

# 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,  
vanderkleid@montclair.edu.

## Degree Requirements Overview

Code	Title	Credits
SEEDS	General Education Requirements	24-27
	New Student Seminar	1
	Major Requirements	79
	Free Electives	16-13
<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

### 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 120	Calculus I	
AMAT 220	Applied Calculus B	
or MATH 220	Calculus II	

### Computer Science Collaterals

CSIT 100	Introduction to Computer Concepts	3
or CSIT 111	Fundamentals of Java Programming	

**Total Credits 79**

## 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

## New Student Seminar

Code	Title	Credits
Students in the Adult Learner program must take GNED 100.		
Complete one course from the following. Some courses may be restricted by major. Consult with an academic advisor.		1
ADVS 198	Pathways to Success	
CHEM 190	Freshman Seminar in Chemistry	
FYS 100	First Year Seminar	
GNED 100	Adult Academic Success Seminar	
GNED 199	New Student Seminar	
HPEM 199	Freshman Seminar in Health and Physical Education	
IDS 155	Pathways to Adult Learning	
JUST 199	New Student Seminar	
MATH 102	New Student Experience for Mathematical Sciences	
MUGN 199	Freshman Seminar for Music Majors	
NURS 199	Introduction to Nursing	
POLS 199	Freshman Seminar in Political Science and Law	

## SEEDS General Education Requirements

Click here for a list of courses that fulfill the SEEDS requirements. (<http://catalog.montclair.edu/programs/seeds-general-education-requirements/>)

Code	Title	Credits
<b>Foundations</b>		
<i>Effective Writing I</i>		
Complete one Effective Writing I course.		3
<i>Effective Writing II</i>		
Complete one Effective Writing II course.		3
<i>Interactive Communication</i>		
Complete one Interactive Communication course.		3
<i>Quantitative Reasoning</i>		
Fulfilled by AMAT 120 or MATH 122 in the major.		
<i>Political and Civic Life</i>		
Complete one Political and Civic Life course.		3
<i>World Language</i>		
Complete two sequential classes in one World Language when starting at the Beginner I or Beginner II level. Complete one class when starting at the Intermediate/Advanced Level.		3-6
<b>Exploration</b>		

Complete one course from four different Exploration categories:	9
<i>Analyzing Cultures and Societies</i>	
<i>Creative Expression</i>	
<i>Ethical Inquiry</i>	
<i>Historical Thinking</i>	
<i>Literary and Artistic Analysis</i>	
<i>Scientific Reasoning</i>	
Fulfilled by BIOL 112 in the major.	
<b>Total Credits</b>	<b>24-27</b>

## Recommended Roadmap to Degree Completion

This recommended degree plan is provided as an outline for students to follow in order to complete their degree requirements within four years and 120 credits. This plan is a recommendation and **MUST** be used in consultation with their academic advisor. Important note: Students should be aware this plan assumes no pre-requisite coursework is required. If pre-requisite coursework is needed, students may have additional requirements to fulfill which do not appear on the plan.

### First Year

Fall	Credits	Spring	Credits
BIOL 112 (Fulfills SEEDS: Exploration 1 - Scientific Reasoning)	4	BIOL 113	4
SEEDS: Effective Writing I	3	SEEDS: Effective Writing II	3
AMAT 120 or MATH 122 (Fulfills SEEDS: Quantitative Reasoning)	4	STAT 230	3
CHEM 120	4	STAT 231	1
New Student Seminar	1	CHEM 121	4
		<b>16</b>	<b>15</b>

### Second Year

Fall	Credits	Spring	Credits
SEEDS: Interactive Communication	3	CSIT 100	3
CHEM 230	3	CHEM 231	3
CHEM 232	2	SEEDS: Exploration 2	3
BIOL 230	4	BIOL 350	4
SEEDS: Interactive Communication	3	Free Elective	3
		<b>15</b>	<b>16</b>

### Third Year

Fall	Credits	Spring	Credits
SEEDS: Exploration 3	3	SEEDS: Exploration 4	3
CHEM 370	3	CHEM 371	3
BIOL 380	4	BIOL 434	3
BIOL 418	4	Free Elective	3
		Free Elective	3
		<b>14</b>	<b>15</b>

**Fourth Year**

<b>Fall</b>	<b>Credits</b>	<b>Spring</b>	<b>Credits</b>
SEEDS: World Language 1	3	SEEDS: World Language 2	3
PHYS 193	4	PHYS 194	4
BIOL 435	3	Free Elective	3
Major Elective	4	Major Elective	4
Free Elective	1		
	<b>15</b>		<b>14</b>

**Total Credits 120**