

BIOLOGY MAJOR, BS

Campus: NYC, Westchester

This major prepares students for further education either in professional schools such as medical, dental, osteopathy, or veterinary medicine, as well as for entrance into science graduate degree programs. The major also prepares you to begin work as a laboratory technician at educational, medical and veterinary, startup, and pharmaceutical industry labs, as well as government and non-profit institutions. The curriculum includes Biology Core courses, Math & Science courses, and a very broad range of Biology elective courses in several categories.

Students are required to pass a comprehensive examination, the Major Field Test in Biology, given as part of BIO 490 Introduction to Research in the Biological Sciences that assesses the ability to integrate and synthesize basic concepts in Biology. To take the required exam, students must also register for Bio 493 (<https://catalog.pace.edu/undergraduate/courses-a-z/bio/>).

Note: Qualified students interested in occupational therapy, optometry, or podiatry also have an opportunity to participate in an accelerated dual-degree program with a professional school. For details see Biology, BS: Pre-Professional major.

Major Completion Summary

Requirement	Credits
University Core Requirements	44-55
Major Requirements	42-47
Open Electives	17-31
Total Credits	128

University Core Requirements (44-55 Credits)

See complete University Core (<http://catalog.pace.edu/undergraduate/university-core-curriculum/>) requirements.

Note: Various major-required math and science courses listed below may fulfill foundation, area of knowledge, and/or core requirements. Please consult with an academic advisor.

Major Requirements (42-47 Credits)

Code	Title	Credits
Biology Core Courses		
BIO 101	General Biology I	4
BIO 102	General Biology II	4
BIO 210	Ecology	4
BIO 231	Genetics	4
BIO 327	Cellular Biochemistry	4
BIO 335	Molecular and Cellular Biology	4
BIO 335A	Molecular and Cellular Biology (NYC students only)	1
BIO 490	Introduction to Research in the Biological Sciences	3
BIO 493	Major Field Test in Biology	0
Select one of the following:		3
BIO 395	Independent Study in Biology	
BIO 480	Research in Biology	
BIO 491	Internship in Biology	
Biology Electives		
Select one course from each of the following category groups:		9-12
<i>Molecular and Cellular Biology Category</i>		
BIO 222	Plants and People	
BIO 264	Microbiology	
BIO 306	Advanced Microbiology	
BIO 325	Neurobiology	
BIO 346	Introduction to Basic Pharmacology	
BIO 375	Advanced Cell Biology	
BIO 399C	Topic: Cancer Cell Biology	

BIO 399I	Fundamentals in Reproductive Biology
<i>Organismal Biology Category</i>	
BIO 221	Botany
BIO 222	Plants and People
BIO 233	Fundamentals of Histology and Histopathology
BIO 236	Comparative Vertebrate Anatomy
BIO 251	Principles of Human Anatomy
BIO 264	Microbiology
BIO 296D	Topic: Medicinal Botany: Plants that Heal
BIO 334	General Physiology
BIO 343	General Endocrinology
BIO 359	Immunology
BIO 399I	Fundamentals in Reproductive Biology
<i>Biological Systems and Ecology Category</i>	
BIO 205	Concepts of Environmental Science
BIO 215	Urban Ecology
BIO 221	Botany
BIO 305	Evolutionary Biology
BIO 307	Microbial Ecology
BIO 322	Animal Behavior
BIO 345	Introduction to Toxicology
Other Required Biology Electives	
Select two additional courses from the three preceding groups. At least one of the two courses must be lecture/laboratory course of 4 credits. 7-8	
Required Math and Science Courses ^{3, 4}	
CHE 111	General Chemistry I
CHE 112	General Chemistry II
CHE 223	Organic Chemistry I
CHE 224	Organic Chemistry II
MAT 131	Calculus I
MAT 141	Introductory Statistics for the Life Sciences
PHY Requirement Either Group A or Group B	
Group A	
PHY 101	College Physics I
PHY 102	College Physics II
Group B	
PHY 111	General Physics I
PHY 112	General Physics II

Total Credits**47-51**² Students may fulfill some requirements within their core or open electives.³ Students should consult with faculty advisor on which physics sequence is most appropriate.

