

Common Course Number: BSC 2010L

Course Title: Principles of Biology I - Laboratory

Catalog Course Description:

This laboratory course is designed to complement BSC 2010, Principles of Biology 1. It covers the nature of scientific investigation, the chemistry of life, microscopy, cell structure and function, metabolism, and the continuity of life.

Credit Hours: 2

Prerequisites: None

Corequisites: BSC 2010

Course Competencies:

Competency 1: The Nature of Scientific Investigation and Tools Biologists Use

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

- 1.1 identify and be able to pose questions that can be answered through scientific investigation.
- 1.2 understand the meaning of the term hypothesis and describe the characteristics of a good scientific hypothesis.
- 1.3 list and describe, in order, the various components of a proper scientific experiment.
- 1.4 be able to summarize and present results in tables and graphs.
- 1.5 discuss, interpret and communicate the results of a scientific experiment.

- 1.6 identify and understand the function of the various parts of a compound microscope and demonstrate proficiency in its correct use.
- 1.7 identify and understand the function of the various parts of a dissecting microscope and demonstrate proficiency in its correct use.
- 1.8 understand how an electron microscope functions and its applications in biology.

Competency 2: The Chemistry of Life

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

- 2.1 gain an understanding of the spatial relationships of atoms in biologically important molecules.
- 2.2 describe the nature of covalent bonds and understand how they are broken and reformed to rearrange atoms into new molecules.
- 2.3 understand the nature of and be able to construct simple hydrocarbons and the six basic functional groups.
- 2.4 depict, in models, the spatial relationships of isomers.
- 2.5 construct simple biologically important molecules such as simple sugars, fatty acids, and amino acids.
- 2.6 describe the structure and function of enzymes.
- 2.7 distinguish between competitive and noncompetitive enzyme inhibition.
- 2.8 discuss the effects of varying pH, temperature and enzyme concentration on the rate of enzyme activity.
- 2.9 propose hypotheses about enzymes and make predictions based on these hypotheses.
- 2.10 construct and interpret graphs of enzyme activity

Competency 3: Cell Structure and Function

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

- 3.1 identify cell structures and organelles using the light microscope and from electron photomicrographs and state the functions of each.
- 3.2 describe the features of selected cell types and list the characteristics shared by certain types of cells.
- 3.3 discuss the evolutionary significance of increasing complexity from unicellular to multicellular organization and provide examples of the various stages.
- 3.4 describe the processes of diffusion and osmosis, the factors that influence them and their importance to cells.
- 3.5 explain the nature and importance of selectively permeable membranes in living cells
- 3.6 define and correctly apply the terms: hypoosmotic, hyperosmotic and isoosmotic.
- 3.7 observe and understand the behavior of plant and animal cells when exposed to these media.

Competency 4: Metabolism: The Nature of Cellular Respiration and Photosynthesis

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

- 4.1 understand and be able to describe the processes of fermentation and cellular respiration.
- 4.2 explain the nature of redox reactions as they occur in cellular metabolism.
- 4.3 demonstrate understanding of spectrophotometry and the ability to effectively use a spectrophotometer.
- 4.4 explain how light and pigments interact in photosynthesis
- 4.5 name and describe the several pigments that participate in photosynthesis.
- 4.6 explain the nature of and demonstrate proficiency in paper chromatography as it is used to separate the pigments of photosynthesis.

Competency 5: The Continuity of Life:

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

- 5.1 describe the cell cycle and explain the events occurring in each stage.
- 5.2 identify the phases of mitosis in an onion root tip and in whitefish blastula cells.
- 5.3 compare and contrast mitosis and cytokinesis in plant and animal cells.
- 5.4 compare and contrast mitosis and meiosis
- 5.5 recognize human chromosomes when presented with an appropriate preparation under the microscope and in a karyogram.
- 5.6 discuss the basic principles of Mendelian inheritance and compare allele frequencies for selected human traits.
- 5.7 understand and apply the concepts involved in human blood typing.
- 5.8 apply the principles of Mendelian and non-Mendelian inheritance patterns to solve genetics problems.
- 5.9 describe the function of restriction enzymes and their relevance to biotechnology.
- 5.10 discuss the basic principles of gel electrophoresis.
- 5.11 explain the use of enzymes in DNA mapping and discuss the importance of DNA mapping.