COURSE OUTLINE

Biology 122
Introduction to Biology

I. Catalog Statement

Biology 122 is a survey course in the biological sciences designed to meet the laboratory science or life science requirement for most general education programs. Biology 122 covers the scientific method, molecular and cellular structure and function, genetics, evolution, a survey of biodiversity, ecology, and the impact of humans on the environment.

Total Lecture Units: 3.0
Total Laboratory Units: 1.0
Total Course Units: 4.0

Total Lecture Hours: 48.0
Total Laboratory Hours: 48.0
Total Faculty Contact Hours: 96.0

Recommended Preparation: Eligibility for English 101

II. Course Entry Expectations

Skill Level Ranges: Reading 6; Writing 6; Listening/Speaking 6; Math 3.

III. Course Exit Standards

Upon successful completion of the required coursework, the student will be able to:
1. describe important biological molecules as well as cellular structure and function;
2. describe the flow of information from DNA to protein, and the principles of inheritance;
3. describe patterns of evolutionary change and mechanisms including natural selection;
4. describe basic ecological principles and the impact of humans on the environment;
5. compare features of animals and plants; describe basic mammalian physiology.

IV. Course Content — Total Faculty Contact Hours = 96

A. Scientific Method — Lecture 3 hours; Lab 3 hours
   1. Metric system
   2. Hypothesis and theory
   3. Biological organization

B. Basic Chemistry — Lecture 6 hours; Lab 3 hours
   1. Atoms and bonding
   2. Properties of water
   3. Macromolecules
      a. Carbohydrates
      b. Lipids
      c. Proteins
      d. Nucleic acids

C. Cell Structure and Function — Lecture 3 hours, Lab 6 hours
1. Prokaryote vs. eukaryote
2. Plant vs. animal
3. Cellular organelles
4. Diffusion and osmosis

D. Energy — Lecture 3 hours, Lab 3 hours
1. Kinetic vs. potential
2. Photosynthesis
3. Cellular respiration

E. Cell Division — Lecture 4 hours, Lab 3 hours
1. DNA replication
2. Mitosis
3. Meiosis
4. Cancer and non-disjunction

F. Mendelian Genetics — Lecture 5 hours, Lab 3 hours
1. Mendel's pea plants
2. Incomplete and co-dominance
3. Sex-linked traits
4. Dihybrid cross and linked genes

G. DNA and Biotechnology — Lecture 4 hours, Lab 3 hours
1. Transcription
2. Translation
3. Biotechnology
    a. Gene therapy
    b. Genetically modified crops
    c. Forensic applications

H. Evolution — Lecture 7 hours, Lab 3 hours
1. Historical perspective
2. Mechanisms
    a. Natural selection
    b. Genetic drift
    c. Gene flow
    d. Mutation
    e. Non-random mating
3. Evidence
    a. Fossil record
    b. Biogeography
    c. Long-term experiments

I. Origin of Life — Lecture 5 hours
1. Big bang and early earth
2. RNA world and first cells
3. Origin of eukaryotes and Cambrian explosion
4. Speciation
5. Vertebrate origins

J. Ecology — Lecture 5 hours, Lab 6 hours
1. Populations
2. Communities
3. Ecosystems
4. Human impact on the biosphere

K. Biodiversity survey — Lab 9 hours
1. Plants
2. Animals
3. Focus on mammals (LA zoo)

L. Mammalian physiology — Lecture 3 hours, Lab 6 hours
1. Sensory physiology
2. Digestive system
3. Circulatory and respiratory systems
4. Reproductive system

V. Methods of Instruction

The following instructional methodologies may be used in the course:
1. lecture;
2. multimedia;
3. laboratory practice;
4. individual and group presentations;
5. field trips.

VI. Out of Class Assignments

The following out of class assignments may be used in this course:
1. homework (e.g., Moodle lessons on cell structure, Mendelian genetics).

VII. Methods of Evaluation

The following methods of evaluation may be used in this course:
1. lecture exams;
2. laboratory quizzes;
3. laboratory assignments.

VIII. Textbook(s)

Phelan, J. *What is Life? A Guide to Biology.* 2nd edition.
New York, NY: W.H. Freeman, 2013.
12th Grade Textbook Reading Level. ISBN: 1-4641-0720-3.

Simon, E., et al. *Campbell Essential Biology.* 5th edition.
San Francisco, CA: Benjamin-Cummings, 2012.
12th Grade Textbook Reading Level. ISBN: 0-3217-7259-8.

IX. Student Learning Outcomes

After successful completion of this course, students should be able to:

1. describe the structure and function of major organic molecules and cellular organelles.
2. compare the processes of mitosis and meiosis, explain the principles of inheritance and solve basic Mendelian genetics problems.
3. define a gene and demonstrate the flow of information from DNA to protein.
4. explain the major mechanisms of evolution and identify the defining characteristics of major groups of organisms.
5. explain the basic principles of population and community ecology and recognize the effects of human activities on the biosphere.