Principles of Biology

BSC 2010/2010L

One of the central objectives of Miami-Dade Community College is the development of superior programs in education. One such program includes two years of college level academic work acceptable for transfer to the upper division of four-year colleges and universities.

As part of these central objectives, the course, PRINCIPLES OF BIOLOGY (BSC 2010) provides a foundation course for students who plan to major in biology or a program in which biology is a significant part of a senior college or university in the State of Florida, or elsewhere. This course at Miami-Dade Community College parallels biology programs at those institutions.

PRINCIPLES OF BIOLOGY meet for 45 class hours of lecture-discussion (2010) and 30 class hours of laboratory activities (2010L) each semester. Four semester hours of credit may be earned for the combination of lecture-discussion and the laboratory activities.

Two general themes run throughout the course:
- The scientific consideration of LIVING THINGS and the BIOSPHERE;
- the moral consideration of MANKIND, ETHICS and PHILOSOPHICAL PROBLEMS. The following is a list of the course competencies for BSC 2010 (Principles of Biology I). They deal with the scientific process and the nature of biology, the chemistry of life, cell structure and function, metabolism, genetics, and the structure and function of DNA. These form the six units of study in the course. Objectives for each of these units are listed below.

The Scientific Process and the Nature of Biology

The student will:

1. Explains the components of the scientific process and recognizes that testable hypotheses form the basis for all scientific inquiry.
2. Demonstrate an understanding of the hierarchical nature of life, from atoms to ecosystems and of the idea that each level of life has emergent properties.
3. Recognize the cell, as the basic unit of all life and that DNA is the molecule responsible for the continuity of life.
4. Comprehend that structure and function are correlated at all levels of biological organization.
5. Understand that all living things interact both with the living and the non-living components of their environment.
6. Recognize that dynamic balance is maintained in living systems through regulatory mechanisms.

The Chemistry of Life
The student will:
1. Identify the components of matter (such as atoms, elements, compounds and molecules), recognize that atoms are the fundamental unit of matter, and understand basic atomic structure.
2. Compare and contrast the basic types of bonds that occur within and between molecules and describe how bonds are made and broken in chemical reactions.
3. Describe the polar nature of water and understand how water's properties play a role in the evolution and continuity of life on Earth.
4. Explain the nature of organic compounds, including the basic functional groups and the relationship between monomers and polymers.
5. Analyze the component structure of carbohydrates. Lipids, proteins, and nucleic acids and understand how these molecules function in living systems.

Cell Structure and Function
The student will:
1. Differentiate between the two basic cell types, describe their differences and similarities, and understand their evolutionary relationship.
2. Understand the importance of subcellular compartmentalization and multicellularity in the evolution of life on Earth.
3. Identify the subcellular organelles and describe their structure and functions.
4. Demonstrate an understanding of the fluid mosaic nature of membrane structure and the basic processes responsible for transport across membranes.
5. Explain the function of cell division, and identify and describe the major steps in the cell cycle including the processes of mitosis and cytokinesis.
6. Demonstrate an understanding of how cell cycles are regulated at the molecular level.