BIOL 0003 - GENERAL ZOOLOGY

Catalog Description

Prerequisite: Completion of intermediate algebra or higher with grade of "C" or better or appropriate placement
Advisory: Eligibility for ENGL 1A
Hours: 144 (54 lecture, 90 laboratory)
Description: Part of the BIOL 1/BIOL 2/BIOL 3 course series for life science majors. Introduction to the principles of zoology through a detailed survey of the diversity of the animal kingdom, with an emphasis on the evolution and functional anatomy of the major groups. Field trips may be required; transportation will be provided. Recommended for biology majors and students in environmental science, pre-veterinary or related programs. Non-life science majors see BIOL 33. Not recommended for students taking BIOL 140. (C-ID BIOL 150) (CSU, UC-with unit limitation)

Course Student Learning Outcomes

- CSLO #1: Evaluate the leading hypotheses for the evolution of metazoans (multi-celled animals).
- CSLO #2: Compare and contrast the developmental processes leading to basic protostome, deuterostome, coelomate, pseudocoelomate, and acoelomate animal body plans.
- CSLO #3: Evaluate the evolutionary adaptations exhibited by various animal phyla.
- CSLO #4: Synthesize the environmental conditions and evolutionary pressures that led to major innovation, including the evolution of terrestrial animals, the evolution of chordates, and the evolution of flight.
- CSLO #5: Investigate the interactions and ecological relationships between humans and other animals.

Effective Term

Fall 2024

Course Type

Credit - Degree-applicable

Contact Hours

144

Outside of Class Hours

108

Total Student Learning Hours

234

Course Objectives

Course objectives are linked to items from the Course Content Outline (in parentheses).
Lecture Objectives:
1. Outline general steps of scientific discovery; distinguish between hypothesis, prediction, and theory and describe the role of experimental controls. (#1)
2. Identify the general properties of living organisms, such as reproduction (comparing and contrasting the adaptive value of asexual and sexual forms of reproduction) and evolution (distinguishing between the various mechanisms of microevolution). (#1, #2)
3. Compare and contrast the major developmental patterns of animals, such as protostomes and deuterostomes, diploblasty and triploblasty, and acoelomate, pseudocoelomate and coelomate body plans. (#3, #4)
4. Explain the Linnaean system of classification and evaluate the strengths and weaknesses of the common species concepts. (#5)
5. Differentiate between taxonomy and phylogenetic systematics, identifying the challenges associated with determining phylogenies. (#5)
6. Describe the key characteristics of major protozoan and animal taxa and evaluate the selective pressures that led to the evolution of those features. (#6 - #19)
7. Evaluate the selective pressures that led to major evolutionary innovations, such as multicellularity, bilateral symmetry, the presence of a coelom, metamerism, the diagnostic chordate features, the presence of jaws, flight, intellect, etc. (#6, #9, #11, #13 - #18)
8. Investigate the evolutionary adaptations exhibited by parasites and compare/contrast major parasitic taxa. (#6, #9, #10, #11)
9. Compare and contrast the development of social behavior in major taxonomic groups. (#11, #13 - #18)
10. Assess the adaptive significance of sensory systems found in organisms, such as ocelli, ampullae of Lorenzini, Jacobson's organs, echolocation, etc. (#6 - #18)
11. Describe the biotic and abiotic factors that control the growth and interactions of animal populations. (#19)
12. Research a zoological topic, using the primary literature and other valid sources. (#1)
Laboratory Objectives:
1. Use basic laboratory techniques to investigate responses of animals to various environmental conditions and to dissect specimens to understand and compare/contrast their physiological and structural adaptations. (#1, #5, #6, #7, #8, #9, #10, #11, #19, #20)
2. Outline or diagram the major reproductive and developmental patterns of animals, such as the major stages of embryonic development and the basic animal body plans including acoelomate, pseudocoelomate, and coelomate structures. (#2)
3. Compare and contrast the general features of the major protozoan and animal taxonomic groups. (#4 - #18)
4. Identify specimens based on the presence or absence of diagnostic characteristics. (#4 - #18)
5. Investigate vertebrate adaptations for predation, defense, locomotion, communication, etc. (#14 - #18, #20)
6. Discuss strategies for observing animal behavior and formulate a plan for making observations. (#20)
7. Use the scientific method to collect, record, and analyze data. (#1, #19)

General Education Information

- Approved College Associate Degree GE Applicability
  - AA/AS - Life Sciences
  - AS - Life Science Lab
- CSU GE Applicability (Recommended-requires CSU approval)
  - CSUGE - B2 Life Science
  - CSUGE - B3 Lab Activity
- Cal-GETC Applicability (Recommended - Requires External Approval)
- IGETC Applicability (Recommended-requires CSU/UC approval)

