

SOUTHEAST MISSOURI STATE UNIVERSITY

Department of Biology

BI 151

Biological Reasoning

New Spring 2006

I. Catalog Description and Credit Hours:

Use of scientific reasoning and evidence from various biological disciplines to test hypotheses about the common ancestry of organisms. (3)

II. Pre- or co- requisite:

EN 100 or EN 140 qualified.

III. Purposes or Objectives of Course:

Students will:

- A. Understand science as a way of answering questions about the physical universe.
- B. Understand the use of the hypothetico-deductive method.
- C. Learn to develop, express, test, and critique hypotheses.
- D. Be familiar with content from a variety of biological disciplines.
- E. Apply and understand evidence for relationships among organisms.

IV. Expectations of Students:

- A. Attend all class sessions, participate in discussions, and complete assignments.
- B. Take three hour examinations and a final exam.

V. Course Content and Outline:

This course explores evidence relating to the common ancestry of organisms on Earth. Students proceed by developing their own hypotheses about the origin and relatedness of organisms. These hypotheses are tested against anatomical and molecular evidence in a series of units. Student record their hypotheses, predictions, results, and conclusions, along with their reasoning processes, in ongoing journal entries during the course. In the process the students are exposed to a variety of types of biological evidence along with the tools for locating and analyzing it, and gain experience in application of scientific reasoning to a problem.

Topics	Class periods
Introduction to the Biology Department	1
Unity and Diversity	1
The Origin and Diversity of Life: What's Your Hypothesis?	2
What is Science?	1
Expressing your hypothesis as a phylogenetic tree	3
Jack Noire and the Law of Nature	2
Classifying the hypotheses	1
Testing for Ancestry: Homology and Analogy	3
What does your hypothesis predict?	2
Testing hypotheses using skeletons	3
Hypothesis discussion and revision	1
Natural Selection	2
Testing for Ancestry: Fossil Record and Transitional Forms	1
Testing hypotheses using fossils: Reptile-mammal transition	3
Testing hypotheses using fossils: Hominids	2
Hypothesis discussion and revision	1
Evaluating Origins Arguments (Web assignment)	
Testing for Ancestry: The Genetic Code	
Basic ideas of DNA, proteins and biological information	3
The genetic code	2
Hypothesis discussion and revision	1
Testing Hypotheses of Relatedness: Molecular Evidence	
Testing hypotheses using protein similarities	3
Testing hypotheses using DNA similarities	3
Hypothesis discussion, revision, conclusions	1
Exams	3
Total	45

VI. Textbook and /or Other Required Materials:

- A. Textbook:
Campbell NA, Reece JB. Biology. 7th Ed. San Francisco: Benjamin-Cummings, 2005.

VII. Basis for student evaluation:

The weight of evaluation criteria may vary at the discretion of the instructor and will be indicated at the beginning of each semester.

- A. Examinations
B. Homework
C. Class participation