Biomedical Sciences MS

LEWIS KATZ SCHOOL OF MEDICINE

About the Program

The MS 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.

Under the guidance of a faculty member, thesis students are provided with a program of experimental research. Two options are available:

- Thesis Track, with a transcripted 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.

Time Limit for Degree Completion: 3 years

Campus Location: Health Sciences Center. With the permission of the student's Advisory Committee, elective courses not offered at HSC may be taken at other campuses.

Full-Time/Part-Time Status: The MS degree program is designed as a full-time day program of study to be completed in 20 to 24 months.

Interdisciplinary Study: The graduate program in Biomedical Sciences is interdisciplinary and emphasizes translational research. Students have the opportunity to work with faculty in disease-based research centers in the Lewis Katz School of Medicine, including the Center for Inflammation and Lung Research; Center for Metabolic Disease Research; Center for Neurovirology and Gene Editing; Center for Substance Abuse Research; Center for Translational Medicine; Comprehensive NeuroAIDS Center; Fels Cancer Institute for Personalized Medicine; Independence Blue Cross Cardiovascular Research Center; Shriners Hospitals Pediatric Research Center; Sol Sherry Thrombosis Research Center; and Temple Autoimmunity Center.

Ranking: In 2023, *U.S. News & World Report* ranked the Lewis Katz School of Medicine at Temple University number 68 in Research and among the Best Medical Schools.

Areas of Specialization: This interdisciplinary Biomedical Sciences graduate program offers five areas of concentration for students who plan to earn the MS with a thesis:

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

Job Prospects: 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.

Non-Matriculated Student Policy: Non-matriculated students may enroll in some courses with permission from the course instructor and approval from the Office of Graduate Studies at the Lewis Katz School of Medicine.

Financing Opportunities: Students may visit the Student Financial Services website for financial aid information.

Admission Requirements and Deadlines

Application Deadline:

Fall: February 15

All applicants to the MS program must apply via BioMedical's Centralized Application Service (BioMedCAS). The system can be accessed at https://biomedcas2024.liaisoncas.com/applicant-ux/#/login. Applicants should check their application status on the BioMedCAS portal often and inquire directly of BioMedCAS about receipt of materials.

A supplemental application is also required to be submitted directly to Temple University. Submission of the supplemental application generates the applicant's TUid number. The BioMedCAS application will not be considered without the assigned TUid.

Letters of Reference:

Number Required: 3

From Whom: Letters of recommendation should be obtained from faculty and supervisors of research experiences.

Coursework Required for Admission Consideration: Applicants should have undergraduate training in the life sciences such as Biochemistry, Biology, Cell Biology, or Molecular Biology and Genetics. Students are also expected to have training in Chemistry and Mathematics.

Bachelor's Degree in Discipline/Related Discipline: A baccalaureate degree in the Biological or Chemical Sciences is required.

Statement of Goals: In approximately 500 to 1,000 words, describe your interest in Temple's Biomedical Sciences graduate program, research interests and past experience, future career goals, and academic and research achievements.

Standardized Test Scores:
GRE: Optional. Students are not required to submit standardized scores, including GRE or MCAT scores, to supplement their application.

Applicants who earned their baccalaureate degree from an institution where the language of instruction was other than English, with the exception of those who subsequently earned a master's degree at a U.S. institution, must report scores for a standardized test of English that meet these minimums:

- TOEFL iBT: 79
- IELTS Academic: 6.5
- PTE Academic: 53

Transfer Credit: Graduate credits from an accredited institution may be transferred into the MS program in Biomedical Sciences. The completed courses must be equivalent in content to coursework offered at Temple, and the grades earned must be a "B" or better in order to transfer credits. The Associate Dean reviews the syllabus from the completed course(s) to determine equivalency and makes the recommendation to accept the credits for transfer.

