are presented by highlighting the main types of neuronal circuits that constitute the building blocks of systems neuroscience. The neural development section is intended to offer students insight into the early 'shaping' of neuronal circuits as computational units. An important concept in systems neuroscience is the fact that information is processed in a hierarchical manner. Covering this issue will allow students to learn about the different

stages of cortical processing that constitute the foundations of cognition. Finally, a fundamental property of neurons and circuits, i.e., the capacity to adapt, is discussed in the context of short and long-term plasticity, adaptation, and learning. The overall goal of this course is to provide students with fundamental knowledge of the function, development, and plasticity of neuronal circuits by emphasizing how neural circuits analyze sensory information, form perceptions of the external worlds, make decisions, and execute movements.

GS14 1031 *Advanced Seminar in Learning and Memory.* **1 sem. hr.**

Prerequisite: Permission of instructor. An advanced seminar intended for those familiar with the principles of learning and conditioning. Discussions will center around major issues in learning and memory.

GS14 1043 *Experimental Analysis of Behavior.* **3 sem. hrs.**

Prerequisite: Permission of instructor. Comparative learning, memory and cognition course covering a wide variety of animals, including humans. Textbook: S. J. Shettleworth: Cognition, Evolution and Behavior, Oxford University Press, 2010. Course format will be discussion of issues from chapters in Shettleworth and supplementary readings. Students will bring issues to discuss in class and will participate in discussion of issues raised by others. Grading will be based upon participation. Class meeting time will accommodate students' schedules.

GS14 1051 *Seminar in Neurobiology of Learning and Memory.* **1 sem. hr.**

Prerequisite: None. This course has two major objectives. The first is to familiarize students with current research in learning and memory with particular emphasis on the cellular and molecular mechanisms. The second goal is to teach students how to give outstanding research seminars. Weekly 90-minute meetings involve alternate faculty and student presentations on current problems in the neurobiology of learning and memory. Faculty and student presentations cover recent articles from leading journals on the same topic. Students are instructed in the preparation of PowerPoint presentations, seminar organization, and techniques of oral presentation and are given feedback by faculty and fellow student following their presentations. Students can register for this course multiple times during their graduate career.

GS14 1063 *Molecular Neurobiology.* **3 sem. hrs.**

Prerequisite: Permission of instructor. This course is a graduate-level treatment of the molecular, cellular, and biochemical events that underlie neuronal function. Emphasis is placed on the basic chemistry and biology of cells residing in the nervous system. The course also covers the structure and function of receptors, channels and pumps necessary for neuronal function and the neurochemistry of specific transmitter systems. The unique demand of neurons as specialized secretory cells is also covered. Finally, development and maturation of the central nervous system is taught at the cellular level along with a discussion of the diseases of the nervous system focusing on the molecular aspects of the disease process. The intent is to provide students with fundamental knowledge of the workings of cells generally and neurons specifically.

GS14 1071 *Translational Neuroscience.* **1 sem. hr.**

Prerequisite: None. This course is a multidisciplinary course that focuses on understanding neurological diseases from both basic and clinical approaches. We will examine several brain disorders including neurodegenerative diseases and psychiatric-behavioral disorders. During each session, a basic and a clinical expert in one of the selected disorders will partner to introduce the general concepts of the neuropathology, clinical signs, diagnosis, therapeutic strategies, and

current research directions of the specific disorder. The main goal of the course is to understand the important interdisciplinary role of basic and clinical research. These research efforts have a common mission: To improve the quality of life of patients suffering from these disorders. Highlighting the interconnection between basic and clinical research will help provide dual feedback to translate the results from bench to bedside. In most of the cases, a PhD faculty will partner with an MD faculty to explain both sides of the most current research. Only by combining knowledge will we be able to advance our efforts in the prevention, diagnosis and treatment of these neurological disorders.

GS14 1072 *Seminar in Molecular Neuroscience.* **2 sem. hrs.**

Prerequisite: None. This course covers a variety of topics generally focused on molecular mechanisms. Each semester will emphasize a particular research area. Examples of topic areas include development, receptor trafficking, neurotransmitter secretion, signaling, olfaction, and synaptic transmission. The objectives of the course are to teach critical thinking, effective presentation skills, logic/persuasive writing, and scientific proposal writing. Weekly meetings (2-hour) will have two short student presentations drawn from primary literature as well as written assignments. Students will be given feedback (from the instructor and peers) on their presentation content/style and written feedback on their written assignments. Each student will write five Specific Aims pages based on papers presented during sessions 2-6 and subsequently generate one scientific proposal in an iterative manner (with feedback from the instructor) based on one of the Aims pages on which they have received feedback. Proposals will be presented and defended in class and final grants will be submitted on the last day of class. Students will be graded based on their oral and written work as well as class participation.

