BIOLOGY, B.S. (CAPITAL)

Begin Campus: Any Penn State Campus

End Campus: Harrisburg

Degree Requirements

For the Bachelor of Science degree in Biology, a minimum of 124 credits is required:

Requirement	Credits
General Education	45
Requirements for the Major	94

15 of the 45 credits for General Education are included in the Requirements for the Major. This includes: 9 credits of GN courses; 6 credits of GQ courses.

Requirements for the Major

To graduate, a student enrolled in the major must earn a grade of C or better in each course designated by the major as a C-required course, as specified by Senate Policy 82-44 (https://senate.psu.edu/policies-and-rules-for-undergraduate-students/82-00-and-83-00-degree-requirements/#82-44).

Common Requirements for the Major (All Options)

Code	Title C	redits
Prescribed Cours	ses	
CHEM 111	Experimental Chemistry I	1
CHEM 113	Experimental Chemistry II	1
MATH 141	Calculus with Analytic Geometry II	4
Prescribed Course	es: Require a grade of C or better	
BIOL 110	Biology: Basic Concepts and Biodiversity	4
BIOL 220W	Biology: Populations and Communities	4
BIOL 230W	Biology: Molecules and Cells	4
BIOL 240W	Biology: Function and Development of Organisms	s 4
CHEM 110	Chemical Principles I	3
CHEM 112	Chemical Principles II	3
MATH 140	Calculus With Analytic Geometry I	4
Additional Cours	es	
Select one of the	following:	8-12
PHYS 211 & PHYS 212 & PHYS 213 & PHYS 214	General Physics: Mechanics and General Physics: Electricity and Magnetism and General Physics: Fluids and Thermal Physics and General Physics: Wave Motion and Quantum Physics	
PHYS 250 & PHYS 251	Introductory Physics I and Introductory Physics II	
Select one of the	following:	3-4
STAT 200	Elementary Statistics	
STAT 240	Introduction to Biometry	
STAT 250	Introduction to Biostatistics	
Requirements fo	r the Option	
Select an option		46-51

Requirements for the Option Ecology Option (46-51 credits)

Available at the following campuses: Altoona, Schuylkill, University Park

Code	Title	Credits
Prescribed Cours	ses	
BIOL 463	General Ecology	3
Additional Cours	es	
STAT 462	Applied Regression Analysis	3
or STAT 464	Applied Nonparametric Statistics	
Select one of the	following:	6-8
CHEM 202 & CHEM 203	Fundamentals of Organic Chemistry I and Fundamentals of Organic Chemistry II	
CHEM 210 & CHEM 212 & CHEM 213	Organic Chemistry I and Organic Chemistry II and Laboratory in Organic Chemistry	

Groups

BIOL 428

Select a minimum of 15 credits of 400-level biology courses, with at least 6 credits from the Ecology group, 3 credits from the Evolution group, and 3 credits from the Practicum group. A maximum of 3 credits of BIOL 400, 494, 495, 496, and SC 295, 395, 495 may be used to fulfill 15 credits minimum in the 400-level biology course requirements.

Ecology Group:	
BIOL 406	Symbiosis
BIOL 412	Ecology of Infectious Diseases
BIOL 415	Ecotoxicology
BIOL 417	Invertebrate Zoology
BIOL 419	Ecological and Environmental Problem Solving
BIOL/PPEM 425	Biology of Fungi
BIOL 429	Animal Behavior
BIOL 435	Ecology of Lakes and Streams
BIOL 436	Population Ecology and Global Climate Change
BIOL 438	Theoretical Population Ecology
BIOL 444	Field Ecology
BIOL 446	Physiological Ecology
BIOL 450W	Experimental Field Biology
BIOL 464	Sociobiology
BIOL 474	Astrobiology
BIOL 482	Coastal Biology
BIOL 499A	Tropical Field Ecology
Evolution Group:	
BIOL 405	Molecular Evolution
BIOL 406	Symbiosis
BIOL 411	Medical Embryology
BIOL 414	Taxonomy of Seed Plants
BIOL 417	Invertebrate Zoology
BIOL 420	Paleobotany
BIOL 421	Comparative Anatomy of Vertebrates
BIOL 422	Advanced Genetics
BIOL/PPEM 425	Biology of Fungi
BIOL 427	Evolution
DIOL 400	B. Lift B. H.

