

# Biology/Botany

## PROGRAM OBJECTIVES

The Biology/Botany degree provides knowledge of the biological sciences necessary for students pursuing careers, graduate study, or professional study for which a baccalaureate degree is appropriate.

The courses provide knowledge needed by students in related fields, such as nursing, secondary education, wildlife, agriculture, and forestry, as well as providing knowledge desired by students majoring in other disciplines both within and outside of the School of Arts and Sciences. Other objectives include emphasizing to students the importance of experience and proficiency in several sciences; helping students develop and use precise, critical and independent thought; increasing students' perception, understanding, and appreciation of themselves and their environment; creating in students an awareness of and interest in the role of biological sciences in meeting social and economic needs; and to make available residents of Eastern Oregon the individual and combined resources of the biology faculty.

## LEARNING OUTCOMES

**Students completing a major in biology will be able to:**

- Demonstrate knowledge of fundamental organism structure, function, and systematics.
- Utilize the principles of Mendelian genetics and molecular biology to think critically and solve problems.
- Demonstrate an understanding of basic ecology.
- Demonstrate an understanding of physiology at the level of the cell and the organism.
- Demonstrate an understanding of general chemistry, organic chemistry, general physics, mathematics, and statistics.
- Demonstrate the ability to write a scientific research paper.
- Demonstrate an understanding of the central role evolution plays in all areas of biology.
- Complete the University Writing Requirement.
- Demonstrate the ability to use computers and software by completing computer assignments in lab courses.

## MEANS OF ASSESSMENT

Students will be assessed using a number of criteria. First, all students completing a biology major must do so with an overall minimum GPA of 2.00 and no grade lower than a "C-" in required biology courses. Second, students must complete all homework, writing assignments, exams, and other assigned work as required for each course. Third, students will be required to demonstrate problem-solving and critical-thinking skills in a wide variety of upper division lecture and lab courses. Finally, students will be required in several mandatory courses to research and summarize current research both in the primary literature and in review articles.

## REQUIREMENTS FOR THE BACHELOR OF ARTS OR THE BACHELOR OF SCIENCE IN BIOLOGY

1. Complete Eastern graduation requirements.
2. Complete a minimum of 51 hours of biology courses with a grade of "C-" or better in each required course, including:

a. One of the following introduction sequences:

- BIOL 211, 212, 213** Prin of Biology (15)  
or
- \*BOT 201, 202 203** Plant Biology (15)  
or
- \*BOT 201, 202, BIOL 334** Plant Tax (15)  
or
- \*BIOL 211, BOT 202, BIOL 334** (15)

b. Each of the following principles courses:

- BIOL 341, 342** Genetics (8)
- BIOL 357** General Ecology (4)
- BIOL 358** General Ecology Lab (1)
- BIOL 431** Cell Structure and Function (5)
- BIOL 432** Animal Physiology (5)  
or
- BIOL 433** Plant Physiology (5)
- BIOL 490** Evolution (3)

c. At least 10 hours selected from the following list of organism courses:

- BIOL 317, 318** Vertebrate Structure (10)
- BIOL 320** Ornithology (2)
- BIOL 321** Mammalogy (2)
- BIOL 323** General Microbiology (5)

- \***BIOL 334** Plant Taxonomy (5)
- BIOL 347** Invertebrate Zoology (5)
- \***BIOL 421** Agrostology (4)

If any of these sequences are taken instead of **BIOL 211, 212, 213** as the introductory sequence, then **BIOL 334** and **BIOL 421** cannot be used to satisfy the 10-hour organism course requirement.

3. Complete at least one course in Plant Biology.
4. Complete General Chemistry (**CHEM 204, 205, 206**; 15 hours) and Organic Chemistry (**CHEM 334, 335, 336**; 12 hours).
5. Complete one of the following: one term of General Physics (**PHYS 201, 202 or 203**; 4 hours) or one course in calculus (4 hours; may not also be counted toward the 12 hour mathematics requirement) or one course in computer programming (4 hours).
6. Complete 12 hours of mathematics at or above the level of **Math 111** (may include up to 6 hours of computer science at or above the 200 level). Statistics (**STAT 315 or STAT 327** or the equivalent) must be included in the 12 hours.
7. Obtain a GPA of 2.00 for all biology courses in addition to at least a "C-" in all required biology courses.

