

GRADUATE SCHOOL OF BIOMEDICAL SCIENCES

Mission Statement

The Graduate School of Biomedical Sciences provides an individualized, diverse and multidisciplinary learning environment for students to develop the knowledge, skills and creativity necessary to succeed in evolving biomedical disciplines.

Graduate Programs

The Graduate School of Biomedical Sciences (<http://gsbs.uthscsa.edu/>) (GSBS) was established in 1972 and currently hosts doctoral programs in Biomedical Engineering, Health Sciences, Integrated Biomedical Sciences (IBMS), Nursing Science, Radiological Sciences and Translational Science. A Professional Doctorate in Medical Physics and Master's degrees in Cell Systems and Anatomy, Clinical Investigation and Translational Science, Biomedical Engineering, Dental Hygiene, Dental Science, Drug Discovery and Development, Immunology and Infection, Medical Health Physics, and Personalized Molecular Medicine are offered. Certificates in Biomedical Data Science, Cancer Prevention, Medical Physics, Pre-Professional and Translational Science are also offered.

The graduate programs leading to the Doctor of Philosophy degree in Nursing Science and the Doctor of Philosophy degree in Health Sciences are conducted by the faculty of the UT Health San Antonio's School of Nursing and School of Health Professions respectively and administered through the Graduate School of Biomedical Sciences (<http://gsbs.uthscsa.edu/>). The Master of Science and Doctoral Programs in Biomedical Engineering are jointly offered by the Graduate School of Biomedical Sciences at the UT Health San Antonio and the Graduate School at The University of Texas at San Antonio (UT-SA) (<http://graduateschool.utsa.edu/>). The Translational Science Ph.D. (TS Ph.D.) program is a unique interdisciplinary, joint doctoral degree program involving four UT Institutions: The University of Texas at San Antonio, The University of Texas at Austin, The University of Texas School of Public Health, San Antonio Regional Campus and the UT Health San Antonio. A Master's program in Clinical Investigation and Translational Science is designed for graduate students and health care professionals interested in the design and conduct of clinical studies. Certificates in Cancer Prevention and in Translational Science are administered through the Master's program in Clinical Investigation and Translational Science. The Master's degree programs in Dental Science and Dental Hygiene are offered under the joint auspices of the university's School of Dentistry and the Graduate School of Biomedical Sciences. A Pre-Professional certificate will provide opportunities for students to enhance their competitiveness when applying to medical school, and certificate in biomedical data science will address the ongoing explosion of biomedical data, such as Electronic Health/Medical Records, to improve our understanding of the mechanisms of disease and ultimately improve health care.

These academic programs offered by the Graduate School of Biomedical Sciences are designed to provide a fundamental foundation of knowledge and scientific inquiry and enable the Graduate School of Biomedical Sciences to assert its primary objective of educating students committed to the advancement of knowledge in contemporary areas of the biomedical sciences. Our educational and research faculty are housed in all six schools of UT Health San Antonio (<http://www.uthscsa.edu/>). A

compelling aspect of graduate education in a health science center is the opportunity for graduate students to interface with health professionals with diverse technological and conceptual capabilities and perspectives in the biomedical sciences. These programs provide opportunities for graduate students to become competent in a specialized field, to attain excellence in the conduct of research, and to gain an understanding of the interdisciplinary nature of biomedical sciences. Our graduate programs are offered in a prominent academic health science center and provide an environment where scientific inquiry can synergize with the healing professions to guide our science in seeking solutions to even the most vexing biomedical issues plaguing mankind. Detailed information about these graduate programs is provided in this catalog.

The proof of accomplishment or enduring value of any educational process is evidenced in the demonstrated productivity and academic achievement of the graduates of the program. Without question, the doctoral and masters programs of the Graduate School of Biomedical Sciences (<http://gsbs.uthscsa.edu/>) have, during the past five decades, achieved outstanding success in their educational mission of preparing professional scientists who function well in academic, industrial, and government sectors.

