Biology B.A.

Click here to view the Suggested Plan of Study (p. 3)

General Education Foundations

Please use this link to view a list of courses that meet each GEF requirement. **(**http://registrar.wvu.edu/gef/**)**

NOTE: Some major requirements will fulfill specific GEF requirements. Please see the curriculum requirements listed below for details on which GEFs you will need to select.

Code	Title	Hours
General Education Foundations		
F1 - Composition & Rhetoric		3-6
ENGL 101 & ENGL 102	Introduction to Composition and Rhetoric and Composition, Rhetoric, and Research	
or ENGL 103	Accelerated Academic Writing	
F2A/F2B - Science & Technology		4-6
F3 - Math & Quantitative Reasoning		3-4
F4 - Society & Connections		3
F5 - Human Inquiry & the Past		3
F6 - The Arts & Creativity		3
F7 - Global Studies & Diversity		3
F8 - Focus (may be satisfied by completion of a minor, double major, or dual degree)		9
Total Hours		31-37

Please note that not all of the GEF courses are offered at all campuses. Students should consult with their advisor or academic department regarding the GEF course offerings available at their campus.

Degree Requirements

Students must complete WVU General Education Foundations requirements, College B.A. requirements, major requirements, and electives to total a minimum of 120 hours. For complete details on these requirements, visit the B.A. Degrees tab on the Eberly College of Arts and Sciences (http://catalog.wvu.edu/undergraduate/eberlycollegeofartsandsciences/#bachelorofartstext) pages.

Departmental Requirements for the B.A. in Biology

Students intending to graduate with a B.A. in Biology must earn a minimum of 32 hours in biology or approved courses in the biological sciences, with a minimum of 120 hours total required for graduation (see Eberly B.A. pages when reaching 42 credits in Biology). Students may not earn both a B.A. and a B.S. in Biology.

- **Capstone Requirement**: The university requires the successful completion of a Biology capstone course (BIOL 320 or BIOL 321). The three semester, BIOL 486, may be counted as the Biology Capstone Experience in place of BIOL 320 or BIOL 321. Two hours of BIOL 486 will be counted as part of the core requirements (replacing BIOL 320 or BIOL 321) and up to 4 hours may count toward upper-level electives.
- **Writing and Communication Skills Requirement:** The Biology Bachelor of Arts is a **SpeakWrite Certified Program**^{TM}. SpeakWrite Certified programs incorporate and develop students' written, verbal, visual, and mediated communication skills across the curriculum.
- **Calculation of Major GPA:** A minimum GPA of a 2.0 is required in all courses applied to major requirements, with a minimum grade of C- in BIOL 115, BIOL 115L, BIOL 117, and BIOL 117L. If a course is repeated, all attempts will be included in the calculation of the GPA, unless the course is eligible for a D/F repeat.
- **Electives and Lab requirement**: Upper-division electives may include any 300- or 400-level BIOL courses (except: BIOL 318, BIOL 320, BIOL 321, BIOL 327, BIOL 387, BIOL 487, BIOL 490, BIOL 491, BIOL 494 and above). Lecture and lab courses can be found in the course catalog. Special topics courses, BIOL 493, can be used as electives. No more than two of the following non-BIOL courses may be counted as a BIOL elective: AEM 341, AEM 341L, AGBI 410, AGBI 410L, BIOC 339, BIOC 531, GEOL 331, PHYS 326, PSYC 426, WMAN 446, WMAN 446L. Students must take a minimum of 16 credits of upper-division biology electives; at least one of the selected courses must have a laboratory.
- **Research option:** With permission of the department, students may enroll in BIOL 386 or BIOL 486. Four hours of BIOL 386 and BIOL 486 may be used towards the 16 hours of Biology upper-division electives. One semester of BIOL 386 or BIOL 486 may be used to satisfy the lab requirement.

Curriculum Requirements

Code	Title	Hours
University Requirements		45
ECAS B.A. Requirements		12
Biology Major Requirements		63
Total Hours		120

University Requirements

Code	Title	Hours
General Education Foundations (GEF) 1, 2, 3, 4, 5, 6, 7, and 8 (31-37 Credits)		
Outstanding GEF Requirements 1, 4, 5, 6, and 7		18
BIOL 191		1
General Electives		26
Total Hours		45

ECAS Bachelor of Arts Requirements

Code	Title	Hours
Fine Arts Requirement		
Foreign Language		12
Global Studies and Diversity Requirement		
Total Hours		12

Biology Major Requirements

Code	Title	Hours
STEM FOUNDATIONS *		**22**
CHEM 115	Fundamentals of Chemistry 1	
& 115L	and Fundamentals of Chemistry 1 Laboratory	
& CHEM 116	and Fundamentals of Chemistry 2	
& CHEM 116L	and Fundamentals of Chemistry 2 Laboratory	
MATH 150	Applied Calculus	
or MATH 153	Calculus 1a with Precalculus	
& MATH 154	and Calculus 1b with Precalculus	
or MATH 155	Calculus 1	
PHYS 101	Introductory Physics 1	
& 101L	and Introductory Physics 1 Laboratory	
& PHYS 102	and Introductory Physics 2	
& PHYS 102L	and Introductory Physics 2 Laboratory	
or PHYS 111	General Physics 1	
& 111L	and General Physics 1 Laboratory	
& PHYS 112	and General Physics 2	
& PHYS 112L	and General Physics 2 Laboratory	
STAT 211	Elementary Statistical Inference	
or STAT 215	Introduction to Probability and Statistics	
CORE COURSES		**22**
BIOL 115	Principles of Biology	
& 115L	and Principles of Biology Laboratory	
BIOL 117	Introductory Physiology	
& 117L	and Introductory Physiology Laboratory	
BIOL 219	The Living Cell	
& 219L	and The Living Cell Laboratory	
BIOL 221	Ecology and Evolution	
BIOL 327	Professional Development	
BIOL 387	Experimental Design & Communication 1	

BIOL 487	Experimental Design & Communication 2	
CHEM 231 & 231L	Organic Chemistry: Brief Course and Organic Chemistry: Brief Course Laboratory	
or CHEM 233 & 233L & CHEM 234 & CHEM 234L	Organic Chemistry 1 and Organic Chemistry 1 Laboratory and Organic Chemistry 2 and Organic Chemistry 2 Laboratory	
BIOLOGY ELECTIVES **		**16**
The 16 hours of upper-division courses can include any 300- or 400-level BIOL course except: BIOL 318, BIOL 327, BIOL 490, BIOL 491, BIOL 494, and above; they must include one class with a lab. ***		
CAPSTONE EXPERIENCE		**3**
Choose from one of the following:		
BIOL 320	The Total Science Experience: Genomics	
BIOL 321	Total Science Experience Lab	
or three semesters of the following :		
BIOL 486	Honors Investigation and Thesis (9 hours)	
Total Hours		63

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STEM foundation courses are common to most STEM majors and excluded from the calculation of the percentage of upper-division courses.

