

MOLECULAR BIOLOGY MAJOR (B.S.)

The main objectives of our undergraduate Molecular Biology major are: to educate students in greater depth in molecular studies than would be possible in our Biology program, and to prepare students in the methodological advances which have changed the study of biology in recent years. The field of molecular biology has an impact on almost every other area of study in the biological sciences, and its development has led to expanded graduate and professional programs.

The Molecular Biology curriculum will provide undergraduate students with a fundamental knowledge of the principles and practices inherent in the rapidly advancing field of molecular biology.

Students who major in Molecular Biology can also enter the burgeoning biotechnology industry, well prepared to compete in the modern scientific marketplace, as most institutions carry on basic or applied research in biomedical areas today using techniques of molecular biology. Students completing this major will be well-prepared to enter professional schools of medicine, dentistry, veterinary medicine, and optometry, as well as graduate programs.

120 credits of coursework is required for the baccalaureate degree with a minimum 2.0 overall GPA, and a minimum 2.0 major GPA.

Certain pre-qualified students may be accepted into the major; others will need to complete the following:

3.00 overall GPA required

Please note: The Biology and Molecular Biology majors have retention policies. By the end of their second semester in the major (i.e. spring), students must maintain a minimum 2.00 GPA and have completed the following courses: BIOL 112 and/or BIOL 113, CHEM 106 and/or CHEM 120, and MATH 111. These criteria do not apply to students entering in the Fall in the <https://www.montclair.edu/university-college/stem-pioneers/> STEM Pioneers Program

Successfully complete one semester of a math, biology and chemistry course in the major with a C- or higher

Departmental advising meeting required.

Contact: Dr. Dirk Vanderklein, Science Hall, Room 116, 973-655-5265

Program Requirements Overview

Code	Title	Credits
	General Education Requirements	32
	World Languages and Cultures Requirements	3-9
	Major Requirements	79
	Free Electives	6-0
Total Credits		120

Major Requirements

Code	Title	Credits
Required Courses		
BIOL 112	Principles of Biology I	4
BIOL 113	Principles of Biology II	4
BIOL 230	Cell and Molecular Biology	4

BIOL 350	Microbiology	4
BIOL 380	Genetics	4
BIOL 434	Molecular Biology	3
BIOL 435	Experimental Molecular Biology	3

Research Requirement

BIOL 409	Externship in Biological Research (Co-operative Education)	4
or BIOL 418	Biology Independent Research	

Elective Courses

Select 8 credits from the list below.	8
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Chemistry Collateral

CHEM 120	General Chemistry I	4
CHEM 121	General Chemistry II	4
CHEM 230	Organic Chemistry I	3
CHEM 231	Organic Chemistry II	3
CHEM 232	Experimental Organic Chemistry I	2
CHEM 370	Biochemistry I	3
CHEM 371	Biochemistry II	3

Physics Collateral

Select one of the following sequences:	8
PHYS 191 University Physics I & PHYS 192 and University Physics II	
PHYS 193 College Physics I & PHYS 194 and College Physics II	

Math Collateral

Select two of the following options:	8
STAT 230 Data Science and Statistics & STAT 231 and Data Science and Biostatistics	
AMAT 120 Applied Calculus A or MATH 122 Calculus I	
AMAT 220 Applied Calculus B or MATH 221 Calculus II	

Computer Science Collaterals

CSIT 100 Introduction to Computer Concepts or CSIT 111 Fundamentals of Programming I	3
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Total Credits	79
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Electives

Code	Title	Credits
BIOL 360	Introduction to Bio-Imaging	3
BIOL 405	Cell Culture	3
BIOL 406	Scanning Electron Microscopy	4
BIOL 410	Toxicology	3
BIOL 411	Introduction to Transmission Electron Microscopy	4
BIOL 415	Population Genetics	3
BIOL 425	Elementary Plant Physiology	3
BIOL 433	Developmental Biology	4
BIOL 442	Human Physiology	4
BIOL 443	Vertebrate Embryology	4
BIOL 444	Cell Physiology	3
BIOL 445	Immunology	3
BIOL 446	Endocrinology	3
BIOL 447	Fundamentals of Pharmacology	3

BIOL 450	Medical Microbiology	3
BIOL 451	Comparative Animal Physiology	3
BIOL 457	Virology	3
BIOL 458	Microbial Genetics	3
BIOL 468	Neurobiology	3
BIOL 475	Medical Genetics	3
BIOL 476	Biology of Cancer	3
BIOL 482	Research Community I: Molecular Biology	4
BIOL 483	Research Community II: Molecular Biology	4
BIOL 487	Statistical Genomics	3
BIOL 488	Special Topics in Cell and Molecular Biology	3-4
BIOL 491	Research in Biology Literature	1
BIOL 492	Senior Colloquium	1
BIOL 493	Molecular Ecology	3
BIOL 497	Genomics	3

General Education Requirements

Click here for a list of courses that fulfill General Education categories. (<http://catalog.montclair.edu/undergraduate-graduate-degree-requirements/general-ed-ba-bs/>)

Code	Title	Credits
A. New Student Seminar		
Complete a 1 credit New Student Seminar course.		1
C. Communication		
1.	<i>Writing</i>	3
2.	<i>Literature</i>	3
3.	<i>Communication</i>	3
D. Fine and Performing Arts		
Complete a 3 credit Fine and Performing Arts course.		3
F. Humanities		
1.	<i>Great Works and Their Influences</i>	3
2.	<i>Philosophical and Religious Perspectives</i>	3
G. Computer Science		
Fulfilled in the major.		
CSIT 100	Introduction to Computer Concepts	
or CSIT 111	Fundamentals of Programming I	
H. Mathematics		
Fulfilled by mathematics collateral requirements in the major.		
I. Natural Science Laboratory		
BIOL 112	Principles of Biology I (Fulfilled in the major.)	
J. Physical Education		
Complete a 1 credit Physical Education course.		1
K. Social Science		
1.	<i>American and European History</i>	3
2.	<i>Global Cultural Perspectives</i>	3
3.	<i>Social Science Perspectives</i>	3
L. Interdisciplinary Studies		
Complete a 3 credit Interdisciplinary Studies course.		3
Total Credits		32

World Languages and Cultures Requirements

Click here for a list of courses that fulfill World Languages and Cultures categories. (<http://catalog.montclair.edu/undergraduate-graduate-degree-requirements/world-languages-cultures-requirement/>)

Code	Title	Credits
World Languages		
Based on language placement exam, complete one or two sequential courses in the same language.		3-6
World Cultures		
Requirement may be fulfilled by course selected in General Education - Social Science: Global Cultural Perspectives.		0-3
Total Credits		3-9

Recommended Roadmap to Degree Completion

This recommended four-year plan is provided as an outline for students to follow in order to complete their degree requirements within four years. This plan is a recommendation and students should only use it in consultation with their academic advisor.

Course	Title	Credits
First Year		
Fall		
GENERAL EDUCATION: (A) New Student Seminar		1
GENERAL EDUCATION: (C1) Writing		3
		Credits
		4
Spring		
GENERAL EDUCATION: (C2) Literature		3
GENERAL EDUCATION: (C3) Communication		3
		Credits
		6
		Total
		10
		Credits