BIOLOGY, B.S. (UNIVERSITY COLLEGE)

Begin Campus: Any Penn State Campus

End Campus: Beaver, Brandywine, Schuylkill, Scranton, York

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	es		
CHEM 111	Experimental Chemistry I	1	
CHEM 113	Experimental Chemistry II	1	
MATH 141	Calculus with Analytic Geometry II	4	
Prescribed Course	s: 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 Course	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 for	Requirements for 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.

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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

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 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 Cour	ses and Related Areas	
Select 17-24 cree	dits from department list 17-24	
General Biology Option (46-51 credits) Available at the following campuses: Abington, Altoona, Beaver, Berks, Brandywine, Harrisburg, Schuylkill, Scranton, University Park, York		

Code	Title	Credits
Additional Co	urses	
Select one of	the following:	6-8

CHEM 202	Fundamentals of Organic Chemistry I
& CHEM 203	and Fundamentals of Organic Chemistry II
CHEM 210	Organic Chemistry I
& CHEM 212	and Organic Chemistry II
& CHEM 213	and Laboratory in Organic Chemistry

Groups

Select a minimum of 18 credits of 400-level biology courses, with at least 3 credits from each of the following groups (each course may be used to satisfy a requirement in only one group). Moreover, a maximum of 3 credits of BIOL 400, 494, 495, 496 and SC 295, 395, 495 may be used to fulfill the 18 credit minimum in the 400-level biology course requirements.

Plant and Fungi Group:

3	•
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 Human and Animal Health

BIOL 460

Human Genetics

	and Animal Health
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 405 BIOL 406 BIOL 411 BIOL 414 BIOL 417 BIOL 420 BIOL 421 BIOL 422 BIOL/PPEM 425 BIOL 427 BIOL 428 BIOL 429 BIOL 432 BIOL 433 BIOL 434 BIOL 436 BIOL 438 BIOL 439 BIOL 443 BIOL 443 BIOL 443 BIOL 443

BIOL 463	General Ecology
BIOL 464	Sociobiology
BIOL 474	Astrobiology
BIOL 478	COMPARATIVE NEUROANATOMY
	velopmental Biology Group:
BIOL 404	Cellular Mechanisms in Vertebrate Physiology
BIOL 405	Molecular Evolution
BIOL 407	Plant Developmental Anatomy
BIOL 411	Medical Embryology
BIOL 413	Cell Signaling and Regulation
BIOL 416	Biology of Cancer
BIOL 422	Advanced Genetics
BIOL 426	Developmental Neurobiology
BIOL 428	Population Genetics
BIOL 430	Developmental Biology
BIOL 431	Reproductive Biology
BIOL 432	Developmental Genetics
BIOL 439	Practical Bioinformatics
BIOL 443	Evo-devo: Evolution of Developmental Mechanisms
BIOL 448	Ecology of Plant Reproduction
BIOL 451	Biology of RNA
BIOL 460	Human Genetics
BIOL 467	Molecular Basis of Neurological Diseases
BIOL 469	Neurobiology
MICRB 410	Principles of Immunology
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 463	General Ecology
BIOL 464	Sociobiology
BIOL 474	Astrobiology
BIOL 482	Coastal Biology
BIOL 499A	Tropical Field Ecology
Physiology Group	p:
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		Ecotoxicology	
	BIOL		Biology of Cancer	
	BIOL		Comparative Anatomy of Vertebrates	
	BIOL		Seeds of Change: The Uses of Plants	
	BIOL		Developmental Neurobiology	
	BIOL	430	Developmental Biology	
	BIOL		Reproductive Biology	
	BIOL	432	Developmental Genetics	
	BIOL	437	Histology	
	BIOL		Evo-devo: Evolution of Developmental Mechanism	ns
	BIOL	446	Physiological Ecology	
	BIOL	460	Human Genetics	
	BIOL	469	Neurobiology	
	BIOL		Functional and Integrative Neuroscience	
	BIOL	472	Human Physiology	
	BIOL	478	COMPARATIVE NEUROANATOMY	
	BIOL	479	General Endocrinology	
	BIOL	482	Coastal Biology	
Pra	acticu	ım 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, 425	/PPEM	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	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	
	BIOT	C 459	Plant Tissue Culture and Biotechnology	
	SC 29	95	Science Co-op Work Experience I	
	SC 39	95	Science Co-op Work Experience II	
	SC 49	95	Science Co-op Work Experience III	
Su	pport	ing Course	es and Related Areas	
Se	lect 2	0-27 credi	ts from department list	20-27

