Biology

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The undergraduate curriculum in the Department of Biology is diverse and will meet a variety of interests in the rapidly expanding fields of the biological sciences. It is also designed to provide an intensive educational experience for students in other disciplines who have an interest in biology. In addition to courses offered in Macelwane Hall, the department offers courses at the University’s Reis Biological Station located by the Huzzah Creek in the Ozarks.

Programs

The department offers Bachelor of Arts (B.A.), Bachelor of Sciences (B.S.), and minor undergraduate degrees as well as MS, MA and Ph.D. graduate degrees. An Advanced Bachelors/Masters (ABM) degree in Bioinformatics and Computational Biology (in conjunction with the Department of Computer Science) is also available for undergraduates. Students who pursue either a major or minor in biology must have at least a 2.00 cumulative grade point average in prerequisite(s) for upper division courses in Biology. These are BIOL 1240/1245, BIOL 1260/1265 (8 credits); CHEM 1110/1115, CHEM 1120/1125 (8 credits).

Biology Major Continuation Standards

Students must have a minimum of a 2.0 GPA in their major courses (BIOL) and required related hours (Chemistry, Mathematics & Statistics, Physics etc.) by the conclusion of their freshman year. Students that fall below a 2.0 GPA will be placed on probation. If a student fails to obtain at least a 2.0 GPA in their major courses (BIOL) and required related hours by the conclusion of their sophomore year they will not be allowed to continue in the program.

Biology (B.A.) Requirements

The department offers a B.A. degree. This degree allows maximum flexibility in selecting upper division courses and will prepare students for entry-level employment in the life sciences, health professions, K-12 education and post-graduate advanced study (e.g., medical school, graduate school). The following Introductory and Upper-Division Biology Courses are required:

Required Introductory Courses
BIOL 1240 Principles of Biology I 3
BIOL 1245 Principles of Biology I Lab 1
BIOL 1260 Principles of Biology II 3
BIOL 1265 Principles of Biology II Lab 1
CHEM 1110 Introduction to Chemistry 1 3
CHEM 1115 Introduction to Chemistry 1 Lab 1
CHEM 1120 Introduction to Chemistry 2 3
BIOL 3010 Evolutionary Biology 3
BIOL 3020 Biochemistry and Molecular Biology 3
BIOL 3030 Principles of Genetics 3
BIOL 3040 Cell Structure and Function 3

In addition to these 12 credits, a minimum of 13 additional upper-division credits in Biology is required (25 in total). This includes at least one plant science course and a structured laboratory course (see list of elective courses below). All Biology majors are required to participate in first and second year mentoring sessions and meet with their mentor when in residence.

Note: A total of 3 credits of Independent Research (BIOL 4960), Library Project (BIOL 4970), and/or Advanced Independent Research (BIOL 4980) can be counted toward the B.A. degree. Note: these courses do not count as structured lab courses nor can they satisfy elective requirements.

Biology (B.S.) Requirements

The department offers five BS degree concentrations: Biological Science, Biological Chemistry & Molecular Biology, Cell Biology & Physiology, Plant Science, and Ecology, Evolution & Conservation. Each concentration requires the following Introductory and Upper-Division Biology Courses:

Required Introductory Courses
BIOL 1240 Principles of Biology I 3
BIOL 1245 Principles of Biology I Lab 1
BIOL 1260 Principles of Biology II 3
BIOL 1265 Principles of Biology II Lab 1
CHEM 1110 Introduction to Chemistry I 3
CHEM 1115 Introduction to Chemistry I Lab 1
CHEM 1120 Introduction to Chemistry II 3
CHEM 1125 Introduction to Chemistry II Lab 1
MATH 1510 Calculus I 4

Statistics course
MATH 1300 Elementary Statistics with Computers OR
BIOL 4790 Biometry 3-4

16 credits from the following courses:
CHEM 2410/2415 Prin. of Organic Chemistry 1+ Lab 3,1

Required Upper-Division Biology Courses
BIOL 3010 Evolutionary Biology 3
BIOL 3020 Biochemistry and Molecular Biology 3
BIOL 3030 Principles of Genetics 3

In addition to these 9 credits, a minimum of 26 upper-division credits of biology is required (35 in total). All B.S. students must complete at least three structured laboratory experiences with at least one from the CMDB category and one from the EEOB category of courses (see below). In addition, B.S. students must complete at least one plant science course and one of several Senior Inquiry options. All Biology majors are required to participate in first and second year mentoring sessions and meet with their mentor when in residence.