Program Requirements

General Program Requirements:
Number of Credits Required Beyond the Baccalaureate: 30 Thesis Track or 36 Non-Thesis Track

Required Courses:

Thesis Track

Code	Title	Credit Hours
Core Courses [1]		
BMSC 8101	Molecules to Cells	6
BMSC 8102	Experimental Design and Biostatistics	1
BMSC 8103	Scientific Integrity and Bioethics	1
BMSC 8201	Organ Systems: Function, Dysfunction and Therapeutics	4
BMSC 8202	Scientific Communications	1
BMSC 8203	Introduction to Bioinformatic Tools and Applications	1
Concentration-Specific Student Seminar and Journal Club (2 terms) [2]		2
Basic Elective		
Select one from the following:		2
BMSC 8205	Cell Structure & Function	
BMSC 8206	Molecular, Cellular and Systems Signal Transduction	
BMSC 8207	Molecular Approaches to Research	
Concentration-Specific Advanced Electives [3]		**4**
Research Courses		
BMSC 9991	Biomedical Science Research	1
BMSC 9996	Master's Thesis	7
Total Credit Hours		**30**

1 All students in the Biomedical Sciences program participate in a common first-year interdisciplinary experience that includes the core courses identified.

2 To complete this requirement, students select the course from the following that aligns with their area of concentration: BMSC 8500 Cancer Biology and Genetics Student Seminar and Journal Club, BMSC 8600 Infectious Disease and Immunity Student Seminar and Journal Club,

[3] BMSC 8700 Molecular and Cellular Biosciences Student Seminar and Journal Club, BMSC 8800 Neuroscience Student Seminar and Journal Club, or BMSC 8900 Organ Systems and Translational Medicine Student Seminar and Journal Club.
Students select approved courses identified in the grid below for their area of concentration. One basic elective not taken to complete the "Basic Elective" requirement may be substituted for an advanced elective to fulfill this requirement.

Approved Advanced Electives by Area of Concentration

Code	Title	Credit Hours
Cancer Biology and Genetics		
BMSC 8502	Cancer Biology	
BMSC 8503	Genetics and Epigenetics	
Infectious Disease and Immunity		
BMSC 8602	The Biology of the Immune Response	
BMSC 8603	Molecular Genetics of Human Viruses	
BMSC 8604	Cellular and Molecular Basis of Host-Microbe Interactions	
Molecular and Cellular Biosciences		
BMSC 8703	RNA and its Role in Gene Expression	
BMSC 8704	Molecular Physiology of Ion Signaling	
BMSC 8706	Structure and Dynamics of Biomolecules and Assemblies	
Neuroscience		
BMSC 8802	Essentials of Neuroscience [1]	
BMSC 8803	Molecular and Cellular Neuroscience	
BMSC 8804	Neuropharmacology	
BMSC 8805	Pharmacology of Drugs of Abuse	
BMSC 8806	Translational Science of Nervous System Diseases	
Organ Systems and Translational Medicine		
BMSC 8902	Mechanisms of Cardiovascular Pathophysiology	
BMSC 8903	Hemostasis and Thrombosis	
BMSC 8904	Translational Pulmonary Physiology - Experimental Basis	
BMSC 8905	Advanced Pharmacology and Translational Medicine	
BMSC 8906	Development, Function and Diseases of the Musculoskeletal System	
BMSC 8907	Organ Metabolism - Molecular Pathology and Experimental Models	

[1] Students who select Neuroscience as their concentration are required to complete BMSC 8802 as one of their advanced electives.

