

# Biology

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Dr. Bruce J. Shockey  
Chair of the Department

As the formal “study of life”, *biology* is at the crux of many spheres of our existence. Such domains of biology include our food and nutrition, our health, and the environments in which we live. Thus, a general knowledge of biology is useful and desirable for people of all walks of life, as well as those who require specialized knowledge for professions in any of the many subspecialties of biology.

In order to meet the educational needs of students in all majors, as well as biology majors, the Biology Department here at Manhattan College offers a variety of general courses for non-majors as well as more rigorous and specialized studies for our biology majors. In order to ensure a broad training, the curriculum for biology majors includes prescribed areas of required studies, plus some electives in advanced courses of cell and molecular biology, as well as organismal biology. In recognition that the best learning comes via *doing*, nearly all of our courses have associated, co-requisite, laboratory components. Many of these lab courses provide training in modern molecular biology techniques, while others provide fundamental training via anatomical, taxonomic, and ecological investigations. We also support off-campus studies that generally include class field trips to venues such as the American Museum of Natural History, the New York Botanical Gardens, and to the nearby, thousand-plus acre Van Cortland Park, a city park that preserves upland forests and wetlands. Our advanced research students present their findings at regional, national, and international meetings. Pre-professional students with interests in clinical studies generally “shadow” medical professionals in clinical settings.

Students preparing for professional school admission should consult the School of Science (<http://catalog.manhattan.edu/undergraduate/science/>) section of the catalog for requirements.

## B.S. Degree

The B.S. degree is the preferred degree for students who wish to prepare for professional or graduate school. Students plan an individual program of study of their Biology courses and free electives after consultation with their assigned advisor in the Biology Department.

### Required Courses for the B.S. Degree

BIOL 111	General Biology I	4
Co-requisite BIOL 113		
BIOL 112	General Biology II	4
Co-requisite BIOL 114		
BIOL 217	Genetics (Co-requisite BIOL 218)	4
BIOL 218	Genetics - Lab (Co-requisite BIOL 217)	0
BIOL 223	Ecology (Co-requisite BIOL 220)	4
BIOL 231	Evolution (Co-requisite BIOL 232)	4
BIOL 404 & BIOL 414	Biology Colloquium I and Biology Colloquium II	

<b>Cell &amp; Molecular Biology (choose any two 4-credit courses)</b>		<b>8</b>
BIOL 225	Microbiology (Co-requisite BIOL 226)	
BIOL 226	Microbiology Lab (Co-requisite BIOL 225 )	
BIOL 302	Developmental Biology (Co-requisite BIOL 335)	
BIOL 335	Developmental Biology Lab (Co-requisite BIOL 302)	
BIOL 319	Cellular BioChemistry/Physiology (Co-requisite BIOL 323)	
BIOL 323	Cellular Biochemistry/Physiology Laboratory (Co-requisite BIOL 319)	
BIOL 321	Molecular Cell Biology (Co-requisite BIOL 322)	
BIOL 322	Molecular Cell Biology Lab (Co-requisite BIOL 321)	
BIOL 405	Neurobiology	
BIOL 407	Neurobiology - Lab (Co-requisite BIOL 405)	
BIOL 426	Immunology	
<b>Organismal Biology (choose any two 4-credit courses)</b>		<b>8</b>
BIOL 301	Comparative Chordate Anatomy (Co-requisite BIOL 313)	
BIOL 313	Compar Chordate Anatomy-Lab (Co-requisite BIOL 301)	
BIOL 304	Invertebrate Zoology	
BIOL 305	Plant Biology (Co-requisite 303)	
BIOL 303	Plant Biology Laboratory (Co-requisite BIOL 305)	
BIOL 320	Animal Physiology (Co-requisite 324)	
BIOL 324	Animal Physiology Laboratory (Co-requisite 320)	
BIOL 326	Animal Behavior (Co-requisite 327)	
BIOL 327	Animal Behavior Lab (Co-requisite 326)	
BIOL 409	Marine Biology	
BIOL 431	Freshwater Ecology	
BIOL 432	Estuarine and Coastal Ecology	
<b>Biology Electives (choose a combination of courses to total at least 4 credits)</b>		<b>4</b>
Any 1 of Cell & Molecular or Organismal courses listed above		
BIOL 207	Anatomy and Physiology I (Co-requisite BIOL 209)	
BIOL 209	Anatomy And Physiology Lab I (Co-requisite BIOL 207)	
BIOL 208	Anatomy and Physiology II (Co-requisite BIOL 210)	
BIOL 210	Anatomy & Physiology II Lab (Co-requisite BIOL 208)	
BIOL 318	Advances in Nutrition	
BIOL 310	Research in Biology for Juniors	
BIOL 311	Research in Biology for Juniors	
BIOL 317	Research in Biology for Juniors	
BIOL 360	Independent Study in Biology for Juniors	
BIOL 375	Internship for Juniors	
BIOL 400	Research in Biology	
BIOL 406	Special Topics: in Biology	
BIOL 410	Research in Biology for Seniors	