There is a diversity of talent, but also a unity of purpose in teaching and mentoring students in an exciting array of interdisciplinary and discipline-based fields of study and research.

Committees on Graduate Studies (COGS)

Each program is supervised by a **Committee on Graduate Studies (COGS)** composed of the program director and representative members of the graduate faculty of that program. The COGS is responsible for establishing admission requirements specific to the program, recommending approval or denial of admission of applicants to the program, overseeing academic curricula, monitoring its students' academic progress in didactic and research activities, attesting eligibility for admission to candidacy for a degree, and verifying to the **Graduate Faculty Council** that the student has fulfilled all requirements for the awarding of the degree. Each graduate program shall have the primary responsibility for the conduct and administration of the program including the appointment of the COGS Chair, the administrative head of the program. The COGS Chair is the voting representative of the program on the Graduate Faculty Council and serves as the liaison officer between the COGS and the Graduate School Dean's Office on all matters pertaining to academic and student affairs. Once the COGS Chair is selected, the Graduate School Dean's Office must be notified via an official memorandum of the decision within one week.

In several graduate programs, a single graduate faculty member serves as both COGS Chair and graduate advisor. The graduate advisor serves as a counselor on academic matters and monitors the student's progress in (a) successfully completing contingencies of admission and course requirements of the program, and (b) selecting an area of research specialization.

Graduate Faculty Council

The Graduate Faculty Council has the responsibility to establish and maintain policies and regulations on matters of graduate education common to all programs administered by the Graduate School of Biomedical Sciences (<http://gsbs.uthscsa.edu/>). These include such matters as general academic requirements for admission to graduate study and advancement to candidacy, for continuation of studies, and awarding of degrees; standards of student professional conduct; grading systems; graduate program review; and criteria for thesis and

dissertation research, supervision of research, and defense of research. Each COGS is responsible for reporting program information to the Graduate Faculty Council and submits recommendations on various graduate program matters, including the submission of degrees, to the council for review and vote for approval.

The Dean of the Graduate School of Biomedical Sciences (<http://gsbs.uthscsa.edu/>) is the administrative head of the graduate programs and serves as the Chair of the Graduate Faculty Council. Ex-officio nonvoting members of the council include the dean, the associate dean(s) of the Graduate School, the Assistant Dean(s) of the Graduate School, the Registrar, and one student representative elected by the Graduate Student Association. The voting members of the Council consist of the COGS chairs of each graduate program.

Courses

MICR 4000. Special Topic. 4 Credit Hours.

This is a self-designed course created by both the student and the department to cover a specific topic. A Course Approval Form must be completed along with documentation of the designed course description.

MICR 5025. Eukaryotic Pathogens. 1 Credit Hour.

The course will provide students with the opportunity to gain a basic comprehensive understanding of parasitology and mycology. The first part of this course will focus on virulence mechanisms and the host immune response with respect to a variety of parasites that cause major human diseases. The second part of this course will cover several important areas of medical mycology including molecular biology, diagnostic/epidemiology, mating/phenotypic switching, morphology, pathogenesis, and antifungal therapies.

MICR 5026. Bacterial Pathogenesis. 1 Credit Hour.

This is an introductory course in microbial pathogenesis focusing on bacterial pathogens that are important in human disease. Students will receive a foundation in the basic concepts and experimental approaches that are crucial for understanding the discipline through directed readings and didactic instruction. Specific concepts, strategies, and mechanisms used by human bacterial pathogens to cause disease will be illustrated.

MICR 5027. Immunology. 1 Credit Hour.

MICR 5027 is designed to build on the immunological concepts covered in MICR 5051 given in the Fall semester and to put those concepts to use as we focus on understanding the world of the mammalian host response to infection and on applying fundamental immunological concepts to the understanding of current immunological research questions in a student-presentation and in-class discussion format. Prerequisite: MICR 5051.

MICR 5028. Virology. 1 Credit Hour.

