

# MOLECULAR BIOLOGY (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.

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

2.5 overall GPA required

Please note: The Biology, Molecular Biology, and Marine Biology and Coastal Science majors have retention policies. By the end of their second semester in the major (i.e. spring semester), students must maintain a minimum GPA of 2.5 and have completed the following courses with a C- or better grade: BIOL112 or BIOL113, and CHEM106 or CHEM120, and MATH111 or AMAT120.

Students are required to meet with their assigned advisor.

Contact: Dr. Dirk Vanderklein, Science Hall 107A,  
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## Program Requirements Overview

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

## Major Requirements

Code	Title	Credits
<b>Required Courses</b>		
BIOL 112	Principles of Biology: Introduction to the Cell	4
BIOL 113	Principles of Biology: Organisms and Diversity	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 & PHYS 192	University Physics I and University Physics II
PHYS 193 & PHYS 194	College Physics I and College Physics II

### Math Collateral

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

### Computer Science Collaterals

CSIT 100 or CSIT 111	Introduction to Computer Concepts or Fundamentals of Java Programming	3
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<b>Total Credits</b>	<b>79</b>
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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 422	Community Ecology	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/programs/general-education-requirements-ba-bs/>)

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

## World Languages and Cultures Requirements

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

Code	Title	Credits
<b>World Languages</b>		
	Based on language placement exam, complete one or two sequential courses in the same language. <b>Requirement is automatically fulfilled by language major courses.</b>	3-6
<b>World Cultures</b>		
	Requirement may be fulfilled by course selected in General Education 0-3 - Social Science: Global Cultural Perspectives. Requirement may also be fulfilled by major coursework. See list of courses.	
<b>Total Credits</b>		<b>3-9</b>

## Recommended Roadmap to Degree Completion

This 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.

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