Open Electives (17-31 Credits)

Code	Title	Credits
Open Electives		
Select 17-31 credits ¹		17-31
Total Credits		17-31

¹ Open Elective credits must include required science and math courses not taken for University Core credit, UNV 101 First-Year Seminar: Introduction to University Community (required of incoming freshmen students), and remaining open electives.

General Track

In addition to the courses listed below, students are required to complete two courses with the Anti-Racism Education attribute attached. These courses may be taken during any semester of their education. See advisor for more information.

Course	Title	Credits
First Year		
Fall		
ENG 110	Composition	3
BIO 101	General Biology I	4
CHE 111	General Chemistry I	4
MAT 103 or MAT 130	Algebra (Or MAT 131) or Precalculus	0-4
UNV 101	First-Year Seminar: Introduction to University Community (STEM Major section)	1
Credits		12-16
Spring		
BIO 102	General Biology II	0-4
CHE 112	General Chemistry II	0-4
MAT 130 or MAT 131	Precalculus (Or CIS 101) or Calculus I	4
ENG 120	Critical Writing	4
Credits		8-16
Second Year		
Fall		
BIO 231	Genetics	0-4
CHE 223	Organic Chemistry I	0-5
Take any one remaining Area of Knowledge course		3
One Learning Community (LC) course		3
One Learning Community (LC) course		3
Credits		9-18
Spring		
BIO 335	Molecular and Cellular Biology (Writing Enhanced (WE) course. In NYC, take BIO 335 and BIO 335A for 5 credits; in PLV, BIO 335 for 4 credits)	4
CHE 224	Organic Chemistry II	0-5
CIS 101	Introduction to Computing (or Any one remaining Area of Knowledge course)	0-3
ENG 201	Writing in the Disciplines	3
Credits		7-15
Third Year		
Fall		
BIO 327	Cellular Biochemistry	4
BIO 210	Ecology	0-4
PHY 101	College Physics I	0-4
One elective course in BIO		3
First Second Language Course. See Advisor for guidelines		3
Credits		10-18
Spring		
BIO 490	Introduction to Research in the Biological Sciences (Writing Intensive (WE) course)	0-3
MAT 141	Introductory Statistics for the Life Sciences (Counts toward Analysis of Human, Social, and Natural Phenomena (AOK5))	4
PHY 102	College Physics II	0-4
One elective course in BIO		3
Second Language Course, if applicable		3
Credits		10-17

Fourth Year**Fall**

BIO 395 or BIO 480 or BIO 491	Independent Study in Biology or Research in Biology or Internship in Biology	3
COM 200	Public Speaking	3
BIO 493	Major Field Test in Biology	0
Take any one remaining Area of Knowledge course		3
One elective course in BIO		4
Credits		13

Spring

One elective course in BIO		4
Take any one remaining Area of Knowledge course		3
Take any one remaining Area of Knowledge course or Open elective course		3
Civic Engagement (CE) course		3
One elective course in BIO		4
Credits		17
Total Credits		86-130

Biology, BS / Biochemistry & Molecular Biochemistry, MS Track

In addition to the courses listed below, students are required to complete two courses with the Anti-Racism Education attribute attached. These courses may be taken during any semester of their education. See advisor for more information.

Course	Title	Credits
First Year		
Fall		
ENG 110	Composition	3
BIO 101	General Biology I (Writing Enhanced (WE))	4
CHE 111	General Chemistry I	4
MAT 103 or MAT 130 or MAT 131	Algebra or Precalculus or Calculus I	3-4
UNV 101	First-Year Seminar: Introduction to University Community (STEM Major section)	1
Credits		15-16
Spring		
BIO 102	General Biology II	0-4
CHE 112	General Chemistry II	0-4
MAT 130 or MAT 131	Precalculus or Calculus I	4
ENG 120	Critical Writing	4
Credits		8-16
Second Year		
Fall		
BIO 231	Genetics	0-4
CHE 223	Organic Chemistry I	0-5
Take any one remaining Area of Knowledge course		3
One Learning Community (LC) course		3
One Learning Community (LC) course		3
Credits		9-18
Spring		
BIO 335	Molecular and Cellular Biology (Writing Enhanced (WE) course. In NYC, take BIO 335 and BIO 335A for 5 credits; in PLV, BIO 335 for 4 credits)	4
CHE 224	Organic Chemistry II	0-5

