

# MASTER OF SCIENCE: CELLULAR AND MOLECULAR BIOLOGY

## Student Learning Outcomes

Students graduating from this program will:

- describe the structures and functions of key biological molecules, how these molecules interact to perform the major biochemical processes of living organisms, and key regulatory events that govern these biochemical processes.
- describe the storage, transmission and expression of genetic information, including key genetic regulatory events.
- employ oral and written communication skills in the presentation of information in cell and molecular biology.
- integrate fundamental knowledge of biochemistry and cell and molecular biology to understand and develop experimental approaches for testing hypotheses about biological mechanisms.

## Degree Requirements

### Thesis Option

Code	Title	Credits
LS-MBB 5561 & LS-MBB 5562	General Biochemistry I and General Biochemistry II	7
LS-CBB 5530 & LS-CBB 5520	Cell and Molecular Biology I and Cell and Molecular Biology II	6
LS-MBB 5611 or LS-CBB 5612	Seminar in Molecular Biology and Biochemistry Seminar in Cell Biology and Biophysics	1
LS-MBB 5599 or LS-CBB 5599	Thesis Research in Molecular Biology and Biochemistry Thesis Research in Cell Biology and Biophysics	6

### Electives

Select ten credit hours from the following: <sup>1</sup>		10
BIOLOGY 5510	Gross Anatomy for Nurse Anesthetists	
BIOLOGY 5510L	Gross Anatomy for Nurse Anesthetists	
BIOLOGY 5519	Principles of Evolution	
BIOLOGY 5525	Bioinformatics and Data Analysis	
BIOLOGY 5528	Human Genomic Epidemiology	
BIOLOGY 5539	Mammalian Physiology	
BIOLOGY 5540	Pathophysiology	
BIOLOGY 5542	Neurobiology	
BIOLOGY 5593	Master of Science Topics	
LS-CBB 5501	Graduate Biophysical Principles	
LS-CBB 5504	Graduate Virology	
LS-CBB 5596	Advanced Experimental Cell Biology I	
LS-CBB 5597	Advanced Experimental Cell Biology II	
LS-MBB 5509	Graduate Developmental Biology	
LS-MBB 5565	Structure And Function Of Proteins	
LS-MBB 5596	Advanced Experimental Molecular Biology I	
LS-MBB 5597	Advanced Experimental Molecular Biology II	

Total Credits 30

<sup>1</sup> Elective courses may also be selected from other alternatives approved by the Biological Sciences Graduate Programs Committee. A limited number of credit hours of upper-level undergraduate courses may be allowed.

Students pursuing the thesis option must also satisfactorily complete written and oral thesis exams.

### Non-Thesis Option

Code	Title	Credits
LS-MBB 5561 & LS-MBB 5562	General Biochemistry I and General Biochemistry II	7

LS-CBB 5530 & LS-CBB 5520	Cell and Molecular Biology I and Cell and Molecular Biology II	6
LS-MBB 5611 or LS-CBB 5612	Seminar in Molecular Biology and Biochemistry Seminar in Cell Biology and Biophysics	1

**Electives**

Select sixteen credit hours from the following: <sup>1</sup> 16

BIOLOGY 5510	Gross Anatomy for Nurse Anesthetists
BIOLOGY 5510L	Gross Anatomy for Nurse Anesthetists
BIOLOGY 5519	Principles of Evolution
BIOLOGY 5525	Bioinformatics and Data Analysis
BIOLOGY 5528	Human Genomic Epidemiology
BIOLOGY 5539	Mammalian Physiology
BIOLOGY 5540	Pathophysiology
BIOLOGY 5542	Neurobiology
BIOLOGY 5593	Master of Science Topics
LS-CBB 5501	Graduate Biophysical Principles
LS-CBB 5504	Graduate Virology
LS-CBB 5538	Molecular Recognition in Cellular Biology
LS-CBB 5596	Advanced Experimental Cell Biology I
LS-CBB 5597	Advanced Experimental Cell Biology II
LS-MBB 5509	Graduate Developmental Biology
LS-MBB 5538	Molecular Recognition in Molecular Biology
LS-MBB 5565	Structure And Function Of Proteins
LS-MBB 5596	Advanced Experimental Molecular Biology I
LS-MBB 5597	Advanced Experimental Molecular Biology II

Total Credits 30

<sup>1</sup> Elective courses may also be selected from other alternatives approved by the Biological Sciences Graduate Programs Committee. A limited number of credit hours of upper-level undergraduate courses may be allowed.

**Emphasis in Bioinformatics**

The emphasis in bioinformatics is a degree option with specific requirements.

This degree option trains students in the fundamental principles of bioinformatics and prepares them for careers in research, medical and corporate settings. Students will learn how to manage and analyze data stored in databases, become familiar with the various computational tools and techniques available to analyze biological data, become familiar with the types of questions and problems within biology that lend themselves to bioinformatics analysis and gain proficiency with a variety of statistical techniques necessary to analyze genomic, proteomic and integrated biological data sets.

Emphasis requirements, in addition to the specified degree requirements.

**Required Electives**

Code	Title	Credits
BIOLOGY 5519	Principles of Evolution	3
MEDB 5501 or MIS 5552	Applied Biostatistics I Data Base Management	3
BIOLOGY 5525	Bioinformatics and Data Analysis	3

Total Credits 9