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No more than one of the following classes maybe counted as a BIOL elective: AEM 341, AEM 401, AGBI 410, BIOC 339, BIOC 531, GEOL 331, PHYS 225.

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Please see an adviser to identify lab classes.

Suggested Plan of Study

First Year

Fall	Hours	Spring	Hours
BIOL 191	1	BIOL 117 & 117L (GEF 8)	4
BIOL 115 & 115L (GEF 2)	4	CHEM 116 & 116L (GEF 8)	4
CHEM 115 & 115L (GEF 8)	4	ENGL 101 (GEF 1)	3
MATH 150 (GEF 3)	3	Foreign Language 102	3
Foreign Language 101	3	General Elective	1
	15		15

Second Year

Fall	Hours	Spring	Hours
BIOL 219 & 219L	4	BIOL 221	3
CHEM 231 & 231L	4	BIOL 327	1
ENGL 102 (GEF 1)	3	BIOL Elective	3
Foreign Language 203	3	Foreign Language 204	3
General Elective	1	GEF 4	3
		General Elective	2
	15		15

Third Year

Fall	Hours	Spring	Hours
BIOL 387	1	BIOL Elective	3
BIOL Elective	3	PHYS 102 & 102L	4

PHYS 101 & 101L	4	ECAS Fine Arts Requirement (GEF 6)	3
GEF 5	3	Statistics Requirement	3
General Elective	3	General Elective	3
	14		16

Fourth Year

Fall	Hours	Spring	Hours
BIOL 487	1	Biology Capstone*	3
BIOL Elective*	4	BIOL Elective*	3
ECAS Global Studies and Diversity Requirement (GEF 7)	3	General Elective	3
General Elective	3	General Elective	3
General Elective	3	General Elective	3
General Elective	1		
	15		15

Total credit hours: 120

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At least one upper division lab course must be taken (386 or 486 can substitute)

B.A. Biology: Pre-Medical Track

The following information is included for advising purposes only and is not an approved curriculum. Completing the stipulations suggested below will not result in an additional designation on any official record.

- **Independent Research**: Students with aspirations to attend top-rank medical schools should include at least three hours of independent research (BIOL 386 or BIOL 486) in their program of study if they are to be competitive. The three semester, BIOL 486, may be counted as the Biology Capstone in place of BIOL 320 or BIOL 321. Four hours of BIOL 386 and BIOL 486 may be used to satisfy upper division electives. One semester of BIOL 386 or BIOL 486 will satisfy the lab course.

- **MCAT:** Students who will take the MCAT in 2015 or later should take PSYC 101, SOC 101, ANTH 105 and one further course in Psychology and Sociology in order to be prepared for the new social sciences section of the MCAT - consult with your adviser for more detailed information.

Note: The list of electives and recommendations outlined below are recommended for students interested in attending medical school. However, admission requirements will vary from one medical school to another, so a review of specific requirements for each school of interest is recommended. B.A. Biology students should select their biology electives from the list below. "Foundation electives" and "Biochemistry Elective" are strongly recommended for a competitive medical school application.

Code	Title	Hours
Foundation Electives		**10**
BIOL 310	Advanced Cellular/Molecular Biology	
BIOL 436	General Animal Physiology	
BIOL 440	Comparative Anatomy	
Biochemistry Elective		**3**
Select one of the following:		
AGBI 410	Introductory Biochemistry	
BIOC 339	Introduction to Human Biochemistry	
Biology Electives		**8**
Select two of the following:		
BIOL 302	Biometry	
BIOL 312	Introduction to Virology	
BIOL 313	Molecular Basis of Cellular Growth	
BIOL 316	Developmental Biology	
BIOL 324	Molecular Genetics	
BIOL 335	Cell Physiology	
BIOL 338	Behavioral Ecology	
BIOL 348	Neuroscience 1	
BIOL 386	Undergraduate Research	

BIOL 410	Cell and Molecular Biology Methods
BIOL 411L	Introduction to Recombinant DNA Laboratory
BIOL 413	Molecular Endocrinology
BIOL 415	Epigenetics
BIOL 425	Developmental Genetics
BIOL 426	Molecular Biology of Cancer
BIOL 438	Animal Behavior
BIOL 453	Molecular Basis of Disease
BIOL 454	Immunology
BIOL 455	Evolution of Infectious Diseases
BIOL 456	Microbial Symbiosis
BIOL 461	Principles of Evolution
BIOL 464	Population and Quantitative Genetics
BIOL 486	Honors Investigation and Thesis
AEM 341	General Microbiology
AEM 401	Environmental Microbiology
PSYC 426	Physiological Psychology
Total Hours	21

Areas of Emphasis Offered:

- Cellular and Molecular Biology (p. 5)
- Ecology and Environmental Biology (p. 8)

Bachelor of Arts or Sciences in Biology: Cellular and Molecular Biology Area of Emphasis

A biology degree with an emphasis in cellular and molecular biology provides the student with all the preparation necessary for the health professions, pharmacy and pharmacology, and graduate school in cellular or molecular biology, virology, genetics, immunology and a variety of related fields. Biology majors pursuing the area of emphasis in Cellular and Molecular Biology take two introductory courses to learn about the processes within cells and the mechanisms for communication between cells. They then take a further concentration of courses in Biology that are related to cellular and molecular biology.

Cellular and Molecular Biology Area of Emphasis Requirements:

Students wishing to complete a Cellular and Molecular Biology Area of Emphasis must take the following selection of courses as part of their required Biology electives, either for the B.A. or the B.S.

