

# 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 (GSBS) was established in 1972 and currently hosts doctoral programs in Biomedical Engineering, 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, Immunology and Infection, Medical Health Physics, and Personalized Molecular Medicine are offered. Certificates in Cancer Prevention (CCP) and Translational Science (CTS) are also offered.

The graduate program leading to the Doctor of Philosophy degree in Nursing Science is conducted by the faculty of the Health Science Center's School of Nursing and administered through the Graduate School of Biomedical Sciences (<http://gsbs.uthscsa.edu>). The Master of Science and Doctoral Programs in Biomedical Engineering is jointly offered by the Graduate School of Biomedical Sciences at the Health Science Center 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 Health Science Center. 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.

These academic programs offered by the GSBS 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 five schools of the Health Science Center (<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 in a prominent academic health science university also provides 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 must be accounted 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 four 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.

## Non-Degree Program

An individual who wishes to enroll in courses in the Graduate School of Biomedical Sciences without entering a formal degree program must apply for admission as a non-degree student. The basic requirements for such admission are the same as those for degree-seeking students except letters of recommendation and GRE scores are not required. Non-degree applicants are also required to provide authorization for a security background and sanction check to be performed at the time of admission.

A non-degree student must receive approval of registration each semester by the Dean of the Graduate School and by the instructor of each course. The student must maintain a grade point average of at least a B (3.0 on a 4.0 scale) in courses taken as a non-degree student. Non-degree students can register for a maximum course load of twelve semester hours in the fall or spring semesters. In general, a student may not maintain non-degree status for more than four consecutive semesters.

All grades received as a non-degree student will be included in the graduate student's transcript and in computation of the cumulative GPA if the student is subsequently admitted to a graduate program. Under special circumstances, such as the computation of the GPA to determine academic probation, the Dean may grant exceptions to this policy. The grading policy for non-degree students are the same as those for degree-seeking students.

International students currently residing abroad should consult with the Office of International Services prior to applying for the non-program. Only degree-seeking applicants are eligible to apply for a student visa status.

## Committees on Graduate Studies (COGS)

Each program is supervised by a **Committee on Graduate Studies (COGS)** composed of 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 applicant and student affairs. Once selected, the Graduate School Dean's Office must be notified via an official memorandum of the decision within one week. 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. In several graduate programs, a single graduate faculty member may serve as both Graduate Advisor and COGS Chair.

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, its supervision, and its defense. Each COGS is responsible 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 Director of Doctoral Studies in the School of Nursing, the Associate Deans for the School of Health Professions and the School of Dentistry, and the Registrar. The voting members of the Council consist of the COGS chairs of each graduate program. The president of the Graduate Student Association serves as the non-voting, student representative on the Graduate Faculty Council.

## 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 4002. Advanced Medical Microbiology. 4 Credit Hours.**

This elective is available to selected fourth-year students. Responsibilities during the period would include 1) the reading of 20-25 short articles out of Morbidity & Mortality Weekly Reports (generally 5-7 pages each), so as to be prepared to 2) lead discussions as MS1 students present summaries of these articles (1 article per student in a small group setting). In addition to enriching the curriculum of the first-year class, this elective will provide the MS4 student with the opportunity to be updated on some of the most current issues of the day in areas of infectious disease.

### **MICR 5003. Core Concepts In Microbiology & Immunology. 4 Credit Hours.**

This course will provide an integrated view of the microbial world and the mammalian immune response. Students will receive a foundation in the basic concepts and experimental approaches that are crucial for understanding core concepts in pathogenic microbiology, virology, parasitology, mycology, and immunology through directed readings and didactic instruction. A special emphasis will be placed on integrating knowledge from each discipline using specific examples to illustrate important concepts in host-pathogen interaction.

### **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.**

MICR5027 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: MICR5051.

### **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, developing/critiquing scientific ideas and grant proposals and effectively communicating one's own scientific ideas with peers. The courses will be offered in three consecutive stages. First, each student will be assigned/encouraged to read articles focusing on a topic in the areas of Microbiology and Immunology and give a 50 minute review presentation on the topic to the class followed by questions/critiques from fellow students and faculty members. Second, each student is guided to develop a mini-proposal on a chosen topic followed by written critiques from fellow students and faculty members. Finally, each student is arranged to give an oral defense of his or her written proposal to the class followed by questions from fellow students and faculty members. Since the proposal writing and defense portions mimic the process involved in M&I track qualification examination, this course will not only have a long lasting impact on the students' scientific skill development, but also help prepare the students for the immediate qualification examination.

### **MICR 5030. Microbiology And Immunology Track Journal Clubs. 0.5 Credit Hours.**

The MI track students, together with faculty members and other researchers, will meet once a week to discuss articles on life science with an emphasis on the Microbiology and Immunology disciplines. At each meeting, an individual will present one or several papers, or a review and related materials. The presentation will be followed by questions and discussions involving everyone present at the meeting. Each meeting is scheduled for one hour.

**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. Acquiring Presentation Skills. 1 Credit Hour.**

This course is designed to prepare the student for giving a scientific lecture or seminar. Students present at least one lecture per academic year. Each student is coached and evaluated by faculty members in terms of both effective public speaking and critically analyzing scientific data. In addition, the seminars are videotaped. Students are required to attend all seminars.

**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 Acquiring Presentation Skills (APS) course (MICR 5090) that is required of all graduate students in the Infection, Inflammation, & Immunity discipline of the IBMS Graduate Program, and the Ph.D. students of the Microbiology & Immunology Graduate Program. Although the APS 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.

**MICR 6022. Advanced Microbial Physiology. 2 Credit Hours.**

This course consists of readings and conferences. The course includes current concepts and experimental studies in microbial structure-function relationships and regulatory mechanisms. Prerequisites: consent of instructor.

**MICR 6024. Advanced Microbial Genetics. 1-4 Credit Hours.**

This course consists of lectures and conferences. This course is an in-depth study of selected areas of microbial genetics, and presentation and discussion of current literature in these areas. Prerequisites: Consent of instructor.

**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 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.**

This course consists of lectures only. This course is an in-depth study of the immune system and how it is regulated, including presentation and discussion of current literature in these areas. Prerequisites: MICR 5051 or consent of instructor.

**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 6091. Seminars In Microbiology & Immunology. 1 Credit Hour.**

Presentations and discussions of recent advances in various areas of Microbiology & Immunology. Invited speakers may be from inside or outside the HSC. Each graduate student in the M&I Track is expected to register for this course each fall and each spring semester for as long as the student is enrolled in graduate school.

**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.