



Course Description

BSC2011 | Principles of Biology 2 | 3.00 credits

This is the second in a sequence of two courses that deals with the principles of modern biology. It covers organic evolution, phylogeny, biological diversity, overviews of plant and animal form and function, behavior, as well as population, community, and ecosystem ecology. Prerequisites: BSC2010, 2010L; corequisite: BSC2011L. Special fee.

Course Competencies

Competency 1: The student will learn, upon completion of this course, the mechanisms of micro- and macroevolution by:

1. Explaining the central role of evolution in modern biology
2. Describing the development of Darwinian evolution
3. Analyzing the evidence supporting the theory of evolution
4. Discussing natural selection as the major agent for evolution and its mechanisms
5. Describing the role of the population as the unit of evolutionary change
6. Explaining the Hardy-Weinberg equilibrium to understand microevolution and the agents that influence microevolution within populations
7. Discussing the process of speciation and definitions of species concepts
8. Analyzing the major evolutionary events and trends that originated and shaped life on Earth throughout its history

Competency 2: The student will learn, upon successful completion of this course, the nature of biological diversity by:

1. Describing the Linnaean hierarchical classification system and binomial nomenclature
2. Constructing and analyzing phylogenetic trees by using cladistics
3. Explaining the similarities and differences among the Domains and Kingdoms of life

Competency 3: The student will learn, upon successful completion of this course, the diversity and characteristics of form and function of viruses by:

1. Describing the basic structures and types of viruses
2. Comparing the replicative cycles of bacteriophages, plant, and animal viruses
3. Describing the pathogenic nature of viruses, viroids, and prions

Competency 4: The student will learn, upon successful completion of this course, the diversity and characteristics of form and function of prokaryotes by:

1. Comparing the structural and functional diversity of Bacteria and Archaea
2. Describing the diversity of major groups of Bacteria
3. Explaining metabolic adaptations within prokaryotes
4. Describing asexual modes of reproduction within prokaryotes
5. Discussing horizontal gene transfer among Bacteria
6. Discussing ecological and pathogenic characteristics of prokaryotes

Competency 5: The student will learn, upon successful completion of this course, the diversity and characteristics of form and function of protists by:

1. Explaining the ambiguous nature of Protists
2. Comparing the structural and functional diversity of major groups of protists
3. Describing the life cycles of various protists
4. Discussing ecological and pathogenic characteristics of protists

Competency 6: The student will learn, upon successful completion of this course, the diversity and characteristics of form and function of plants by:

1. Describing characteristics and adaptations to life on land of bryophytes, seedless vascular plants, and seed plants
2. Comparing the structural and functional diversity of taxonomic groups of plants
3. Comparing the life cycles of bryophytes, seedless vascular plants, and seed plants
4. Discussing alternation of generation in relationship to plant life cycles
5. Discussing ecological characteristics of plants and their importance to humans

Competency 7: The student will learn, upon successful completion of this course, the diversity and characteristics of form and function of fungi by:

1. Comparing the structural and functional diversity of taxonomic groups of fungi
2. Comparing the sexual and asexual life cycles of the various groups of fungi
3. Discussing ecological characteristics of fungi, including their role as pathogens (a pathogenic role is an ecological role)
4. Describing characteristics of the mutualistic nature of lichens

Competency 8: The student will learn, upon successful completion of this course, the diversity and characteristics of form and function of animals by:

1. Describing the developmental process of multicellular animals leading to body symmetry, body plans, and tissue layers
2. Comparing the structural and functional diversity of the invertebrates, including sponges, Cnidarians, the major Lophotrochozoa phyla, the major Ecdysozoa phyla, and the major Deuterostome phyla
3. Comparing the structural and functional diversity of the vertebrate groups and their adaptations to terrestrial existence
4. Discussing characteristics of primates related to human evolution

Competency 9: The student will learn, upon successful completion of this course, the relationships of organisms with their environment by:

1. Describing the levels of organizations in ecology
2. Discussing factors involved in population fluctuation and regulation
3. Analyzing the interactions existing in communities, such as competition, predator-prey, and symbiosis
4. Analyzing the biogeochemical cycles existing in ecosystems
5. Identifying factors that shape terrestrial and aquatic ecosystems
6. Analyzing human impacts on Earth's biosphere
7. Assessing sustainable development in the conservation of Earth's resources

Learning Outcomes:

- Communicate effectively using listening, speaking, reading, and writing skills
- Solve problems using critical and creative thinking and scientific reasoning
- Describe how natural systems function and recognize the impact of humans on the environment