Curriculum Requirements

Code	Title	Hours
BIOL 310	Advanced Cellular/Molecular Biology	3
BIOL 324	Molecular Genetics	3
Select two of the following:		6
BIOL 312	Introduction to Virology	
BIOL 313	Molecular Basis of Cellular Growth	
BIOL 316	Developmental Biology	
BIOL 335	Cell Physiology	
BIOL 348	Neuroscience 1	
BIOL 409	Biochemical Basis of Therapeutics	
BIOL 410	Cell and Molecular Biology Methods	
BIOL 411L	Introduction to Recombinant DNA Laboratory	
BIOL 413	Molecular Endocrinology	
BIOL 415	Epigenetics	
BIOL 418	Medical Genetics	
BIOL 420	Genomics	

BIOL 423	Biochemistry of Nucleic Acids and Proteins	
BIOL 424	Protein Structure and Function	
BIOL 425	Developmental Genetics	
BIOL 426	Molecular Biology of Cancer	
BIOL 430	Bioinformatics	
BIOL 436	General Animal Physiology	
BIOL 453	Molecular Basis of Disease	
BIOL 454	Immunology	
BIOL 455	Evolution of Infectious Diseases	
BIOL 456	Microbial Symbiosis	
BIOL 464 & 464L	Population and Quantitative Genetics and Population Genetics Laboratory	
FIS 432	Forensic Biology	
Total Hours		12

Suggested Plan of Study for the B.A. in Biology with an Area of Emphasis in Cellular and Molecular Biology

First Year

Fall	Hours	Spring	Hours
BIOL 191	1	ENGL 101	3
BIOL 115 & 115L	4	BIOL 117 & 117L	4
CHEM 115 & 115L	4	CHEM 116 & 116L	4
MATH 150	3	Language 102	3
Language 101	3	General Elective	1
	15		15

Second Year

Fall	Hours	Spring	Hours
BIOL 219 & 219L	4	BIOL 221	3
CHEM 233 & 233L	4	BIOL 327	1
ENGL 102	3	CHEM 234 & 234L	4
Language 203	3	Language 204	3
General Elective	1	General Elective	1
		GEF 4	3
	15		15

Third Year

Fall	Hours	Spring	Hours
GEF 5	3	GEF 6	3
BIOL 310	3	Biology Capstone	2
BIOL 387	1	PHYS 102 & 102L	4
PHYS 101 & 101L	4	BIOL 324	3
STAT 211	3	General Elective	3
General Elective	1		
	15		15

Fourth Year

Fall	Hours	Spring	Hours
BIOL 478	3	CMB AoE Elective 2	3

GEF 7		3 Biology Elective	3
CMB AoE Elective 1 (with lab)		4 General Elective	3
General Elective		3 General Elective	3
General Elective		2 General Elective	3
		15	15

Total credit hours: 120

Suggested Plan of Study for the B.S. in Biology with an Area of Emphasis in Cellular and Molecular Biology

First Year

Fall	Hours	Spring	Hours
BIOL 191		1 ENGL 101	3
GEF 4		3 BIOL 117 & 117L	4
BIOL 115 & 115L		4 CHEM 116 & 116L	4
CHEM 115 & 115L		4 General Elective	3
MATH 155		4	
		16	14

Second Year

Fall	Hours	Spring	Hours
ENGL 102		3 BIOL 221	3
BIOL 219 & 219L		4 BIOL 327	1
CHEM 233 & 233L		4 CHEM 234 & 234L	4
PHYS 101 & 101L		4 PHYS 102 & 102L	4
		STAT 211	3
		15	15

Third Year

Fall	Hours	Spring	Hours
BIOL 310 (Group I elective)		3 BIOL 324 (Group II)	3
BIOL 387		1 General Elective	3
GEF 5		3 General Elective	3
GEF 6		3 Biology Elective, Lab 1	4
GEF 7		3 Biology Capstone	2
Biology Elective, Group III, AoE Elective 1		3	
		16	15

Fourth Year

Fall	Hours	Spring	Hours
BIOL 487		1 Biology Elective, Group IV, AoE Elective 2	3
Biology Elective, Lab 2		4 General Elective	3
General Elective		3 General Elective	3
General Elective		2 General Elective	3
General Elective		3 General Elective	3
General Elective		1	
		14	15

Total credit hours: 120

Bachelor of Arts or Science in Biology: Ecology and Environmental Biology Area of Emphasis

Ecology and Environmental Biology Area of Emphasis:

Curriculum Requirements

Code	Title	Hours
Core Courses		**6**
BIOL 302	Biometry	
BIOL 461	Principles of Evolution	
Ecology Electives		**6**
Select 2 of the following:		
BIOL 338	Behavioral Ecology	
BIOL 361 & 361L	Plant Ecology and Plant Ecology Laboratory	
BIOL 363	Plant Geography	
BIOL 365 & 365L	Conservation Biology and Conservation Biology Laboratory	
BIOL 456	Microbial Symbiosis	
BIOL 457	Ecology of Parasites	
BIOL 463	Global Ecology	
WMAN 446 & 446L	Freshwater Ecology and Freshwater Ecology Laboratory	
Total Hours		12

Suggested Plan of Study for the B.A. in Biology with an Area of Emphasis in Ecology/ Environmental Biology

First Year

Fall	Hours	Spring	Hours
BIOL 191	1	ENGL 101 (GEF 1)	3
Foreign Language 101	3	Foreign Language 102	3
BIOL 115 & 115L (GEF 2)	4	BIOL 117 & 117L (GEF 8)	4
MATH 150 (GEF 3)	3	CHEM 116 & 116L (GEF 8)	4
CHEM 115 & 115L (GEF 8)	4	General Elective	1
	15		15

Second Year

Fall	Hours	Spring	Hours
ENGL 102 (GEF 1)	3	Foreign Language 204	3
Foreign Language 203	3	BIOL 221	3
BIOL 219 & 219L	4	BIOL 327	1
CHEM 233 & 233L	4	CHEM 234 & 234L	4
General Elective	1	STAT 211	3
		General Elective	1
	15		15

Third Year

Fall	Hours	Spring	Hours
BIOL 387	1	GEF 6 (ECAS Fine Arts Requirement)	3
GEF 4	3	Biology Capstone	2

GEF 5	3	BIOL 461	3
BIOL 302	3	PHYS 102 & 102L	4
PHYS 101 & 101L	4	General Elective	3
General Elective	1		
	15		15

Fourth Year

Fall	Hours	Spring	Hours
BIOL 487	1	BIOL Elective with Laboratory	4
ECAS Global Studies and Diversity Requirement (GEF 7)	3	Ecology AoE Elective 2	3
Ecology AoE Elective 1	3	General Elective	3
General Elective	3	General Elective	3
General Elective	3	General Elective	2
General Elective	2		
	15		15