CIS 101	Introduction to Computing (or Any one remaining Area of Knowledge course)	0-3
ENG 201	Writing in the Disciplines	3
Credits		7-15
Third Year		
Fall		
BIO 327	Cellular Biochemistry	4
BIO 210	Ecology	0-4
PHY 101	College Physics I	0-4
MAT 141	Introductory Statistics for the Life Sciences (Analysis of Human, Social, and Natural Phenomena (AOK5))	4
First Second Language Course. See Advisor for guidelines		3
Credits		11-19
Spring		
BIO 490	Introduction to Research in the Biological Sciences (Writing Intensive (WE) course)	0-3
PHY 102	College Physics II	0-4
Take any one remaining Area of Knowledge course		3
Take any one remaining Area of Knowledge course		3
Second Language Course, if applicable		3
Credits		9-16
Fourth Year		
Fall		
BIO 493	Major Field Test in Biology	0
COM 200	Public Speaking	3
BMB 629	Molecular Biochemistry	4
BIO 480	Research in Biology (BIO 395 and BIO 491 cannot substitute for BIO 480 in this track)	3
BMB 626	Cellular Biochemistry and Advanced Molecular Biology	4
BMB 610	Seminar	1
Credits		15
Spring		
Civic Engagement (CE) course		3
One elective course in BIO		4
BMB 640	Physical Biochemistry	4
BMB 710	Research I	4
Take any one remaining Area of Knowledge course or Open elective course		3
Credits		18
Total Credits		92-133

Pre-Professional, Pre-Med Track

In addition to the courses listed below, students are required to complete two courses with the Anti-Racism Education attribute attached. These courses may be taken during any semester of their education. See advisor for more information.

Course	Title	Credits
First Year		
Fall		
ENG 110	Composition	3
BIO 101	General Biology I	0-4
CHE 111	General Chemistry I	0-4
MAT 103 or MAT 130 or MAT 131	Algebra or Precalculus or Calculus I	3-4
UNV 101	First-Year Seminar: Introduction to University Community	1
Credits		7-16

Spring

BIO 102	General Biology II	0-4
CHE 112	General Chemistry II	0-4
MAT 130 or MAT 131	Precalculus or Calculus I	4
ENG 120	Critical Writing	4

Credits **8-16**

Second Year**Fall**

BIO 231	Genetics	0-4
PHY 101	College Physics I	0-4
CHE 223	Organic Chemistry I	5
Two Learning Community (LC) courses		6

Credits **11-19**

Spring

BIO 335	Molecular and Cellular Biology (Writing Enhanced (WE) course. In NYC, take BIO 335 and BIO 335A for 5 credits; in PLV, BIO 335 for 4 credits)	4
CHE 224	Organic Chemistry II	5
PHY 102	College Physics II	0-4
ENG 201	Writing in the Disciplines	3

Credits **12-16**

Third Year**Fall**

BIO 210	Ecology	0-4
BIO 327	Cellular Biochemistry	4
BIO 251	Principles of Human Anatomy	4
Take any one remaining Area of Knowledge course or CIS 101		3
First Second Language Course. See Advisor for guidelines		3

Credits **14-18**

Spring

BIO 264	Microbiology	0-4
BIO 334	General Physiology	0-4
BIO 490	Introduction to Research in the Biological Sciences (Writing Enhanced (WE) course)	0-3
MAT 141	Introductory Statistics for the Life Sciences	4
Second Language Course, if applicable		3

