

JEFFERSON COLLEGE

COURSE SYLLABUS

BIO206

GENERAL ZOOLOGY

5 Credit Hours

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BIO206: GENERAL ZOOLOGY

I. CATALOGUE DESCRIPTION

Prerequisite: 1-1/2 units of high school biology and 1 unit of high school chemistry, or BIO101.

5 semester hours credit.

General Zoology deals with animal cell structure and chemical processes, the structure and function of various organ systems, and an introduction to animal genetics, evolution and ecology. The required laboratory consists of classification and dissection of representatives of 10 animal phyla and a research project. General Zoology will satisfy the laboratory science requirement for the Associate of Arts degree. (S)

II. GENERAL COURSE OBJECTIVES

Upon completion of this course the student will be able to:

- A. Demonstrate scientific literacy.
- B. Have a basic understanding of the cell and its processes.
- C. Have an understanding of the structures and functions of most animal organ systems
- D. Be able to work genetics problems involving, monohybrid, dihybrid, sex-linked characteristics.
- E. Demonstrate a knowledge of natural selection and how it operates.
- F. Demonstrate an ability to use the Hardy-weinberg law and its formula.
- G. Have a basic understanding of Ecology, its principles and terminology.
- H. Understand animal classification.
- I. Demonstrate practical competence in dissection and identification of organ systems.
- J. Reason through the process and solution of a scientific project.
- K. Demonstrate the ability to write a scientific paper from the data in a project of their own choosing.

III. COURSE OUTLINE (course content will be drawn from this)

- A. Scientific method
- B. Chemistry
- C. Organic chemistry
- D. Physical properties
- E. Cells
- F. Respiration
- G. Synthesis
- H. Control of protein synthesis
- I. Tissue and integuments
- J. Skeletons
- K. Muscles
- L. Nutrition
- M. Gas exchange
- N. Internal transport
- O. Immunity
- P. Excretion
- Q. Nervous system
- R. Endocrine system
- S. Cell division
- T. Reproduction
- U. Development
- V. Genetics

W. Evolution

X. Ecology

IV. UNIT OBJECTIVES

A. Scientific Method

1. Understand the concepts of the scientific method including the relationship of hypothesis, theory, and law.

B. Chemistry

1. Understand basic chemical principles including
 - a. Chemical Bonds
 - b. Bonding, acids, bases, and buffers
 - c. Laws of Thermodynamics

C. Biological Molecules

1. Identify the molecular structures of: carbohydrates, lipids, proteins, and nucleic acids.
2. Identify the names of several examples of the above given categories.
3. Give the various biological functions of the above categories.

D. Physical Properties

1. Understand the concept of "unit membrane" and how it functions in osmosis, dialysis, facilitated passive and active transport, pinocytosis, and phagocytosis, and exocytosis.
2. Know the chemical nature of enzymes their functions and the relationship of their structure to their function.

E. Cells

1. Understand the functions of and identify on a diagram the following cell organelles; nucleus, chromosomes, cell membrane, nucleolus, mitochondria, ribosomes, endoplasmic reticulum, golgi bodies, microtubuals, microfilaments.

F. Respiration

1. Understand the basic energy generating pathways:
 - a. Fermentation
 - b. Glycolysis,
 - c. The Krebs Cycle
 - d. The electron transport system
2. Know where the energy generating pathways occur within the cell.
3. Know the functions NADPH, FADPH, GTP, cytochromes, ADP and ATP and where each functions within the sequences of respiration.

