

SOUTHEAST MISSOURI STATE UNIVERSITY

Department of Biology

BI 300

Introduction to Evolutionary Biology

New Fall 2001

I. Catalog Description and Credit Hours of Course: An introduction to historical biology, incorporating principles of ecology, systematics, biogeography, and basic principles of evolutionary biology. Three lectures. (3)

II. Prerequisites: BO200, BI200, BI225, ZO200, and MA134, or consent of instructor.

III. Purposes or Objectives of the Course:

- A. To familiarize students with the practice of historical science.
- B. To familiarize students with the basic mechanisms for evolutionary change.
- C. To explain basic principles of biological inquiry as they apply to comparative data.
- D. To introduce and explain the principles of comparative biology.
- E. To introduce and explain the contributions of paleontology to evolutionary biology.
- F. To provide students the opportunity to ask and test questions regarding evolutionary biology.
- G. Provide student the opportunity to develop an appreciation of biological literature as a resource.
- H. To familiarize students with hypotheses regarding the origin and history of life.

IV. Expectations of Students:

Students are expected to attend classes, participate in discussions, and achieve satisfactory performance on examinations and homework assignments. Homework assignments will consist of five papers involving phylogeny, adaptation, homology and convergence, biogeography, and evolutionary history of a particular group of organisms chosen by the student. A term paper incorporating lessons from homework assignments will be required of all students.

V. Course Content or Outline:

Lecture periods

A. Theories and Concepts

- 1. Evaluating hypotheses in a historical science (Chapter 2 and 3)
 - a. Philosophical considerations 1
 - b. Darwinism and Selectionism 1
 - c. Methods 1
- 2. Mechanisms of Organic Evolution (Chapter 4 and 5)
 - a. Introduction to Hardy-Weinberg equilibrium 2
 - b. Deviations I: Mutations 1
 - c. Deviations II: Genetic drift and migration 1
- 3. Review of Molecular Evolution (Chapter 7)
 - a. Single-copy sequences 1
 - b. Duplications and inversions 1
 - c. Evidence from developmental biology 1
- 4. Nature of Selection (Chapter 8)
 - a. Adaptationism=bad evolutionism 1
 - b. Testing adaptive hypotheses 1

Exam 1

1

B. Evidence and Analyses	
1. Mechanisms of Speciation (Chapter 9)	
a. Species concepts	1
b. Geographic hypotheses	1
c. Mechanisms of divergence	1
2. Phylogenetic Theory (Chapter 10)	
a. Characters and phylogenies	1
b. Models of character change	1
c. Using phylogenies in testing hypotheses	1
3. Pre-Cambrian Evolution (Chapter 11)	
a. Hypotheses regarding the origin(s) of life	1
b. Cenancestors and eocytes	1
c. The eukaryotic revolution!	1
4. Cambrian Explosion and Adaptive Radiations (Chapter 12)	
a. Reference to the fossil record	1
b. Innovations; developmental constraints and bauplane	1
c. Macroevolutionary trends	1
Exam 2	1
C. Controversies, Past and Present	
1. Controversy in Evolutionary Thought	
a. The difficulty of historical analysis (TBD*)	3
b. Topic 1 (see below) (TBD*)	8
c. Topic 2 (see below) (TBD*)	8
Total	45

Special topics to be chosen from a list including, but not limited to the following:

Mass extinctions	Chapter 13
Biogeographic hypotheses	TBD*
Trends and interpretations	TBD*
Sexual selection	Chapter 15
Social behavior	Chapter 16
Human evolution	Chapter 14, 18

*To be determined: Instructor-selected readings from secondary or primary literature.

VI. Textbook:	
Freeman, S. and J.C. Herron. 1998. Evolutionary Analysis. Prentice-Hall, Upper Saddle River, NJ.	
VII. Basis of Student Evaluation	
Three exams	60%
Homework assignments	20%
Term paper	20%