Credits **7-18**

Fourth Year**Fall**

One elective course in subject BIO		4
BIO 493	Major Field Test in Biology	0
BIO 395 or BIO 480 or BIO 491	Independent Study in Biology or Research in Biology or Internship in Biology	3
PSY 112	Introduction to Psychology (Analysis of Human, Social, and Natural Phenomena (AOK5))	4
COM 200	Public Speaking	3

Credits **14**

Spring

One elective course in subject BIO		4
One Civic Engagement (CE) course		3
Take any one remaining Area of Knowledge course		3
Take any one remaining Area of Knowledge course		3

Take any one remaining Area of Knowledge course (if needed)	3
Credits	16
Total Credits	89-133

Pre-Professional, Pre-Occupational Therapy Track

In addition to the courses listed below, students are required to complete two courses with the Anti-Racism Education attribute attached. These courses may be taken during any semester of their education. See advisor for more information.

Course	Title	Credits
First Year		
Fall		
ENG 110	Composition	3
BIO 101	General Biology I	0-4
CHE 111	General Chemistry I	0-4
MAT 103 or MAT 130 or MAT 131	Algebra or Precalculus or Calculus I	3-4
UNV 101	First-Year Seminar: Introduction to University Community	1
Credits		7-16
Spring		
BIO 102	General Biology II	0-4
CHE 112	General Chemistry II	0-4
MAT 130 or MAT 131 or CIS 101	Precalculus or Calculus I or Introduction to Computing	4
ENG 120	Critical Writing	4
PSY 112	Introduction to Psychology (Counts toward Analysis of Human, Social, and Natural Phenomena (AOK5))	4
Credits		12-20
Second Year		
Fall		
BIO 231	Genetics	0-4
PHY 101	College Physics I	0-4
One Learning Community (LC) course with COM 200		3
COM 200	Public Speaking (Learning Community (LC))	3
PSY 320	Abnormal Psychology I	3
Credits		9-17
Spring		
BIO 335	Molecular and Cellular Biology (Writing Enhanced (WE) course. In NYC, take BIO 335 and BIO 335A for 5 credits; in PLV, BIO 335 for 4 credits)	4
First Second Language Course. See Advisor for guidelines. Or CIS 101		3
Take any one remaining Area of Knowledge course		3
PHY 102	College Physics II	0-4
ENG 201	Writing in the Disciplines	3
Credits		13-17
Third Year		
Fall		
BIO 210	Ecology	0-4
BIO 251	Principles of Human Anatomy	0-4
BIO 327	Cellular Biochemistry	4
Take any one remaining Area of Knowledge course and Civic Engagement (CE) course		3
First Second Language Course. See Advisor for guidelines, or Second Language Course if needed		3
Credits		10-18

Spring

BIO 334	General Physiology	0-4
BIO 490	Introduction to Research in the Biological Sciences	0-3
MAT 141	Introductory Statistics for the Life Sciences (Analysis of Human, Social, and Natural Phenomena (AOK5))	4
BIO 493	Major Field Test in Biology	0
BIO 395 or BIO 480 or BIO 491	Independent Study in Biology (Paired with Area of Knowledge course) or Research in Biology or Internship in Biology	3
Take any one remaining Area of Knowledge course		3
Credits		10-17

Fourth Year**Fall**

CHE 223	Organic Chemistry I (In the summer)	0-5
CHE 224	Organic Chemistry II (In the summer)	0-5
First Second Language Course. See Advisor for guidelines, in the summer, if needed		3
Second Language Course, if applicable, in the summer, if needed		3
Fall semester at Columbia University		14
Credits		20-30
Total Credits		81-135

Pre-Professional, Pre-Pharmacy Track

In addition to the courses listed below, students are required to complete two courses with the Anti-Racism Education attribute attached. These courses may be taken during any semester of their education. See advisor for more information.

