

**BIOL 43 - Ecology and Evolution****Catalog Description****Transfer Status:** CSU/UC**Prerequisite:** Intermediate Algebra or equivalent**Unit(s):** 5.00**Lecture:** 51.00 Contact hours/102.00 Out of class hours/153.00 Total hours/3.00 Unit(s)**Lab:** 102.00 Contact hours/0.00 Out of class hours/102.00 Total hours/2.00 Unit(s)**Total:** 153.00 Contact hours/102.00 Out of class hours/255.00 Total hours/5.00 Unit(s)**Course Description:** This course, intended for majors, examines the basic principles governing evolution of organisms and interactions between organisms and the environment, and emphasizes ecological principles and mechanisms of evolution. (C-ID BIOL 130S/BIOL 135S).**Objectives**

Upon successful completion of this course, the student should be able to:

1. Apply the processes of scientific inquiry including experimental design.
2. Carry out an experiment to test a specific hypothesis using appropriate controls.
3. Explain the essential elements of life, major hypotheses for life's history, mechanisms for the diversification of life, and evolution.
4. Apply the tools of evolutionary biology to the analysis and evaluation of historical relationships among organisms.
5. Describe mechanisms of evolutionary change including evolutionary forces that determine patterns of genetic diversity within species.
6. Provide evidence for evolution.
7. Evaluate the ecological relationships of organisms at the population, community, and ecosystem level.
8. Describe flow of energy within an ecosystem and the role of nutrient cycling in maintaining ecosystem integrity.
9. Explain fundamental prokaryotic replication, metabolism, and cellular structure in relationship to evolution of diversity.

Course Content**Topic Titles / Suggested Time Topic****Lecture**

<u>Topics</u>	<u>Lec Hrs</u>
Population Ecology: population structure, growth, regulation, and fluctuation, intraspecific interactions	8.50
Community ecology: interspecific interactions (predator-prey relations, competition, symbiosis), community structure and succession	8.50
Ecosystem diversity (biomes)	4.25
Ecosystems ecology: trophic structure, energy flow, nutrient cycling, ecosystem integrity	4.25
Conservation biology	4.25
Social systems, animal behavior	4.25
Mechanisms of evolutionary change: natural selection, genetic drift, gene flow, and mutation, and nonrandom mating	8.50
Population genetics	4.25
Speciation and extinction	4.25

Total Hours: 51.00**Lab**

<u>Topics</u>	<u>Lab Hrs</u>
Introduction to the scientific method	6.00
Scientific writing	6.00
Primary research articles	12.00
Scientific graphing	6.00
Experimental design	6.00
Statistical analysis of data	12.00
Using model organisms (<i>C. elegans</i> , <i>Drosophila</i> , <i>Brassica</i> , etc.)	12.00
Field sampling methodologies, species interactions	12.00
Mechanisms of evolution	6.00
Simulations of evolution	6.00
Population growth modeling	6.00
Measures of species diversity and richness	6.00

Topics**Lab Hrs**

Animal behavior

6.00

Total Hours: 102.00**Methods of Instruction**

- A. Discussion
- B. Field Trips
- C. Homework: Students are required to complete two hours of outside-of-class homework for each hour of lecture
- D. Laboratory Experiments
- E. Reading Assignments
- F. Biology Majors Sequence

Methods of Evaluation

- A. Exams/Tests
- B. Quizzes
- C. Research Projects
- D. Written Assignments
- E. Practical Evaluations
- F. Mid-term and final examinations

Examples of Assignments**Reading Assignments**

1. Read the textbook section discussing the size of *Drosophila* sperm. There will be an in-class discussion of the evolutionary implications for a species to have such large sperm cells.
2. Read the provided handout on avian respiratory systems. Be prepared to discuss how this is adaptive for birds, and why it has not evolved in other vertebrates.

Writing Assignments

1. Read the assigned paper on *C. elegans*, and in 1 page, summarize the following: Describe the stages development; What physical (morphological) differences were observed?
2. Read the assigned research paper and answer the following questions in a 1 page summary: What is the primary question of this research? What was the researchers primary finding? Why is this finding significant?

Out-of-Class Assignments

1. Choose a mammal species from the provided fish & wildlife website. Write a 1-2 page report that addresses the following two questions: What factors determine the distribution of this species? Examining the distribution, what factors may be important in maintaining the genetic diversity of the species in California?
2. Visit the provided research conference website. Choose a topic and write a 1 paragraph description of why that topic is interesting and what questions it raises.

Recommended Materials of InstructionRaven, P. et al. (2020). *Biology. McGraw Hill, 12th.*Mistry, S. (2018). BIOL 43 Lab Handouts. *Biology Department.***Minimum Qualifications**

Biological Sciences (Masters Required)

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