

Biomedical Sciences (M.S.)

About The Program:

The M.S. program is aimed at broad interdisciplinary training in the major areas of Biomedical Sciences. The goal is to train students in the theory and practice of Biomedical Sciences for eventual service in research and teaching. Students are instructed in diverse laboratory techniques through a series of lecture and laboratory courses, and provided with a program of experimental research for thesis students under the guidance of a faculty member. Two options are available:

- Thesis Track, with a transcribed concentration in the area of thesis research. Five areas of concentration or clusters are available: Cancer Biology and Genetics, Infectious Disease and Immunity, Molecular and Cellular Biosciences, Neuroscience, and Organ Systems and Translational Medicine. Students complete and defend a master's thesis under the supervision of a faculty member.
- Non-Thesis Track, which is in General Biomedical Sciences. Students complete didactic coursework in each of the five cluster areas.

Career Options: This well-balanced program has been designed to be individually tailored to meet the interests and needs of each student and to fully prepare each student for a Biomedical Sciences career in academia, industry, and government. The graduate program is designed to provide training in the theory and practice of Biomedical Sciences for eventual placement in research and teaching positions.

Prerequisites for Admission: Applicants should have at least one year of Advanced Biological Science (such as Biochemistry, Cell Biology, Genetics, Immunology, Microbiology, Molecular Biology, Neuroscience, Pharmacology, or Physiology); one year of General Chemistry; one year of Organic Chemistry; one year of Physics; and Mathematics through Calculus.

Areas of Specialization:

- Cancer Biology and Genetics
- Infectious Disease and Immunity
- Molecular and Cellular Biosciences
- Neuroscience
- Organ Systems and Translational Medicine

Requirements of Programs:

- **Total Credit Hours:** 30 Thesis Track or 36 Non-Thesis Track
- **Culminating Events:**

Thesis:

For the Thesis Track, the thesis must be based on an original research project. It should demonstrate the student's familiarity with laboratory techniques related to the research project and the ability to evaluate critically the literature in the student's chosen area. The student submits the thesis in complete form not less than 14 days prior to the date of the final examination. The thesis must have

been read and approved by the thesis advisor prior to distribution. The student should confirm a time and date for the thesis defense with the Final Examination Committee.

The final examination consists of a defense of the student's thesis to demonstrate competence within the field of the thesis and closely related areas. The student's Advisory Committee votes to pass or fail the thesis and the defense at the conclusion of the presentation. If the student must make revisions, those changes must be approved as arranged by the Committee.

Note that the Non-Thesis Track has no culminating event. Students may elect to obtain research experience within a laboratory.

Required Courses

All students participate in a common first-year interdisciplinary experience that includes the following core courses:

Molecules to Cells – Graduate level course that describes fundamentals of biochemistry, molecular biology, cell biology and immunology. Biochemistry, molecular biology and cell biology will consider both prokaryotic and eukaryotic organisms. Immunology will include principles of immunology and host-pathogen interactions.

Organ Systems: Function, Dysfunction and Therapies – This graduate level course provides instruction in the physiological, pathophysiological and pharmacological aspects of various organ systems. Organ systems will include cardiovascular, pulmonary, renal, endocrine, musculoskeletal and neurological.

Scientific Design and Biostatistics

Scientific Communications – This course will provide instruction in both written and oral scientific communications. Students will be guided in the preparation of power point presentations, abstracts and full manuscripts.

Bioinformatics – This is a one-credit course to provide instruction in bioinformatic approaches to the conduct of biomedical research.

Scientific Integrity – This is a one-credit graduate course to provide Biomedical Science graduate students with instruction in ethical conduct of research.

Advanced elective courses are selected for one of the following tracks:

Thesis Track (6 credits in the area of concentration)

Non-Thesis Track (20 credits, with at least one course in each of the five areas of concentration)

Seminar/Specialized Journal Club

Courses:

Click [HERE](#) for more information on the courses below.

- Introduction to Biochemistry and Molecular Biology
- Introduction to Cell Biology and Immunology
- Introduction to Molecular and Cell Biology
- Molecules to Cells
- Experimental Design and Biostatistics
- Scientific Integrity and Bioethics
- Introduction to Laboratory Research I
- Organ Systems: Function, Dysfunction and Therapeutics
- Scientific Communications
- Bioinformatics
- Introduction to Laboratory Research II
- Cell Structure & Function
- Molecular, Cellular and Systems Signal Transduction
- Molecular Approaches to Research
- Scientific Grant Writing
- Cancer Biology and Genetics Student Seminar and Journal Club
- Cancer Biology
- Genetics and Epigenetics
- Special Topics in Cancer Biology and Genetics
- Infectious Disease and Immunity Student Seminar and Journal Club
- The Biology of the Immune Response
- Molecular Genetics of Human Viruses
- Cellular and Molecular Basis of Host-Microbe Interactions
- Special Topics in Infectious Disease and Immunity
- Molecular and Cellular Biosciences Student Seminar and Journal Club
- Enzymes and Proteins
- RNA and its Role in Gene Expression
- Molecular Physiology of Ion Signaling
- Biophysical Approaches to Research
- Structure and Dynamics of Biomolecules and Assemblies
- Special Topics in Molecular and Cellular Biosciences
- Neuroscience Student Seminar and Journal Club.
- Essentials of Neuroscience
- Molecular and Cellular Neuroscience
- Neuropharmacology.
- Pharmacology of Drugs of Abuse
- Translational Science of Nervous System Diseases
- Developmental Neurobiology
- Special Topics in Neuroscience
- Organ Systems and Translational Medicine Student Seminar and Journal Club
- Mechanisms of Cardiovascular Pathophysiology
- Hemostasis and Thrombosis
- Translational Pulmonary Physiology - Experimental Basis
- Advanced Pharmacology and Translational Medicine
- Development, Function and Diseases of the Musculoskeletal System
- Organ Metabolism - Molecular Pathology and Experimental Models
- Special Topics in Organ Systems and Translational Medicine
- Biomedical Science Research
- Preliminary Exam Preparation
- Master's Project
- Master's Thesis