Genetics and Developmental Biology Option (46-51 credits)

Available at the following campuses: Abington, Berks, Harrisburg, Schuylkill,

University Park, York

Code	Title Ci	edits
Prescribed Course	es	
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 Course	s	
Select 2-5 credits	from the following:	2-5
MATH 220	Matrices	
MATH 231	Calculus of Several Variables	
MICRB 201	Introductory Microbiology	
MICRB 202	Introductory Microbiology Laboratory	
Groups		
credits from the G from Evolution, an of 3 credits of BIO	of 12 credits of 400-level courses, with at least 6 enetics and Developmental Biology group, 3 credit d 3 credits from the Practicum group. A maximum L 400, 494, 495, 496 and SC 295, 395, 495 may be 12 credit minimum in the 400-level biology course	
•	elopmental Biology Group:	
BIOL 404	Cellular Mechanisms in Vertebrate Physiology	
BIOL 405	Molecular Evolution	
BIOL 407	Plant Developmental Anatomy	
BIOL 411	Medical Embryology	
BIOL 413	Cell Signaling and Regulation	
BIOL 416	Biology of Cancer	
BIOL 422	Advanced Genetics	
BIOL 426	Developmental Neurobiology	
BIOL 428	Population Genetics	
BIOL 431	Reproductive Biology	
BIOL 432	Developmental Genetics	
BIOL 439	Practical Bioinformatics	
BIOL 443	Evo-devo: Evolution of Developmental Mechanism	ıs
BIOL 448	Ecology of Plant Reproduction	
BIOL 451	Biology of RNA	
BIOL 460	Human Genetics	
BIOL 467	Molecular Basis of Neurological Diseases	
BIOL 469	Neurobiology	
BMB 400	Molecular Biology of the Gene	
or BMB 450	Bacterial Genetics	
or BMB 464	Molecular Medicine	
or BMB 484	Functional Genomics	
or HORT 407	Plant Breeding	
	Principles of Immunology	
Evolution Group:	3,	
BIOL 405	Molecular Evolution	
BIOL 406	Symbiosis	
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BIC	DL 411	Medical Embryology
BIC	L 414	Taxonomy of Seed Plants
BIC	L 417	Invertebrate Zoology
BIC	L 420	Paleobotany
BIC	L 421	Comparative Anatomy of Vertebrates
BIC	L 422	Advanced Genetics
BIC 42	DL/PPEM	Biology of Fungi
BIC	L 427	Evolution
BIC	L 428	Population Genetics
BIC	L 429	Animal Behavior
BIC	L 432	Developmental Genetics
BIC	L 433	Evolution of Vertebrates
BIC	L 434	Pathobiology of Emerging Infectious Disease
BIC	L 436	Population Ecology and Global Climate Change
BIC	L 438	Theoretical Population Ecology
BIC	L 439	Practical Bioinformatics
BIC	L 443	Evo-devo: Evolution of Developmental Mechanisms
BIC	L 446	Physiological Ecology
BIC	L 451	Biology of RNA
BIC	L 460	Human Genetics
BIC	L 463	General Ecology
BIC	L 464	Sociobiology
BIC	L 474	Astrobiology
BIC	L 478	COMPARATIVE NEUROANATOMY
Practi	cum Group:	
BIC	L 400	Teaching in Biology
BIC	L 402W	Biological Experimental Design
BIC	L 407	Plant Developmental Anatomy
BIC	L 414	Taxonomy of Seed Plants
BIC	L 417	Invertebrate Zoology
BIC	L 419	Ecological and Environmental Problem Solving
BIC	L 421	Comparative Anatomy of Vertebrates
BIC	L 422	Advanced Genetics
BIC 42!	DL/PPEM	Biology of Fungi
BIC	DL 433	Evolution of Vertebrates
BIC	L 437	Histology
BIC	L 439	Practical Bioinformatics
BIC	L 444	Field Ecology
BIC	L 450W	Experimental Field Biology
BIC	L 461	Contemporary Issues in Science and Medicine
BIC	L 473	Laboratory in Mammalian Physiology
BIC	L 475N	, , ,
BIC	L 478	COMPARATIVE NEUROANATOMY
BIC	L 482	Coastal Biology
BIC	L 494	Research Project
	L 495	Internship in Biology
	L 496	Independent Studies
	L 499A	Tropical Field Ecology
	295	Science Co-op Work Experience I
	395	Science Co-op Work Experience II
55		and the state of t

