Degree Applicable

Glendale Community College
April 2013

COURSE OUTLINE

Biology 123
Evolution

I. Catalog Statement

Biology 123 examines the history of life on earth, and the mechanisms that have led to the diversity we see today. Topics to be covered include a brief history of evolutionary thought, adaptive vs. neutral evolution (natural selection and genetic drift), biogeography, the origin of life, population genetics and speciation, an exploration of the fossil record and modern systematics, and recent work in the fields of sexual selection, behavior, development, and human evolution.

Total Lecture Units: 3.0
Total Course Units: 3.0

Total Lecture Hours: 48.0
Total Faculty Contact Hours: 48.0

Recommended Preparation: Eligibility for English 101

II. Course Entry Expectations

Skill Level Ranges: Reading 6; Writing 6; Listening/Speaking 6; Math 3

III. Course Exit Standards

Upon successful completion of the required coursework, the student will be able to:

1. describe Darwin's contribution to our understanding of how evolution works.
2. describe the major evolutionary forces that act to change populations over time.
3. explain how one species can become two over time.
4. describe key events in the history of life on earth, including the origin of life and the Cambrian explosion.
5. identify some important finds in the fossil record and what they demonstrate about the nature of evolution.
6. describe what is known about human evolution from our primate ancestors, and the impact of our evolutionary past on modern humans.

IV. Course Content **Total Faculty Contact Hours = 48**

A. Overview of Topics in Evolutionary Biology 2 hours

B. History of Evolutionary Ideas — 6 hours
   1. Pre-Darwinian ideas
      a. Plato and Aristotle
      b. Ussher and Paley
      c. Cuvier and Lamarck
      d. Hutton and Lyell
   2. Charles Darwin
      a. Family life
      b. Beagle voyage
   3. Development of ideas/influences
      a. Thomas Malthus
      b. Alfred Russel Wallace
      c. Artificial selection
      d. Hooker and Huxley

C. Deep Time — 3 hours
   1. Radiometric dating
      a. Age of the earth
      b. Carbon isotopes
   2. Early fossils
      a. Ediacaran fauna
      b. Cambrian explosion

D. Genetics Primer — 3 hours
   1. Mendelian inheritance
   2. Mitosis and Meiosis
   3. Transcription and Translation

E. Microevolution — 4 hours
   1. Mutation
   2. Genetic Drift
   3. Gene flow
   4. Natural Selection
      a. Stabilizing
      b. Directional
      c. Diversifying

F. Speciation — 3 hours
   1. Allopatric vs. Sympatric speciation
   2. Pre-zygotic vs. post-zygotic isolation
   3. Biological Species Concept
   4. Adaptive radiations

G. Origin of life — 3 hours
   1. Three domains
   2. RNA world

3. Prokaryotes and the origin of photosynthesis
4. Endosymbiosis and the origin of eukaryotes

H. Development 3 hours
1. Homologous features
2. Master control (Hox) genes
3. Gene duplication
4. Constraints

I. Extinction 3 hours
1. History of Mass extinctions
2. Permian extinction and Pangaea
3. K-T extinction and the rise of mammals
4. Human-caused extinctions

I. Coevolution 3 hours
1. Plant/pollinator
2. Predator/prey
3. Agricultural pests
4. Mutualisms

J. Disease and Evolutionary Medicine 3 hours
1. Parasite and host
2. Bacterial evolution
3. AIDS

K. Evolution of Sex 3 hours
1. The two-fold cost of sex
2. Advantages of sexual reproduction
3. Sexual selection
4. Mating systems

L. Behavior 3 hours
1. Parent offspring conflict
2. Maternal investment
3. Inclusive fitness

M. Phylogeny and Systematics 3 hours
1. Biological classification
2. Cladistics
3. DNA sequence comparisons

N. Human Evolution 3 hours
1. Human ancestry
2. Modern humans and our evolutionary legacy

V. Methods of Instruction

The following instructional methodologies may be used in the course:
1. classroom lecture and discussion;
2. online audio/video material with study guide questions;
3. group activities and interactive demonstrations.

VI. Out of Class Assignments

The following out of class assignments may be used in the course:
1. written responses to online video clips/podcasts;
2. homework exercises (e.g., radiometric dating of fossils, genetic sequence database search).

VII. Methods of Evaluation

The following methods of evaluation may be used in the course:
1. exams;
2. homework exercises;
3. written responses to online video clips/podcasts;
4. student presentations and discussions.

VIII. Textbook

Zimmer, C. *Evolution: the triumph of an idea.* New York, NY: Harper Perennial, 2006.
12th grade textbook reading level. ISBN: 0-0611-3840-1.

IX. Student Learning Outcomes

After successful completion of this course, students should be able to:
1. describe Darwin's contribution to evolutionary biology.
2. explain the evolutionary forces that act to change populations over time.
3. describe the process of speciation.
4. identify key events in the history of life on earth.
5. describe some important finds in the fossil record.