Total credit hours: 120

Suggested Plan of Study for the B.S. in Biology with an Area of Emphasis in Ecology/ Environmental Biology

First Year

Fall	Hours	Spring	Hours
BIOL 191	1	ENGL 101 (GEF 1)	3
GEF 4	3	BIOL 117 & 117L (GEF 8; B.S. First Area 2)	4
BIOL 115 & 115L (GEF 2; B.S. First Area 1)	4	CHEM 116 & 116L (GEF 8; B.S. Second Area 2)	4
CHEM 115 & 115L (GEF 8; B.S. Second Area 1)	4	STAT 211	3
MATH 155 (GEF 3)	4		
	16		14

Second Year

Fall	Hours	Spring	Hours
ENGL 102 (GEF 1)	3	BIOL 221	3
BIOL 219 & 219L	4	BIOL 327	1
CHEM 233 & 233L	4	CHEM 234 & 234L	4
PHYS 101 & 101L (B.S. Third Area 1)	4	PHYS 102 & 102L (B.S. Third Area 2)	4
		General Elective	3
	15		15

Third Year

Fall	Hours	Spring	Hours
BIOL 387	1	BIOL 461 (Group III elective)	3
GEF 5	3	Biology Capstone	2
GEF 6	3	General Elective	4
ECAS Global Studies and Diversity Requirement (GEF 7)	3	General Elective	3
BIOL 302 (Group IV elective)	3	General Elective	3
General Elective	2		
	15		15

Fourth Year			
Fall	**Hours**	**Spring**	**Hours**
BIOL 487	1	Ecology AoE Elective Course 2	3
Ecology AoE Elective Course 1	3	BIOL Elective with Lab (Group II)*	4
Biology Elective with lab (Group I)*	4	General Elective	3
General Elective	3	General Elective	3
General Elective	2	General Elective	2
General Elective	2		
	15		15

Total credit hours: 120

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Maybe fulfilled by a course selected in Area of Emphasis.

Major Learning Outcomes

BIOLOGY

Upon successful completion of the B.A. or B.S. degree, **Biology** majors will demonstrate competency in these areas:

1. Students will demonstrate competency in five content areas (listed below) at three biological levels - cellular/molecular, organismal/physiological, ecological and populations)

- Information flow
- Transformations of energy and matter
- Structure-function relationships
- Evolution
- Systems and interactions

2. Students will be able to apply science process skills, including: reading the primary literature, developing a testable hypothesis, designing and experiment, collecting and analyzing data statistically.

3. Students will be able to communicate effectively with both fellow scientists and non-scientists in both written and oral forms.

4. Students will be able to synthesize knowledge and skills from across the curriculum and apply them to societal issues and problems.

COURSES

BIOL 101. General Biology 1. 3 Hours.
PR or CONC: BIOL 101L or BIOL 103. Introductory course in biology: cellular, organismal, and population genetics, including reproduction, growth and development, and evolution.

BIOL 101L. General Biology 1 Laboratory. 1 Hour.
PR or CONC: BIOL 101. Experiments in biology: genetics and evolution; reproduction, growth, and development of cells, organisms, and populations.

BIOL 102. General Biology 2. 3 Hours.
PR or CONC: BIOL 102L or BIOL 104. Introductory biology: energetics and physiology of cells, organisms, and populations, including regulation and control of multicellular organisms.

BIOL 102L. General Biology 2 Laboratory. 1 Hour.
PR or CONC: BIOL 102. Experiments in biology: materials exchange, actions of enzymes, photosynthesis and respiration, and physiology of organisms.

BIOL 105. Environmental Biology. 3 Hours.
Population growth and human impacts on the environment, including ecosystem destruction, biological diversity, pollution, and global climate change are explored to obtain the concepts necessary to understand complex environmental issues of our time. (Intended for non-biology majors.).

BIOL 105L. Environmental Biology Laboratory. 1 Hour.
PR or CONC: BIOL 105. Field and laboratory exercises explore fundamental ecological concepts and environmental problems, such as biodiversity, pollution, and natural resource utilization.

BIOL 107. Biotechnology and Society. 3 Hours.
An overview of the use of biotechnology to solve agricultural, medical, and environmental problems. Bioethical concerns and societal impacts of the use of the technologies will be discussed.

BIOL 108. Drugs and the Body. 3 Hours.
An overview of how common prescription, street and over-the-counter drugs alter body functions. How the body absorbs and metabolizes various drugs, drug interactions, and the biology of addiction will also be presented.

BIOL 113. Inquiry and Reasoning for Biologists. 1 Hour.
PR or CONC: BIOL 115 or consent. Problem-based and team-based learning approach using topics from BIOL 115 to help students build foundational knowledge in biological principles as well as develop and practice critical thinking skills essential for success as a science major.

BIOL 115. Principles of Biology. 3 Hours.
PR or CONC: (BIOL 115L or BIOL 116) with a minimum grade of C-. Presentation of basic principles of modern biology. First in a four-course, integrated sequence required of biology majors. Topics include ecology and evolution, organismal biology, and cellular/molecular biology.

BIOL 115L. Principles of Biology Laboratory. 1 Hour.
PR or CONC: BIOL 115 with a minimum grade of C-. Emphasizes proper understanding and use of the scientific method to design and perform biological experiments. Discipline-specific communication techniques, including scientific writing, also emphasized.

BIOL 117. Introductory Physiology. 3 Hours.
PR: ((BIOL 101 and BIOL 102 and (BIOL 101L or BIOL 103) and (BIOL 102L or BIOL 104)) or ((BIOL 115 and (BIOL 115L or BIOL 116)) with a minimum grade of C- in all and PR or CONC: BIOL 117L or BIOL 118. Continuation of BIOL 115 and 115L. The diversity of reproductive, developmental, functional, and integrative mechanisms in plants and animals.

BIOL 117L. Introductory Physiology Laboratory. 1 Hour.
PR: ((BIOL 101 and BIOL 102 and (BIOL 101L or BIOL 103) and (BIOL 102L or BIOL 104)) or ((BIOL 115 and (BIOL 115L or BIOL 116)) and PR or CONC: BIOL 117. Continuation of BIOL 115 and 115L. Utilizes themes from plant and animal physiology to enhance students' skills when applying the scientific method. Emphasis is placed on experimental design and discipline-specific communication methods.

BIOL 122. Human Sexuality. 3 Hours.
A study of biological, behavioral and societal aspects of sexuality. Issues considered include changing fecundity, social-legal implications, sex roles, sexually transmitted diseases, populations, erotica, aging, dysfunctions, and decision- making skills for sex related issues.