G. Synthesis

1. Know the mechanisms of synthesis of lipids, and carbohydrates and the relationship of synthesis to intermediate products in respiration
- H. Control of protein synthesis
1. Know the above stated relationships to providing the raw materials for protein synthesis as well as the relationship of essential & non-essential amino acids, DNA, m RNA, t RNA, r RNA, and ribosomes.
- G. Tissue and integument
1. Know the structure and functions of the five basic tissues.
 2. Know the structure and functions of the integument.
 3. Know the differences and similarities of invertebrate integument and vertebrate integument.
 4. Know several specialized integumentary structures and their functions.
- H. Skeletons
1. Know the different types of skeletons of the Animal Kingdom.
 2. Know several exoskeletal systems and how they are formed.
 3. Know the parts of a bone, various types of bone, and how each is formed, and the relationship of cartilage to bone.
 4. Know the major divisions of the vertebrate skeletal system.
- I. Muscles
1. Know the physiology of muscle contraction.
 2. Know the types of muscle tissue.
 3. Know the unique characteristics of vertebrate and invertebrate muscle.
- J. Nutrition
1. Know the major organs of digestion and their function.
 2. Know the different types of digestive systems of the Animal Kingdom.
- K. Gas Exchange
1. Know the major organs of lung breathing, gill breathing, and skin breathing and their function.
 2. Know the major components of blood and their functions.
- L. Internal transport
1. Know the major organs of the circulatory system and their function.
 2. Know the major components of blood and their functions.
- M. Immunity
1. Know the process of active and passive immunity and how the immune system functions
 2. Know the origin and solution of immune systems in animals.

- N. Excretion
1. Know the basic parts of the kidney and nephron and how they function.
 2. Understand the origin of excretory systems and their evolution.
- O. Nervous System
1. Know the main divisions of the nervous system how each functions and relates to the central nervous system.
 2. Know how a neuron functions and the function of other supporting nerve cells.
- P. Endocrine System
1. Know the location, hormone produced, and target organs of GH, ACTH, TSH, FSH, LH, Antidiuretic, Thyroxin, Oxytocin, glucagon, insulin, cortisone, estrogen, progesterone, and androgen hormones.
- Q. Cell Reproduction
1. Know the major features of mitosis and meiosis - how they differ and the end result of the division.
- R. Reproduction
1. Know the organs of the human reproductive system and their functions.
- S. Development
1. Know the stages in early development and the unique aspects of each stage
- T. Genetics
1. Understand and be able to work word problems in monohybrid and dihybrid crosses, sex linkage, multiple allele, and multiple gene crosses, in genetics.
 2. Understand linkage, crossing-over, and gene mapping using linked genes.
 3. Mathematically determine probabilities in monohybrid, dihybrid and larger crosses.
 4. Be able to use chi-square to determine degree of fit in genetics problems.
- U. Evolution
1. Understand Natural Selection.
 2. Understand the Hardy-Weinberg law.
 3. Be able to mathematically determine the frequency of homozygotes and heterozygotes in a population using the Hardy-Weinberg formula.
 4. Predict gene frequencies after several generations with total selection against recessive or dominate genes.

5. Know the forces causing gene frequency change in the Hardy-Weinberg law.
6. Understand the concepts of speciation and the difference between allopatric and sympatric speciation.

V. Ecology

1. Know the basic concepts of food chains and understand ecologic succession.
2. Know the basic land biomes
3. Know the basic concepts of population ecology such as, geometric growth, doubling time, carrying capacity, limiting factors, S and J shaped population curves.
4. Be able to interrelate population Ecology, natural selection, the Hardy-Weinberg law and genetics to show the forces of change and the outcomes of that change in a real world setting.

V. METHOD OF INSTRUCTION

- A. Lectures
- B. Laboratory Exercises
- C. Class Discussion
- D. Reading Textbook
- E. Laboratory Research Projects

VI. REQUIRED TEXTBOOK(S) WITH PUBLICATION INFORMATION

Miller, Stephen A and John P. Harley, *Zoology*, 6th ed., Boston: McGraw-Hill, 2005.

VII. REQUIRED MATERIALS (Student)

None.

VIII. SUPPLEMENTAL REFERENCES

None.

IX. METHOD OF EVALUATION (Student)

A. Lecture Exams

B. Laboratory Practical Exams