GS14 1081 *Seminar in Neural Coding and Behavior.* **1 sem. hr.**

Prerequisite: None. It is increasingly being realized that neural systems encode information through the ensemble activity of large populations of neurons. The Seminar in Neural Coding and Behavior will review papers that address how neurons use population codes to represent information via the correlated activity of many neurons. We will address issues related to information coding by individual neurons, sparse coding schemes, population coding and decoding, and the relationship between the response properties of different brain systems and the natural statistics of their inputs. Finally, we will discuss how neurons encode and decode information to produce behavioral responses.

GS14 1143 *Cellular Neurophysiology.* **3 sem. hrs.**

Prerequisite: Consent of the course coordinator. This course is a graduate-level treatment of cellular neurophysiology. It is designed for first-year students and will provide students with the basic tools for understanding electrical and chemical signaling in the nervous system. Students will learn about topics ranging from bioelectricity to synaptic transmission to plastic changes in synaptic strength that underlie learning and memory. This course is appropriate for students with an interest in neuroscience who are comfortable with the use of mathematical concepts to describe events that occur in the natural world. It is recommended that students have one semester of a calculus-based physical sciences course or one semester of a calculus-based life sciences course prior to taking this course.

GS14 1153 *Theoretical Neuroscience: From Cells to Learning Systems.* **3 sem. hrs.**

Prerequisite: None. This course will cover the biophysical foundations of neuronal cells. It will include a mathematical analysis of ion channels, action potential propagation and generation as well as synaptic transmission. It will also describe reduced neuronal models, models of VI receptive fields and correlations between different cortical neurons.

GS14 1173 *Cognitive Neuroscience.***3 sem. hrs.**

Prerequisite: Permission of the instructor. This course is an introductory graduate-level overview of cognitive neuroscience. The course will cover basics in history, neuroanatomy, methods of cognitive neuroscience, sensation and perception, control of action, learning and memory, emotion, language, attention, drugs and cognition, impulsivity, cognitive control, social cognition, and neurobiology of disease. The intent is to provide students with fundamental knowledge of how the brain relates to cognitive functions and how this may help in understanding and treatment of human diseases that affect the central nervous system.

GS14 1181 *Graduate Neuroanatomy.***1 sem. hr.**

Prerequisite: None. This course will provide a broad overview of the structure and function of the central nervous system. The general architecture of the nervous system and its functional systems are presented in a series of online exercises. The exercises allow the students to examine brain anatomy at a detailed view of the regional anatomy of the brain and spinal cord. MRIs of brain anatomy, as commonly presented in the scientific literature, will be presented using a computerized learning system.

GS14 1611 *Current Topics in Neuroscience.***1 sem. hr.**

Prerequisite: Permission of instructor. This course will give an overview of the wide range of research being carried out in the GSBS Neuroscience Graduate Program (NSGP), and is open to all first-year graduate students. Through informal discussions with a different NSGP faculty member each week, students will gain an appreciation for some of the big ideas and unsolved questions in Neuroscience research, and become familiar with the experimental and theoretical approaches being used to tackle those questions. This is a pass/fail course. Anyone with a strong interest in Neuroscience research is encouraged to take this class. There are no exams and no reading assignments, but students are expected to attend all lectures and to actively participate in class discussions.

GS14 1612 *Biostatistics for Life Scientists.***2 sem. hrs.**

Prerequisite: Permission of instructor. This is an entry-to-intermediate-level course aimed at scientists in the life sciences. During the first half of the semester, the course will introduce students to the basic concepts and statistical tests that are routinely encountered in analyzing scientific data in designed experiments, as opposed to the analysis of clinical or epidemiological type data. Following an introduction to probability, students will learn what statistical tests are appropriate and how to run them. Emphasis is on intelligent usage rather than mathematical formality. Standard tests such as t, z, chi squared, ANOVA and regression analyses will be learned, as well as how power analyses and calculating sample size is performed. During the second half of the semester, advanced topics in life sciences, including Poisson distributions, clustering methods and multidimensional analyses will be included. Another goal of this course will be to build familiarity with the basic R toolkit for statistical analysis and graphics.