This course focuses on the molecular and cellular biology of animal viruses, and their interactions with host cells. Many of the viruses to be covered in this course are medically significant or have provided critical information that has expanded our understanding of cell biology, immunology, development, and differentiation.

MICR 5029. Building Scientific Thinking Skills. 2 Credit Hours.

The goal of this course is to provide the opportunity for graduate students to develop critical thinking skills in reading scientific literature, writing scientific grant proposals and manuscripts, and effectively communicating their own scientific ideas with peers. The course will be offered in three consecutive stages. First, each student will be assigned a scientific article focusing on a topic in the areas of Microbiology and Immunology and will give a 50 minute review presentation to the class. The content of the article will be discussed and reframed in the context of a grant proposal, followed by questions/critiques from fellow students and faculty members. Second, each student will be guided to develop a F31-style fellowship proposal on their chosen topic. Students are encouraged to work with their mentors to develop the proposal focused on their own research. The writing is expected to complete over the course of four weeks, after which feedback is provided by peers and MIMG faculty before a final draft is submitted. Finally, each student presents an oral mock qualifying exam (QE) defense of his or her final written proposal to the class and a mock QE committee composed of MIMG faculty members. This course is different from many other writing courses because it is designed to achieve multiple purposes: 1. Since the proposal writing and defense portions mimic the process involved in the MIM discipline QE with MIMG faculty, this course will serve as a practice for the QE (though all MIM students must write an entirely original QE proposal for actual QE); 2. Since the scientific proposal is fully spelled out and written in the format for F31 fellowship application, the student may use the same proposal for his/her F31 application; 3. Since the proposal focuses on the research of the thesis project, the discussions/critiques from the class will help the student to evaluate the feasibility and significance of his or her potential thesis project before investing too much into the project; 4. Finally, the three stages of this course have a long lasting impact on scientific skill development.

MICR 5031. Pathogenic Microbiology. 3 Credit Hours.

This lecture-only course integrates different disciplines (immunology, cell biology, genetics, biochemistry, molecular biology, physiology, and medical microbiology) with a central theme focused on molecular mechanisms of microbial pathogenesis in humans. Recommended prerequisites for this course are Biochemistry and Molecular Biology.

MICR 5035. Emerging Trends in Immunology and Infection. 2 Credit Hours.

An intense and advanced exploration of the primary literature focusing on the latest emerging trends in immunological research. The format will allow students to develop skills of in depth critical analysis and will involve a combination of student presentations of current data and discussions of the historical development and evolution of new directions in immunological research.

MICR 5051. Intro To Immunology. 2 Credit Hours.

This course is a study of immune responses with emphasis on experimental strategies for elucidating cellular and molecular mechanisms. Three phases of study: (1) immunochemistry and molecular biology of antibodies, lymphocyte receptors, and products of the major histocompatibility complex; (2) cellular interactions and immunoregulation; and (3) immunopathologies (hypersensitivity, autoimmunity, immunodeficiency, transplantation rejection, and tumor immunology). Prerequisites: consent of instructor, courses in General Biology and Genetics recommended.

MICR 5090. Research Progress Report. 1 Credit Hour.

This course allows students to present a progress report on their research project in a formal setting. Students present a 50-minute seminar to members of the Molecular Immunology & Microbiology Discipline and the Department of Microbiology, Immunology and Molecular Genetics. Students are challenged to think independently and critically through practice of asking and answering critical questions as they organize their presentation, and they evaluate each other's research findings. This course serves as a mechanism for the students to develop and practice oral presentation skills in a friendly environment, learn to explain experimental rationale, scientific methods, results and their significance to colleagues. Research Progress Report (RPR) serves as a vehicle to encourage student productivity within the laboratory. The seminars are videotaped for review by the presenters.

MICR 5091. Current Topics In Microbiology And Immunology. 0.5-3 Credit Hours.

Students will be given an opportunity to gain in-depth understanding of selected topics in microbiology and immunology through a combination of library research and discussion with faculty. Prerequisites: consent of instructor.

