

Biol 1413: General Zoology

Course Topics & Common Course Objectives

A survey of the animal kingdom and animal-like protists from an evolutionary perspective. Major lines of evolution will be traced as characteristics of each animal group are compared and contrasted. The taxonomy, diversity, anatomy, physiology, behavior and ecology of all major animal phyla will be studied along with several minor phyla with an emphasis on the functional anatomy of each group. Laboratory skills will include developing a facility with manipulation of wet mount and prepared slides and dissections under the microscope and dissecting microscope.

Prerequisites: BIOL 1406 or BIOL 1408 or equivalent

Common Course Objectives

I. Introduction

1. Define zoology and its relationship to other biological sciences
2. Distinguish between the various fields of professional zoological research and applications
3. Develop an understanding of the animal kingdom and a facility with the techniques used in the biological investigation of animals at a depth appropriate for the college level
4. Describe the role of taxonomy and systematics in animal studies

II. Animals: General Characteristics

1. Learn the characteristics common to all living organisms and be able to distinguish these from characteristics unique to animals
2. Learn the general requirements for all living organisms and the specific requirements of animals
3. Understand the general features of animal life cycles and forms of reproduction

III. Organization of the Animal Body

1. Describe the general features used to classify animal groups such as type of symmetry, number of tissue layers, body cavities, segmentation and cephalization and distinctive larval forms
1. Describe the structure and function of animals in general at the cellular, tissue and organ level of structural organization.

IV. Interactions of Animals with their Environment

1. Describe the major environmental characteristics and limiting factors associated with the earth's major ecosystems
2. Compare and contrast the adaptations required for living on land, in freshwater and in marine ecosystems

V. The Diversity of Animals

1. Describe the origin and early evolution of the animal kingdom
2. Describe the distinguishing characteristics of the major animal phyla
3. Describe the structure and function of representatives of the major animal phyla at the cellular, tissue and organ level of structural organization relates to these
4. Understand and be able to interpret general evolutionary relationships among and between different animal groups

VI. Laboratory Skills

1. Develop a facility with microscopes and dissecting microscopes, their specific uses, and the advantages and disadvantages of each
2. Learn to estimate the relative sizes of objects both with and without magnification
3. Develop the ability to perform directed dissections of animals representative of major phyla or

- classes
4. Develop a familiarity with histological structures of tissues and organs representative of various animal phyla and evolutionary strategies
 5. Be able to prepare wet mounts and manipulate both living and preserved specimens to facilitate study of their anatomical structures
 6. Be able to collect, properly preserve, identify and display representative animal species (optional) and appreciate the biological value of such activities

Course Topics

The following topics should serve as a focus for lecture discussions and lab activities. They might be combined or ordered in a variety of different ways:

I. Introduction

- A. Overview of Zoology as a Profession
- B. The Nature of Scientific Inquiry
- C. The Nature of Life
- D. The requirements for life

II. Animals: General Characteristics

- A. Animals as a distinct kingdom
- B. The relationship of the animal kingdom to other kingdoms of life
- C. The evolutionary origin of animals
- D. The evolutionary history of animal groups
- E. The diversity and abundance of animals in the world

III. Organization of the Animal Body

- A. Cellular Structure and Function
- B. Animal Tissues
 1. epithelium
 2. connective tissues
 3. muscle tissues
 4. nervous tissues
- C. Animal organs
animal anatomy & physiology is dominated by its organs and organ systems
the major organ systems found in one form or another in most animals:
 1. skin (integument)
 2. support
 3. muscular system
 4. digestive
 5. respiratory
 6. nervous and senses
 7. endocrine
 8. circulatory
 9. excretory
 10. reproductive
- D. Physiology of the Animal Body
 1. Communication within the body and between individuals
 3. Support, Protection and Movement
 4. Circulatory Systems
 5. Respiratory Systems
 6. Digestion and Nutrition

7. Salt and Water Balance and Excretion
8. Temperature Adaptations and Homeostasis
9. Reproduction
10. Life Cycles, Embryonic Development & Larval Forms

IV. Interactions of Animals with their Environment

- A. Animal Ecology
- B. Animal Systematics and Evolution
- C. Principals of Animal Behavior

V. The Diversity of Animals

A. Criteria for Animal Classification

Animals can be classified into major groups or phyla based on the above characteristics plus some additional traits:

1. type of symmetry: asymmetrical, radial symmetry, bilateral symmetry
2. tissues:
 - embryonic: ectoderm, mesoderm, endoderm
 - adult: epithelial, connective, muscle, nervous
3. type of body cavity if any
4. presence or absence of segmentation (metamerism)
5. cephalization or the formation of and the development of a nervous system
6. complexity of tissues, organs and organ systems

B. The major phyla of animals

1. Animal-Like Protists; the Protozoans
2. Animals with simple architecture
 - a. Sponges
 - b. Cnidaria
 - c. Ctenophora
 - d. other related groups (Placozoa, Mesozoa)
3. The Acoelomate Phyla
 - a. Platyhelminthes
 - b. Gnathostomulids and Gastrotrichs
4. The Pseudocoelomate Phyla
 - a. Nematoda
 - b. other related pseudocoelomate phyla (Nematomorpha, Kinorhyncha, Loricifera, Rotifera, Priapulida, Acanthocephala, Entoprocta)
5. The Coelomate Phyla - Protostomes
 - a. Mollusca
 - b. Annelida
 - c. Arthropoda
 - d. other related protostome groups (Ectoprocta, Phoronida, Brachiopoda, Nemertea, Sipuncula, Echiura, Tardigrada, Pogonophora, Onychophora)
6. The Coelomate Phyla - Deuterostomes
 - a. Echinodermata
 - b. Chordata
 - i. fishes and related forms
 - ii. amphibians
 - iii. reptiles and birds
 - iv. mammals
 - c. other related deuterostome groups (Chaetognatha, Hemichordata)