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
			BIOL 422	Advanced Genetics
Neuroscience Opti Available at the following	on (46-51 credits) lowing campuses: University Park		BIOL/PPEM 425	Biology of Fungi
Code	Title	Credits	BIOL 427	Evolution
Prescribed Course	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		_	BIOL 439	Practical Bioinformatics
Select 3 credits fr		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	OOMI ATATIVE NEOTIOANATOWI		BIOL 463	General Ecology
·	of 12 credits of 400-level biology courses, with	12	BIOL 463	Sociobiology
	from the Neuroscience group, 3 credits from the		BIOL 474	Astrobiology
	and 3 credits from the Practicum Group. A maxin		BIOL 474	COMPARATIVE NEUROANATOMY
of 3 credits of BIC	0L 400, 494, 495, 496 and SC 295, 395, 495 may b	oe	Practicum Group	
	12 credit minimum in the 400-level biology cours	se	BIOL 400	Teaching in Biology
requirements.			BIOL 400	
Neuroscience Gro	•		BIOL 402VV	Biological Experimental Design Plant Developmental Anatomy
BIOL 404	Cellular Mechanisms in Vertebrate Physiology		BIOL 414	Taxonomy of Seed Plants
BIOL 413	Cell Signaling and Regulation		BIOL 414	Invertebrate Zoology
BIOL 424	Seeds of Change: The Uses of Plants		BIOL 417	Ecological and Environmental Problem Solving
BIOL 426	Developmental Neurobiology		BIOL 419	Comparative Anatomy of Vertebrates
BIOL 430	Developmental Biology		BIOL 421	Advanced Genetics
BIOL 437	Histology		BIOL/PPEM	Biology of Fungi
BIOL 467	Molecular Basis of Neurological Diseases		425	Biology of Fullyi
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 450W	Contemporary Issues in Science and Medicine
	Pharmacological Influences on Health		BIOL 473	Laboratory in Mammalian Physiology
or BBH 468	Neuroanatomical Bases for Disorders of Behav	ior and	BIOL 475N	Education in Manimalian Physiology
11550 464	Health		BIOL 478	COMPARATIVE NEUROANATOMY
or HDFS 468			BIOL 470	Coastal Biology
	5 Energy and Macronutrient Metabolism		BIOL 494	Research Project
	5Learning and Memory		BIOL 495	Internship in Biology
or PSYCH 46Physiological Psychology			BIOL 495	Independent Studies
	7Clinical Neuropsychology		BIOL 499A	Tropical Field Ecology
Evolution Group:	Mala and an Earth of		BIOTC 459	Plant Tissue Culture and Biotechnology
BIOL 405	Molecular Evolution		SC 295	Science Co-op Work Experience I
BIOL 406	Symbiosis		SC 395	Science Co-op Work Experience II
BIOL 411	Medical Embryology		SC 495	Science Co-op Work Experience III
BIOL 414	Taxonomy of Seed Plants		JJ 730	55.500 00 Op 110111 Experience III

Supporting Courses and Related Areas	
Select 14-19 credits from department list	14-19

Plant Biology Option (46-51 credits)

Available at the following campuses: University Park

Code	Credits	
Prescribed Cours	es	
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

425

BIOL 432

BIOL 433

BIOL 434

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.

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	Biology of Fungi			

DIUL 43 I	neproductive biology
BIOL 444	Field Ecology
BIOL 446	Physiological Ecology
BIOI 448	Ecology of Plant Reproduction

BIOL 451	Biology of RNA
BIOL 482	Coastal Biology

DIOL 431	biology of files
BIOL 482	Coastal Biology
BIOL 499A	Tropical Field Ecology
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
BIOL 421	Comparative Anatomy of Vertebrates
BIOL 422	Advanced Genetics
BIOL/PPEM	Biology of Fungi
425	
BIOL 427	Evolution
BIOL 428	Population Genetics
BIOL 429	Animal Behavior

Developmental Genetics

Evolution of Vertebrates

Pathobiology of Emerging Infectious Disease

DIOI 100				
BIOL 436	· · · · · · · · · · · · · · · · · · ·			
BIOL 438	Theoretical Population Ecology			
BIOL 439	Practical Bioinformatics			
BIOL 443	Evo-devo: Evolution of Developmental Mechanis	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	5,			
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			
	es and Related Areas			
	its from department list	14-19		
CCICOL 1-7 13 GIEUI	non department not	1-7 13		

