

## BA Biology & BS Secondary Education

Revised 01/2009 MDW

*Concepts in Biology I* (50-114) and *Concepts in Biology II* (50-115) should be taken during the freshman year; *Microbiology* (50-242) and *Cell Biology* (50-271) should be taken during the sophomore year. A minimum of thirty-five (35) credit hours in biology is required.

Chemistry and Mathematics courses should be scheduled as early as possible in the program of study. Required courses in Chemistry, Physics, and Geosciences fulfill the Natural Science and Mathematics general education requirement.

*Basic Statistics* (48-160) may be substituted for Introduction to *Statistics* (53-141).

<b>Biology Core Requirement (26 cr hrs)</b> <input type="checkbox"/>			<b>Professional Education (32 cr hrs)</b>		
50-114	Concepts in Biology I	4 <input type="checkbox"/>	60-204	Educational Computing & Technology	3 <input type="checkbox"/>
50-115	Concepts in Biology II	4 <input type="checkbox"/>	60-206	Teachers, Schools, & Society	2 <input type="checkbox"/>
50-242	Microbiology	4 <input type="checkbox"/>	60-251	Psychological Foundations of Education	3 <input type="checkbox"/>
50-271	Cell Biology	4 <input type="checkbox"/>	60-291	Principles of Teaching	3 <input type="checkbox"/>
50-332	Genetics	3 <input type="checkbox"/>	60-311	Classroom Measurement & Assessment	3 <input type="checkbox"/>
50-351	Ecology	3 <input type="checkbox"/>	60-393+	Social Foundation of Education <b>OR</b>	3 <input type="checkbox"/>
<b>Physiology Requirement</b> (Select 50-479 <b>AND</b> one lecture course from among 50-472, 50-474, 50-477, 50-478, and 50-480.)			60-406++	Multicultural Education	3 <input type="checkbox"/>
50-479	Integrated Physiology Lab*	1 <input type="checkbox"/>	65-453	Teaching of Science**	3 <input type="checkbox"/>
*Scheduled concurrently with physiology lecture course.			65-397	Student Teaching (1 <sup>st</sup> Exp)	6 <input type="checkbox"/>
50-472	Animal Cell Physiology	3 <input type="checkbox"/>	65-397	Student Teaching (2 <sup>nd</sup> Exp)	6 <input type="checkbox"/>
50-474	Vertebrate Systems Physiol	3 <input type="checkbox"/>	<b>Physical Sciences Requirement (8 cr hrs)</b> <input type="checkbox"/>		
50-477	Plant Physiology	3 <input type="checkbox"/>	52-115	Chem for the Sciences 1	4 <input type="checkbox"/>
50-478	Microbial Physiology	3 <input type="checkbox"/>	52-116	Chem for the Sciences 2	4 <input type="checkbox"/>
50-480	Comparative Animal Physiol	3 <input type="checkbox"/>	52-230*	Fund Organ Chem* · **	4 <input type="checkbox"/>
<b>Biology &amp; Other Science Electives</b> Selections on reverse; list below.			54-111*	Intro Physics I* · **	4 <input type="checkbox"/>
_____	_____	_____	*PDE (*Penn Dept of Education) requires an organic chemistry and a physics course for biology teacher certification.		
_____	_____	_____	<b>Mathematics Requirement (3 cr hrs)</b> <input type="checkbox"/>		
_____	_____	_____	53-141	Introduction to Statistics	3 <input type="checkbox"/>
_____	_____	_____	+ course approved for cultural diversity credit. ++ course approved for cultural diversity and Values credit. *PDE requirement. ** Fall semester only		

**Biology & Other Science Electives:** 9-13 cr hrs required, **minimum 9 cr biology** and/or marine science courses.

**FIELD COURSES\*:** Select one.

50-200	Dendrology	3	<input type="checkbox"/>
50-252	Field Zoology	3	<input type="checkbox"/>
50-253	Freshwater Biology	3	<input type="checkbox"/>
50-263	Field Botany	3	<input type="checkbox"/>
50-452	Limnology	3	<input type="checkbox"/>
50-457	Entomology	3	<input type="checkbox"/>
50-459	Ornithology	3	<input type="checkbox"/>

\*Offered summer sessions mainly with some during fall or spring semesters. Seasons preclude most of these being taught outside Summer sessions.