OTHER COURSE OFFERINGS**GS21 1014** *Design and Management of Clinical Trials.***4 sem. hrs.**

Minimum prerequisite: Bachelor's degree. This course will teach the basic research concepts and principles that underlie the design and actual day-to-day conduct of clinical trials using examples primarily from cancer trials. Topics include the nature of disease and its impact on research protocol

design, appropriate statistics to use, and medical terminology frequently encountered in clinical research; methods to monitor human subjects' response to treatment including imaging, molecular diagnostics, and interactions and monitoring of clinical research laboratories; rules and regulations (including OHRP, FDA, and state), ethics, and human subjects training needed for clinical trials. In addition to 21 hours of lecture, the student will participate in two of three available on-site practicums (Regulatory and Ethical Concepts in Human Subjects Research; Clinical Trial Management; Data Management in Cancer Clinical Trials). Each practicum requires 24 hours of participation.

GS21 1017 *Foundations of Biomedical Research.* **7 sem. hrs.**

First-year GSBS students only (others by permission of instructor). This course provides incoming graduate students with a broad overview of modern biomedical sciences, spanning historical perspectives to cutting edge approaches. The course combines traditional didactic lectures and interactive critical thinking and problem solving exercises to provide students with a strong background in fundamental graduate-level topics including genetics, molecular and cellular biology, biochemistry, physiology, developmental biology and biostatistics. This is the Core Course which fulfills the GSBS Breadth requirement.

GS21 1018 *Foundations of Biomedical Research for Quantitative Students.* **7 sem. hrs.**

Prerequisite: None, but permission from Dr. Mattox is required. Enrollment is limited to GSBS first-year and second-year students who will pursue the quantitative degree track. This course will provide incoming graduate students with a broad overview of modern biomedical sciences, spanning historical perspectives to cutting edge approaches. The course combines traditional didactic lectures and interactive critical thinking and problem solving exercises to provide students with a strong background in fundamental graduate-level topics including genetics, molecular and cellular biology, biochemistry, physiology, developmental biology and biostatistics. This is the GSBS Core Course which will be graded pass/fail and together with Introduction to Biostatistics and Clinical Trials (GS011033) fulfills the GSBS Breadth requirement for quantitative-track students.

GS21 1051 *The Ethical Dimensions of the Biomedical Sciences.* **1 sem. hr.**

Prerequisite: None. This course is required for graduation from all degree programs at GSBS. This course is a systematic overview of the ethical concepts and traditions that are the foundation of biomedical science. The aim of the course is to provide students of the biomedical sciences with a framework to recognize, examine, and resolve ethical issues that may arise in their professional lives. These concepts will be examined through facilitated small group discussions of cases and exercises that involve ethical issues in the responsible conduct of biomedical research. Students will prepare to participate in these small group discussions by completing required reading assignments.

GS21 1061 *Critical Thinking in Science.* **1 sem. hr.**

Prerequisite: General knowledge of biology or biomedicine. In this course students will develop skills for critically and professionally evaluating the significance, logic and presentation of scientific studies. Class sessions will emphasize student discussion and debate of topics including experimental design, the logical interpretation of results, scientific fraud, controversial results, dogma, and effective critique. Through class exercises students will gain understanding of the peer review process and will develop skills required to write critiques of manuscripts and research proposals.

GS21 1111 *Statistical Genetics Journal Club.* **1 sem. hr.**

Prerequisite: None; recommended concurrent graduate course in statistics and genetics. The aim of the journal club is to facilitate students' awareness of the field of statistical genetics. Topics include the following: methods for mapping genes, analyzing genome-wide association studies, the design and analysis of sequencing studies, gene-gene and gene-environment interactions, and statistical methods for emerging and high throughput data types. Particular emphasis is given to presentation skills, critical reading of articles, and asking questions. A strong interest in gaining practical experience in statistical and computational genetics is more important than specific background, although some graduate study in statistics or genetics will be helpful.