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

Code	Title	Credits
Prescribed Cours		
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

15-20

(CHEM 212	Organic Chemistry II	3	BIOL	427	Evolution	
(CHEM 213	Laboratory in Organic Chemistry	2	BIOL	428	Population Genetics	
Additional Courses				BIOL	429	Animal Behavior	
Groups				BIOL	432	Developmental Genetics	
Select a minimum of 12 credits of 400-level courses, with at least 6			12	BIOL	433	Evolution of Vertebrates	
	credits from the Physiology group, 3 credits from the Evolution group,			BIOL	434	Pathobiology of Emerging Infectious Disease	
		the Practicum group. A maximum of 3 credits of		BIOL	436	Population Ecology and Global Climate Change	<u>;</u>
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.				BIOL	438	Theoretical Population Ecology	
Physiology Group:				BIOL	439	Practical Bioinformatics	
ſ	BIOL 404			BIOL	443	Evo-devo: Evolution of Developmental Mechani	sms
	BIOL 404	Cellular Mechanisms in Vertebrate Physiology		BIOL	446	Physiological Ecology	
		Symbiosis Richary of Aging		BIOL	451	Biology of RNA	
	BIOL 409	Biology of Aging		BIOL	460	Human Genetics	
	BIOL 411	Medical Embryology		BIOL	463	General Ecology	
	BIOL 412	Ecology of Infectious Diseases		BIOL	464	Sociobiology	
	BIOL 413	Cell Signaling and Regulation			474	Astrobiology	
	BIOL 415	Ecotoxicology			478	COMPARATIVE NEUROANATOMY	
	BIOL 416	Biology of Cancer			um Group		
	BIOL 421	Comparative Anatomy of Vertebrates			400	Teaching in Biology	
	BIOL 424	Seeds of Change: The Uses of Plants			402W	Biological Experimental Design	
	BIOL 426	Developmental Neurobiology			407	Plant Developmental Anatomy	
	BIOL 430	Developmental Biology			414	Taxonomy of Seed Plants	
	BIOL 431	Reproductive Biology			- 414 - 417	·	
	BIOL 432	Histology Evo-devo: Evolution of Developmental Mechanisms Physiological Ecology				Invertebrate Zoology	
	BIOL 437				419	Ecological and Environmental Problem Solving	
	BIOL 443			BIOL		Comparative Anatomy of Vertebrates	
	BIOL 446				422	Advanced Genetics	
	BIOL 460			425	_/PPEM	Biology of Fungi	
	BIOL 469	Neurobiology			_ 433	Evolution of Vertebrates	
	BIOL 470	Functional and Integrative Neuroscience			- 433 - 437		
	BIOL 478	COMPARATIVE NEUROANATOMY				Histology Practical Bioinformatics	
	BIOL 479	General Endocrinology			439		
	BIOL 482	Coastal Biology			_ 444	Field Ecology	
	ANSC 431	Physiology of Animal Reproduction			448	Ecology of Plant Reproduction	
	or ANTH 466	or ANTH 466The Skull			450W	Experimental Field Biology	
	or BMB 484	Functional Genomics		BIOL		Contemporary Issues in Science and Medicine	
	or ENT 402V	Biology of Animal Parasites			473	Laboratory in Mammalian Physiology	
		Microbial Physiology and Structure			_ 475N		
		Principles of Immunology			476	Advanced Human Anatomy - cadaver based	
		Medical Microbiology			478	COMPARATIVE NEUROANATOMY	
		3 Viral Pathogensis			482	Coastal Biology	
		5Physiological Psychology			494	Research Project	
F	Evolution Group:			BIOL	495	Internship in Biology	
i	BIOL 405	Molecular Evolution		BIOL	496	Independent Studies	
	BIOL 406	Symbiosis		BIOL	499A	Tropical Field Ecology	
	BIOL 411	Medical Embryology			TC 459	Plant Tissue Culture and Biotechnology	
	BIOL 414	Taxonomy of Seed Plants		SC 2	95	Science Co-op Work Experience I	
	BIOL 417	Invertebrate Zoology		SC 3		Science Co-op Work Experience II	
	BIOL 420	Paleobotany		SC 4	195	Science Co-op Work Experience III	
	BIOL 421	-		Supporting Courses and Related Areas			
	BIOL 421	Comparative Anatomy of Vertebrates Advanced Genetics		Select	15-20 cred	lits from department list	15-2
	425	Biology of Fungi					
	-=-						

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.