Population Genetics

BIOL 429	Animal Behavior	
BIOL 432	Developmental Genetics	
BIOL 433	Evolution of Vertebrates	
BIOL 434	Pathobiology of Emerging Infectious Disease	
BIOL 436	Population Ecology and Global Climate Change	
BIOL 438	Theoretical Population Ecology	
BIOL 439	Practical Bioinformatics	
BIOL 443	Evo-devo: Evolution of Developmental Mechanism	ms
BIOL 446	Physiological Ecology	
BIOL 451	Biology of RNA	
BIOL 460	Human Genetics	
BIOL 463	General Ecology	
BIOL 464	Sociobiology	
BIOL 474	Astrobiology	
BIOL 478	COMPARATIVE NEUROANATOMY	
Practicum Group	:	
BIOL 400	Teaching in Biology	
BIOL 402W	Biological Experimental Design	
BIOL 407	Plant Developmental Anatomy	
BIOL 414	Taxonomy of Seed Plants	
BIOL 417	Invertebrate Zoology	
BIOL 419	Ecological and Environmental Problem Solving	
BIOL 421	Comparative Anatomy of Vertebrates	
BIOL 422	Advanced Genetics	
BIOL/PPEM	Biology of Fungi	
425		
BIOL 433	Evolution of Vertebrates	
BIOL 437	Histology	
BIOL 439	Practical Bioinformatics	
BIOL 444	Field Ecology	
BIOL 450W	Experimental Field Biology	
BIOL 461	Contemporary Issues in Science and Medicine	
BIOL 473	Laboratory in Mammalian Physiology	
BIOL 475N		
BIOL 478	COMPARATIVE NEUROANATOMY	
BIOL 482	Coastal Biology	
BIOL 494	Research Project	
BIOL 495	Internship in Biology	
BIOL 496	Independent Studies	
BIOL 499A	Tropical Field Ecology	
BIOTC 459	Plant Tissue Culture and Biotechnology	
SC 295	Science Co-op Work Experience I	
SC 395	Science Co-op Work Experience II	
SC 495	Science Co-op Work Experience III	
	ses and Related Areas	
	lits from department list	17-24
201001 17 24 0100		1, 47

General Biology Option (46-51 credits)

Available at the following campuses: Abington, Altoona, Beaver, Berks, Brandywine, Harrisburg, Lehigh Valley, Schuylkill, Scranton, University Park, York

Code Additional Cours	Title es	Credits
Select one of the	following:	6-8
CHEM 202 & CHEM 203	Fundamentals of Organic Chemistry I and Fundamentals of Organic Chemistry II	
CHEM 210 & CHEM 212 & CHEM 213	Organic Chemistry I and Organic Chemistry II and Laboratory in Organic Chemistry	
Groups		
at least 3 credits may be used to s a maximum of 3 495 may be usec biology course re		
Plant and Fungi	•	
BIOL 406	Symbiosis	
BIOL 407	Plant Developmental Anatomy	
BIOL 414	Taxonomy of Seed Plants	
BIOL 420	Paleobotany	
BIOL 424	Seeds of Change: The Uses of Plants	
BIOL/PPEM 425	Biology of Fungi	
BIOL 431	Reproductive Biology	
BIOL 441	Plant Physiology	
BIOL 444	Field Ecology	
BIOL 446	Physiological Ecology	
BIOL 448	Ecology of Plant Reproduction	
BIOL 451	Biology of RNA	
BIOL 482	Coastal Biology	
BIOL 499A	Tropical Field Ecology	
PPEM 427	Mycotoxins: Effects of Fungal Toxins on Humar and Animal Health	1
Evolution Group:		
BIOL 405	Molecular Evolution	
BIOL 406	Symbiosis	
BIOL 411	Medical Embryology	
BIOL 414	Taxonomy of Seed Plants	
BIOL 417	Invertebrate Zoology	
BIOL 420	Paleobotany	
BIOL 421	Comparative Anatomy of Vertebrates	
BIOL 422	Advanced Genetics	
BIOL/PPEM 425	Biology of Fungi	
BIOL 427	Evolution	
BIOL 428	Population Genetics	
BIOL 429	Animal Behavior	
BIOL 432	Developmental Genetics	
BIOL 433	Evolution of Vertebrates	
BIOL 434	Pathobiology of Emerging Infectious Disease	
BIOL 436	Population Ecology and Global Climate Change	
BIOL 438	Theoretical Population Ecology	
BIOL 439	Practical Bioinformatics	
BIOL 443	Evo-devo: Evolution of Developmental Mechanis	sms