GS21 1112 *Bio-behavioral Research Methods in Cancer Prevention and Addiction.* **2 sem. hrs.**

Prerequisite: None. This course addresses the growing demand for multi-disciplinary research in disease prevention. Going beyond traditional behavioral research, the bio-behavioral approach investigates the biological mechanisms underlying risk-related behaviors such as tobacco use, unhealthy diet, sedentary lifestyle, chronic stress, and social isolation and aims at understanding their role in determining cancer risk. The primary objective of this survey course will be to provide students with a greater understanding of the basic mechanisms involved in the complex interplay of genetic, neurobiological, psychological, and environmental factors in the initiation of smoking, dietary practices, exercise habits, and other healthful behaviors as well as the methodological approaches used in cancer prevention research. Other objectives include developing students' appreciation of how different disciplines can contribute to cancer prevention as well as their awareness of the promise and potential pitfalls of multidisciplinary approaches. Topics include: (1) risk modeling; (2) bio-behavioral basis of nicotine dependence; (3) neurophysiological mechanisms of addiction; (4) psychophysiological response to exercise; (5) genetics of risk-taking behaviors; (6) psychological influences on immune function, subsequent cancer risk, and risk reduction techniques; (7) genetic determinants of behavior; and (8) psychophysiological, cognitive, and motivational mechanisms underlying persuasion in response to cancer prevention messages. Emerging areas of future research will be identified and discussed.

GS21 1121 *Resources and Methods for Analysis of Patient-Derived Samples.* **1 sem. hr.**

Prerequisite: None. This course will provide the knowledge needed for the practical application of patient-oriented biological research. Over ten weeks, students will receive training on how to obtain, prepare, analyze, and interpret patient samples for research purposes. Students will attend ten 90-minute sessions in which lecturers with expertise in each topic will be educate them on the resources available at the institution, potential pitfalls, practical limitations, costs, and contacts for help.

GS21 1131 *Nano Course in Biomedical Sciences.* **1 sem. hr.**

Prerequisite: Permission of PI and Course Director. These will be a set of nano-courses with varying topics scheduled through the year. The courses will run from 3-10 days depending on the topic and the amount of project time needed. The class will require the student to present a written and oral report at the end of the course. Topics will vary in range from quantitative sciences to biological, covering all aspects of modern biomedical sciences.

GS21 1132 *Human Protocol Research.* **2 sem. hrs.**

Prerequisite: None. Human Protocol Research is an integrated, multidisciplinary course designed to provide students the necessary tools to devise, execute, and understand exemplary protocol research

involving humans in clinical trials. Phase 0, I, II, III and IV trials will be discussed. Students participating in this course will gain an understanding of trial design, sample size and ethical/regulatory issues pertaining to clinical trials. The course is complementary and non-overlapping with Translational Sciences: Bench to the Bedside and Back (GS211232). Seminars in Clinical Cancer Treatment (GS211031) is a companion seminar series to Human Protocol Research. It is recommended, but not mandatory, that students taking Human Protocol Research also take Seminars in Clinical Cancer Treatment (GS211031).

GS21 1142 *Writing Scientific Research Articles for Publication.* **2 sem. hrs.**

Prerequisite: Permission of instructor. This course presents the fundamentals of writing scientific research articles for publication and includes the basic structure of the research article, writing strategies, and ethical issues. Participants will improve scientific hypothesis-driven writing skills through discussion, readings, and numerous graded writings assignments; and they will go through the writing process, including revisions, of producing a draft of a scientific article.

GS21 1143 *Oral Communication Skills for Scientists.* **3 sem. hrs.**

Prerequisite: Students must be in their second year or later of graduate school. The primary goal of this course is to train graduate students in the art of oral communication. The ability to effectively communicate one's ideas to an audience, large or small, is critical for the future success of our students, whether they wish to pursue careers in academic research, teaching, industry, or government. Lectures will cover various aspects and types of oral communication including: 1) the basic principles of public speaking; 2) how to engage in non-scripted speaking; 3) how to prepare an excellent talk and provide constructive criticism; 4) how to lecture/give a talk outside one's immediate area of expertise; 5) how to prepare a short talk for a national meeting; 6) how to deliver an "elevator speech"; 7) how to connect with and deliver a scientific talk to a lay audience; and 8) how to prepare a "chalk talk" for a job interview. Students will be videotaped so that every aspect of their deliveries can be self-critiqued and discussed with the class at large in order to improve upon such things as eye contact with the audience, hand gestures, use of pointers, vocal variation and volume, diction/enunciation, speed of delivery, clarity of slides (where relevant), etc. We anticipate that postdoctoral fellows within the program may also wish to audit the course in order to improve upon their communication skills and participate in discussions.