BIOL 191. First-Year Seminar. 3 Hours.
Engages students in active learning strategies that enable effective transition to college life at WVU. Students will explore school, college and university programs, policies and services relevant to academic success. Provides active learning activities that enable effective transition to the academic environment. Students examine school, college and university programs, policies and services.

BIOL 219. The Living Cell. 3 Hours.
PR: (BIOL 117 and (BIOL 117L or BIOL 118 or BIOL 240) and (CHEM 115 and CHEM 115L) with a minimum grade of C- in all and PR or CONC: BIOL 219L or BIOL 220. Third course in the core curriculum required for biology-related majors. It will expand on topics from BIOL 115/117, especially with regard to cell chemistry, bioenergetics, cell physiology and gene expression.

BIOL 219L. The Living Cell Laboratory. 1 Hour.
PR: BIOL 117 and (BIOL 117L or BIOL 118 or BIOL 240) and (CHEM 115 and CHEM 115L) with a minimum grade of C- in all and PR or CONC: BIOL 219. BIOL 219L is the laboratory that accompanies BIOL 219 (The Living Cell).

BIOL 221. Ecology and Evolution. 3 Hours.
PR: BIOL 117 and (BIOL 117L or BIOL 118) with a minimum grade of C- in all. Basic concepts in evolution and ecology including Darwin's theory of natural selection, modern population genetics, speciation, population growth and regulation, demography, community ecology, ecosystem dynamics, and human ecology.

BIOL 235. Human Physiology. 3 Hours.
PR: (BIOL 101 and BIOL 102 and BIOL 103 and BIOL 104) or BIOL 115. (Intended for non-biology majors.) An introductory course in the function of the human.

BIOL 236. Human Physiology: Quantitative Laboratory. 1 Hour.
PR: MATH 156 and CHEM 116 and (BIOL 115 or (BIOL 101 and BIOL 102 and BIOL 103 and BIOL 104) or PR or CONC: BIOL 235). Optional lab for BIOL 235 incorporating engineering concepts, such as mass and energy balances, circuit theory, and chemical kinetics to quantify and help understand many aspects of human physiology.

BIOL 293. Special Topics. 1-6 Hours.
PR: Consent. Investigation of topics not covered in regularly scheduled courses.

BIOL 298. Honors. 1-3 Hours.
PR: Students in the Honors Program and consent by the honors director. Independent reading, study, or research.

BIOL 301. History of Biology. 3 Hours.
PR: (BIOL 101 and BIOL 103 and BIOL 102 and BIOL 104) or BIOL 115. History of development of biological knowledge with philosophical and social backgrounds.

BIOL 302. Biometry. 3 Hours.
PR: STAT 211. Application of quantitative methods and statistics to biological data with emphasis on hands-on hypothesis construction, experimental design, data analysis and biological interpretation of statistical results.

BIOL 310. Advanced Cellular/Molecular Biology. 3 Hours.
PR: BIOL 219 and (BIOL 219L or BIOL 220). Advanced study of molecular mechanisms underlying fundamental cellular processes.

BIOL 310L. Advanced Cellular/Molecular Biology Laboratory. 2 Hours.
PR or CONC: BIOL 310. Experimental approaches to the study of cellular systems.

BIOL 312. Introduction to Virology. 3 Hours.
PR: BIOL 219. Survey of viruses, their modes of replication and spread, and the medical and economic significance of viral diseases in public health.

BIOL 313. Molecular Basis of Cellular Growth. 3 Hours.
PR: BIOL 219. Study of the integration of internal and external influences as they regulate the division, growth, and differentiation of cells. Topics include hormones as cell effectors, cancer, and stem cells.

BIOL 315. Communicating Natural Science. 3 Hours.
PR: BIOL 219 or BIOL 221. Teaches students to effectively communicate about scientific discoveries and scientific issues in both written and oral forms to professional scientists, the public, the media and politicians. Students will learn to consider the knowledge, biases and goals of their intended audience to communicate thoughtfully and effectively.

BIOL 316. Developmental Biology. 3 Hours.
PR: BIOL 219 and (BIOL 219L or BIOL 220). A molecular genetic analysis of the mechanisms by which multicellular organisms develop from single cells.

BIOL 316L. Developmental Biology Laboratory. 1 Hour.
PR: BIOL 219 and (BIOL 219L or BIOL 220) and PR or CONC: BIOL 316. Experimental approaches to the genetic analysis of the mechanisms by which multicellular organisms develop from single cells.

BIOL 318. Writing Appalachian Ecology. 3 Hours.
This course encourages students to think about the long-term future of our planet. What could our world be like in 200 years? How will current environmental problems change the future? How will relationships with the natural world change? Students address questions like these in creative nonfiction essays they write about research being conducted at the Fernow Experimental Forest in WV.

BIOL 320. The Total Science Experience: Genomics. 3 Hours.
PR: BIOL 219. Biological research experience incorporating critical skills of being a research scientist, including writing grant proposals, manuscripts, and materials for presentation of results in a public forum. Students conceive, design, propose, execute, analyze, and report an experiment with a genomics focus. Fulfills the capstone requirement in Biology and provides a realistic exposure to joys and challenges of performing scientific research.

BIOL 321. Total Science Experience Lab. 3 Hours.
PR or CONC: BIOL 221. Biological research experience incorporating diverse learning experiences that take place in the process of being a research scientist; including writing grant proposals, manuscripts, and presentation of results in a public forum.

BIOL 324. Molecular Genetics. 3 Hours.
PR: BIOL 219 and (BIOL 219L or BIOL 220). Theoretical and practical knowledge in genetics as a field of study and as an approach for investigating biological problems.

BIOL 324L. Molecular Genetics Laboratory. 1 Hour.
PR: BIOL 219 and (BIOL 219L or BIOL 220) and PR or CONC: BIOL 324. The laboratory is a logical sequence of experiments providing actual research experience in molecular genetics.

BIOL 327. Professional Development. 1 Hour.
PR: BIOL 219. This course provides an overview of opportunities for students graduating with degrees in the biological sciences. An assessment test will help identify strengths and weaknesses within the field.

BIOL 335. Cell Physiology. 3 Hours.
PR: BIOL 219. Emphasis on the unity and diversity of cells; membrane structure and function; and the role that intracellular compartments, cytoskeleton, and extracellular matrix play in cell physiology.