BIOL 411	Research in Biology for Seniors	
BIOL 413	Research in Biology for Seniors	
BIOL 460	Independent Study in Biology	
BIOL 475	Internship for Seniors	

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**Total Credits** **40**

### Cognate Requirements for the B.S. Degree

CHEM 101 & CHEM 102	General Chemistry I and General Chemistry II	6
CHEM 103	General Chemistry Laboratory I	1
CHEM 104	General Chemistry Laboratory II	1
CHEM 319 & CHEM 320	Organic Chemistry I and Organic Chemistry II	6
CHEM 323 & CHEM 324	Organic Chemistry Laboratory I and Organic Chemistry Laboratory II	4
Calculus I		3
MATH 155 or MATH 185	Calculus for the Life Sciences I Calculus I	
Calculus II		3
MATH 156 or MATH 186	Calculus for the Life Sciences II Calculus II	
Physics I		4
PHYS 107	Introduction to Physics I	
or		
PHYS 101 & PHYS 191	Physics I and Physics I Lab	
Physics II		4
PHYS 108	Introduction to Physics II	
or		
PHYS 102 & PHYS 192	Physics II and Physics II Lab	

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**Total Credits** **32**

### B.A. Degree

Recognizing that many students have a distinct interest in Biology, yet possess diverse career goals, the Department offers the B.A. degree with a relatively large number of electives. Students should use these electives to either minor or concentrate in any of the humanities, social science or business disciplines. This program is not recommended for students wishing to go on to medical/professional school, graduate studies in Biology, or physical therapy programs unless other prerequisites are met. The B.A. program is intended to help students obtain employment in medical and pharmaceutical sales, medical writing, careers in public health and safety and the insurance industry as it relates to health care.

**Required Courses for the B.A. Degree**

BIOL 111	General Biology I	4
BIOL 113	General Biology I Laboratory	0
BIOL 112	General Biology II	4
BIOL 114	General Biology II Laboratory	0
BIOL 217	Genetics	4
BIOL 218	Genetics - Lab	0
BIOL 223	Ecology	4
BIOL 220	Ecology Lab	0
BIOL 231	Evolution	4
BIOL 232	Evolution Laboratory	0
BIOL 404	Biology Colloquium I	1
BIOL 414	Biology Colloquium II	1

**Biology Electives (choose a combination of courses from the list below to total at least 14 credits.)** **14**

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**Total Credits** **36**

**Biology Electives for the B.A. with Their Co-Requisite Labs**  
<sup>1</sup> (choose a combination to total at least 14 credits)

BIOL 207	Anatomy and Physiology I	4
BIOL 209	Anatomy And Physiology Lab I	0
BIOL 208	Anatomy and Physiology II	4
BIOL 210	Anatomy & Physiology II Lab	0
BIOL 225	Microbiology	4
BIOL 226	Microbiology Lab	0
BIOL 301	Comparative Chordate Anatomy	4
BIOL 313	Compar Chordate Anatomy-Lab	0
BIOL 302	Developmental Biology	4
BIOL 335	Developmental Biology Lab	0
BIOL 304	Invertebrate Zoology	4
BIOL 305	Plant Biology	4
BIOL 303	Plant Biology Laboratory	0
BIOL 318	Advances in Nutrition	2
BIOL 319	Cellular BioChemistry/Physiology	4
BIOL 323	Cellular Biochemistry/Physiology Laboratory	0
BIOL 320	Animal Physiology	4
BIOL 324	Animal Physiology Laboratory	0
BIOL 321	Molecular Cell Biology	4
BIOL 322	Molecular Cell Biology Lab	0
BIOL 326	Animal Behavior	4
BIOL 327	Animal Behavior Lab	0

BIOL 405	Neurobiology	4
BIOL 407	Neurobiology - Lab	0
BIOL 409	Marine Biology	4
BIOL 426	Immunology	4
BIOL 431	Freshwater Ecology	4
BIOL 432	Estuarine and Coastal Ecology	4
BIOL 441	Cardiovascular Biology	3
BIOL 310	Research in Biology for Juniors	2
BIOL 311	Research in Biology for Juniors	2
BIOL 317	Research in Biology for Juniors	3
BIOL 360	Independent Study in Biology for Juniors	2
BIOL 375	Internship for Juniors	2
BIOL 400	Research in Biology	1
BIOL 406	Special Topics: in Biology	4
BIOL 410	Research in Biology for Seniors	2
BIOL 411	Research in Biology for Seniors	2
BIOL 413	Research in Biology for Seniors	3
BIOL 460	Independent Study in Biology	1-3
BIOL 475	Internship for Seniors	3

<sup>1</sup> A student may take 9 Biology credits in Research and/or Independent Study. However, a maximum of 3 credits may be in Independent Study.