GS21 1151 *Scientific Writing.* **1 sem. hr.**

Prerequisite: 2nd-year/pre-candidacy students. The objectives of the course are to teach critical thinking and the fundamentals of proposal writing that will help students write candidacy exam proposals, grants, papers, meeting abstracts, and theses/ dissertations. Students will develop a research plan and write a 6-page grant proposal. Students will learn to edit and critique fellow students' proposals, which will help prepare students for writing their candidacy exam proposals. Weekly meetings will consist of lectures from faculty/experts addressing how to compose grant proposal sections. In addition, students will meet weekly with faculty in small groups to critique/discuss research assignments during which students will be given feedback on their proposal content/style by faculty and fellow students. This course fulfills the GSBS Scientific Writing requirement.

GS21 1153 *Hypothesis Design and Scientific Writing.* **3 sem. hrs.**

Prerequisite: Students must be in their 2nd-year or later years of graduate school. The principal goal of this course is to teach graduate students the precise and rigorous writing skills needed to generate a competitive biomedical research grant application. Grant writing is an important skill regardless of whether a student plans to pursue a career in academic research,

teaching, biotechnology or other areas. Lectures will cover basics of grant writing including but not limited to: 1) hypothesis design and specific aims, 2) significance and innovation, and 3) preliminary data and approach. Each student will write an F31 NIH grant application including all necessary documentation, e.g., biosketch, project summary, project narrative, etc. Mentors of students enrolled in the course will be required to provide in depth and timely feedback on their student's proposal. To ensure that students and mentors are aware of and prepared to meet their responsibilities in this course, they will be required to sign a form listing their respective commitments. Each student grant application will be subject to review by other students enrolled in the course as well as by two members of the EMC Program faculty. This course is taught at the UT-MDACC Science Park campus in Smithville, Texas. This course fulfills the GSBS Scientific Writing requirement.

GS21 1161 *Critical Thinking in Science – Independent Project.* **1 sem. hr.**

Prerequisite: General knowledge of biology or biomedicine. In this course, students will develop skills for critically and professionally evaluating the significance, logic, and presentation of scientific studies. Class sessions will emphasize student discussion and debate of topics including experimental design, the logical interpretation of results, scientific fraud, controversial results, dogma, and effective critique. Through class exercises, students will gain an understanding of the peer review process and will develop skills required to write critiques of manuscripts and research proposals. This "Special Project" version of Critical Thinking in Science will be letter-graded and will require that the student complete an independent project, approved by the instructor, in which the student critically examines a major scientific question or explores in depth a scientific issue impacted by critical thinking.

GS21 1162 *Effective Career Planning.* **2 sem. hrs.**

Prerequisite: Must be a post-candidacy student. This course will expose students to essential information that will complement their other didactic and laboratory-based training to prepare them for their next career chapter. All sessions will be offered in an interactive format. Students will learn to define their ideal career by exploring available paths inside and outside of academia; craft a goal oriented "Individual Development Plan" and target application packages; develop an effective network; improve skills for interviewing as well as negotiation and improve their self-awareness by identifying their top skills, strengths, interests, and values. Students are expected to finish various tasks and written/oral assignments relevant to each topic covered during the course and generate a presentation on their individual development plans as their final exam.

GS21 1171 *NIH Fellowship Proposal Development.* **1 sem. hr.**

Prerequisite: Scientific Writing (GS211152), Scientific Writing for Grant Proposals (GS031111), Topics in Microbiology and Infectious Diseases (GS071092) or an equivalent course. This course is designed for students who intend to submit an NIH fellowship application (F30, F31, F99/K00) at the end of the course. Participants will learn about the components of a fellowship application, how to develop an effective training plan and the peer review process. By the end of the course, participants will have developed a complete draft of their application. Participants are expected to have completed the GSBS Scientific Writing course, or equivalent, as the Research Strategy and Specific Aims sections will not be covered.

GS21 1232 *Translational Sciences: From Bedside to Bench and Back.* **2 sem. hrs.**

Prerequisite: None. This is an integrated, multidisciplinary course designed to provide students the necessary tools to devise, fund, implement, and publish exemplary research involving

patients or materials obtained from a human source. Students participating in this course will gain an understanding of the depth, complexity, and limitations of integrating laboratory and clinical research into investigations of human disease. After completion of the course, students will understand the importance of translational research: using laboratory findings to benefit human patients (bench to bedside) and investigating clinical observations in the laboratory (bedside to bench). This course is distinct from Human Protocol Research (GS211132); this course focuses on the interrelationship between laboratory-based and clinical research. A culture that fosters translational research of the highest quality requires laboratory and clinical investigators appreciate the scientific complexity of patient-oriented translational research.