Senior Inquiry Options include:
BIOL 4910 Internship in Conservation 1-3
BIOL 4911 Integrative Bioinformatics Internship 1-3
BIOL 4912 Internship in Plant Science 1-3
BIOL 4970 Library Project 1-4
BIOL 4980 Advanced Independent Research 1-4
BIOL 4890 Comprehensive Examination 0
BIOL 5000-level course 3

Note: A total of 4 credits of Independent Research (BIOL 4960), Library Project (BIOL 4970), and/or Advanced Independent Research (BIOL 4980) can be counted toward the B.S. degree. Note: these courses do not count as structured lab courses nor can they satisfy elective requirements.

Biological Sciences Concentration

Required Upper-Division Biology Courses
BIOL 3040 Cell Structure and Function 3
CMDB Elective with Lab 4-5
EEOB Elective with Lab 4-5
Additional CMDB or EEOB Lab Course 1-5
Plant Course 3-4
Senior Inquiry 0-4
Electives up to 35

Biological Chemistry and Molecular Biology Concentration

Required Upper-Division Biology Courses
BIOL 3040 Cell Structure and Function 3

Two of:
BIOL 4030 Introduction to Genomics 3
BIOL 4070 Adv. Biochemistry 3
BIOL 4700 Molecular Biology 3
### Two of:
- BIOL 3060 Cell Structure & Function Lab 1
- BIOL 3100 Experiments in Genetics Lab 1
- BIOL 4050 Molecular Techniques Lab 2
- BIOL 4160 Microbial Ecology 4
- BIOL 4650 Microbiology Lab 2
- EEOB Elective with Lab 4-5
- Plant Course 3-4
- Senior Inquiry 0-4
- Electives up to 35

### Cell Biology & Physiology Concentration

#### Required Upper-Division Biology Courses
- BIOL 3040 Cell Structure and Function 3
- BIOL 4540 Human Cellular Physiology I 3

#### One of
- BIOL 3060 Cell Structure & Function Lab 1
- BIOL 4050 Molecular Techniques Lab 2
- BIOL 4610 Developmental Biology Lab 2
- BIOL 4650 Microbiology Lab 2

#### One of
- BIOL 3420 Comparative Anatomy 5
- BIOL 3470 Physiology Lab 2
- BIOL 4440 Histology 4
- EEOB Elective with Lab 4-5
- 2 CB&P Elective Courses (see below) 6-8
- Plant Course 3-4
- Senior Inquiry 0-4
- Electives up to 35

### Plant Science Concentration

#### Required Upper-Division Biology Courses
- BIOL 3040 Cell Structure and Function 3
- BIOL 3260 Biology of Plants & Fungi 4
- BIOL 3490 Plant Physiology 3
- BIOL 4090 Plant Ecology 3
- CMDB Elective Lab 1-5
- EEOB or CMBD Elective Lab 1-5
- Senior Inquiry 0-4
- Electives up to 35

### Ecology, Evolution & Conservation Concentration

#### Required Upper-Division Biology Courses
- BIOL 4750 General Ecology 4
- Plant Course 3-4
- Ecology (EC) Elective 3
- Evolution (EV) Elective 3
- Organismal (O) Elective 3
- Tools elective 2
- CMDB Elective with Lab 4-5
- EEOB Elective with Lab 4-5

### Senior Inquiry

- Electives 0-4

### Biology Elective Courses*

#### A. Cellular, Molecular & Developmental Biology
- BIOL 3060 Cell Structure and Function Laboratory 1
- BIOL 3100 Experiments in Genetics Laboratory 1
- BIOL 3420 Comparative Anatomy (EV, CB&P) 5
- BIOL 3470 General Physiology Laboratory 2
- BIOL 3480 Exercise Physiology (CB&P) 3
- BIOL 3490 Plant Physiology (CB&P) 3
- BIOL 4030 Introduction to Genomics 3
- BIOL 4050 Molecular Techniques Laboratory (T) 2
- BIOL 4070 Advanced Biochemistry 3
- BIOL 4080 Advanced Cell Biology (CB&P) 3
- BIOL 4150 Nerve Cell Mech. in Behavior (CB&P) 3
- BIOL 4160 Microbial Ecology (T) 4
- BIOL 4410 Comp. Animal Physiol. (EV, O, CB&P) 3
- BIOL 4440 Vertebrate Histology (CB&P) 4
- BIOL 4500 Introductory Endocrinology (CB&P) 3
- BIOL 4510 Behavioral Endocrinology (CB&P) 3
- BIOL 4540 Human Cellular Physiology I 3
- BIOL 4600 Developmental Biology (CB&P) 3
- BIOL 4610 Developmental Biology Lab 2
- BIOL 4630 Immunobiology (CB&P) 3
- BIOL 4640 Microbiology (O, CB&P) 3
- BIOL 4650 Microbiology Laboratory 2
- BIOL 4700 Molecular Biology 3
- BIOL 4720 Cancer Biology (CB&P) 3

