

Course discipline/number/title: BIOL 2000: Ecology

A. CATALOG DESCRIPTION

1. Credits: 4
2. Hours/Week: 3 Lecture, 2 lab
3. Prerequisites (Course discipline/number): BIOL 1100 or BIOL 1101 or BIOL 1102 or BIOL 1220
4. Other requirements: None
5. MnTC Goals (if any): Goal/3 Natural Sciences, Goal 10/People and the Environment

B. COURSE DESCRIPTION: This course teaches the basic principles of organismal, population, community, and ecosystem ecology, with an emphasis on applied ecology. The course is designed so that at the conclusion of the course students will have an appreciation and understanding of the principles of ecology and be able to: (1) explain the various biotic and abiotic forces acting on an organism in its natural environment, (2) determine the importance of these forces under varying conditions, and (3) predict how human activities may alter the effects of these forces. The lab portion of this course reemphasizes lecture concepts and offers hands-on experience with the concepts in the lab and/or field setting.

C. DATE LAST REVISED (Month, year): February, 2019

D. OUTLINE OF MAJOR CONTENT AREAS:

1. Life and the Physical Environment
  - a) Abiotic and biotic factors
  - b) Variations in the physical environment
  - c) Levels of organization
  - d) Biological communities
  - e) Ecological niche
  - f) Geographical patterns
  - g) Biomes
2. Ecosystems
  - a) Nutrients and biogeochemical cycles
  - b) Food webs and trophic structure
  - c) Primary and secondary production
3. Organisms
  - a) Adaptations to life in varying environments
  - b) Life histories and evolutionary fitness
4. Populations
  - a) Demography
  - b) Life tables and survivorship
  - c) Life history patterns
  - d) Distributions
  - e) Population structures
  - f) Population growth models: density dependent and density independent
  - g) Population dynamics
  - h) Population genetics
  - i) Natural Selection
  - j) Speciation
5. Species Interactions
  - a) Competition: interspecific and intraspecific
  - b) Mutualism
  - c) Commensalism
  - d) Parasitism
  - e) Predation and predator-prey relationships

- D. OUTLINE OF MAJOR CONTENT AREAS: Continued. . .
- f) Coevolution
6. Communities
- a) Community Structure
  - b) Community Development
  - c) Succession
  - d) Biodiversity
  - e) Island Biogeography
  - f) Species Richness
7. Ecological Applications
- a) Conservation
  - b) Ecological crisis
  - c) Sustainability
- E. LEARNING OUTCOMES (GENERAL): The student will be able to:
1. Explain role of environmental factors including a rapidly changing climate on species distributions and abundance patterns;
  2. Model and analyze characteristics of populations (e.g., population growth, predator-prey cycles, age structure, life history);
  3. Explain species-to-species interactions (e.g., competition, predation, parasitism, niche partitioning);
  4. Summarize characteristics of communities (e.g., trophic relationships, succession, effects of disturbance.);
  5. Summarize characteristics of ecosystems (e.g., energy flow, biogeochemical cycles, biodiversity, complexity vs. stability, etc.);
  6. Explain the significance of Island Biogeography and the species-area relationship to Conservation Biology
  7. Explain evolution and defend as the unifying principle of biological science;
  8. Explain the processes and mechanisms of evolution;
  9. Contrast adaptation and acclimation;
  10. Summarize species concepts and speciation;
  11. Explain factors that determine species distribution as well as rates of extinction, speciation, and movement;
  12. Apply the concepts of ecology to conservation biology
- F. LEARNING OUTCOMES (MNTC):
- Goal 3/Natural Sciences: The student will be able to:
1. Demonstrate understanding of scientific theories.
  2. Formulate and test hypotheses by performing laboratory, simulation, or field experiments in at least two of the natural science disciplines. One of these experimental components should develop, in greater depth, students' laboratory experience in the collection of data, its statistical and graphical analysis, and an appreciation of its sources of error and uncertainty.
  3. Communicate their experimental findings, analyses, and interpretations both orally and in writing.
- Goal 10/People and the Environment: The Student will be able to:
1. Explain the basic structure and function of various natural ecosystems and of human adaptive strategies within those systems.
  2. Evaluate critically environmental and natural resource issues in light of understandings about interrelationships, ecosystems, and institutions.
  3. Propose and assess alternative solutions to environmental problems.
  4. Articulate and defend the actions they would take on various environmental issues.
- G. METHODS FOR EVALUATION OF STUDENT LEARNING: Methods may include but are not limited to:
1. Exams
  2. Laboratory activities and assignments
  3. Lecture Assignments
  4. Group projects

- G. METHODS FOR EVALUATION OF STUDENT LEARNING: Methods may include but are not limited to:  
Continued. . .  
5. Presentations  
6. Student-directed research
- H. RCTC CORE OUTCOME(S). This course contributes to meeting the following RCTC Core Outcome(s):  
Critical Thinking. Students will think systematically and explore information thoroughly before accepting or formulating a position or conclusion.
- I. SPECIAL INFORMATION (if any):
1. The initial lab session explains and familiarizes the student with general safety hazards and safety equipment in the lab. During the pre-lab discussion, the hazardous characteristics of any materials used during the lab are discussed. In addition, if the lab involves any potentially infectious material, the students will be instructed on the proper use and disposal. The instructor will direct all students to wear necessary protective equipment while working with any hazardous chemicals. Safety Data Sheets for chemicals used are available online.
  2. Field lab work will also be part of this course, so students will be outside for some lab activities.