MASTER COURSE OUTLINE

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COURSE TITLE

Majors Ecology/Evolution

GENERAL COURSE INFORMATION

Dept.: BIOL&	Course Num: 221	(Formerly: BIO 121)
CIP Code: 26.0101	Intent Code: 11	Program Code: N/A
Credits: 5		
Total Contact Hrs Per Qtr.: 71.5		
Lecture Hrs: 38.5	Lab Hrs: 33	Other Hrs: 0
Distribution Designation: Lab Science LS		

COURSE DESCRIPTION (as it will appear in the catalog)

The first quarter in a three-quarter general biology series, this series is designed for life-science majors, pre-professional students, and for students intending to take advanced courses in the biological sciences. Topics of study include: ecology including population, community, and ecosystem ecology; evolution including the origin and history of life, microevolution, macroevolution, and systematics; the diversity of life including bacteria, archaea, protists, plants, fungi, and animals. Related investigations take place in a three-hour lab period each week. NOTE: This majors' biology sequence may be taken in the following order: BIOL& 222, 223, and 221, with instructor's permission.

PREREQUISITES

Successful completion of either CHEM& 121 or CHEM& 161 with a 2.0 or better or concurrent enrollment in CHEM& 121 or CHEM& 161, or instructor permission. Recent high school biology or BIOL&100 strongly recommended.

TEXTBOOK GUIDELINES

A recent edition of a majors' biology text such as *Biology* by Brooker, Widmaier, Graham, and Stilling, McGraw-Hill Higher Education. The text used must have departmental approval.

COURSE LEARNING OUTCOMES

Upon successful completion of the course, students should be able to demonstrate the following knowledge or skills:

1. Compile examples of each of the unifying principles of biology; provide evidence for each principle's importance.
2. Apply the scientific method to hypothetical biological problems; design valid experiments.
3. For each of the major terrestrial and aquatic biomes analyze the effects of climate, water conditions, and predominant vegetation on biome distribution.
4. Interpret the principles of population ecology discussing effect on natural populations and applying the principles to human population growth.
5. Classify and explain the different types of species interactions and outline the effects of each interaction within ecological communities.

6. Interpret the different models used to simulate community diversity, stability, and change in communities, giving examples as well as discussing applications and impacts.
7. Apply the principles of ecosystem ecology to selected ecosystems, predicting the effects of each principle as well as human influence on ecosystems.
8. Compile evidence for the benefits of biodiversity as well as the causes of biodiversity loss and evaluate the effectiveness of conservation strategies to reverse biodiversity loss.
9. Illustrate the theory of evolution by natural selection using examples, evidence of evolutionary change as well as molecular processes that promote evolution.
10. Explain Hardy-Weinberg equilibrium and use the tools of population genetics to calculate allele frequencies, identify and explain the results of natural selection, and describe and discuss the impacts of other causes of population change.
11. Classify and explain the differing species concepts and their applications; interpret the effects of the various types of reproductive barriers on speciation and examine the types of speciation and the effects of each type.
12. Use the principles of phylogeny to construct phylogenetic trees; analyze use of phylogeny to describe evolutionary relationships/events; explain cladistics, molecular clocks, and how horizontal gene transfer impacts the reconstruction of phylogenies.
13. For bacteria, archaea, protists, seedless/seed plants, fungi, invertebrate/vertebrate animals and their subgroups, compile and evaluate significance of diversity, evolution, structure, movement, reproduction, nutrition, metabolism, ecological roles.
14. Describe origin/history of life on Earth and the fossil record; using appropriate names, describe Earth's geological history along with the major events/trends observed. Correlate knowledge of diversity of life to illustrate/explain life's history.

INSTITUTIONAL OUTCOMES

IO3 Human Relations/Workplace Skills: Students will be able to demonstrate teamwork, ethics, appropriate safety awareness and/or workplace specific skills.

COURSE CONTENT OUTLINE

1. General Introduction
   Principles of Biology and the Levels of Biological Organization
   Biology As a Scientific Discipline – the Scientific Method and Experimental Design
2. Ecology
   Introduction to Ecology and Biomes, Population Ecology
   Species Interactions, Community Ecology
   Ecosystem Ecology, Conservation Biology
3. Evolution
   Introduction to Evolution, Population Genetics
   Origin of Species and Macroevolution, Taxonomy and Systematics
4. Diversity
   Archaea and Bacteria, Protists
   Plants and the Conquest of Land, Evolution and Diversity of Gymnosperms and Angiosperms
   Fungi
   Introduction to Animal Diversity
   Invertebrates, Vertebrates
5. Origin and History of Life on Earth

DEPARTMENTAL GUIDELINES *(optional)*

- The overall course percentage will be based on the following weighted categories:

  - Lecture exams (including 2-4 tests plus a comprehensive final exam) collectively worth 60%,
  - Laboratory work collectively worth 25-30%, and
  - Class assignments/quizzes collectively worth 10-15% of the overall score.
- A standard grade scale will be used for this course with a 2.0 grade point corresponding to 70-72%.
- All exams are proctored. When possible, exams are held on campus. Online and hybrid courses may have exams online, but they must be proctored to ensure academic honesty.
- Lab is an essential part of this class and is required for credit. Students missing more than two labs will not be given credit for this course.
- PO5 should be assessed: Students will be able to solve problems by gathering, interpreting, combining and/or applying information from multiple sources.

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DIVISION CHAIR APPROVAL **DATE**