Course	Title	Credits
First Year		
Fall		
ENG 110	Composition	3
BIO 101	General Biology I	0-4
CHE 111	General Chemistry I	0-4
MAT 103 or MAT 103 or MAT 130 or MAT 131	Algebra or Algebra or Precalculus or Calculus I	3-4
UNV 101	First-Year Seminar: Introduction to University Community	1
Credits		7-16
Spring		
BIO 102	General Biology II	0-4
CHE 112	General Chemistry II	0-4
MAT 130 or MAT 131 or CIS 101	Precalculus or Calculus I or Introduction to Computing	4
ENG 120	Critical Writing	4
PSY 112	Introduction to Psychology (Counts toward Analysis of Human, Social, and Natural Phenomena (AOK5))	4
Credits		12-20
Second Year		
Fall		
BIO 231	Genetics	0-4
MAT 141	Introductory Statistics for the Life Sciences (Analysis of Human, Social, and Natural Phenomena (AOK5))	4
PHY 101	College Physics I	0-4
COM 200	Public Speaking	3

One Learning Community (LC) course with COM 200		3
Credits		10-18
Spring		
BIO 335	Molecular and Cellular Biology (Writing Enhanced (WE) course. In NYC, take BIO 335 and BIO 335A for 5 credits; in PLV, BIO 335 for 4 credits)	4
CIS 101	Introduction to Computing (Or First Language Course)	0-3
PHY 102	College Physics II	0-4
ENG 201	Writing in the Disciplines	3
Take any one remaining Area of Knowledge course		3
Credits		10-17
Third Year		
Fall		
BIO 327	Cellular Biochemistry	4
BIO 210	Ecology	0-4
BIO 251	Principles of Human Anatomy	0-4
First Second Language Course. See Advisor for guidelines, or Second Language Course		3
Take any one remaining Area of Knowledge course and Civic Engagement (CE) course		3
Credits		10-18
Spring		
BIO 490	Introduction to Research in the Biological Sciences (Writing Enhanced (WE))	0-3
BIO 264	Microbiology	0-4
BIO 493	Major Field Test in Biology	0
BIO 334	General Physiology	0-4
BIO 395 or BIO 480 or BIO 491	Independent Study in Biology or Research in Biology or Internship in Biology	3
Take any one remaining Area of Knowledge course (Paired with BIO 395, BIO 480, or BIO 491)		3
Credits		6-17
Fourth Year		
Fall		
CHE 223	Organic Chemistry I (In the summer)	0-5
CHE 223	Organic Chemistry I (In the summer)	0-5
First Second Language Course. See Advisor for guidelines, or Second Language course (In the summer, if needed)		
Fall credits at Albany College of Pharmacy		21
Credits		21-31
Total Credits		76-137

Pre-Professional, Pre-Podiatry Track

In addition to the courses listed below, students are required to complete two courses with the Anti-Racism Education attribute attached. These courses may be taken during any semester of their education. See advisor for more information.

Course	Title	Credits
First Year		
Fall		
ENG 110	Composition	3
BIO 101	General Biology I	0-4
CHE 111	General Chemistry I	0-4
MAT 103 or MAT 130 or MAT 131	Algebra or Precalculus or Calculus I	3-4
UNV 101	First-Year Seminar: Introduction to University Community ((STEM Major section))	1
Credits		7-16

Spring

BIO 102	General Biology II	0-4
CHE 112	General Chemistry II	0-4
MAT 130 or MAT 131 or CIS 101	Precalculus or Calculus I or Introduction to Computing	4
ENG 120	Critical Writing	4
PSY 112	Introduction to Psychology (Analysis of Human, Social, and Natural Phenomena (AOK5))	4

Credits **12-20**

Second Year**Fall**

BIO 231	Genetics	0-4
PHY 101	College Physics I	0-4
COM 200	Public Speaking (Learning Community (LC))	3
One Learning Community (LC) course (with COM 200)		3
First Second Language Course. See Advisor for guidelines		3

Credits **9-17**

Spring

BIO 335	Molecular and Cellular Biology (Writing Enhanced (WE) course. In NYC, take BIO 335 and BIO 335A for 5 credits; in PLV, BIO 335 for 4 credits)	4
PHY 102	College Physics II	0-4
ENG 201	Writing in the Disciplines	3
Second Language Course, if applicable		3
CIS 101	Introduction to Computing (If needed)	0-3

