COMMON COURSE OUTLINE: Course discipline/number/title: BIOL 2000: General Ecology

A. CATALOG DESCRIPTION
1. Credits: 4
2. Hours/Week: 3 hours lecture and 2 hours lab per week
3. Prerequisites (Course discipline/number): BIOL 1100 or BIOL 1101 or BIOL 1102 or 1220, college level reading and writing.
4. Co-requisites (Course discipline/number): None

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, (3) predict how human activities may alter the effects of these forces, and (4) evaluate the trade-off occurring among our biological, social, political, and economic worlds. In addition, students will be introduced to contemporary issues in ecology through assigned readings from recent literature and specific writing assignments.

The lab portion of this course reemphasizes lecture concepts and offers hand-on experience with the concepts in the lab and/or field setting. Lab attendance is a necessity for the course to best experience the applied aspects of ecology.

B. DATE LAST REVISED (Month, year): May, 2008

C. OUTLINE OF MAJOR CONTENT AREAS:
1. Life and the Physical Environment
   a) The Physical Environment: 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
   c) Life History Patterns
   d) Distributions
   e) Population Structures
   f) Population Growth Models: density dependent and density independent
   g) Population Dynamics
   h) Population Genetic
   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
   f) Coevolution
C. OUTLINE OF MAJOR CONTENT AREAS: Continued...

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

D. LEARNING OUTCOMES (GENERAL): The student will be able to:

1. Describe the history of the field of ecology;
2. Describe characteristics of the abiotic environment that affect living things and the adaptations and physiological adjustments (acclimations) organisms exhibit that allow them to cope with this environment;
3. Describe role of environmental factors (e.g., temperature, rainfall, etc.) in determining global patterns of species distributions and abundance, and biome classification;
4. Describe biological classification systems;
5. Describe organism life histories (reproductive modes and patterns, energy allocation, generalists vs. specialists, r and K selection, senescence, etc.);
6. Describe characteristics of populations (e.g., models of population growth, age structure, life tables, dynamics, density-dependent vs. density-independent factors influencing population growth, human population growth, etc.);
7. Describe species-to-species interactions (e.g., competition, predation, symbioses, etc.);
8. Describe characteristics of communities (e.g., structure, food chains and food webs, succession, effects of disturbance, etc.);
9. Describe characteristics of ecosystems (e.g., energy flow, biogeochemical cycles, biodiversity, complexity vs. stability, etc.);
10. Describe island biogeography;
11. Define evolution and understand evolution as the unifying principle of biological science;
12. Describe natural selection and sexual selection, a special case of natural selection;
13. Describe additional forces that result in changes in gene frequencies (e.g., random genetic drift, founder effect);
14. Describe species concepts and speciation;
15. Apply the concepts of ecology to conservation biology with special reference to southeastern Minnesota.

E. LEARNING OUTCOMES (MNTC):

Goal 2/Critical Thinking: The Student will be able to:

1. Gather factual information and apply it to a given problem in a manner that is relevant, clear, comprehensive, and conscious of possible bias in the information selected.
2. Analyze the logical connections among the facts, goals, and implicit assumptions relevant to a problem or claim; generate and evaluate implications that follow from them.
3. Recognize and articulate the value assumptions which underlie and affect decisions, interpretations, analyses, and evaluations made by ourselves and others.

Goal 3/Natural Sciences: The Student will be able to:

1. Demonstrate understanding of scientific theories and the ways in which scientists develop, express, and test theories in the field of biology.
2. Formulate and test hypotheses by performing laboratory or simulation experiments requiring the collection of data and its graphical analysis; gain an appreciation of uncertainty and sources of error in data collection and analysis.
3. Evaluate societal issues from a biological perspective, asking questions about the evidence presented and making informed judgments about biology-related topics and policies.

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.
E. LEARNING OUTCOMES (MNTC): Continued . . .

2. Describe the basic institutional arrangements (social, legal, political, economic, and religious) that are evolving to deal with environmental and natural resources challenges. Evaluate critically environmental and natural resource issues in light of understandings about interrelationships, ecosystems, and institutions.

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4. Propose and assess alternative solutions to environmental problems.

5. Articulate and defend the actions they would take on various environmental issues.

F. METHODS FOR EVALUATION OF STUDENT LEARNING:

Methods may include any of the following:

1. Laboratory reports and/or quizzes
2. Objective and/or subjective tests
3. Laboratory practical tests
4. Assignments
5. Essay tasks
6. Group work/projects
7. Presentations
8. Attendance (especially laboratory attendance)
9. Student-directed research

G. SPECIAL INFORMATION (if any):

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. A copy of Material Safety Data Sheets for chemicals used is available in the lab. Field lab work will also be part of this course, so students will be outside for some lab activities.