Die:	51	B1	
BIOL 446	Physiological Ecology	BIOL 411	Medical Embryology
BIOL 451	Biology of RNA	BIOL 412	Ecology of Infectious Diseases
BIOL 460	Human Genetics	BIOL 413	Cell Signaling and Regulation
BIOL 463	General Ecology	BIOL 415	Ecotoxicology
BIOL 464	Sociobiology	BIOL 416	Biology of Cancer
BIOL 474	Astrobiology	BIOL 421	Comparative Anatomy of Vertebrates
BIOL 478	COMPARATIVE NEUROANATOMY	BIOL 424	Seeds of Change: The Uses of Plants
Genetics and Dev	velopmental Biology Group:	BIOL 426	Developmental Neurobiology
BIOL 404	Cellular Mechanisms in Vertebrate Physiology	BIOL 430	Developmental Biology
BIOL 405	Molecular Evolution	BIOL 431	Reproductive Biology
BIOL 407	Plant Developmental Anatomy	BIOL 432	Developmental Genetics
BIOL 411	Medical Embryology	BIOL 437	Histology
BIOL 413	Cell Signaling and Regulation	BIOL 443	Evo-devo: Evolution of Developmental Mechanisms
BIOL 416	Biology of Cancer	BIOL 446	Physiological Ecology
BIOL 422	Advanced Genetics	BIOL 460	Human Genetics
BIOL 426	Developmental Neurobiology	BIOL 469	Neurobiology
BIOL 428	Population Genetics	BIOL 470	Functional and Integrative Neuroscience
BIOL 430	Developmental Biology	BIOL 472	Human Physiology
BIOL 431	Reproductive Biology	BIOL 478	COMPARATIVE NEUROANATOMY
BIOL 432	Developmental Genetics	BIOL 479	General Endocrinology
BIOL 439	Practical Bioinformatics	BIOL 482	Coastal Biology
BIOL 443	Evo-devo: Evolution of Developmental Mechanisms	Practicum Group	
BIOL 448	Ecology of Plant Reproduction	BIOL 400	Teaching in Biology
BIOL 451	Biology of RNA	BIOL 402W	Biological Experimental Design
BIOL 460	Human Genetics	BIOL 407	Plant Developmental Anatomy
BIOL 467	Molecular Basis of Neurological Diseases	BIOL 414	Taxonomy of Seed Plants
BIOL 469	Neurobiology	BIOL 417	Invertebrate Zoology
MICRB 410	Principles of Immunology	BIOL 419	Ecological and Environmental Problem Solving
Ecology Group:	, 3	BIOL 421	Comparative Anatomy of Vertebrates
BIOL 406	Symbiosis	BIOL 422	Advanced Genetics
BIOL 412	Ecology of Infectious Diseases	BIOL/PPEM	Biology of Fungi
BIOL 415	Ecotoxicology	425	3, 3
BIOL 417	Invertebrate Zoology	BIOL 433	Evolution of Vertebrates
BIOL 419	Ecological and Environmental Problem Solving	BIOL 437	Histology
BIOL/PPEM	Biology of Fungi	BIOL 439	Practical Bioinformatics
425	,	BIOL 444	Field Ecology
BIOL 429	Animal Behavior	BIOL 450W	Experimental Field Biology
BIOL 435	Ecology of Lakes and Streams	BIOL 461	Contemporary Issues in Science and Medicine
BIOL 436	Population Ecology and Global Climate Change	BIOL 473	Laboratory in Mammalian Physiology
BIOL 438	Theoretical Population Ecology	BIOL 475N	· · · · · · · · · · · · · · · · · · ·
BIOL 444	Field Ecology	BIOL 476	Advanced Human Anatomy - cadaver based
BIOL 446	Physiological Ecology	BIOL 478	COMPARATIVE NEUROANATOMY
BIOL 450W	Experimental Field Biology	BIOL 482	Coastal Biology
BIOL 463	General Ecology	BIOL 494	Research Project
BIOL 464	Sociobiology	BIOL 495	Internship in Biology
BIOL 474	Astrobiology	BIOL 496	Independent Studies
BIOL 482	Coastal Biology	BIOL 499A	Tropical Field Ecology
BIOL 499A	Tropical Field Ecology	BIOTC 459	Plant Tissue Culture and Biotechnology
Physiology Group		SC 295	Science Co-op Work Experience I
BIOL 404	Cellular Mechanisms in Vertebrate Physiology	SC 395	Science Co-op Work Experience II
BIOL 406	Symbiosis	SC 495	Science Co-op Work Experience III
BIOL 409	Biology of Aging		and the state of t
513E 703	2.0.0g) 0.7.gmg		