BIOL 338. Behavioral Ecology. 3 Hours.
PR: BIOL 112 or BIOL 221. Consideration of the influences of environmental factors on short-and long-term regulation, control, and evolution of the behavior of animals. Students on the Morgantown campus will be required to complete BIOL 221.

BIOL 339. Animal Communication. 3 Hours.
PR: BIOL 221 or BIOL 348 or instructor consent. Communication mediates most interactions between individuals and the brain dedicates much of its resources to generating and processing these signals. This course examines why and how animals communicate, the physiological mechanisms involved in generating / sensing communication signals, how evolution shapes communication, and how communication signals can influence decision making.

BIOL 340. Invertebrate Zoology. 3 Hours.
PR: BIOL 221. The evolution of animals without vertebral columns.

BIOL 341. Ichthyology. 4 Hours.
PR: Corequisite of BIOL 341L. Study of the internal and external structure of fishes, their systematic and ecological relationships, and their distribution in time and space. (Dissection kit required.).

BIOL 341L. Ichthyology Laboratory. 0 Hours.
PR: Corequisite of BIOL 341. Ichthyology - BIOL 341 Laboratory.

BIOL 344. Advanced Human Physiology. 3 Hours.
PR: BIOL 219 and (BIOL 219L or BIOL 220) with a minimum grade of C- and PR or CONC: BIOL 344L. Explores the cellular and integrative features of the human body and its systems. We will cover topics from the level of the cell all the way through to the organ system and how these systems interact with one another. Designed for students interested in health professions and will have a heavy focus on health care.

BIOL 344L. Advanced Human Physiology Laboratory. 1 Hour.
PR: BIOL 219 and (BIOL 219L or BIOL 220) with a minimum grade of C- and PR or CONC: BIOL 344. Laboratory course that will focus on the detrimental and beneficial impact of psychological stress on human systems. Students will explore virtual manipulation of physiological systems at the cellular system, the intersection of social justice, psychological stress, and physiological experimentation, and will allow you to track your own stress and its impacts on your physiology by designing a semester long experiment.

BIOL 345. Human Anatomy. 3 Hours.
PR: BIOL 219 and (BIOL 219L or BIOL 220) and PR or CONC: (BIOL 345L or BIOL 346) with a minimum grade of C- in all. Study of human morphology, with a focus on anatomical function and medical applications. Lecture integrates integument, skeletal, muscular, cardiovascular, digestive, urogenital, respiratory, and nervous system anatomy. The co-requisite lab parallels these lecture topics. This course is intended for students interested in the human health fields.

BIOL 345L. Human Anatomy Laboratory. 2 Hours.
PR: BIOL 219 and (BIOL 219L or BIOL 220) and PR or CONC: BIOL 345 with a minimum grade of C- in all. This lab course meets twice a week and parallels the discussion of anatomy and function in BIOL 345 lecture. Students use microscopes to identify integument anatomy, examine human bones in order to name bones and relevant bone landmarks. Students collaborate with a partner to fully dissect a cat, sheep brain, pig heart and cow eye.

BIOL 348. Neuroscience 1. 3 Hours.
PR: BIOL 219 with a minimum grade of C-. An introduction to neuroscience, including basic neuroanatomical neurophysiology, and the relationship between the central nervous system, physiology, and behavior.

BIOL 349. Neuroscience 2. 3 Hours.
PR: BIOL 348. An introductory systems level course on organization of the nervous system, from an evolutionary to a clinical perspective. Topics include development and functional organization of sensory, motor, autonomic and cognitive systems. The evolutionary history and human health concerns associated with these systems will be addressed, through lecture, discussion, and readings in the primary literature.

BIOL 350. Plant Physiology. 4 Hours.
PR: (BIOL 117 and (BIOL 117L or BIOL 118) and CHEM 116 and CHEM 116L) or (CHEM 112 and CHEM 112L and PLSC 206) and Coreq: BIOL 350L. Physiochemical processes of plants.

BIOL 350L. Plant Physiology Laboratory. 0 Hours.
PR: Corequisite of BIOL 350. Plant Physiology - BIOL 350 Laboratory.

BIOL 353L. Flora of West Virginia Laboratory. 3 Hours.
PR: (BIOL 101 and BIOL 101L and BIOL 102 or BIOL 102L) or (BIOL 115 and BIOL 115L) or GEOG 307. Identification of local woody and herbaceous seed plants, with emphasis on common native and introduced species. Conducted primarily through field trips to nearby areas with the use of dichotomous keys to determine the scientific names of observed specimens.

BIOL 355. Understanding Climate Change. 3 Hours.
Fundamental understanding of the causes, consequences, and challenges of human-caused climate change. Provides students with both intuitive and quantitative understanding of the topic through lectures, readings, videos, demonstrations, homework exercises, writing assignments, and computer simulation models.

BIOL 361. Plant Ecology. 4 Hours.
PR: BIOL 221 and Coreq: BIOL 361L. Introduction to the four divisions of plant ecology, including physiological ecology, population ecology, community ecology and ecosystem ecology.

BIOL 361L. Plant Ecology Laboratory. 0 Hours.
PR: Corequisite of BIOL 361. Plant Ecology - BIOL 361 Laboratory.

BIOL 363. Plant Geography. 3 Hours.
PR: BIOL 221. World-wide distribution patterns of plants and factors related to these distributions, including dispersal. Limiting factors, climate, isolation, evolutionary history, plate tectonics, pleistocene glaciations, and human activities. Plant communities and soils of polar, temperate, and tropical biomes are discussed.

BIOL 365. Conservation Biology. 3 Hours.
PR: BIOL 221 or WMAN 313 and Coreq: BIOL 365L. Review of literature, research, and application of topics including biodiversity, endangered species, population biology, extinction, invasive species, conservation, restoration, and sustainability.

BIOL 365L. Conservation Biology Laboratory. 0 Hours.
PR: Corequisite of BIOL 365. Conservation Biology - BIOL 365 Laboratory.

BIOL 376L. Research Methods Laboratory. 3 Hours.
PR or CONC: BIOL 221. Introduction to the tools and mathematics that scientists use to solve scientific problems. Mathematical modeling, experimental design, hypothesis formulation, data collection, use of statistics, reading and evaluating the scientific literature, writing and reviewing scientific papers, and oral presentation of scientific research.

