



**Common Course Number:** BSC-1030

**Course Title:** Social Issues in Biology

**Catalog Course Description:**

BSC 1030 develops in students an understanding and appreciation for living systems (including themselves) and the skills and knowledge needed to address biological issues that are important and relative to their lives and the society in which they live. Such issues include, but are not limited to, the origin of biodiversity, advances in reproductive technology, genetic engineering, scientific ethics, advances in the treatment of disease and genetic disorders, environmental problems, and sociobiology.

**Credit Hours Breakdown:** 3 lecture hours

**Prerequisite:** None

**Corequisite:** None

**Course competencies:**

**Competency 1:** The student will understand the nature of science, the scientific method, how scientists use the latter to ask and answer questions about the living world, and how the results of scientific endeavors are evaluated, applied to, and affect everyday human life.

*Upon successful completion of this course, the student will demonstrate knowledge of the nature of science by:*

- A. Defining science and biology, describing their interrelationship, and understanding why science is conducted, as well as the factors that control scientific research.
- B. Explaining the components of the scientific method (observation, hypothesis, prediction, experiment, control group, test group, data, analysis, conclusion, theory) and identifying these components in various experiments.

- C. Explaining how scientists formulate hypotheses through inductive reasoning and how they are tested through deductive reasoning.
- D. Developing effective skills to analyze and evaluate scientific information that may have a societal and/or personal impact, and applying critical reasoning to evaluate current theories and technologies.

**Competency 2:** The student will understand how ethics and morals affect biological decision-making.

*Upon successful completion of this course, the student will demonstrate knowledge of how ethical and moral issues affect the decision-making process in science by:*

- A. Defining ethics and morals and discussing their relationship to the discipline of biology.
- B. Analyzing the influence of ethics and politics on biological research.
- C. Discussing a variety of current social/biological issues and explaining how ethics play a role in directing the current attitudes of people.

**Competency 3:** The student will understand how genetic information determines an organism's characteristics (including the expression of certain diseases) and how medical technology can be applied to alleviate some genetic disorders.

*Upon successful completion of this course, the student will demonstrate knowledge of genetics by:*

- A. Explaining the structure and function of nucleic acids.
- B. Explaining the relationships among DNA, genes, and chromosomes, how they determine an organism's characteristics and the mechanisms by which genetic disorders may result in disease.
- C. Describing the processes of replication, transcription, and translation, and how disruptions in these processes, such as mutation, can affect their end products.
- D. Discussing how new biotechnologies may be used in the treatment of genetic disorders.
- E. Analyzing the ethical and legal issues that relate to the applications of biotechnology to such genetic disorders.

**Competency 4:** The student will understand the factors affecting, consequences of, and mechanisms involved in cellular growth and reproduction, including abnormal cellular growth such as cancer.

*Upon successful completion of this course, the student will demonstrate knowledge of the mechanisms involved in cellular growth and reproduction by:*

- A. Describing the process of cellular growth and the effects of nutrition on that process.
- B. Explaining the evolutionary significance of multicellularity and the resulting specialization of cells and division of labor.
- C. Relating the steps of mitosis and meiosis to organismic growth and reproduction.
- D. Discussing the impact of uncontrolled cellular growth (cancer) on the life and health of humans and on society.
- E. Discussing, the various means of treating cancer and recent advances in modes of treatment.

**Competency 5:** The student will understand the factors affecting, consequences of, and mechanisms involved in human growth and reproduction, both on the organismic level (conception, pregnancy and birth), and on the population level (population growth and its impact on the planet).

*Upon successful completion of this course, the student will demonstrate knowledge of the mechanisms of organismic and population growth by:*

- A. Describing how conception occurs in humans and the events that occur during the different stages of human pregnancy.
- B. Discussing medical problems that may arise while trying to conceive, successfully carry, and deliver a baby, as well as the medical treatments available.
- C. Analyzing the ethical issues involved with such medical procedures as in vitro fertilization, surrogate motherhood, genetic engineering, termination of pregnancy, and cloning.
- D. Defining the basic parameters of human population dynamics, including birth rate, death rate, doubling time, exponential growth, logistic growth, and population density.
- E. Discussing the factors that control population growth, how they affect human populations, and the ethical questions surrounding the various methods available to limit population growth.
- F. Discussing the impact of uncontrolled human population growth on the planet, including the sustainable nature of Earth's ecosystems.

*Competency 6: The student will understand the natural processes of evolution that govern speciation and extinction, how they affect the continuation of the human species, and the role of physical conditions and natural phenomena that govern and change our planet.*

*Upon successful completion of this course, the student will demonstrate knowledge of the process of evolution by:*

- A. Discussing the changing nature of the physical world, that populations must adapt to these changes in order to survive and reproduce and that changes within species may lead to changes in other species (coevolution).
- B. Describing the work of Charles Darwin, understanding how his observations led to the theory of natural selection, and explaining the major steps in this process.
- C. Explaining the phenomena of speciation and extinction and inferring that they are a direct result of the process of natural selection.
- D. Describing how scientists group living organisms into hierarchical groups based on their shared characteristics, and name and characterize the major systematic taxa.
- E. Discussing how life is theorized to have evolved on Earth and evaluating the major evidence supporting this scenario.
- F. Identifying the major events in the biological and cultural evolution of *Homo sapiens*.