BMB 400

Select 20-27 cre	edits from department list	20-27
	velopmental Biology Option (46-51 credits) following campuses: Abington, Berks, Harrisburg, Sch York	nuylkill,
Code	Title	Credits
Prescribed Cour	rses	
BIOL 322	Genetic Analysis	3
BIOL 430	Developmental Biology	3
BMB 401	General Biochemistry	3
BMB 402	General Biochemistry	3
CHEM 210	Organic Chemistry I	3
CHEM 212	Organic Chemistry II	3
CHEM 213	Laboratory in Organic Chemistry	2
Additional Cours	ses	
Select 2-5 credit	ts from the following:	2-5
MATH 220	Matrices	
MATH 231	Calculus of Several Variables	
MICRB 201	Introductory Microbiology	
MICRB 202	Introductory Microbiology Laboratory	
Groups		
of 3 credits of B	and 3 credits from the Practicum group. A maximu HOL 400, 494, 495, 496 and SC 295, 395, 495 may b	
used to fulfill the requirements.	e 12 credit minimum in the 400-level biology cours	
requirements.	e 12 credit minimum in the 400-level biology cours evelopmental Biology Group:	
requirements.	5,	
requirements. Genetics and De	evelopmental Biology Group:	
requirements. Genetics and De BIOL 404	evelopmental Biology Group: Cellular Mechanisms in Vertebrate Physiology	
requirements. Genetics and De BIOL 404 BIOL 405	evelopmental Biology Group: Cellular Mechanisms in Vertebrate Physiology Molecular Evolution	
requirements. Genetics and De BIOL 404 BIOL 405 BIOL 407	evelopmental Biology Group: Cellular Mechanisms in Vertebrate Physiology Molecular Evolution Plant Developmental Anatomy	
requirements. Genetics and De BIOL 404 BIOL 405 BIOL 407 BIOL 411	evelopmental Biology Group: Cellular Mechanisms in Vertebrate Physiology Molecular Evolution Plant Developmental Anatomy Medical Embryology	
requirements. Genetics and De BIOL 404 BIOL 405 BIOL 407 BIOL 411 BIOL 413	evelopmental Biology Group: Cellular Mechanisms in Vertebrate Physiology Molecular Evolution Plant Developmental Anatomy Medical Embryology Cell Signaling and Regulation	
requirements. Genetics and De BIOL 404 BIOL 405 BIOL 407 BIOL 411 BIOL 413 BIOL 416	evelopmental Biology Group: Cellular Mechanisms in Vertebrate Physiology Molecular Evolution Plant Developmental Anatomy Medical Embryology Cell Signaling and Regulation Biology of Cancer	
requirements. Genetics and De BIOL 404 BIOL 405 BIOL 407 BIOL 411 BIOL 413 BIOL 416 BIOL 422	evelopmental Biology Group: Cellular Mechanisms in Vertebrate Physiology Molecular Evolution Plant Developmental Anatomy Medical Embryology Cell Signaling and Regulation Biology of Cancer Advanced Genetics	
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requirements. Genetics and De BIOL 404 BIOL 405 BIOL 407 BIOL 411 BIOL 413 BIOL 416 BIOL 422 BIOL 426 BIOL 428 BIOL 431 BIOL 432 BIOL 432 BIOL 439 BIOL 443 BIOL 448 BIOL 448	evelopmental Biology Group: Cellular Mechanisms in Vertebrate Physiology Molecular Evolution Plant Developmental Anatomy Medical Embryology Cell Signaling and Regulation Biology of Cancer Advanced Genetics Developmental Neurobiology Population Genetics Reproductive Biology Developmental Genetics Practical Bioinformatics Evo-devo: Evolution of Developmental Mechani Ecology of Plant Reproduction Biology of RNA	se
requirements. Genetics and De BIOL 404 BIOL 405 BIOL 407 BIOL 411 BIOL 413 BIOL 416 BIOL 422 BIOL 426 BIOL 428 BIOL 431 BIOL 432 BIOL 439 BIOL 443 BIOL 448 BIOL 448 BIOL 448 BIOL 451 BIOL 460	evelopmental Biology Group: Cellular Mechanisms in Vertebrate Physiology Molecular Evolution Plant Developmental Anatomy Medical Embryology Cell Signaling and Regulation Biology of Cancer Advanced Genetics Developmental Neurobiology Population Genetics Reproductive Biology Developmental Genetics Practical Bioinformatics Evo-devo: Evolution of Developmental Mechani Ecology of Plant Reproduction Biology of RNA Human Genetics	se

