

**Course Description****BSC2010 | Principles of Biology | 3.00 credits**

In this course students will apply the scientific method to critically examine and explain the natural world. This course will cover molecular biology, cellular biology, genetics, metabolism, and replication. Student learning outcomes: students will demonstrate scientific literacy by articulating and practicing the scientific method; students will evaluate data regarding validity; students will read and interpret a variety of scientific data; students will identify major macromolecules and state their importance to living organisms; students will explain metabolism; students will compare and contrast prokaryotic and eukaryotic structures and processes of cell division and replication; and students will explain gene expression; students will solve problems in transmission genetics. Pre/Corequisite: BSC 2010L, CHM 1045. Special Fee.

**Course Competencies:**

**Competency 1:** The student will, upon completion of this course, understand the process of science and the nature of biology by:

1. Explaining the components of the scientific process as the basis for all scientific inquiry.
2. Understanding the hierarchical nature of life and its emergent properties.
3. Discussing the characteristics of life and how living things interact with one another and with their environment.
4. Describing how dynamic balances are maintained in living systems through regulatory mechanisms.

**Competency 2:** The student will, upon successful completion of this course, understand the basic chemistry of life by:

1. Identifying the components of matter and understanding basic atomic structure.
2. Differentiating the basic types of chemical bonds that form molecules and compounds.
3. Describing intermolecular interactions and how bonds are made and broken in chemical reactions.
4. Describing the properties of water and how they play a role in the evolution and continuity of life on Earth.
5. Identifying the functional groups of organic molecules and the relationship between monomers and polymers.
6. Comparing the structure and function of carbohydrates, lipids, proteins, and nucleic acids in living systems.

**Competency 3:** The student will, upon successful completion of this course, be able to understand cell structure and function by:

1. Differentiating the basic cell types and their evolutionary relationships.
2. Explaining the structure and functions of subcellular organelles.
3. Understanding the structure and function of biological membranes.
4. Explaining cellular inter- and intracellular communication pathways.
5. Explaining cellular reproduction, the cell cycle, and how it is regulated at the molecular level.
6. Contrasting asexual and sexual reproduction.

**Competency 4:** The student will, upon successful completion of this course, understand energy transformations within a cell by:

1. Understanding how the laws of thermodynamics apply to energy transformations within cells.
2. Explaining the structure, function, and regulation of enzymes in cellular metabolism.
3. Describing the structure and function of ATP and its role in exergonic and endergonic reactions.
4. Analyzing the stages of cellular respiration, anaerobic processes, and photosynthesis and their evolutionary significance in the continuation of life on Earth.

**Competency 5:** The student will, upon successful completion of this course, be able to explain how DNA directs cellular structure and function by:

1. Explaining DNA structure, replication, and the nature of the genetic code.
2. Describing the nature and consequences of point and chromosomal mutations.
3. Understanding transcription and translation as means for gene expression.

4. Contrasting regulation of gene expression in prokaryotes and eukaryotes and their evolutionary significance.
5. Describing the principles and techniques of gene manipulation and molecular genetics.

**Competency 6:** The student will, upon successful completion of this course, be able to understand the principles of classical and modern genetic analyses by:

1. Understanding the nature of heredity and the structure and behavior of chromosomes.
2. Explaining and contrasting the principles of Mendelian and non-Mendelian genetics.
3. Understanding the genetic basis of diseases.
4. Describing techniques utilized in genetic testing and molecular biology.

**Learning Outcomes:**

- Solve problems using critical and creative thinking and scientific reasoning
- Describe how natural systems function and recognize the impact of humans on the environment