*Competency 7: The student will understand the effects of various human activities on the environment and its biodiversity, as well as the ultimate consequences of these activities on our long-term survival.*

*Upon successful completion of this course, the student will demonstrate knowledge of the effects of human intervention/activities on the environment and its biodiversity by:*

- A. Defining biodiversity; explain how it contributes to the stability of ecosystems, and how rates of speciation and extinction have a direct effect upon an ecosystem's ability to perpetuate itself by increasing or decreasing biodiversity.
- B. Explaining how biodiversity is affected by various human activities such as habitat destruction and pollution, and the eventual effect of loss of biodiversity upon the future of the human species.
- C. Discussing human attitudes toward the well-being and survival of other species and relating these attitudes to the ethical systems of society.

*Competency 8: The student will understand how organismic health and behavior may be affected by factors such as nutrition, drugs, environmental contaminants, and pathogenic organisms.*

*Upon successful completion of this course, the student will demonstrate knowledge of the effect of environmental factors on health and behavior by:*

- A. Describing the functioning of the digestive system, demonstrating understanding of human dietary requirements, and analyzing how diet influences human health.
- B. Analyzing and evaluating the human behaviors that can lead to the development of diseases, such as cancers, circulatory disorders, AIDS, and respiratory ailments.
- C. Describing the integrated functioning of the human nervous, endocrine, and immune systems and its relationship to such factors as behavior, stress, health, exercise, and disease.
- D. Describing the effects of drugs and pollution on living organisms, especially on human health and behavior.



**Common Course Number:** BSC-1005 (*REVISION*)

**Course Title:** General Education Biology

**Catalog Course Description:**

This general education biology course covers basic biological concepts, concentrating on selected principles that help explain molecular biology, evolution, genetics, growth, disease, and the problems of humans in the environment. It is designed to stimulate interest in the variety of life that exists on our planet, help students recognize the factors that provide order in this variety, and involve students in the processes of inquiry, observation, and analysis of biological organization in order to give them a foundation for intelligently interpreting and evaluating biological topics.

**Credit Hours Breakdown:** 3 lecture hours

**Prerequisite:** None

**Co requisite:** None

**Course Competencies:**

**Competency 1:** The student will understand the nature of science, the scientific method, and the field of biology.

*Upon successful completion of this course, the student will demonstrate knowledge of the nature of science and the scientific process by:*

- A. Describing and/or illustrating the scientific method as presented in the literature.
- B. Differentiating between science and biology.
- C. Comparing the characteristics of life common to a simple cell and multicellular organisms.

*Competency 2: The student will become familiar with the basic principles of matter and energy, and understand how they relate to living organisms.*

*Upon successful completion of this course, the student will demonstrate knowledge of the nature of matter and energy and how they relate to living organisms by:*

- A. Defining energy and matter, and their laws, and explaining how they are used in biological systems.
- B. Explaining the basic structure of atoms and molecules and recognizing examples of covalent, hydrogen, and ionic bonding.
- C. Explaining the importance of water to life and the concept of acidity as well as its expression as pH.
- D. Identifying the four major groups of organic compounds (carbohydrates, lipids, proteins, and nucleic acids) and understanding their functions in living systems.
- E. Describing the roles of enzymes in the synthesis and decomposition of biological compounds.
- F. Describing the processes of photosynthesis and cellular respiration.

*Competency 3: The student will become familiar with cell structure and function and their interrelationships.*

*Upon successful completion of this course, the student will demonstrate knowledge of the nature of cell structure and function by:*

- A. Describing the structure of a typical cell and explaining the function of the subcellular organelles.
- B. Differentiating between plant and animal cells with respect to structure and function.
- C. Identifying and explaining methods of cell transport such as diffusion, osmosis, and active transport.

*Competency 4: The student will understand the processes of cellular and organismal proliferation.*

*Upon successful completion of this course, the student will demonstrate knowledge of the cellular and organismal processes of proliferation by:*

- A. Explaining the function and significance of cell division and organismic reproduction.
- B. Comparing and contrasting mitosis and meiosis and describing the significant events that occur in each stage of these processes.
- C. Explaining the principles of heredity, as illustrated by the work of Gregor Mendel, and their application to humans.
- D. Describing the structure of DNA and understand how it functions to control a cell's activity and acts as the molecule of heredity.
- E. Explaining the processes of DNA replication, transcription and translation.

*Competency 5: The Student will understand and appreciate the nature of evolutionary theory.*

*Upon successful completion of this course, the student will demonstrate knowledge of the nature of evolutionary theory by:*

- A. Explaining the theory of evolution of life on Earth favored by modern scientists.
- B. Describing and explaining Darwin's basic concept of natural selection and how it relates to the theory of evolution.
- C. Listing and explaining the several categories of evidence that support the theory of evolution.
- D. Describing how scientists group living organisms into hierarchical groups based on their shared characteristics, and name and characterize the major systematic taxa.

**Competency 6:** The student will understand the relationship between organisms and the environment as well as how the environment is affected by population growth and consumption of resources.

*Upon successful completion of this course, the student will demonstrate knowledge of interactions between organisms and the environment by:*

- A. Identifying and explaining the ways in which the abiotic environment affects living systems.
- B. Describing the factors that control population growth and the mechanisms involved.
- C. Discussing the various relationships existing among individuals and populations in communities.
- D. Explaining the nature of ecosystems with particular reference to their sustainability.
- E. Listing and describe the major biomes of the world.
- F. Discussing the major impact humans have on their environment