Molecular Biology of the Gene

or BMB 450 Microbial/Molecular Genetics

or BMB 464 Molecular Medicine

or HORT 407 Plant Breeding

or BMB 484 Functional Genomics

or MICRB 41 Principles of Immunology

E۱	olution Group:	
	BIOL 405	Molecular Evolution
	BIOL 406	Symbiosis
	BIOL 411	Medical Embryology
	BIOL 414	Taxonomy of Seed Plants
	BIOL 417	Invertebrate Zoology
	BIOL 420	Paleobotany
	BIOL 421	Comparative Anatomy of Vertebrates
	BIOL 422	Advanced Genetics
	BIOL/PPEM 425	Biology of Fungi
	BIOL 427	Evolution
	BIOL 428	Population Genetics
	BIOL 429	Animal Behavior
	BIOL 432	Developmental Genetics
	BIOL 433	Evolution of Vertebrates
	BIOL 434	Pathobiology of Emerging Infectious Disease
	BIOL 436	Population Ecology and Global Climate Change
	BIOL 438	Theoretical Population Ecology
	BIOL 439	Practical Bioinformatics
	BIOL 443	Evo-devo: Evolution of Developmental Mechanisms
	BIOL 446	Physiological Ecology
	BIOL 451	Biology of RNA
	BIOL 460	Human Genetics
	BIOL 463	General Ecology
	BIOL 464	Sociobiology
	BIOL 474	Astrobiology
	BIOL 478	COMPARATIVE NEUROANATOMY
Pı	racticum Group:	
	BIOL 400	Teaching in Biology
	BIOL 402W	Biological Experimental Design
	BIOL 407	Plant Developmental Anatomy
	BIOL 414	Taxonomy of Seed Plants
	BIOL 417	Invertebrate Zoology
	BIOL 419	Ecological and Environmental Problem Solving
	BIOL 421	Comparative Anatomy of Vertebrates
	BIOL 422	Advanced Genetics
	BIOL/PPEM 425	Biology of Fungi
	BIOL 433	Evolution of Vertebrates
	BIOL 437	Histology
	BIOL 439	Practical Bioinformatics
	BIOL 444	Field Ecology
	BIOL 450W	Experimental Field Biology
	BIOL 461	Contemporary Issues in Science and Medicine
	BIOL 473	Laboratory in Mammalian Physiology
	BIOL 475N	
	BIOL 478	COMPARATIVE NEUROANATOMY
	BIOL 482	Coastal Biology
	DIOL 404	D 1 D 1 1

BIOL 494

BIOL 495

BIOL 496

Research Project

Internship in Biology

Independent Studies

BIOL 499A	Tropical Field Ecology		BIOL 406	Symbiosis
SC 295	Science Co-op Work Experience I		BIOL 411	Medical Embryology
SC 395	Science Co-op Work Experience II		BIOL 414	Taxonomy of Seed Plants
SC 495	Science Co-op Work Experience III		BIOL 417	Invertebrate Zoology
Supporting Cours	es and Related Areas		BIOL 420	Paleobotany
Select 9-17 credit	s from department list	9-17	BIOL 421	Comparative Anatomy of Vertebrates
Nauraaianaa Onti	ion (AC E1 avadita)		BIOL 422	Advanced Genetics
	on (46-51 credits) lowing campuses: University Park		BIOL/PPEM 425	Biology of Fungi
Code	Title	Credits	BIOL 427	Evolution
Prescribed Cours	es		BIOL 428	Population Genetics
BIOL 469	Neurobiology	3	BIOL 429	Animal Behavior
BMB 401	General Biochemistry	3	BIOL 432	Developmental Genetics
BMB 402	General Biochemistry	3	BIOL 433	Evolution of Vertebrates
CHEM 210	Organic Chemistry I	3	BIOL 434	Pathobiology of Emerging Infectious Disease
CHEM 212	Organic Chemistry II	3	BIOL 436	Population Ecology and Global Climate Change
CHEM 213	Laboratory in Organic Chemistry	2	BIOL 438	Theoretical Population Ecology
Additional Course	es		BIOL 439	Practical Bioinformatics
Select 3 credits fr	om the following:	3	BIOL 443	Evo-devo: Evolution of Developmental Mechanisms
BIOL 426	Developmental Neurobiology		BIOL 446	Physiological Ecology
BIOL 470	Functional and Integrative Neuroscience		BIOL 451	Biology of RNA
BIOL 478	COMPARATIVE NEUROANATOMY		BIOL 460	Human Genetics
Groups			BIOL 463	General Ecology
	n of 12 credits of 400-level biology courses, wi	ith 12	BIOL 464	Sociobiology
	from the Neuroscience group, 3 credits from t		BIOL 474	Astrobiology
	and 3 credits from the Practicum Group. A ma		BIOL 478	COMPARATIVE NEUROANATOMY
	0L 400, 494, 495, 496 and SC 295, 395, 495 ma	-	Practicum Group:	
	12 credit minimum in the 400-level biology co	urse	BIOL 400	Teaching in Biology
requirements. Neuroscience Gro			BIOL 402W	Biological Experimental Design
BIOL 404	Cellular Mechanisms in Vertebrate Physiolog	NV	BIOL 407	Plant Developmental Anatomy
BIOL 413	Cell Signaling and Regulation	ЭУ	BIOL 414	Taxonomy of Seed Plants
BIOL 424			BIOL 417	Invertebrate Zoology
BIOL 424 BIOL 426	Seeds of Change: The Uses of Plants Developmental Neurobiology		BIOL 419	Ecological and Environmental Problem Solving
	1 37		BIOL 421	Comparative Anatomy of Vertebrates
BIOL 430	Developmental Biology		BIOL 422	Advanced Genetics
BIOL 437	Histology		BIOL/PPEM	Biology of Fungi
BIOL 457	Molecular Basis of Neurological Diseases		425	ziology on ang.
BIOL 470	Functional and Integrative Neuroscience		BIOL 433	Evolution of Vertebrates
BIOL 472	Human Physiology		BIOL 437	Histology
BIOL 473	Laboratory in Mammalian Physiology		BIOL 439	Practical Bioinformatics
BIOL 478	COMPARATIVE NEUROANATOMY		BIOL 444	Field Ecology
BIOL 479	General Endocrinology		BIOL 450W	Experimental Field Biology
BBH 432	Biobehavioral Aspects of Stress		BIOL 461	Contemporary Issues in Science and Medicine
	Pharmacological Influences on Health		BIOL 473	Laboratory in Mammalian Physiology
or BBH 468	Neuroanatomical Bases for Disorders of Beh Health	avior and	BIOL 475N	, , ,
0* LIDEC 469			BIOL 478	COMPARATIVE NEUROANATOMY
or HDFS 468			BIOL 482	Coastal Biology
	5 Energy and Macronutrient Metabolism		BIOL 494	Research Project
	5 Learning and Memory		BIOL 495	Internship in Biology
or PSYCH 46Physiological Psychology			BIOL 496	Independent Studies
or PSYCH 4 Evolution Group:	or PSYCH 47Clinical Neuropsychology		BIOL 499A	Tropical Field Ecology
EVOLUTION GROUP:				
BIOL 405	Molecular Evolution		BIOTC 459	Plant Tissue Culture and Biotechnology