### Cognate Requirements for the B.A. Degree

CHEM 101 & CHEM 102	General Chemistry I and General Chemistry II	6
CHEM 103	General Chemistry Laboratory I	1
CHEM 104	General Chemistry Laboratory II	1
CHEM 319 & CHEM 320	Organic Chemistry I and Organic Chemistry II	6
MATH 100	Pre-Calculus Mathematics	3
MATH 230	Elementary Statistics	3
Physics I		4
PHYS 107	Introduction to Physics I	
or		
PHYS 101 & PHYS 191	Physics I and Physics I Lab	
Physics II		4
PHYS 108	Introduction to Physics II	
or		

PHYS 102 & PHYS 192	Physics II and Physics II Lab
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**Total Credits****28**

## Minors

A minor requires 15 credits in Biology courses planned in consultation with and approval of the Chair of the Biology Department. Eight of these credits must be the General Biology sequence (BIOL 111-114). The remaining credits must be chosen from courses that satisfy B.S. major requirements.

## Grade Requirements

Majors and minors must attain a minimum grade of C in all biology courses. Prerequisites for upper level Biology courses: C or better in General Biology I (BIOL 111 and BIOL 113) and C or better in General Biology II (BIOL 112 and BIOL 114) or the equivalents are required.

## Registration for Advanced Courses

Permission of the academic advisor of the Biology Department is required for registration in all courses at the 300 and 400 levels.

## Courses for Non-Biology Majors

The following courses are offered for and are restricted to students majoring in departments other than Biology.

BIOL 103	Introduction to Biology	3
BIOL 207 & BIOL 208	Anatomy and Physiology I and Anatomy and Physiology II	8
BIOL 131	Principles of Biology I	4
BIOL 132	Principles of Biology II	4
BIOL 133	Principles of Biology Lab I	0
BIOL 134	Principles of Biology Lab II	0
BIOL 221	Introductory Nutrition	3
BIOL 222	Biology for Engineers	3
BIOL 441	Cardiovascular Biology	3

## PLANS OF STUDY

### Bachelor of Science in Biology

#### First Year

Fall	Credits	Spring	Credits
BIOL 111		4 BIOL 112	4
BIOL 113		0 BIOL 114	0
MATH 155		3 CHEM 102	3
CHEM 101		3 CHEM 104	1

CHEM 103	1	MATH 156	3
SCI 100	1	PHIL 213	3
ENGL 110	3	RELS 110	3
		SCI 101	1

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**15** **18**

**Second Year**

<b>Fall</b>	<b>Credits</b>	<b>Spring</b>	<b>Credits</b>
MLL		3 CMPT 155	3
BIOL 223	4	CHEM 320	3
BIOL 220	0	CHEM 324	2
BIOL 232	0	BIOL 217	4
BIOL 231	4	BIOL 218	0
CHEM 319	3	MLL	3
CHEM 323	2	Elective	3

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**16** **18**

**Third Year**

<b>Fall</b>	<b>Credits</b>	<b>Spring</b>	<b>Credits</b>
BIOL Cell Elective		4 BIOL Organismal Elective	4
HIST 150	3	PHYS 108	4
ENGL 150	3	PHIL 150	3
RELS Catholic Studies	3	Social Sciences	3
PHYS 107	4		

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**17** **14**

**Fourth Year**

<b>Fall</b>	<b>Credits</b>	<b>Spring</b>	<b>Credits</b>
BIOL Organismal Elective	4	BIOL Cell Elective	4
BIOL Elective	2	BIOL Elective	2
RELS Global/Contemporary	3	BIOL 414	1
Social Sciences	3	MUSC 150 or ART 150	3
Elective	3	Electives	6
BIOL 404	1		

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**16** **16**

**Total Credits: 130****Bachelor of Arts in Biology****First Year**

<b>Fall</b>	<b>Credits</b>	<b>Spring</b>	<b>Credits</b>
BIOL 111	4	RELS 110	3
BIOL 113	0	MLL	3
MLL	3	BIOL 112	4
CHEM 101	3	BIOL 114	0

CHEM 103	1 CHEM 102	3
SCI 100	1 CHEM 104	1
ENGL 110	3 PHIL 213	3
	SCI 101	1

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**15** **18**

**Second Year**

<b>Fall</b>	<b>Credits</b>	<b>Spring</b>	<b>Credits</b>
CHEM 319		3 CHEM 320	3
MATH 100		3 Social Sciences	3
CMPT 155		3 MATH 230	3
BIOL 223		4 HIST 150	3
BIOL 231		4 BIOL 218	0
		BIOL 217	4

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**17** **16**

**Third Year**

<b>Fall</b>	<b>Credits</b>	<b>Spring</b>	<b>Credits</b>
BIOL Elective		4 BIOL Elective	4
PHYS 107		4 Free Elective	3
Free Elective		3 ENGL 150	3
Social Studies		3 PHYS 108	4
MUSC 150 ( or ART 150)		3 PHIL 150	3

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**17** **17**

**Fourth Year**

<b>Fall</b>	<b>Credits</b>	<b>Spring</b>	<b>Credits</b>
BIOL Elective		4 BIOL Elective	2
RELS Catholic Studies		3 BIOL 414	1
Free Electives		8 RELS Global/Contemporary	3
BIOL 404		1 Free Electives	8

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**16** **14**

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**Total Credits: 130**