- IGETC - 5B Biological Science
- IGETC - 5C Laboratory Science

Articulation Information

- CSU Transferable
- UC Transferable

Methods of Evaluation

- Classroom Discussions
  - Example: To assess lecture course objective #5, "Differentiate between taxonomy and phylogenetic systematics, identifying the challenges associated with determining phylogenies", students might take part in a classroom discussion about the different methods and outcomes associated with the fields of taxonomy and phylogenetic systematics. Students could be evaluated based on participation, accuracy of information, and completeness of information.
- Objective Examinations
  - Example: To assess lab course objective #4, "Identify specimens based on the presence/absence of diagnostic characteristics", students might answer an objective quiz or exam question asking them to identify the correct taxon of a specimen given the presence of a particular set of diagnostic features. Students could be evaluated based on accuracy of answer.
- Problem Solving Examinations
  - Example: To assess lab course objective #4, "Identify specimens based on the presence/absence of diagnostic characteristics", students might be given an unknown specimen and asked to identify the correct taxon of that specimen and to describe (either verbally or in writing) the diagnostic features that warrant that taxonomic designation. Students could be evaluated based on their accuracy and completeness in identifying the diagnostic characteristics and their accuracy in using those characteristics to correctly identify the taxon.
- Projects
  - Example: To assess lab course objective #1, "Use basic laboratory techniques to investigate responses of animals to various environmental conditions and to dissect specimens to understand and compare/contrast their physiological and structural adaptations", students might develop and carry out an experiment that compares animal responses under different environmental conditions. Students could be evaluated based on the completeness of the project, including the presence of a clear experimental plan, the identification of hypothesis and predictions, description of appropriate data collection methodology, evidence of participation in experimental set up and data collection, and documentation of experimental results
- Reports
  - Example: To assess lab course objective #1, "Use basic laboratory techniques to investigate responses of animals to various environmental conditions and to dissect specimens to understand and compare/contrast their physiological and structural adaptations", students might develop and carry out an experiment that compares animal responses under different environmental conditions and document the experiment in a written lab report. Students could be evaluated based on completeness of the report, quality of the information included in the report, and scientific accuracy of conclusions drawn.
- Skill Demonstrations
  - Example: To assess lab course objective #1, "Use basic laboratory techniques to investigate responses of animals to various environmental conditions and to dissect specimens to understand and compare/contrast their physiological and structural adaptations", students might develop and carry out an experiment that compares animal responses under different environmental conditions. Students could be evaluated based on their skill in using appropriate pieces of lab equipment to collect experimental data and on their accuracy in carrying out the steps of the experimental method.

Repeatable

No

Methods of Instruction

- Laboratory
- Lecture/Discussion
- Distance Learning

Lab:

1. To address lab course objective #3, "Compare/contrast the general features of the major protozoan and animal taxonomic groups", the instructor might use the Socratic method to guide students through the process of identifying and describing the diagnostic morphological characteristics of a selected group, such as arthropods.
2. To address lab course objective #7, "Use the scientific method to collect, record, and analyze data", the instructor might guide students to develop, either individually or in groups, a zoology experiment based in the hypothetico-deductive scientific method.

Lecture:

1. To address lecture course objective #9, "Compare/contrast the development of social behavior in major taxonomic groups", the instructor might prepare lectures that explain the complex social behaviors that appear in eusocial insects and in birds. The lectures could include examples of these behaviors (colony formation, care of offspring, etc.), supplemented by images and/or videos where appropriate.
2. To address lecture course objective #11, "Describe the biotic and abiotic factors that control the growth and interactions of animal populations", the instructor might lead an in-class discussion of how various factors affect population dynamics, asking students to categorize factors as biotic or abiotic.

Distance Learning

1. To address lecture course objective #2, "Identify the general properties of living organisms, such as reproduction (comparing and contrasting the adaptive value of asexual and sexual forms of reproduction) and evolution (distinguishing between the various mechanisms of microevolution)", the instructor might prepare a lecture to post online that explains the basic properties of living organisms, providing examples of each. This online lecture might include text, audio (with transcript), and/or captioned video presentation of information.The students will be listening and/or watching this lecture, taking notes, asking clarifying questions (via chat, Zoom, email, etc.), making connections to previous lecture topics and/or material learned in previous classes (e.g. BIOL 001 or BIOL 033), and applying this information to questions on

homework assignments that ask students to think critically about the distinctions between living and non-living entities. A student can demonstrate mastery of this objective in multiple ways. One example is to successfully answer an online multiple choice or essay exam question that asks the student to describe the identifying properties of living organisms. Another example is to ask the student to create a list or concept map that illustrates the distinction between living and non-living entities. Students could create this list or concept map digitally and upload the file to the course LMS, or create on paper and then scan/photograph the list or concept map and upload the resulting file to the course LMS.

2. To address lecture course objective #4, "Explain the Linnaean system of classification and evaluate the strengths and weaknesses of the common species concepts", the instructor might guide students in an online discussion of the strengths and weaknesses of the species concept, asking students to consider specific examples of species that illustrate those strengths and weaknesses.

Typical Out of Class Assignments

Reading Assignments

1. Read the chapter in the textbook about radiates and compare the structure of Phylum Cnidaria with Phylum Ctenophora. 2. Read a published scientific paper about a topic, such as the evolution of tetrapods, and be prepared to discuss the topic in class.

Writing, Problem Solving or Performance

1. Write a 4-6 page paper about a zoological topic, such as the evolutionary history of hominids. 2. Answer an essay question on an exam about a topic covered in class, such as the progression in embryonic development from bastula to gastrula to a coelomic cavity forming inside the mesoderm.

Other (Term projects, research papers, portfolios, etc.)

Required Materials

- Integrated Principles of Zoology
  - Author: Hickman et al.
  - Publisher: McGraw Hill
  - Publication Date: 2020
  - Text Edition: 18th
  - Classic Textbook?:
  - OER Link:
  - OER:
- Laboratory Studies in Integrated Principles of Zoology
  - Author: Hickman et al.
  - Publisher: McGraw Hill
  - Publication Date: 2020
  - Text Edition: 18th
  - Classic Textbook?:
  - OER Link:
  - OER:
- BIOL 3 Lab Manual
  - Author: Skillen
  - Publisher: Sierra Printing
  - Publication Date: 2019
  - Text Edition: 10th
  - Classic Textbook?:
  - OER Link:
  - OER:

Other materials and-or supplies required of students that contribute to the cost of the course.