SC 295	Science Co-op Work Experience I		
SC 395	Science Co-op Work Experience II		
SC 495	Science Co-op Work Experience III		
Supporting Courses and Related Areas			
Select 14-19 cred	lits from department list	14-19	

Plant Biology Option (46-51 credits)

Available at the following campuses: University Park

Code	Title	Credits
Prescribed Cou	rses	
BIOL 407	Plant Developmental Anatomy	3
BIOL 441	Plant Physiology	3
BMB 401	General Biochemistry	3
BMB 402	General Biochemistry	3
CHEM 210	Organic Chemistry I	3
CHEM 212	Organic Chemistry II	3
CHEM 213	Laboratory in Organic Chemistry	2

Additional Courses

Groups

Select a minimum of 12 credits of 400-level biology courses, with 12 at least 6 credits from the Plant and Fungi group, 3 credits from the Evolution group, and 3 credits from the Practicum group. A maximum of 3 credits of BIOL 400, 494, 495, 496 and SC 295, 395, 495 may be used to fulfill the 12 credit minimum in the 400-level biology course requirements.

requirements.		
Plant and Fungi Group:		
BIOL 406	Symbiosis	
BIOL 414	Taxonomy of Seed Plants	
BIOL 420	Paleobotany	
BIOL 424	Seeds of Change: The Uses of Plants	
BIOL/PPEM 425	Biology of Fungi	
BIOL 431	Reproductive Biology	
BIOL 444	Field Ecology	
BIOL 446	Physiological Ecology	
BIOL 448	Ecology of Plant Reproduction	
BIOL 451	Biology of RNA	
BIOL 482	Coastal Biology	
BIOL 499A	Tropical Field Ecology	
Evolution Group:		
BIOL 405	Molecular Evolution	
BIOL 406	Symbiosis	
BIOL 411	Medical Embryology	
BIOL 414	Taxonomy of Seed Plants	
BIOL 417	Invertebrate Zoology	
BIOL 420	Paleobotany	
BIOL 421	Comparative Anatomy of Vertebrates	
BIOL 422	Advanced Genetics	
BIOL/PPEM 425	Biology of Fungi	
BIOL 427	Evolution	
BIOL 428	Population Genetics	
BIOL 429	Animal Behavior	