GS21 1301 *Clinical Perspectives for a Basic Scientist.* **1 sem. hr.**

Prerequisite: None. Impacting clinical practice is a major driver for research in the academic setting and even more so in industry. Understanding of clinical questions/needs is key in order to find the right research focus, or to identify a suitable clinical counterpart to perform research that will translate into clinical practice. In this newly created nanocourse, emphasis is on clinical aspects in cancer, and how research in general can accelerate and contribute to answer clinical questions in this field. Therefore, many of our speakers are clinicians or have a strong clinical background, e.g., in pathology, surgery, therapy modalities, or clinical trials. The students will hear firsthand what the urgent clinical questions/challenges are and participants will have the opportunity to discuss these themes with the clinicians. Additionally, we want to highlight clinical aspects in cancer prevention and survivorship to expose students to research opportunities existing in these fields. The nanocourse lectures will close with the testimony of a cancer survivor. At the end of this nanocourse, students will have gained insight into different clinical specialties and their research questions.

GS21 1321 *Seminar in Molecular Imaging:
Design and Application of Targeted Agents.* **1 sem. hr.**

Prerequisite: None. Molecular imaging is a multidisciplinary field that uses noninvasive methods to monitor the biochemistry in human diseases at the cellular level. Molecular imaging continues to grow as a field due in large part to advances in contrast agent development. Drug discovery techniques such as phage-display libraries and protein engineering have provided researchers with an abundance of unique, diseases-specific molecules that can be converted into diagnostic analogs for imaging. The objective of the proposed course is to introduce the fundamentals of molecular imaging and provide an in depth description of how the design of an imaging agent can improve how diseases such as cancer are detected, managed, and treated. Each lecture will be given by a leading expert in the field and focus on 1) a clinically relevant class of imaging agents, 2) a description of the impact on patient care, and 3) presentation of emerging preclinical concepts with translational value. Topics will include the development of conventional imaging agents as well as novel approaches such as nanoparticle imaging, fluorescence-guided surgery, and multimodality imaging. The goal of the course will be to 1) give students a unique perspective of how chemical, biological, and pharmacological sciences impact cancer imaging, and 2) provide them with knowledge about the molecular imaging field which may be useful in their research and encourage future collaborations. Students will present an oral report at the end of the course.

GS21 1331 *Precision BioMedicine and Nanotechnology.* **1 sem. hr.**

Prerequisite: None. This course is intended to provide a broad background in the methods of precision medicine and targeted nanomedicine. Topics to be covered include proteomics, metabonomics (metabolomics), selective tissue targeting, patient-optimized dosing based on

transport physics and imaging, with hands-on demonstrations and lectures. Topics covered are relevant to any scientists working in medical research.

GS21 1341 *Nano Course in Lymphatics in Health and Disease.* **1 sem. hr.**

Prerequisite: None. This nanocourse will familiarize students with the “other” circulatory system, the lymphatics. This system works to promote fluid homeostasis, immune cell trafficking, cellular waste cleanup, metastasis, and plays important roles in disease states such as Alzheimer’s, lymphedema, and hypertension. The goal is to enable budding and established researchers to suitably incorporate lymphatics into research proposals that will answer questions important to relevant pathologies. Objectives are to be able to recount the basics of lymphatics anatomy and biology, to be able to describe imaging and bench methods for visualizing lymphatics and to recognize pathological conditions for which lymphatic roles should be investigated.

GS21 1351 *Nano Course in Cardio-oncology.* **1 sem. hr.**

Prerequisite: None. Cardio-oncology is a medical subspecialty concerned with the diagnosis and treatment of cardiovascular diseases (CVDs) and organ failure mediated by macro- and micro-circulatory defects in cancer patients. The goal of cardio-oncology is for cancer patients to receive maximum and uninterrupted treatment for cancer while protecting them from cardiovascular complications mediated by the treatment. For this, we must understand both pathophysiology of CVDs and mechanisms of anti-cancer treatments. The course is designed to provide an overview of the cardiovascular system in both normal and pathological states, of various cancer treatments, and how cancer treatments affect the cardiovascular system and other organ functions. There will be 10 lectures, each 1.5 hours long, and students will write a review on one of the specific subjects given by the lecturers.

