Molecular Biosciences

Elliot Altman, Graduate Program Director

The Molecular Biosciences Ph.D. is an interdisciplinary program in the College of Basic and Applied Sciences that includes faculty from the departments of Biology, Chemistry, Mathematical Sciences, and Physics and Astronomy. It is a rigorous, research-oriented course of study that aims to help students develop an understanding of cellular function and biological mechanisms at a molecular scale.

All students in the program will be expected to complete a minimum of two consecutive semesters of full-time study in residence at MTSU. Only full-time students will be admitted.

Requirements for the Ph.D. in Molecular Biosciences

Admissions are based on a comprehensive assessment of a candidate's qualifications, including Graduate Record Examination (GRE) scores, undergraduate and graduate grade point average, and letters of recommendation. Applicants must submit all application materials, including the following, to the College of Graduate Studies.

Candidate must

1. submit application and fee to the College of Graduate Studies.
2. submit official transcripts showing a grade point average (GPA) in previous academic work that indicates potential for success in advanced study. Successful applicants typically have a minimum 3.5 GPA in their graduate work or a minimum 3.0 GPA when entering with a bachelor's degree. Applicants should hold a bachelor's, master's, or doctoral degree in biochemistry, biology, chemistry, or a closely related subject. In addition, the following undergraduate courses are specifically recommended: six semesters of a combination of general biology, microbiology, cell biology, genetics, and biochemistry courses, including some laboratory coursework; two semesters of general/inorganic chemistry and at least one semester of organic chemistry, which should include a laboratory component; two semesters of physics; and one semester of calculus. Students who lack any component of these minimum course requirements will be asked to remedy their deficiency or demonstrate competency in these areas.
3. submit official scores for the verbal, quantitative and analytical writing measures of the GRE that indicate potential for success in the Molecular Biosciences program. The GRE is an important measure and is given significant consideration in the admissions review process. Successful applicants typically have scores on the Verbal and Quantitative measure at or above the 50th percentile for persons intending graduate study in science with a combined score that exceeds 1,000.
4. provide letters of recommendation from at least three professors or professionals that address the applicant's potential to successfully complete a Ph.D. in the Molecular Biosciences program.

International students must also meet the College of Graduate Studies requirement for proof of English language proficiency. This may be accomplished by submission of TOEFL, UMELI, or IELTS scores that meet the college's requirements or by successful completion of level 112 of ELS coursework.

Applicants who do not meet these minimums but whose application materials indicate high potential for success may be admitted conditionally. Such students must meet the conditions of their admission in the time stated to remain in the program of study.

The application deadline is February 15 for those wishing to be considered for graduate assistantships for the following fall. Late applications may be considered, but financial support is not guaranteed.

Once admitted to the program, candidates must complete at least 76 postbaccalaureate semester hours as follows. Students entering with a master's degree in a science discipline may have up to 16 graduate hours of previous coursework applied after determination that the content of the courses is directly equivalent to existing courses in the Molecular Biosciences curriculum.

Core Courses (31 hours)

BIOL	6380	Experimental Immunology
BIOL	6390	Advanced Cell and Molecular Biology
BIOL	6760	Bioinformatics
CHEM	6500	Biochemistry I
CHEM	6510	Biochemistry II
MOBI	7010	Lab Rotation
MOBI	7100	Research Ethics
PHYS	7010	Principles of Molecular Biophysics
STAT	7020	Introduction to Biostatistics

Electives (11 hours)

Each student, in consultation with his/her advisor and committee, will select at least 11 hours of elective coursework from at least two of the rubrics represented below. Other courses not listed below may be substituted with approval of the student's advisor and committee.

BIOL	6270	Cell Metabolism and Human Disease
BIOL	6290	Advanced Scanning Electron Microscopy
BIOL	6330	Principles of Physiology
BIOL	6360	Energy Dispersive X-Ray Theory and Analysis
BIOL	6410	Advanced Transmitting Electron Microscopy
BIOL	6430	Clinical and Pathogenic Microbiology
BIOL	6440	Advanced Virology
BIOL	6450	Advancements in Molecular Genetics
BIOL	6590	Environmental Toxicology
BIOL	6720	Advanced Animal Development
BIOL	6730	Advanced Microbial Physiology and Biochemistry
BIOL	6750	Advanced Plant Biotechnology

BIOL 6770 Issues in Biotechnology
BIOL 7010 Analysis of Genetic Markers
CHEM 6100 Intermediate Organic Chemistry
CHEM 6110 Topics in Organic Chemistry
CHEM 6230 Intermediate Analytical Chemistry
CHEM 6300 Intermediate Physical Chemistry
CHEM 6520 Topics in Biochemistry
CHEM 6530 Biochemical Techniques
CHEM 6610 Environmental Chemistry
CHEM 7110 Advanced Topics in Organic Chemistry
CHEM 7510 Advanced Biochemistry
MOBI 7200 Biomolecular Modeling and Simulation
STAT 6604 Problems in Statistics: Experimental Design

Special Topics Courses and Seminars (16 hours)

Students are required to complete a minimum of four special topics courses and four seminars.

MOBI 7300 Special Topics in Molecular Biosciences
MOBI 7400 Seminar in Molecular Biosciences

Directed Research (6 hours before candidacy)

MOBI 7500 Directed Research in Molecular Biosciences

Dissertation (12 hours)

MOBI 7640 Dissertation Research

Students are also required to

1. make at least two research presentations at regional, national, or international meetings as the lead or coauthor;
2. be lead author or make significant contribution as coauthor of two articles published, in press, or under review in high-quality, peer-reviewed journals; and
3. in collaboration with an MTSU faculty member serving as principal investigator, make a significant contribution to the development of at least one external grant proposal.