Credits **10-17**

Third Year**Fall**

BIO 210	Ecology	0-4
BIO 251	Principles of Human Anatomy	0-4
BIO 327	Cellular Biochemistry	4
Take any one remaining Area of Knowledge and Civic Engagement (CE) course		3
Take any one remaining Area of Knowledge course		3

Credits **10-18**

Spring

BIO 490	Introduction to Research in the Biological Sciences (Writing Enhanced (WE) course)	0-3
MAT 141	Introductory Statistics for the Life Sciences (Analysis of Human, Social, and Natural Phenomena (AOK5))	4
BIO 493	Major Field Test in Biology	0
BIO 334	General Physiology	0-4
BIO 395 or BIO 480 or BIO 491	Independent Study in Biology or Research in Biology or Internship in Biology	3
Take any one remaining Area of Knowledge course		3

Credits **10-17**

Fourth Year**Fall**

CHE 223	Organic Chemistry I (In the summer)	0-5
CHE 224	Organic Chemistry II (In the summer)	0-5
Fall credits at NY College of Podiatry		19

Credits **19-29**

Total Credits **77-134**

Pre-Professional, Pre-Optometry Track

In addition to the courses listed below, students are required to complete two courses with the Anti-Racism Education attribute attached. These courses may be taken during any semester of their education. See advisor for more information.

Course	Title	Credits
First Year		
Fall		
ENG 110	Composition	3
BIO 101	General Biology I	0-4
CHE 111	General Chemistry I	0-4
MAT 103 or MAT 130 or MAT 131	Algebra or Precalculus or Calculus I	3-4
UNV 101	First-Year Seminar: Introduction to University Community ((STEM Major section))	1
Credits		7-16
Spring		
BIO 102	General Biology II	0-4
CHE 112	General Chemistry II	0-4
MAT 130 or MAT 131 or CIS 101	Precalculus or Calculus I or Introduction to Computing	4
ENG 120	Critical Writing	4
PSY 112	Introduction to Psychology (Analysis of Human, Social, and Natural Phenomena (AOK5))	4
Credits		12-20
Second Year		
Fall		
BIO 231	Genetics	0-4
PHY 101	College Physics I	0-4
MAT 141	Introductory Statistics for the Life Sciences (Analysis of Human, Social, and Natural Phenomena (AOK5))	4
COM 200	Public Speaking ((Learning Community (LC) course)	3
One Learning Community (LC) course		3
Credits		10-18
Spring		
BIO 335	Molecular and Cellular Biology (Writing Enhanced (WE) course. In NYC, take BIO 335 and BIO 335A for 5 credits; in PLV, BIO 335 for 4 credits)	4
CIS 101	Introduction to Computing (Or First Language course)	0-3
PHY 102	College Physics II	0-4
ENG 201	Writing in the Disciplines	3-4
Take any one remaining Area of Knowledge course		3
Credits		10-18
Third Year		
Fall		
BIO 210	Ecology	0-4
BIO 251	Principles of Human Anatomy	0-4
BIO 327	Cellular Biochemistry	4
First Second Language Course. See Advisor for guidelines, or Second Language Course		3
Take any one remaining Area of Knowledge and Civic Engagement (CE) course		
Credits		7-15
Spring		
BIO 490	Introduction to Research in the Biological Sciences	0-3
BIO 264	Microbiology	0-4
BIO 493	Major Field Test in Biology	0

BIO 334	General Physiology	4
BIO 395 or BIO 480 or BIO 491	Independent Study in Biology or Research in Biology or Internship in Biology	3
Take any one remaining Area of Knowledge course		3
Credits		10-17
Fourth Year		
Fall		
CHE 223	Organic Chemistry I (In the summer)	0-5
CHE 224	Organic Chemistry II (In the summer)	0-5
First and Second Language courses in the summer, if needed		
Fall credits at SUNY College of Optometry		21
Credits		21-31
Total Credits		77-135