

Common Course Outline for: BIOL 2206 Ecology

A. Course Description

1. Number of credits: 4
2. Lecture hours per week: 3
Lab hours per week: 3
3. Prerequisites: BIOL 1502 (C or higher)
4. Co-requisites: None
5. MnTC Goals: 3 and 10

This course is designed for students majoring in biology. Students will explore ecological concepts and the scientific research that has built our understanding of interactions in nature at the organismal, population, community, ecosystem, and global levels. Students will acquire an understanding of how the different levels of ecology are studied, how these levels relate to each other, and what properties are important at increasing levels of complexity. Additional topics include evolutionary ecology and contemporary environmental change and its consequences. Students will engage in techniques appropriate to ecological study and gain experience in experimental design, data analysis and interpretation, and the communication of results. This course meets a requirement for the Biology (Minnesota State Transfer Pathway) AS-P degree. Lab requires field trips on and off campus which might include required field trips on prescribed dates. Lecture 3 hours per week. Lab 3 hours per week.

B. Date last revised: August 2019

C. Outline of Major Content Areas

Lecture: Subtopics listed under each main topic may vary due to recent developments in the field and current events.

1. History and development of ecology as a science
2. The physical environment
3. Physiological ecology
 - a. Coping with environmental variation
4. Evolutionary ecology
 - a. Life history
 - b. Behavioral ecology
 - c. Evolution and ecology
 - d. Classification and nomenclature
5. Population ecology
 - a. Distribution and abundance
 - b. Population growth and regulation
6. Species interactions

- a. Competition
- b. Predation and herbivory
- c. Parasitism
- d. Mutualism and commensalism
- 7. Community ecology
 - a. Community structure and dynamics
 - b. Ecological succession
 - c. Biogeography
 - d. Species diversity
- 8. Ecosystem ecology
 - a. Energetics
 - b. Energy flow and food webs
 - c. Nutrient supply and cycling
- 9. Applied and large-scale ecology
 - a. Conservation biology
 - b. Landscape ecology and ecosystem management
 - c. Global ecology
 - d. Biogeochemistry
- 10. Contemporary ecological issues
 - a. Biodiversity loss
 - b. Climate change

Laboratory: Laboratory and field ecology experiences may vary, depending on weather and resources available for field work. This will also apply to the amount of emphasis given to the different levels of organization in ecology. Students will actively participate in lab by applying the scientific process to studies related to:

- 1. Microscopy
- 2. Population ecology: factors that regulate population growth
- 3. Physiological ecology: coping with environmental variation
- 4. Community ecology
 - a. Species interactions
 - b. Species diversity
- 5. Ecosystem ecology
 - a. Energy flow and food webs
 - b. Nutrient cycling and decomposition
 - c. Water quality
 - d. Soil ecology
- 6. Minnesota biomes
- 7. Aquatic habitats
- 8. Ecological modeling and statistical analysis
- 9. Phenology
- 10. Paleoecology
 - a. Dendroecology
- 11. Winter ecology

D. Course Learning Outcomes

Upon successful completion of the course, the student will be able to:

1. Understand and apply knowledge of the relationships of organisms with their environment at the level of the individual, population, community, ecosystem, and biosphere. (2a, 3a, 10a)
2. Use critical thinking skills to understand, evaluate, and analyze ecological processes and interactions. (2a, 2b, 2c, 2d, 3a, 10a, 10d)
3. Demonstrate ability to select a sampling method, plan a sampling regime, and apply relevant statistics tests to ecological data. (2a, 2b, 2c, 2d, 3b)
4. Formulate a hypothesis, and conduct and analyze an ecological experiment. (2a, 2b, 2c, 2d, 3b)
5. Organize, draft, edit, and revise formal scientific writing. (3c)
6. Read, interpret, incorporate, and cite information and ideas from primary literature into writing. (2a, 2c, 3a, 3c)
7. Utilize and understand the value to human society of ecological modeling, monitoring, and restoration. (2a, 2b, 2c, 2d, 3d, 10c, 10d, 10e, 10f)

E. Methods for Assessing Student Learning

A variety of evaluation and assessments methods will be used including, but not limited to, the following:

1. Examinations (multiple choice, true-false, fill-in-the-blank, matching, short answer and critical thinking questions)
2. Quizzes
3. Poster and/or oral presentations
4. Laboratory and field reports, including formal scientific writing
5. A final comprehensive exam

F. Special Information

The laboratory portion of the course is delivered in the Biology Learning Center (BLC). The BLC has its own set of operating policies and procedures. An instructor will include the most recent version of the Departmental and Biology Learning Center Policies in the course syllabus.

One or more labs may require the use of Biosafety Level 2 standards.

Laboratory procedures require the handling, treatment and preservation of macroinvertebrates; there are no exceptions or alternate activities.

Lab requires field trips on and off campus which might include required field trips on prescribed dates.