**MOLECULAR SELECTION:** Select one.

50-333	Molecular Biology	3	<input type="checkbox"/>
52-341	Biochemistry I	4	<input type="checkbox"/>

**BIOLOGY & MARINE SCIENCE SELECTION:**

50-211	Invertebrate Zoology	3	<input type="checkbox"/>	55-221	Marine Invertebrates	3	<input type="checkbox"/>
50-212	Vertebrate Zoology	3	<input type="checkbox"/>	55-241	Marine Biology	3	<input type="checkbox"/>
50-222	Comp Biol Plants	3	<input type="checkbox"/>	55-250	Wetland Ecology	3	<input type="checkbox"/>
50-233	Human Genetics	3	<input type="checkbox"/>	55-260	Marine Ecology	3	<input type="checkbox"/>
50-331	Embryology	3	<input type="checkbox"/>	55-298	Phys Marine Inverteb	3	<input type="checkbox"/>
50-342	Medical Microbiology	3	<input type="checkbox"/>	55-300	Behavior Marine	3	<input type="checkbox"/>
50-343	Immunology	3	<input type="checkbox"/>		Organ		
50-350	Plant Pathology	3	<input type="checkbox"/>	55-320	Marine Microbiology	3	<input type="checkbox"/>
50-361	Comp Vert Anatomy	3	<input type="checkbox"/>	55-330	Tropical Invertebrates	3	<input type="checkbox"/>
50-364	Vertebrate Histology	3	<input type="checkbox"/>	55-342	Marine Botany	3	<input type="checkbox"/>
50-390	Undergrad Research Biol	3	<input type="checkbox"/>	55-343	Marine Ichthyology	3	<input type="checkbox"/>
50-391	Undergrad Research Biol	3	<input type="checkbox"/>	55-345	Marine Ornithology	3	<input type="checkbox"/>
50-411	Radiation Biology	3	<input type="checkbox"/>	55-394	Comp Phys Mar Organ	3	<input type="checkbox"/>
<b>50-430</b>	<b>Evolution</b>	3	<input type="checkbox"/>	55-431	Ecol Marine Plankton	3	<input type="checkbox"/>
	<b>Strongly recommended.</b>			55-432	Marine Evol Ecology	3	<input type="checkbox"/>
50-432	Microb & Molec Genet	3	<input type="checkbox"/>	55-441	Biology of Molluscs	3	<input type="checkbox"/>
50-435	Bioinform & Genomic	3	<input type="checkbox"/>	55-464	Biol Oceanography	3	<input type="checkbox"/>
50-442	Virology of Mammals	3	<input type="checkbox"/>	55-470	Research Diver Meth	3	<input type="checkbox"/>
50-444	Plant & Animal Tiss Cult	1	<input type="checkbox"/>	55-490	Marine Aquaculture	3	<input type="checkbox"/>
50-450	Mycology	3	<input type="checkbox"/>	55-491	Coral Reef Ecology	3	<input type="checkbox"/>
50-451	Conservation Biology	3	<input type="checkbox"/>	55-492	Marine Mammals	3	<input type="checkbox"/>
50-455	Environ Microbiology	3	<input type="checkbox"/>	55-493	Behavioral Ecology	3	<input type="checkbox"/>
50-460	Population Biology	3	<input type="checkbox"/>				
50-461	Animal Behavior	3	<input type="checkbox"/>				
50-462	Plant Anatomy	3	<input type="checkbox"/>				
50-476	Neurophysiology	3	<input type="checkbox"/>				
50-481	Senior Seminar	1	<input type="checkbox"/>				
50-484	Methods Biotech	3	<input type="checkbox"/>				
50-489	Current Topics	3	<input type="checkbox"/>				
50-490	Internship Biol/AHS	3-	<input type="checkbox"/>				
		15					
50-493	Honors Indep Study I	3	<input type="checkbox"/>				
50-494	Honors Indep Study II	3	<input type="checkbox"/>				
50-_____	Second field Course (see previous list)	3	<input type="checkbox"/>				