BIOL 432	Developmental Genetics		
BIOL 433	Evolution of Vertebrates		
BIOL 434	Pathobiology of Emerging Infectious Disease		
BIOL 436	Population Ecology and Global Climate Change		
BIOL 438	Theoretical Population Ecology		
BIOL 439	Practical Bioinformatics		
BIOL 443	Evo-devo: Evolution of Developmental Mechanism	ns	
BIOL 446	Physiological Ecology		
BIOL 451	Biology of RNA		
BIOL 460	Human Genetics		
BIOL 463	General Ecology		
BIOL 464	Sociobiology		
BIOL 474	Astrobiology		
BIOL 478	COMPARATIVE NEUROANATOMY		
Practicum Group:			
BIOL 400	Teaching in Biology		
BIOL 402W	Biological Experimental Design		
BIOL 407	Plant Developmental Anatomy		
BIOL 414	Taxonomy of Seed Plants		
BIOL 417	Invertebrate Zoology		
BIOL 419	Ecological and Environmental Problem Solving		
BIOL 421	Comparative Anatomy of Vertebrates		
BIOL 422	Advanced Genetics		
BIOL/PPEM 425	Biology of Fungi		
BIOL 433	Evolution of Vertebrates		
BIOL 437	Histology		
BIOL 439	Practical Bioinformatics		
BIOL 444	Field Ecology		
BIOL 450W	Experimental Field Biology		
BIOL 461	Contemporary Issues in Science and Medicine		
BIOL 473	Laboratory in Mammalian Physiology		
BIOL 475N			
BIOL 478	COMPARATIVE NEUROANATOMY		
BIOL 482	Coastal Biology		
BIOL 494	Research Project		
BIOL 495	Internship in Biology		
BIOL 496	Independent Studies		
BIOL 499A	Tropical Field Ecology		
BIOTC 459	Plant Tissue Culture and Biotechnology		
SC 295	Science Co-op Work Experience I		
SC 395	Science Co-op Work Experience II		
SC 495	Science Co-op Work Experience III		
Supporting Cours	es and Related Areas		
Select 14-19 credits from department list 14-19			
Vertebrate Physiology Option (46-51 credits)			

Vertebrate Physiology Option (46-51 credits) Available at the following campuses: Abington, Altoona,

Brandywine, Schuylkill, University Park

Code	Title	Credits
Prescribed Co	ourses	
BIOL 472	Human Physiology	3
BIOL 473	Laboratory in Mammalian Physiology	2

BMB 401	General Biochemistry	3
BMB 402	General Biochemistry	3
CHEM 210	Organic Chemistry I	3
CHEM 212	Organic Chemistry II	3
CHEM 213	Laboratory in Organic Chemistry	2
Additional Cou	rses	
Groups		
Select a minim	um of 12 credits of 400-level courses, with at least 6	12
and 3 credits fr BIOL 400, 494,	e Physiology group, 3 credits from the Evolution group, rom the Practicum group. A maximum of 3 credits of 495, 496 and SC 295, 395, 495 may be used to fulfill inimum in the 400-level biology course requirements.	
Physiology Gro	up:	
BIOL 404	Cellular Mechanisms in Vertebrate Physiology	
BIOL 406	Symbiosis	
BIOL 409	Biology of Aging	
BIOL 411	Medical Embryology	
BIOL 412	Ecology of Infectious Diseases	
BIOL 413	Cell Signaling and Regulation	
BIOL 415	Ecotoxicology	
BIOL 416	Biology of Cancer	
BIOL 421	Comparative Anatomy of Vertebrates	
BIOL 424	Seeds of Change: The Uses of Plants	
BIOL 426	Developmental Neurobiology	
BIOL 430	Developmental Biology	
BIOL 431	Reproductive Biology	
BIOL 432	Developmental Genetics	
BIOL 437	Histology	
BIOL 443	Evo-devo: Evolution of Developmental Mechanisms	
BIOL 446	Physiological Ecology	
BIOL 460	Human Genetics	
BIOL 469	Neurobiology	
BIOL 470	Functional and Integrative Neuroscience	
BIOL 478	COMPARATIVE NEUROANATOMY	
BIOL 479	General Endocrinology	
BIOL 482	Coastal Biology	
ANSC 431	Physiology of Animal Reproduction	
or ANTH	466The Skull	
or BMB 4	84 Functional Genomics	
or ENT 40	02WBiology of Animal Parasites	
or MICRB	40 Microbial Physiology and Structure	
	41 Principles of Immunology	
or MICRB	3 41 Medical Microbiology	
or MICRB	43 Viral Pathogensis	
or PSYCH	I 46Physiological Psychology	
Evolution Group	p:	
BIOL 405	Molecular Evolution	
BIOL 406	Symbiosis	
BIOL 411	Medical Embryology	
BIOL 414	Taxonomy of Seed Plants	
BIOL 417	Invertebrate Zoology	
BIOL 420	Paleobotany	
PIOL 421	Comparative Anatomy of Vertebrates	

