

# SOUTHEAST MISSOURI STATE UNIVERSITY

Department of Biology

BI 503

Fundamental Concepts of Evolution

New Fall 2012

**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. Does not count toward completion of a graduate degree. Three lectures. (3)

**II. Prerequisites:**

Admission to Graduate Study in Department of Biology. Thirty semester hours of acceptable undergraduate credit in science and mathematics.

**III. Purpose or Objectives of the Course:**

Provide a broad base for understanding modern concepts in evolution.

**IV. Student Learning Outcomes:**

- A. Students will be able to critique a scientific publication about evolution and summarize the key findings.
- B. Students will be able to explain how populations evolve by natural selection.
- C. Students will be able to integrate genetic evidence and the fossil record to explain evolutionary change.

**V. Expectations of Students:**

- A. Students attend all lectures and complete all assignments for BI 300, Introduction to Evolutionary Biology.
- B. Demonstrate understanding of material on all assignments and exams by earning a minimum of 80% of possible points.

**VI. 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. Cenozoic 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 bauplan	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.

**VII. Textbook:**

Futuyma. 2005. Evolution. Sinauer Publishing.

**VIII. Basis of Student Evaluation**

Three exams	60%	Grading scale:
Homework assignments	20%	70%-100% = A
Term paper	20%	0%-69% = F

**IX. Academic Policy Statement:**

Students will be expected to abide by the University Policy for Academic Honesty regarding plagiarism and academic honesty. Refer to: <http://www6.semo.edu/judaffairs/code.html>

**X. Student with Disabilities Statement:**

If a student has a special need addressed by the Americans with Disabilities Act (ADA) and requires materials in an alternative format, please notify the instructor at the beginning of the course. Reasonable efforts will be made to accommodate special needs.