## TYPICAL FIRST YEAR CURRICULUM

### Fall

- BIOL 211** Principles of Biology (5) [1]
- CHEM 204** General Chemistry (5) [2]
- General Education & Elective Courses (5) [3]
- MATH 111** or above

### Winter

- BIOL 212** Principles of Biology (5) [1]
- CHEM 205** General Chemistry (5) [2]
- General Education & Elective Courses (6) [3]
- MATH 111** or above

### Spring

- BIOL 213** Principles of Biology (5) [1]
- CHEM 206** Qualitative Analysis (5) [2]
- General Education & Elective Courses (6) [3]

## TYPICAL SECOND YEAR CURRICULUM

### Fall

- CHEM 334** Organic Chemistry I (4)
- General Education or Elective Courses (8) [3]
- Organism Course (5) – optional

### Winter

- CHEM 335** Organic Chemistry II (4)
- Organism Course (5) - optional

General Education or Elective Courses (8) [3]

### Spring

- CHEM 336** Organic Chemistry III (4)
- Organism Course (2-5) - optional
- General Education or Elective Courses (13) [3]
- STAT 315** or **STAT 327** (4 or 5)

## TYPICAL THIRD YEAR CURRICULUM

### Fall

- PHYS 201** Introduction to Physics (4)
- General Education and Elective Courses (12) [3]

### Winter

- BIOL 341** Genetics (4)
- General Education and Elective Courses (11) [3]

### Spring

- BIOL 342** Genetics (4)
- BIOL 357** Ecology (4)
- BIOL 358** Ecology Laboratory (1)
- General Education and Elective Courses (7) [3]

## TYPICAL FOURTH YEAR CURRICULUM

### Fall

- BIOL 431** Cell Structure & Function (5)
- General Education or Elective Courses (10) [3]

### Winter

- BIOL 432** Animal Physiology (5) OR
- BIOL 433** Plant Physiology (5)
- General Education or Elective Courses (11) [3]

### Spring

- BIOL 490** Evolution (3)
- General Education or Elective Courses (13) [3]

### Note:

[1] Must have completed or be concurrently enrolled in a college level chemistry sequence.

[2] Students not meeting admission requirements to **CHEM 204, 205** should take appropriate level math and general education courses and perhaps **CHEM 101, 102, 103**.

[3] Selected to meet general education requirements or to meet biology program requirement of one year of mathematics at or above the level of **Math 111**.

# REQUIREMENTS FOR THE MINOR IN BIOLOGY

This minor is also available via the Division of Distance Education

1. A minimum of 30 graded credit hours in biology, including at least 15 upper division hours, selected from the following:

a. One of the following introduction sequences:

**BIOL 211, 212, 213** Prin of Biology (15)

or

**\*BOT 201, 202 203** Plant Biology(15)

or

**\*BOT 201, 202, BIOL 334** Plant Tax (15)

or

**\*BIOL 211, BOT 202, BIOL 334** (15)

b. At least one organism course, such as:

**BIOL 317** Vertebrate Structure (5)

**BIOL 318** Vertebrate Structure (5)

**BIOL 320** Ornithology (2)

**BIOL 321** Mammalogy (2)

**BIOL 323** General Microbiology (5)

**\*BIOL 334** Plant Taxonomy (5)

**BIOL 347** Invertebrate Zoology (5)

**\*BIOL 421** Agrostology (4)

\*If **BOT 202** and **BIOL 334** are taken as the introductory sequence, then **BIOL 334** and **BIOL 421** cannot be used to satisfy this requirement.

c. At least one principles course, such as:

**BIOL 319** Vertebrate Natural History (3)

**BIOL 341** Genetics (4)

**BIOL 342** Genetics (4)

**BIOL 350** Animal Behavior (4)

**BIOL 357** General Ecology (4)

**BIOL 431** Cell Structure and Function (5)

**BIOL 432** Animal Physiology (5)

**BIOL 433** Plant Physiology (5)

**BIOL 445** Immunology (3)

2. A grade of "C-" or better in each course counting toward the minor. Obtain an overall GPA of 2.00 for all biology courses counting toward the minor.