**Restrictions on Non-classroom Courses.**  
 A maximum of 3 cr hrs of 50-490 may be applied as biology elective credit toward the degree.  
 A maximum of 6 cr hr from among 50-389, 50-391, 50-493, and 50-494 may be applied as biology elective credit toward the degree.

# General Education Requirements

**Two cultural diversity courses** (6 cr hr) are required. One is 70-101 *Introduction to the Exceptional Individual*; the second is 60-393 *Social Foundation of Education* or 60-394 *Education in Urban Society* or 60-406 *Multicultural Education*. Designate these with a + symbol.

**Foreign Language Requirement.** All BA majors in Biology must fulfill a foreign language requirement. Apply these credits to the Communication Elective or to Group A below. Any of the following courses may be used to satisfy the requirement: 10-101 French 1, 10-102 French 2, 10-203 French 3; 10-204 French 4; 11-101 German 1, 11-102 German 2, 11-203 German 3, 11-204 German 4; 12-101 Spanish 1, 12-102 Spanish 2, 12-203 Spanish 3, 12-204 Spanish 4; 13-102 Russian 2, 13-203 Russian 3, 13-204 Russian 4; 14-102 Italian 2; 16-106 Chinese 2, or 18-102 Latin 2.

**Communication (9 cr hrs)**

20-101	English Composition I	3	<input type="checkbox"/>
50-290	Writing in Biology	3	<input type="checkbox"/>
25-103	*Public Speaking	3	<input type="checkbox"/>

20-201 English Composition II can be substituted for Writing in Biology (substitution requires written justification, advisor endorsement, and BAHS Office approval).

**Quantitative-Analytical Reasoning** (3 cr hrs)

Fulfilled by mathematics requirement for major.

**Values, Ethics, ...** (3 cr hrs)

\_\_\_\_\_ 3  
 Suggestions: 50.230 Human Sexuality, 41.105 Environmental Issues & Choices, 60.406 Multicultural Education

**GROUP C. Natural Science and Mathematics** (12 cr hrs)

Fulfilled by chemistry, physics, and geosciences requirements for the major.

**Penn Dept of Education (PDE)** requires an earth or space science course for certification in biology. Choose **ONE** from the group (at right).

51-100	Environmental Geology	3	<input type="checkbox"/>
51-101	Physical Geology	3	<input type="checkbox"/>
51-255	Meteorology	3	<input type="checkbox"/>
51-259	Oceanography	3	<input type="checkbox"/>

**GROUP A. Humanities** (12 cr hrs, 3 dept)

25-103	*Public Speaking	<input type="checkbox"/>
_____	Foreign Language	<input type="checkbox"/>
_____		<input type="checkbox"/>
_____		<input type="checkbox"/>

**GROUP B. Social Sciences** (12 cr hrs)

48-101	General Psychology	3	<input type="checkbox"/>
48-212	Adolescent Psychology	3	<input type="checkbox"/>
70-101+	Intro Except Individual	3	<input type="checkbox"/>
45-211	Principles of Sociology	3	<input type="checkbox"/>

**Fitness and Recreational Skills** (2 cr hrs)

_____	_____	<input type="checkbox"/>
_____	_____	<input type="checkbox"/>

**Free Electives.** List free elective courses here.

_____	_____	<input type="checkbox"/>	_____	_____	<input type="checkbox"/>
_____	_____	<input type="checkbox"/>	_____	_____	<input type="checkbox"/>
_____	_____	<input type="checkbox"/>	_____	_____	<input type="checkbox"/>
_____	_____	<input type="checkbox"/>	_____	_____	<input type="checkbox"/>