

March 2006

## I. GENERAL INFORMATION

GENERAL BIOLOGY II

BIO 122

4 credit hours - 5 contact hours

### COURSE DESCRIPTION:

BIO 122, General Biology II will include, but not limited to a study of micro and macroevolution and the effects on speciation, a study of evolutionary relationships and diversity of life (Bacteria, Fungi, Protista, Plantae, Animalia), ecology the basic ecological principles and the ecological relationships found in the environment, and animal behavior. An emphasis is placed on evolutionary theory and the diversity of life. Representative examples of the major phyla are used to compare the basic body plans, physiology, and life history of living organisms. *Prerequisite:* High School Biology or BIO 121 is recommended.

## II. COURSE OBJECTIVE

Students will develop an understanding of the basic principles of biology. A major objective of the course is to develop evolutionary theory as a unifying concept in biology and to use evolutionary principles to explain biodiversity and speciation. Students are expected to understand the basic principles of systematics. In addition, students are expected to develop an understanding of these basic principles and be able to apply concepts to solve problems. Group laboratory work helps students develop problem solving and communication skills.

## IV. METHOD OF INSTRUCTION

Three hours of lecture and two hours of laboratory per week.

Required Text

Required Lab Manual

Students may be assessed using a variety of tools including but not limited to: lecture exams, quizzes, group projects, Lab assignments, formal papers, journals

## IV. COURSE OUTLINE

### POTENTIAL CLASSROOM SCHEDULE

- A. Evolutionary thought
  - 1. Development of evolutionary thought
  - 2. Evidence for evolution
    - a. Fossil record
    - b. Comparative anatomy
    - c. Embryology

## B. Principles of Evolution

1. Micro vs. Macroevolution
2. Gene pool and gene frequency
3. Hardy-Weinberg principles
4. Mutations
5. Gene flow
6. Genetic drift
7. Natural selection

## C. Speciation

1. Defining a species
2. Allopatric vs. sympatric speciation
3. Isolating mechanisms

## D. Origin and Evolution of Life

1. Conditions of the early earth
2. Formation of cells
3. Multicellular organisms
4. Human evolution

## E. Systematics

1. Classifying organisms
2. The binomial system
3. Domains and kingdoms of life

## F. Bacteria

1. Characteristics and adaptations
2. Structure
3. Reproduction
4. Pathogenic vs. beneficial

## G. Protista

1. Characteristics and adaptations
2. Classification
  - a. Plant-like protists (unicellular algae)
  - b. Fungus-like protists (water and slime molds)
  - c. Animal-like protists (protozoa)

## H. Fungi

1. Characteristics and adaptations
2. A survey of the major phyla
  - a. Chytridiomycota (chytrids)
  - b. Ascomycota (sac fungi)
  - c. Basidiomycota (club fungi)
  - d. Zygomycota (zygote fungi)

## I. Plant Structure and function

1. Classification and adaptations
  - a. Evolutionary origins and trends
  - b. Survey of the major divisions
2. Plant form and function
  - a. Plant tissues (dermal, ground and vascular)

- b. Roots
  - 1. Structure and function
  - 2. Growth
- c. Stems
  - 1. Structure and function
  - 2. Growth
- d. Leaves
  - 1. Structure and function
- e. Special adaptations of roots, stems and leaves
- f. Water and nutrient transport
- 3. Reproduction and development
  - a. Flowers
    - 1. Structure and function
    - 2. Pollination and fertilization
  - b. Seeds
    - 1. Ovule and embryo
    - 2. Dormancy and dispersal
    - 3. Germination and growth
  - c. Fruits
    - 1. Structure and function
    - 2. Development
- 4. Responses to environment
  - a. Plant hormones
  - b. Tropisms

#### J. Animal Structure and Function

- 1. Characteristics and evolutionary trends
  - a. Survey of major animal phyla
  - b. Major evolutionary trends in body plans
- 2. Homeostasis and organization
  - a. Feedback systems in homeostasis
  - b. Organization of the animal body plan (cells, tissues, organs, organ systems)
- 3. Animal physiology: human models and comparisons to other forms
  - a. Principles of circulation
  - b. Principles of respiration
  - c. Nutrition and digestion
  - d. Excretion
  - e. Lymphatic and Immune system
  - f. Endocrine system
  - g. Nervous system
  - h. Muscle and skeleton
  - i. Reproduction and development

#### K. Ecology

- 1. Principles of population growth
- 2. Community Interactions and Competition
- 3. Ecosystem structure and function
  - a. Nutrient cycling
  - b. Environmental Impact (Acid Rain, Global Warming)
- 4. Survey of Earth's Ecosystems

## POTENTIAL LABORATORY SCHEDULE

- A. Plant Responses to the Environment
  - 1. Plant hormone activity
  - 2. Tropisms
- B. Human Evolution
- C. Classification and Taxonomy
  - 1. Binomial system of classification
  - 2. Use of taxonomic keys
- D. Survey of Bacteria, Protists and Fungi
  - 1. Prepared slides and live samples
- E. Survey of Algae, Mosses, Ferns and Liverworts
  - 1. Prepared slides and live samples
- F. Plant Survey
  - 1. Tissues and nutrition
  - 2. Reproduction and growth
- G. Invertebrate Survey
  - 1. Planaria and hydra
  - 2. Earthworms, clams, crayfish
- H. Vertebrate Survey
  - 1. Starfish, perch, frog
  - 2. Fetal pig
- I. Animal Physiology - Fetal Pig Dissection
  - 1. Digestive system
  - 2. Circulatory and respiratory systems
  - 3. Excretory and reproductive systems