MICR 5092. Special Problems. 1-9 Credit Hours.

The course provides an opportunity for the student to engage in a special research project or to develop proficiency in the use of certain laboratory methods. Prerequisites: consent of instructor.

MICR 5095. Current Topics in Immunobiology and Host-microbe Interactions. 1 Credit Hour.

This course is designed to enhance and expand on the existing Research Progress Report (RPR) course (MICR 5090) that is required of all graduate students in the Molecular Immunology & Microbiology discipline of the IBMS Graduate Program. Although the RPR course allows students to gain experience with regard to making formal lecture presentations of their research, it is limited in that students present their work only once a year, the opportunity for full discussion is limited by the time available after presentations, and being a course in which participants are exclusively students, there are no opportunities to observe examples of how skilled seasoned investigators (i.e., faculty and postdoctoral fellows) present their work. In the currently proposed course, graduate students will not only have more frequent opportunities to present their own research and receive vital feedback and critiques, but will also hear and critique presentations by more senior investigators regarding projects performed in labs throughout the Department of Microbiology, Immunology & Molecular Genetics. Prerequisites: MICR 5090.

MICR 6026. Advanced Molecular Genetics Of Eukaryotic Pathogens. 2 Credit Hours.

This course will cover the major research methods and techniques used to study human fungal pathogens.

MICR 6030. The Microbiome & The Associated Metabolites in Health and Diseases. 2.5 Credit Hours.

This course provides an overview on the role of the microbiome and the associated metabolites in human health and diseases. It will focus on clarifying the conceptual framework for understanding how microbiome and the associated metabolites, particularly gut microbiome, impact human health and well-being. The course will also introduce students to the technologies and approaches used to study the microbiome and the associated metabolites in human and murine models. Prerequisites: MICR 5051 Open for Cross Enrollment on Space Available Basis.

MICR 6043. Advanced Topics In Virology. 2 Credit Hours.

This course is an in-depth study of selected topics in animal virology at the molecular level. Prerequisites: consent of instructor.

MICR 6050. Advanced Topics In Tumor Immunology. 1 Credit Hour.

This course provides an opportunity for students to gain a solid foundation in modern tumor immunology. Topics include tumor antigens, autoimmunity, mechanisms of killing, dysregulation of inflammation, and counter measures mediated by tumor to thwart or subvert host immunity.

MICR 6052. Advanced Immunobiology. 3 Credit Hours.

MICR 6052 is composed of 2 separate Modules that are designed to build on the immunological concepts covered in IBMS 5000 given in the Fall semester and to put those concepts to use as we focus on understanding the world of the mammalian host response to infection. In addition, students will gain a more detailed understanding of the current concepts, approaches, and applications of research in the field of immunology. Module 1 is devoted entirely to understanding fundamental concepts in immunology primarily through lectures and including some in-class discussion. Module 2 is focused on applying fundamental immunological concepts to the understanding of current immunological research questions in a student-presentation and in-class discussion format. Prerequisites: IBMS 5000 or consent of instructor. Open for Cross Enrollment on Space Available Basis.

MICR 6071. Supervised Teaching. 1-9 Credit Hours.

This course consists of teaching under the close supervision of instructors as laboratory assistants and as leaders in tutorial or review sessions. The more advanced students may present formal lectures in the classroom or lead discussions in the laboratory. Prerequisites: consent of chair or department.

MICR 6097. Research. 1-12 Credit Hours.

This course consists of independent, original research under the direction of faculty advisor. May be conducted in bacteriology, virology, mycology, parasitology, and immunology.

MICR 6098. Thesis. 1-12 Credit Hours.

Registration for at least one term is required of M.S. candidates. Admission to candidacy for the Master of Science degree is required.

MICR 7099. Dissertation. 1-12 Credit Hours.

Registration for at least two terms is required of Ph.D. candidates. In addition, Ph.D. candidates may be required to complete a course in Biostatistics. Prerequisites: Admission to candidacy for the Doctor of Philosophy degree.