3. A minimum of 10 hours counting toward the minor must be completed at Eastern Oregon University.

## BIOLOGY COURSE DESCRIPTIONS

**BIOL 101 - Intro to Biology\*N/NW Credits: 3.00**

**Gen Ed-Natural Science**

**New Gen Ed-Natural World**

Integrated study of biology including a discussion of the nature of science, evolution, cell biology,

genetics, physiology and ecology of plants and animals, including man. Prerequisites: BIOL 101: MATH 070

**BIOL 101R - Intro Biol Recit Credits: .00**

**BIOL 102 - Intro to Biology\*N/NW Credits: 3.00**

**Gen Ed-Natural Science**

**New Gen Ed-Natural World**

Integrated study of biology including a discussion of the nature of science, evolution, cell biology, genetics, physiology and ecology of plants and animals, including man. Prerequisites: BIOL 102: MATH 070, BIOL 101

**BIOL 103 - Intro to Biology\*N/NW Credits: 3.00**

**Gen Ed-Natural Science**

**New Gen Ed-Natural World**

Integrated study of biology including a discussion of the nature of science, evolution, cell biology, genetics, physiology and ecology of plants and animals, including man. Prerequisites: BIOL 103: MATH 070, BIOL 101, 102

**BIOL 104 - Intro Biol Lab\*N/NW**

**Credits: 1.00**

**Gen Ed-Natural Science**

**New Gen Ed-Natural World**

Survey of biological laboratory topics for the non-major student. Prerequisite: BIOL 102 or equivalent.

**BIOL 110 - Selected Topics Credits: 1.00 to 6.00**

**BIOL 210 - Selected Topics Credits: 1.00 to 6.00**

Topics of current interest to students and faculty.

**BIOL 211 - Prin of Biology\*N/NW Credits: 5.00**

**Gen Ed-Natural Science**

**New Gen Ed-Natural World**

Basic concepts of modern biology. 211-Cellular chemistry, biochemistry, cell biology, and genetics; 212-Molecular and developmental biology, evolution, morphology and diversity of major taxonomic groups; 213-Plant and animal physiology, ecology, and animal behavior. Prerequisites:BIOL 211: Co-requisite: CHEM 204 (preferred) or CHEM 101.

**BIOL 211L - Prin of Biol Lab Credits: .00**

**BIOL 212 - Prin of Biology\*N/NW Credits: 5.00**

**Gen Ed-Natural Science**

**New Gen Ed-Natural World**

Basic concepts of modern biology. 211-Cellular chemistry, biochemistry, cell biology, and genetics; 212-Molecular and developmental biology, evolution, morphology and diversity of major taxonomic groups; 213-Plant and animal physiology, ecology, and animal behavior. Prerequisites:BIOL 212: BIOL 211, and co-requisite: CHEM 205 (preferred) or CHEM 102.

**BIOL 212L - Prin of Biol Lab Credits: .00**

**BIOL 213 - Prin of Biology\*N/NW Credits: 5.00****Gen Ed-Natural Science****New Gen Ed-Natural World**

Basic concepts of modern biology. 211-Cellular chemistry, biochemistry, cell biology, and genetics; 212-Molecular and developmental biology, evolution, morphology and diversity of major taxonomic groups; 213-Plant and animal physiology, ecology, and animal behavior. Prerequisites:BIOL 213: BIOL 211 and BIOL 212, college level chemistry.

**BIOL 213L - Prin of Biol Lab Credits: .00****BIOL 221 - Intro Microbiol Credits: 4.00****BIOL 221L - Intro Micro Lab Credits: .00****BIOL 231 - Human Anat & Physiology Credits: 4.00**

Introduction to the principles of human anatomy and physiology. Includes cell biology, histology, nervous integument, skeletal, and muscle anatomy and physiology. The cat is used as an anatomical model and the student is used for the physiological portion in the laboratory segment of this course. Prerequisite: CHEM 103.