Comparative Anatomy of Vertebrates

BIOL 421

BIOL 422	Advanced Genetics
BIOL/PPEM 425	Biology of Fungi
BIOL 427	Evolution
BIOL 428	Population Genetics
BIOL 429	Animal Behavior
BIOL 432	Developmental Genetics
BIOL 433	Evolution of Vertebrates
BIOL 434	Pathobiology of Emerging Infectious Disease
BIOL 436	Population Ecology and Global Climate Change
BIOL 438	Theoretical Population Ecology
BIOL 439	Practical Bioinformatics
BIOL 443	Evo-devo: Evolution of Developmental Mechanisms
BIOL 446	Physiological Ecology
BIOL 451	Biology of RNA
BIOL 460	Human Genetics
BIOL 463	General Ecology
BIOL 464	Sociobiology
BIOL 474	Astrobiology
BIOL 478	COMPARATIVE NEUROANATOMY
Practicum Group:	
BIOL 400	Teaching in Biology
BIOL 402W	Biological Experimental Design
BIOL 407	Plant Developmental Anatomy
BIOL 414	Taxonomy of Seed Plants
BIOL 417	Invertebrate Zoology
BIOL 419	Ecological and Environmental Problem Solving
BIOL 421	Comparative Anatomy of Vertebrates
BIOL 422	Advanced Genetics
BIOL/PPEM 425	Biology of Fungi
BIOL 433	Evolution of Vertebrates
BIOL 437	Histology
BIOL 439	Practical Bioinformatics
BIOL 444	Field Ecology
BIOL 448	Ecology of Plant Reproduction
BIOL 450W	Experimental Field Biology
BIOL 461	Contemporary Issues in Science and Medicine
BIOL 473	Laboratory in Mammalian Physiology
BIOL 475N	
BIOL 476	Advanced Human Anatomy - cadaver based
BIOL 478	COMPARATIVE NEUROANATOMY
BIOL 482	Coastal Biology
BIOL 494	Research Project
BIOL 495	Internship in Biology
BIOL 496	Independent Studies
BIOL 499A	Tropical Field Ecology
BIOTC 459	Plant Tissue Culture and Biotechnology
SC 295	Science Co-op Work Experience I
SC 395	Science Co-op Work Experience II
SC 495	Science Co-op Work Experience III

Supporting Courses and Related Areas

Select 15-20 credits from department list

15-20

General Education

Connecting career and curiosity, the General Education curriculum provides the opportunity for students to acquire transferable skills necessary to be successful in the future and to thrive while living in interconnected contexts. General Education aids students in developing intellectual curiosity, a strengthened ability to think, and a deeper sense of aesthetic appreciation. These are requirements for all baccalaureate students and are often partially incorporated into the requirements of a program. For additional information, see the General Education Requirements (https://bulletins.psu.edu/undergraduate/general-education/baccalaureate-degree-general-education-program/) section of the Bulletin and consult your academic adviser.

The keystone symbol appears next to the title of any course that is designated as a General Education course. Program requirements may also satisfy General Education requirements and vary for each program.

Foundations (grade of C or better is required and Inter-Domain courses do not meet this requirement.)

· Quantification (GQ): 6 credits

· Writing and Speaking (GWS): 9 credits

Breadth in the Knowledge Domains (Inter-Domain courses do not meet this requirement.)

Arts (GA): 3 credits

· Health and Wellness (GHW): 3 credits

· Humanities (GH): 3 credits

· Social and Behavioral Sciences (GS): 3 credits

· Natural Sciences (GN): 3 credits

Integrative Studies

· Inter-Domain Courses (Inter-Domain): 6 credits

Exploration

- GN, may be completed with Inter-Domain courses: 3 credits
- GA, GH, GN, GS, Inter-Domain courses. This may include 3 credits
 of World Language course work beyond the 12th credit level or the
 requirements for the student's degree program, whichever is higher: 6
 credits

University Degree Requirements

First Year Engagement

All students enrolled in a college or the Division of Undergraduate Studies at University Park, and the World Campus are required to take 1 to 3 credits of the First-Year Seminar, as specified by their college First-Year Engagement Plan.

Other Penn State colleges and campuses may require the First-Year Seminar; colleges and campuses that do not require a First-Year Seminar provide students with a first-year engagement experience.

First-year baccalaureate students entering Penn State should consult their academic adviser for these requirements.

Cultures Requirement

6 credits are required and may satisfy other requirements

United States Cultures: 3 credits
International Cultures: 3 credits

Writing Across the Curriculum

3 credits required from the college of graduation and likely prescribed as part of major requirements.

Total Minimum Credits

A minimum of 120 degree credits must be earned for a baccalaureate degree. The requirements for some programs may exceed 120 credits. Students should consult with their college or department adviser for information on specific credit requirements.

Quality of Work

Candidates must complete the degree requirements for their major and earn at least a 2.00 grade-point average for all courses completed within their degree program.

Limitations on Source and Time for Credit Acquisition

The college dean or campus chancellor and program faculty may require up to 24 credits of course work in the major to be taken at the location or in the college or program where the degree is earned. Credit used toward degree programs may need to be earned from a particular source or within time constraints (see Senate Policy 83-80 (https://senate.psu.edu/policies-and-rules-for-undergraduate-students/82-00-and-83-00-degree-requirements/#83-80)). For more information, check the Suggested Academic Plan for your intended program.