Non-Thesis Coursework Track

Code	Title	Credit Hours
Core Courses [1]		
BMSC 8101	Molecules to Cells	6
BMSC 8102	Experimental Design and Biostatistics	1
BMSC 8103	Scientific Integrity and Bioethics	1
BMSC 8104	Introduction to Laboratory Research I	1
BMSC 8201	Organ Systems: Function, Dysfunction and Therapeutics	4
BMSC 8202	Scientific Communications	1
BMSC 8203	Introduction to Bioinformatic Tools and Applications	1
BMSC 8204	Introduction to Laboratory Research II	1
Student Seminar and Journal Club (2 terms) [2]		2
Basic Elective		
Select one from the following:		2
BMSC 8205	Cell Structure & Function	
BMSC 8206	Molecular, Cellular and Systems Signal Transduction	

BMSC 8207	Molecular Approaches to Research	
Advanced Electives [3]		**16**
Total Credit Hours		**36**

1. All students in the Biomedical Sciences program participate in a common first-year interdisciplinary experience that includes the core courses identified.
2. To complete this requirement, students select from BMSC 8500 Cancer Biology and Genetics Student Seminar and Journal Club, BMSC 8600 Infectious Disease and Immunity Student Seminar and Journal Club, BMSC 8700 Molecular and Cellular Biosciences Student Seminar and Journal Club, BMSC 8800 Neuroscience Student Seminar and Journal Club, or BMSC 8900 Organ Systems and Translational Medicine Student Seminar and Journal Club.
3. Students fulfill this requirement by selecting approved courses identified in the grid above. At least one course must be taken in each of the five areas of concentration: Cancer Biology and Genetics, Infectious Disease and Immunity, Molecular and Cellular Biosciences, Neuroscience, and Organ Systems and Translational Medicine. Basic electives not taken to complete the "Basic Elective" requirement may be substituted for advanced electives to fulfill this requirement.

Non-Thesis Project Track

Code	Title	Credit Hours
Core Courses [1]		
BMSC 8101	Molecules to Cells	6
BMSC 8102	Experimental Design and Biostatistics	1
BMSC 8103	Scientific Integrity and Bioethics	1
BMSC 8104	Introduction to Laboratory Research I	1
BMSC 8201	Organ Systems: Function, Dysfunction and Therapeutics	4
BMSC 8202	Scientific Communications	1
BMSC 8203	Introduction to Bioinformatic Tools and Applications	1
Student Seminar and Journal Club (2 terms) [2]		2
Basic Elective		
Select one from the following:		2
BMSC 8205	Cell Structure & Function	
BMSC 8206	Molecular, Cellular and Systems Signal Transduction	
BMSC 8207	Molecular Approaches to Research	
Advanced Electives [3]		**12**
Research Course		
BMSC 9995	Master's Project (2 terms) [4]	5
Total Credit Hours		**36**

1. All students in the Biomedical Sciences program participate in a common first-year interdisciplinary experience that includes the core courses identified.
2. To complete this requirement, students select from BMSC 8500 Cancer Biology and Genetics Student Seminar and Journal Club, BMSC 8600 Infectious Disease and Immunity Student Seminar and Journal Club, BMSC 8700 Molecular and Cellular Biosciences Student Seminar and Journal Club, BMSC 8800 Neuroscience Student Seminar and Journal Club, or BMSC 8900 Organ Systems and Translational Medicine Student Seminar and Journal Club.
3. Students fulfill this requirement by selecting approved courses identified in the grid above. At least one course must be taken in each of the five areas of concentration: Cancer Biology and Genetics, Infectious Disease and Immunity, Molecular and Cellular Biosciences, Neuroscience, and Organ Systems and Translational Medicine.
4. This course is taken under the direction of a faculty mentor. All BMSC 9995 credits must be earned under the direction of the same faculty mentor.

Culminating Event:

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 except for successful completion of coursework. Students may elect to gain research experience within a laboratory.

Contacts

Program Web Address:

https://medicine.temple.edu/education/biomedical-sciences-graduate-program

Department Information:

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tusmgrad@temple.edu
215-707-2423
215-707-6687

Submission Address for Application Materials:

https://biomedcas2024.liaisoncas.com/applicant-ux/#/login

Submission Address for Supplemental Temple University Application:

https://apply.temple.edu/MED_GRAD/

Department Contacts:

Admissions and Program Coordinators:
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