**BIOL 231L - Hum Anat/Phys Lab Credits: .00****BIOL 232 - Human Anat & Physiology Credits: 4.00**

Continuation of the principles of human anatomy and physiology. Includes the anatomy and physiology of the circulatory, respiratory, renal, digestive, reproductive and endocrine systems. The cat is used as an anatomical model and the student is used for the physiological portion in the laboratory segment of this course. Prerequisite: BIOL 231.

**BIOL 232L - Hum Anat/Phys Lab Credits: .00****BIOL 234 - Intro Microbiology Credits: 4.00**

Basic microbiology emphasizing bacteria and viruses, functions of the immune response in preventing and promoting disease, survey of microorganisms pathogenic to humans, laboratory methods for handling and studying bacteria. Prerequisites: CHEM 101, 102, 103.

**BIOL 234L - Intro Microbiol Lab Credits: .00****BIOL 310 - Selected Topics Credits: 1.00 to 6.00**

Topics of current interest to the general public. Prerequisites: An introductory biology sequence for majors or non-majors.

**BIOL 310L - Biology 310L Credits: .00****BIOL 317 - Vertebrate Structure Credits: 5.00**

Taxonomy, evolution, comparative anatomy, and histology of the vertebrates. Prerequisites: A majors-level biology sequence.

Restrictions:

**BIOL 317L - Vertebrate Struct Lab Credits: .00**

Restrictions: May not be enrolled in one of the following Class(es): Freshman

**BIOL 318 - Vertebrate Structure Credits: 5.00**

Taxonomy, evolution, comparative anatomy, and histology of the vertebrates. Prerequisites: A majors-level biology sequence. BIOL 317 prerequisite for BIOL 318.

Restrictions: May not be enrolled in one of the following Class(es): Freshman

**BIOL 318L - Vertebrate Struct Lab Credits: .00**

Restrictions: May not be enrolled in one of the following Class(es): Freshman

**BIOL 319 - Vertebrate Natural Hist Credits: 3.00**

Ecology and behavior of vertebrates including temperature and moisture adaptations, feeding, communication, reproduction, and zoogeography. Prerequisites: A majors-level biology sequence\*.

Restrictions: May not be enrolled in one of the following Class(es): Freshman

**BIOL 320 - Ornithology Credits: 2.00**

Taxonomy, natural history, and identification of birds, emphasizing local species. Prerequisites: A majors-level biology sequence\*.

Restrictions: May not be enrolled in one of the following Class(es): Freshman

**BIOL 321 - Mammalogy Credits: 2.00**

Taxonomy, natural history, and identification of mammals, emphasizing local species. Prerequisites: A majors-level biology sequence\*.

**BIOL 323 - General Microbiology Credits: 5.00**

Survey of prokaryotic and eukaryotic microorganisms emphasizing bacteria and viruses. Classification, evolution, cytology, genetics, physiology, and ecology of microorganisms; laboratory techniques for isolating, culturing, and identifying microorganisms. Prerequisites: A majors-level general biology or principles sequence\*.

Restrictions: May not be enrolled in one of the following Class(es): Freshman

**BIOL 323L - Gen Microbiology Lab Credits: .00**

Restrictions: May not be enrolled in one of the following Class(es): Freshman

**BIOL 334 - Plant Taxonomy Credits: 5.00**

Principles of plant classification, collection and identification. Prerequisites: BIOL 211, 212, 213; or BIOL 101 or BOT 201, BOT 202.

Restrictions: May not be enrolled in one of the following Class(es): Freshman, Sophomore

**BIOL 334L - Plant Tax Lab Credits: .00**

Restrictions: May not be enrolled in one of the following Class(es): Freshman, Sophomore

**BIOL 341 - Genetics Credits: 4.00**

Classical and modern principles of genetics emphasizing experimental design and interpretation. Prerequisites: A majors-level biology sequence\*; and junior class standing.