GS21 1611 *Topics in Molecular Medicine.* **1 sem. hr.**

Prerequisite: MD/PhD students only; permission of instructor. The seminar will use selected topics in molecular medicine as a vehicle to introduce students to basic ideas of biomedical research, to the skills involved in evaluating the research literature and presenting data, and to the interplay between the research laboratory and the problems of clinical medicine. Students will be expected to conduct literature reviews, make oral presentations of research papers, and participate in the discussions of each topic. The course is offered in the Fall, Spring, and Summer semester, and MD/PhD students are required to register for the course throughout their tenure in the Program except during the third and fourth years of Medical School when schedules for clinical rotations conflict with the weekly seminar.

GS21 1613 *Translational Cancer Research.* **3 sem. hrs.**

Prerequisite: Basic and Translational Cancer Biology (GS041233) preferred. This course will provide a primer for translational cancer research and will review concisely the current understanding of human cancer biology that is driving interest in targeted therapy and personalized management for prevention, detection and treatment of cancer. Techniques used to characterize human cancers at a cellular and molecular level will be described. Concepts, examples and alternative strategies to achieve individualized targeted therapy will be presented. Processes for developing drugs and biomarkers will be reviewed. Translation from bench to bedside and back will be outlined for surgical oncology, radiation oncology, medical oncology and cancer imaging. Challenges for translation in cancer prevention will be considered. Infrastructure required for translational research will be reviewed, including tissue banks, biopsies, interventional radiology, molecular pathology, molecular imaging, bioinformatics, biostatistics, novel trial design and interactive databases. Objectives and paths for training

and career development will be outlined as well as the sociology of team science. Interactions between Academe, Pharma, the NCI, FDA and Foundations will be explored. Finally, the course will analyze barriers to more rapid translation of cancer research to the clinic and community. This course consists of a two-hour lecture and one-hour seminar, weekly.

GS21 1622 *Topics in Cancer Prevention.* **2 sem. hrs.**

Prerequisite: None. Given the projected shortage in 2020 of medical oncologists to care for cancer patients and survivors, the need for cancer prevention and control is urgent. Research and discovery of new and improved strategies for preventing cancer will be discussed, as well as the application of proven cancer prevention strategies in the clinic and community, and the ethical implications surrounding all of these efforts in cancer prevention and control. The objectives of this course are to provide students in the basic, behavioral, and population sciences with a strong foundation in conceptual models used for cancer prevention research and practice, the principal approaches used in promising areas of research, and new challenges and opportunities for future cancer prevention and control activities. The course will be taught by a team of MD Anderson faculty from various basic science, population science, and clinical disciplines.

GS21 1723 *Cancer Research Administration and Management – Pre-Award.* **3 sem. hrs.**

Prerequisite: Permission of instructor. This course is intended for students pursuing a career in Cancer Research Administration and for working professionals with aspirations of working as a research administrator in a research institution specializing in oncology, or the like. This course provides an overview and introduction to the broad field of research administration and management. Elements of the curriculum include understanding the environment and context within which research administration is conducted, fiscal management, regulatory compliance, sponsored program administration, grant proposal and budget development and a specific emphasis on pre-award management. This course is designed to benefit students who are preparing to sit for the National Certified Administrator® Licensing Exam.

GS21 1733 *Cancer Research Administration and Management – Post-Award.* **3 sem. hrs.**

Prerequisite: Permission of instructor. This course is intended for students pursuing a career in Cancer Research Administration and for working professionals with aspirations of working as a research administrator in a research institution specializing in oncology, or the like. This course provides an overview of the post-award components of effective and compliant research administration. Elements of the curriculum include the principles of post-award research administration, fiscal management, regulatory compliance, and leadership with a specific emphasis on post-award management. This course is designed to benefit students who are preparing to sit for the National Certified Research Administrator® Licensing exam.

GS21 1743 *Cancer Research Administration and Management - Lab/Practicum.* **3 sem. hrs.**

Prerequisite: Permission of instructor. This course is intended for students pursuing a career in Cancer Research Administration and for working professionals with aspirations of working as a research administrator in a research institution specializing in oncology, or the like. The Lab/Practicum requires independent completion of a project related to research administration with Central Office and mentor involvement. This course is designed to benefit students who are preparing to sit for the National Certified Research Administrator® Licensing exam.