BIOL 386. Undergraduate Research. 1-4 Hours.
PR: Written consent of chair and a 2.7 grade point average in biology. (May be repeated for a maximum of 6 credit hours.) Individual laboratory or field experiments supervised by a faculty member.

BIOL 387. Experimental Design & Communication 1. 1 Hour.
PR: BIOL 327 with a minimum grade of C-. The second course in a three-course series providing professional development to Biology majors. This course focuses on proposal writing, advanced experimental design, critiques of scientific literature/ideas, and professional communication to non-scientific audiences.

BIOL 393. Special Topics. 1-6 Hours.
PR: Consent. Investigation of topics not covered in regularly scheduled courses.

BIOL 409. Biochemical Basis of Therapeutics. 3 Hours.
PR: BIOL 219. This course explores the process of drug discovery and development. The topics emphasized include the biological factors that determine success, failure, or limitation of therapeutics. Other topics include, specific therapeutic areas and regulation.

BIOL 410. Cell and Molecular Biology Methods. 3 Hours.
PR: BIOL 219. Introduction to the theory, application, ethic and economics of biotechnologies.

BIOL 411L. Introduction to Recombinant DNA Laboratory. 4 Hours.
PR: BIOL 219 and (BIOL 219L or BIOL 220). Introduction to basic principles and techniques of recombinant DNA technology. Includes molecular cloning, isolation of plasmid DNA, agarose/acrylamide gel electrophoresis, restriction enzyme mapping, nucleic acid hybridization, and DNA sequencing.

BIOL 413. Molecular Endocrinology. 3 Hours.
PR: BIOL 219. Hormonal action is discussed at the cellular and molecular levels. Topics include hormone production and regulation, receptor kinetics and activation, and receptor output.

BIOL 415. Epigenetics. 3 Hours.
PR: BIOL 219 or consent. Explores the molecular mechanisms, phenotypic phenomena and current applications of epigenetics and the study of how genetic information is used and maintained.

BIOL 418. Medical Genetics. 3 Hours.
PR: BIOL 219. The use of genetic principles to uncover biological mechanisms of both inherited and infectious diseases. The role of the human genome. The evolution of genetic diseases and the impact on human populations. Genetic medicine and current medical treatments.

BIOL 420. Genomics. 3 Hours.
PR: BIOL 219. Advanced elective examining biology and evolution on a genome-wide scale. Topics include fields of study and methods of DNA sequence acquisition and annotation, including exploration of the human genome and its contribution to disease discovery.

BIOL 421. Experimental Biochemistry. 2 Hours.
PR: AGBI 410 and PR or CONC: BIOL 423. Advanced biochemistry laboratory. Research and hypothesis design, manipulation of DNA and proteins, use of biochemical techniques to express protein and analyze function.

BIOL 422. Current Topics in Genome Biology. 1 Hour.
PR: BIOL 219. Exploration of modern topics in genomics research through interactive discussion of current literature. Students learn approaches to critical evaluation of manuscripts while exploring current research in this rapidly growing field. The course is organized around student-led discussions of manuscripts selected by the class. Undergraduate students are paired with graduate students to facilitate interpretation of complex material.

BIOL 423. Biochemistry of Nucleic Acids and Proteins. 3 Hours.
PR: AGBI 410 or equivalent. Focuses on the biochemistry of proteins and nucleic acids, with an emphasis on application of advanced knowledge to contemporary problems in cell biology, neuroscience, and immunology. Develops critical thinking, predictive, and problem-solving abilities that prepare students for health-related professional/graduate schools and the biotech industry.

BIOL 423L. Biochemistry of Nucleic Acids and Proteins Laboratory. 2 Hours.
PR: AGBI 410 and PR or CONC: BIOL 423. Advanced biochemistry laboratory. Research and hypothesis design, manipulation of DNA and proteins, use of biochemical techniques to express protein and analyze function.

BIOL 424. Protein Structure and Function. 4 Hours.
PR: BIOL 219 and (CHEM 231 or CHEM 233). Explores fundamentals of the protein structure; methods of structure determination; features of globular, membrane, and fibrous proteins; and approaches to protein classification.

BIOL 425. Developmental Genetics. 3 Hours.
PR: BIOL 219. This course covers the mechanisms by which genetics instructs the process of development. The complex interactions between cells, the environment, and the genome are presented.

BIOL 426. Molecular Biology of Cancer. 3 Hours.
PR: BIOL 219. Exploration of molecular pathways leading to the development of cancer with emphasis on gene expression, cell cycle regulation, and signaling pathways targeted in conventional therapies.

BIOL 430. Bioinformatics. 3 Hours.
PR: BIOL 219 or Consent. An introduction to algorithms and tools for analysis of genetic and genomic data in an evolutionary context.

BIOL 436. General Animal Physiology. 3 Hours.
PR: BIOL 221. In-depth, current treatment of physiological principles which operate at various levels of biological organization in animals of diverse taxonomic relationships. Understanding is developed from background lectures and student analyses in discussion sessions of research literature.

BIOL 438. Animal Behavior. 4 Hours.
PR: BIOL 221. Introduction to animal behavior (ethology) emphasizing the ecology and evolution of individual and social behaviors. Laboratory includes independent investigation of behavioral phenomena. (Offered in even numbered years.).

BIOL 439. Neuroethology. 3 Hours.
PR: BIOL 348 with a minimum grade of C-. Explores the way sensory systems process information to mediate behavior in a wide variety of animals in order to understand similarities and differences in neural mechanisms.

BIOL 440. Comparative Anatomy. 4 Hours.
PR: WVU sections require BIOL 219 and BIOL 221 or consent, WVUIT sections require BIOL 112. A functional and evolutionary study of vertebrate structure. (Dissection kit required.).

BIOL 448. Plant-Microbial Interactions. 3 Hours.
PR: BIOL 221. An exploration of how dynamic linkages between plants and soil microbes shape biological function at the organismal, ecosystem, and global scales.

BIOL 450. Plant Systematics. 4 Hours.
PR: BIOL 117 and (BIOL 117L or BIOL 118) and Coreq: BIOL 450L. Study of the taxonomy of flowering plants worldwide and related topics in angiosperm classification and evolution. Laboratories emphasize characteristics of selected families of monocotyledons and dicotyledons using living and herbarium material.

BIOL 450L. Plant Systematics Laboratory. 0 Hours.
PR: Corequisite of BIOL 450. Plant Systematics - BIOL 450 Laboratory.

BIOL 453. Molecular Basis of Disease. 3 Hours.
PR: BIOL 219. Examine medical, ethical, and legal/regulatory issues emerging from the Human Genome Project and its applications to personalized medicine.