Restrictions: May not be enrolled in one of the following Class(es): Freshman, Sophomore

**BIOL 341L - Genetics Lab Credits: .00**

Restrictions: May not be enrolled in one of the following Class(es): Freshman, Sophomore

**BIOL 342 - Genetics Credits: 4.00**

Classical and modern principles of genetics emphasizing experimental design and interpretation. Prerequisites: A majors-level biology sequence\*; and junior class standing. BIOL 341 and CHEM 334 prerequisites for BIOL 342.

Restrictions: May not be enrolled in one of the following Class(es): Freshman, Sophomore

**BIOL 342L - Genetics Lab Credits: .00**

Restrictions: May not be enrolled in one of the following Class(es): Freshman, Sophomore

**BIOL 347 - Invertebrate Zoo Credits: 5.00**

Introduction to the comparative biology of the invertebrates with an emphasis on taxonomy, evolution, and comparative anatomy. Includes an introduction to the principles of parasitology. Prerequisites: A majors-level biology sequence\*.

Restrictions: May not be enrolled in one of the following Class(es): Freshman

**BIOL 347L - Invert Zoo Lab Credits: .00**

Restrictions: May not be enrolled in one of the following Class(es): Freshman

**BIOL 350 - Animal Behavior Credits: 4.00**

Evolutionary approach to the proximate and ultimate causes of behavior, including instincts and learning, sensory perception, behavioral control and organization, and the adaptiveness of behavior. Prerequisites: A majors-level biology sequence\*.

Restrictions: May not be enrolled in one of the following Class(es): Freshman

**BIOL 357 - Gen Ecology Credits: 4.00**

An introduction to the principles of ecology including organism adaptations, population ecology, and community structure and function. Prerequisites: A majors level biology sequence and Junior class standing.

Restrictions: May not be enrolled in one of the following Class(es): Freshman, Sophomore

**BIOL 358 - Gen Ecology Lab Credits: 1.00**

**(Writing Intensive)** An introduction to ecological methods, data analysis, and scientific writing. Prerequisites or co-requisite: BIOL 357, STAT 315 or STAT 327 (preferred).

Restrictions: May not be enrolled in one of the following Class(es): Freshman

**BIOL 401 - BIOL 401 Credits: 1.00 to 15.00**

Restrictions: May not be enrolled in one of the following Class(es): Freshman, Sophomore

**BIOL 402 - Service Learning In Biology Credits: 1.00 to 5.00**

Students will partner with a biology faculty member and a nonprofit or government organization to

complete a service project involving the biological sciences. Prerequisite: BIOL 211, 212, 213.

Restrictions: May not be enrolled in one of the following Class(es): Freshman, Sophomore

**BIOL 405 - Reading & Conference Credits: 1.00 to 15.00**

Restrictions: May not be enrolled in one of the following Class(es): Freshman, Sophomore

**BIOL 407 - Seminar Credits: 1.00 to 15.00**

**(Writing Intensive)** Student lectures and written papers on aspects of a broad topic of interest. Prerequisites: BIOL 211, 212, 213; or BIOL 101, BOT 202, BIOL 334; and junior class standing.

Restrictions: May not be enrolled in one of the following Class(es): Freshman, Sophomore

**BIOL 409 - Practicum/Internship Credits: 1.00 to 5.00**

Students will partner with a biology faculty member and a nonprofit or government organization to complete a practicum experience in the biological sciences.

Restrictions: May not be enrolled in one of the following Class(es): Freshman, Sophomore

**BIOL 410 - Selected Topics Credits: 1.00 to 6.00**

Topics of current interest to students and faculty. Prerequisites: A majors-level biology sequence\*; and junior class standing.

Restrictions: May not be enrolled in one of the following Class(es): Freshman, Sophomore

**BIOL 410L - BIOL 410L Credits: .00**

Restrictions: May not be enrolled in one of the following Class(es): Freshman, Sophomore

**BIOL 421 - Agrostology Credits: 4.00**

Classification and identification of grasses of the United States. Prerequisite: BIOL 334 or BOT 203.

Restrictions: May not be enrolled in one of the following Class(es): Freshman, Sophomore

**BIOL 431 - Cell Struct/Function Credits: 5.00**

Intensive study of the structure and function of biological systems from the molecular to the tissue level. Emphasizes the molecular biology of cells and the regulatory mechanisms for biochemical and physiological processes. Prerequisites: A majors-level biology sequence\*; CHEM 334 and junior class standing.