#### B. Ecology, Evolutionary and Organismal Biology
- BIOL 3220 Biology of Invertebrates (O) 3
- BIOL 3260 Biology of Plants & Fungi (O) 4
- BIOL 3280 Ethnobotany (O) 3
- BIOL 3450 Economic Botany (O) 3
- BIOL 4010 Sex, Evolution and Behavior (EV) 3
- BIOL 4040 Pollination Biology (EV) 3
- BIOL 4090 Plant Ecology (EC) 3
- BIOL 4100 Natural History of Vertebrates (O) 4
- BIOL 4120 Field Botany (EV) 5
- BIOL 4130 Field Mammalogy (O) 5
- BIOL 4140 Field Ornithology (EC, O) 5
- BIOL 4160 Microbial Ecology (T) 4
- BIOL 4170 Intro to GIS (T) 3
- BIOL 4180 Intermediate GIS (T) 3
- BIOL 4190 GIS in Biology (T) 3
- BIOL 4200 Aquatic Ecology (EC) 4
- BIOL 4210 Biology and Classification of Orchids (O) 3
- BIOL 4260 Biology of Amphibians and Reptiles (O) 4
- BIOL 4280 Biology of Fishes (O) 4
- BIOL 4310 Biology of Birds (O) 4
- BIOL 4320 Cave Biology 4
- BIOL 4330 Spring Flora of the Ozarks (O) 4
- BIOL 4340 Systematic Biology (EV) 3
- BIOL 4350 Biology of Parasitic Organisms (O) 3
BIOL 4360 Animal Behavior (EC) 3
BIOL 4370 Animal Behavior Laboratory 1
BIOL 4380 Biology of Mammals (O) 4
BIOL 4390 Systematic Biology Laboratory 1
BIOL 4480 Conservation Biology (EC) 3
BIOL 4580 Applied Population Genetics (EV) 3
BIOL 4670 Population Biology (EC) 3
BIOL 4750 General Ecology 4
BIOL 4770 Coevolution (EV) 3
BIOL 4780 Molecular Phylogenetic Analysis (T) 4

* Courses that satisfy the plant requirement are in italics

Reduced College Core Requirements
Students pursuing a B.S. degree are eligible to reduce the number of credits in Philosophy (from 9 to 6), Theology (from 9 to 6), English Literature (from 6 to 3), and Language (from 9 to 6). Note: Students that drop out of the B.S. degree program and seek a B.A. must fulfill the standard set of college core requirements.

Minor
A minor in Biology may be obtained by students who complete the following prerequisite courses: BIOL 1240/1245 and 1260/1265 or equivalents (8 credits) and CHEM 1110/1115 and 1120/1125 or equivalents (8 credits), and a minimum of 12 credits of upper-division Biology electives selected from BIOL 3010 through BIOL 4790. For all courses taken as part of the minor, a student must have earned at least a 2.00 grade point average.

Required Courses
BIOL 1240 Principles of Biology I 3
BIOL 1245 Principles of Biology I Lab 1
BIOL 1260 Principles of Biology II 3
BIOL 1265 Principles of Biology II Lab 1
CHEM 1110 Introduction to Chemistry 1 3
CHEM 1115 Introduction to Chemistry 1 Lab 1
CHEM 1120 Introduction to Chemistry 2 3
CHEM 1125 Introduction to Chemistry 2 Lab 1

Elective Courses
12 credits of upper division (BIOL 3010 – BIOL 4790) electives

In accordance with Arts and Sciences graduation requirements, a student must earn an overall 2.00 grade point average in all major and minor (certificate or related) courses that are approved for completion of their degree program