BIOL 454. Immunology. 3 Hours.
PR: BIOL 240 or BIOL 219. Explores the fundamental principles and practices of immunology including how the immune system is organized, how it functions to keep us healthy, and how it can cause allergies and autoimmune disease.

BIOL 455. Evolution of Infectious Diseases. 3 Hours.
PR: BIOL 221. The application of phylogenetics, microbiology, immunology, and epidemiology towards understanding the evolution of infectious diseases. Students will develop a fundamental understanding of the significance of evolution and ecology in infectious disease emergence and control.

BIOL 456. Microbial Symbiosis. 3 Hours.
PR: BIOL 221. An understanding of the significance of microbial symbioses towards ecological and health processes will be developed. Molecular techniques used towards identifying the composition and functions of microbial communities will be discussed. (Also listed as BIOL 615.).

BIOL 457. Ecology of Parasites. 3 Hours.
PR: BIOL 219 and BIOL 220. An introduction to the wide diversity of evolved relationships between parasites and their hosts. This course incorporates topics such as gene regulation, cell signaling, animal physiology, and evolution into a complete picture of host/parasite interactions.

BIOL 461. Principles of Evolution. 3 Hours.
PR: BIOL 112 or BIOL 221. Introduction to the study of evolution, including genetics of evolutionary change, speciation and adaptation molecular evolution, the history of life, extinction, co-evolution and the origins of humans. Students on the Morgantown campus will be required to complete BIOL 221.

BIOL 462. Ecosystem Models. 3 Hours.
PR: BIOL 221. Students will gain an understanding of the theory and mechanics behind ecosystem model, including models that predict soil decomposition and photosynthesis, ecosystem and terrestrial biosphere models. Students will also learn basic coding behind these models.

BIOL 463. Global Ecology. 3 Hours.
PR: BIOL 221 or GEOG 307. The Earth viewed as a changing biogeochemical system. Topics include the structure, composition and dynamics of the ecosphere, nutrient cycles, changing atmospheric composition, climate change, ozone depletion, land-use change, biological invasions, and changes in biodiversity.

BIOL 464. Population and Quantitative Genetics. 3 Hours.
PR: BIOL 221 and Coreq: BIOL 464L. Relationship of gene and genotype frequencies in populations of diploid organisms and the effects of mutation, selection, and non-random mating in relation to single gene pairs. Application of these concepts to multigenic inheritance of quantitative traits.

BIOL 464L. Population Genetics Laboratory. 0 Hours.
PR: Corequisite of BIOL 464. Population Genetics - BIOL 464 Laboratory.

BIOL 474. Neurogenetics and Behavior. 3 Hours.
PR: BIOL 219 with a minimum grade of C-. Covers the principles and techniques that define the field of neurogenetics. Analyzes the development and function of the nervous system at cellular and molecular levels. Particular emphasis placed on genetic and environmental factors that contribute to human neurological disorders and the study of how genes control behavior.

BIOL 475. Neurobiological Diseases. 3 Hours.
PR: BIOL 348. The physiological mechanisms of neurobiological diseases. Impact of neurobiological diseases on society. Standard and experimental treatments. Current research.

BIOL 476. Computational Neuroscience. 4 Hours.
PR: BIOL 348 and Coreq: BIOL 476L. Tools and concepts used to probe and characterize the dynamics of neurons, neural networks and neural coding mechanisms. Lectures introducing concepts and discussion sessions focusing on current research literature complement computer laboratories where the student learns programming skills, analytical tools and neural modeling methods used in computational neuroscience research.

BIOL 476L. Computational Neuroscience Laboratory. 0 Hours.
PR: BIOL 348 and Coreq: BIOL 476. Computational Neuroscience - BIOL 476 Laboratory.

BIOL 477. Central Nervous System Evolution and Development. 3 Hours.
PR: BIOL 348. Origin and evolution of the central nervous system, focusing on developmental and genetic mechanisms underlying structural modifications that serve as the basis for the evolution of animal behavior.

BIOL 478. Sensory Neural Systems and Behavior. 3 Hours.
PR: BIOL 348 with a minimum grade of C-. Exploration of how brains acquire information about the external world and process this information to produce sensory perceptions. Students gain a deep understanding of sensory transduction and neural processing at the cellular, network and systems levels. Additionally the class is aimed at enhancing science communication.

BIOL 479. Principles of Systems Neuroscience. 3 Hours.
PR: BIOL 348. Fundamental principles of nervous system organization with an emphasis on interactions between neurons and the consequences for behavior. There will be a focus on recent advances in our understanding of each organizational principle.

BIOL 486. Honors Investigation and Thesis. 1-4 Hours.
(May be repeated for credit; max credit 12 hr.) PR: Second semester of junior year, recommendation of advisor, biology majors only. Permission required. Supervised readings, investigation, and study.

BIOL 487. Experimental Design & Communication 2. 1 Hour.
PR: BIOL 387 with a minimum grade of C-. The third course in a three-course series providing professional development to Biology majors. This course focuses on argumentation and synthesis skills, analysis and communication of experimental results, problem solving, science and its effect on society, and sociopolitical/ethical problems related to the field of biology.

BIOL 490. Teaching Practicum. 1-3 Hours.
PR: Consent. (May be repeated for a maximum of 9 credit hours.) Teaching practice as a tutor or assistant.

BIOL 491. Professional Field Experience. 1-18 Hours.
PR: Consent. (May be repeated up to a maximum of 18 hours.) Prearranged experiential learning program, to be planned, supervised, and evaluated for credit by faculty and field supervisors. Involves temporary placement with public or private enterprise for professional competence development.

BIOL 492. Directed Study. 1-3 Hours.
Directed study, reading, and/or research.

BIOL 493. Special Topics. 1-6 Hours.
PR: Consent. Investigation of topics not covered in regularly scheduled courses.

BIOL 494. Seminar. 1-3 Hours.
PR: Consent. Presentation and discussion of topics of mutual concern to students and faculty.

BIOL 495. Independent Study. 1-6 Hours.
Faculty supervised study of topics not available through regular course offerings.

BIOL 496. Senior Thesis. 1-3 Hours.
PR: Consent.

BIOL 497. Research. 1-6 Hours.
Independent research projects.

BIOL 498. Honors. 1-3 Hours.
PR: Students in Honors Program and consent by the honors director. Independent reading, study or research.