Restrictions: May not be enrolled in one of the following Class(es): Freshman, Sophomore

**BIOL 432 - Animal Physiology Credits: 5.00**

**(Writing Intensive)** Principles of animal physiology, emphasizing homeostatic control mechanisms, functional, and fundamental inter-relationships between interacting systems in various invertebrate and vertebrate animals. Emphasizes research approaches. Prerequisites: BIOL 431; and junior class standing.

Restrictions: May not be enrolled in one of the following Class(es): Freshman, Sophomore

**BIOL 432L - Animal Phys Lab Credits: .00**  
Restrictions: May not be enrolled in one of the following Class(es): Freshman, Sophomore

**BIOL 433 - Plant Physiology Credits: 5.00 (Writing Intensive)** Physical and biochemical processes of plant functions, including water relations, photosynthesis, and growth and development. Prerequisites: BIOL 211, 212, 213; or BIOL 101 or BOT 201, BOT 202.  
Restrictions: May not be enrolled in one of the following Class(es): Freshman, Sophomore

**BIOL 433L - Plant Phys Lab Credits: .00**  
Restrictions: May not be enrolled in one of the following Class(es): Freshman, Sophomore

**BIOL 445 - Immunology Credits: 3.00**  
Fundamentals of immunochemistry, cellular immunology, and immunogenetics; current applications of immunological techniques; immune system dysfunctions and immunologically-related diseases. Prerequisites: A majors-level biology sequence\*; CHEM 334; and junior class standing.  
Restrictions: May not be enrolled in one of the following Class(es): Freshman, Sophomore

**BIOL 490 - Evolution Credits: 3.00 (Writing Intensive, Capstone)** A capstone experience in biology providing a synthesis of the principles of biology in the context of evolutionary theory. Prerequisites: BIOL 357, 341, 342, 431, and 432 or 433; and senior class standing.  
Restrictions: May not be enrolled in one of the following Class(es): Freshman, Junior, Sophomore

**BIOL 505 - Reading & Conference Credits: 1.00 to 15.00**  
Restrictions: May not be enrolled in one of the following Level(s): Denied Adm Undergraduate, Non-Admitted Undergraduate, Undergraduate. Must be enrolled in one of the following Class(es): Graduate, Non-Admitted Graduate, Post-Baccalaureate

**BIOL 510 - Selected Topics Credits: 1.00 to 6.00**  
Topics of current interest. Taught only during summer session. Prerequisites: An introductory sequence in biology; graduate standing.  
Restrictions: May not be enrolled in one of the following Level(s): Denied Adm Undergraduate, Non-Admitted Undergraduate, Undergraduate. Must be enrolled in one of the following Class(es): Graduate, Non-Admitted Graduate, Post-Baccalaureate

## **BOTANY COURSE DESCRIPTIONS**

**BOT 201 - Plant Biology I\*N/NW Credits: 5.00**  
**Gen Ed-Natural Science**  
**New Gen Ed-Natural World**  
Introduction to plant cell structure and function.  
Prerequisite: None.

**BOT 202 - Plant Biol II\*N/NW Credits: 5.00**  
**Gen Ed-Natural Science**  
**New Gen Ed-Natural World**  
Comparative biology of plants. A survey of the plant kingdoms emphasizing life cycles, morphological features and anatomy. Prerequisite: BIOL 101 or BIOL 211.

**BOT 203 - Plant Biology\**NW* Credits: 5.00**  
**New Gen Ed-Natural World**  
Vascular plant taxonomy and spring flower identification. Prerequisite: BIOL 101, 102 OR BIOL 211, 212 OR BOT 201, 202.

**BOT 350 - Intro Plant Path Credits: 4.00**  
WINTER, EVEN YEARS. This is an OSU class.  
Infectious and noninfectious plant diseases; nature of pathogens and pathogenesis; influence of environment, and principles of control. Prerequisite: Introductory botany or biology.

**BOT 350L - Intro Plant Path Lab Credits: .00**  
WINTER. EVEN YEARS. This is an OSU class.