Degree Applicable

Glendale Community College
May, 2003
Revised April, 2011

COURSE OUTLINE

Biology 101
General Biology

I. Catalog Statement

Biology 101 is the first half of a one year course designed for biological science majors. It covers fundamental biological principles and processes including: the scientific method, biochemistry, metabolism, cell respiration, photosynthesis, molecular biology, cell structure and function, mitosis and meiosis, Mendelian genetics, molecular genetics, and gene regulation.

Units - 4.0
Lecture Hours - 3.0
Laboratory Hours - 3.0
(Faculty Laboratory Hours 3.0 + Student Laboratory Hours 0.0 = Total Laboratory Hours 3.0)

Prerequisite: Chemistry 101.

II. Course Entry Expectations

Skill Level Ranges: Reading 5; Writing 5; Listening/Speaking 5; Math 5.

Prior to enrolling in the course, the student should be able to:
1. describe chemical processes in terms of chemical equations and be able to use the equations to answer quantitative questions concerning the process described;
2. analyze modern theories of atomic motion, especially as they apply to gases;
3. utilize quantum theory to predict electronic structures of the atom;
4. utilize bonding theories to describe the chemical nature of ions and molecules;
5. demonstrate an understanding of intermolecular forces and apply those forces to the nature of solids and liquids;
6. demonstrate the proper use of laboratory equipment and the ability to handle chemicals safely.

III. Course Exit Standards

Upon successful completion of the required course work, the student will be able to:
1. identify the properties of lipids, carbohydrates, proteins, and nucleic acids;
2. describe the structure of prokaryotic and eukaryotic cells;
3. explain cell respiration and photosynthesis;
4. describe the relationships between meiosis and Mendelian genetics;
5. describe the processes of replication, transcription, and translation of the DNA molecule;
6. explain the basic mechanisms of gene regulation in prokaryotes and eukaryotes.

IV. <u>Course Content</u> **Total Contact Hours = 96**

A. Introduction 3 hours
1. The scientific method and its current application in biology
2. Characteristics of living systems
3. Overview of evolutionary theory as the central paradigm of the biological sciences

B. Chemistry of Biological Systems 14 hours
1. Properties of water
2. Functional groups and carbon based molecules
3. Biological monomers and polymers
4. Carbohydrates, lipids, proteins, and nucleic acids
5. Enzymes and enzyme kinetics

C. Cell Biology 14 hours
1. Microscopy
2. Cell size and surface to volume ratio
3. Prokaryotic and eukaryotic cell structure and function
4. Cell membrane structure
5. Active and passive transport across membranes

D. Cellular Energetics 18 hours
1. Laws of thermodynamics
2. Oxidation-reduction and energy
3. Phosphorylation
4. Glycolysis and the Krebs Cycle
5. Electron transport and the Mitchell Hypothesis
6. Energy, pigments, and light
7. Light dependent/independent reactions of photosynthesis

E. Cell Division 7 hours
1. Chromosomes, genes, and DNA
2. Mitosis
3. Meiosis
4. Meiotic abnormalities

F. Mendelian Genetics 14 hours
1. Historical perspective of Mendel's work
2. Mendelian laws
3. Autosomal and sex-linked patterns of inheritance
4. Types of dominance
5. Recombination and linkage maps
6. Solving genetic problems
7. Genetic abnormalities

G. Molecular Genetics 16 hours
1. Early work - DNA versus protein code
2. Early work - the search for DNA structure
3. Watson and Crick’s model of the DNA structure
4. DNA replication and repair
5. Central dogma of molecular biology
6. Mutations - origin and types
7. Some basic techniques from biotechnology

H. Gene Regulation 10 hours

` 1. Basic prokaryotic models
2. Inducible/repressible systems
3. Operon and derivative models
4. Basic eukaryotic models
5. Transposable elements

V. Methods of Presentation

The following instructional methodologies may be used in the course:
1. lectures;
2. multi-media;
3. online.

VI. Assignments and Methods of Evaluation

1. Lecture examinations.
2. Laboratory practical examinations.
3. Final examination.
4. Selected reading from peer-reviewed journals or books.

VII. Textbook

Sadava, D., D.M. Hillis, C.H. Heller, M.R. Berenbaum, Life: The Science of Biology. Current Edition.
New York: W.H. Freeman & Company, 2011.
13th Grade Textbook Reading Level. ISBN: 1429253029.

Conover, Keith, General Biology Laboratory Manual Biology 101, Parts I and II.
Glendale Community College, 2011.
13th Grade Textbook Reading Level.

VIII. Student Learning Outcomes

1. Students will be able to describe and compare the structures of prokaryotic and eukaryotic cells.
2. Students will be able to describe, compare, and explain the differences between mitosis and meiosis. Students will also be able to identify cells in different stages of cell division.
3. Students will be able to define a gene, explain the processes of transcription and translation, and compare these processes in prokaryotes and eukaryotes.
4. Students will be able to explain how organisms acquire energy by photosynthesis and cellular respiration.
5. Students will be able to explain the basis principles of Mendelian genetics and solve genetics problems involving autosomal and X-linked genes.