



# BROWARD COLLEGE COURSE OUTLINE

**LAST REVIEW: 2010-2011**

**NEXT REVIEW: 2015-2016**

**STATUS: A**

**COURSE TITLE: Introduction to Biology II**

**COMMON COURSE NUMBER: BSC1011**

**CREDIT HOURS: 3**

**CONTACT HOUR BREAKDOWN**

*(per 16 week term)*

**CLOCK HOURS: 48**

*(Voc. Course ONLY)*

**Lecture: 3**

**Lab:**

**Clinic:**

**Other:**

**PREREQUISITE(S):** BSC1010 and BSC1010L with a minimum grade of C

**COREQUISITE(S):** BSC1011L

**PRE/COREQUISITE(S):**

**COURSE DESCRIPTION** *(750 characters, maximum)*: This course is the second of a two-semester sequence introducing science majors to biological principles including a study of the diversity of organisms, evolution and population dynamics, and ecology. Three hours lecture per week.

General Education Requirements – Associate of Arts Degree (AA), meets Area(s): Area

General Education Requirements – Associate in Science Degree (AS), meets Area(s): Area

General Education Requirements – Associate in Applied Science Degree (AAS), meets Area(s): Area

## UNIT TITLES

1. Origin and Diversity of Life
2. Prokaryotes, protists, Fungi, and Viruses
3. Plant Biology
4. Animal Biology
5. Evolution and Population Dynamics
6. \*Ecology

**\*Optional**

## **UNITS**

### **Unit 1 Origin and Diversity of Life**

#### **General Outcome:**

- 1.0 The student shall:** be able to discuss the major steps in chemical evolution which are thought to have led to the origin of living cells and describe the possible adaptive radiation producing the diversity of organisms.

#### **Specific Measurable Learning Outcomes:**

**Upon successful completion of this unit, the student shall be able to:**

- 1.1 Describe conditions believed to have been present on the primitive earth and outline possible major steps of chemical evolution leading to the first cells.
- 1.2 Describe the distinguishing characteristics of members of the Kingdoms Prokaryotes, protists, Fungi, plants, and animals.
- 1.3 Describe evidence supporting the view that prokaryotes form the most ancient group of organisms on earth, and that this group gave rise to the other organisms.
- 1.4 Describe the binomial system of nomenclature, listing taxonomic categories from the broadest to the most specific taxa.

**Common Course Number: BSC1011**

**Unit 2 Prokaryotes, protists, Fungi, Viruses**

**General Outcome:**

**2.0 The student shall: be** able to explain how prokaryotes, protists, fungi, and viruses are classified, detail the characteristics and importance of each group in the biological hierarchy.

**Specific Measurable Learning Outcomes:**

**Upon successful completion of this unit, the student shall be able to:**

- 2.1 Describe the distinguishing characteristics and taxonomy of the viruses.
- 2.2 Explain why eubacteria and archaeobacteria are considered to be separate prokaryotic lineages.
- 2.3 Detail the basic taxonomy of bacteria.
- 2.4 Describe the structure and function of a bacterial cell.
- 2.5 List the principal modes of bacterial nutrition and distinguish among the different forms of heterotrophy and autotrophy.
- 2.6 List the important ecological roles of bacteria.
- 2.7 Discuss the three mechanisms of genetic recombination (conjugation, transformation, and transduction) that take place in bacteria.
- 2.8 Compare and contrast a virus with a free-living cell.
- 2.9 Relate the steps that take place in the process of viral infection, contrasting a lytic infection with a lysogenic infection.
- 2.10 Describe major animal, plant and bacterial viral pathogens and list methods of transmission and disease prevention.
- 2.11 Detail what is currently known about the relationship between viruses and cancer.
- 2.12 Describe the biological basis for AIDS and relate how the HIV virus infects individuals and causes the symptoms of AIDS, and strategies to combat this virus.
- 2.13 Compare and contrast the main groups of protists and relate their evolutionary significance.

- 2.14 Describe the complete life cycle of the malarial parasite and selected other parasites.
- 2.15 Describe the main modes of nutrition found among the fungi and outline their general reproductive cycle.
- 2.16 List an overview of the divisions of fungi and state the distinguishing characteristics of each division.
- 2.17 Explain multicellularity in the fungi and contrast this with protists, prokaryotes, plants and animals.

**Unit 3 Plant Biology**

**General Outcome:**

- 3.0** The students should be able to discuss the diversity of the plant kingdom, relate the life cycles of major plant groups, describe reproduction in flowering plants, discuss plant growth and structure, and explain plant transport systems.

**Specific Measurable Learning Outcomes:**

**Upon successful completion of this unit, the student shall be able to:**

- 3.1 Outline the characteristics of the plant kingdom and the distinguishing features of each plant division.
- 3.2 Distinguish, based on their characteristics and life cycles, the nonvascular plants from the vascular plants and the gymnosperms from the angiosperms.
- 3.3 Relate the life cycle details for a typical moss, club moss, fern, gymnosperm, and angiosperm.
- 3.4 Describe the evolutionary history of plants, including the relative sequence in which major plant groups have appeared in the fossil record.
- 3.5 Describe the basic structure of various angiosperm flowers.
- 3.6 Describe specializations of flowers with regard to the process of pollination.
- 3.7 Outline the events of megasporogenesis, microsporogenesis, and fertilization in a typical angiosperm.
- 3.8 Compare embryogenesis and seed development in dicots and monocots; detail the events of germination.
- 3.9 Discuss modes of asexual reproduction in plants.
- 3.10 Outline characteristic structures and functions of the various tissue types that occur in plants.
- 3.11 Describe the patterns of primary and secondary growth.
- 3.12 Describe the anatomy of a leaf and relate its structure to its function.

- \*3.13 Explain water movement in plants and distinguish the roles of root pressure, transpiration, and water potential in explaining water transport.
- 3.14 Describe how the stomatal apparatus regulates the rate of transpiration, including the role of guard cells.
- \*3.15 Outline the ways plants transport food molecules from one tissue to another.
- 3.16 List the mechanisms for gas exchange in plants.
- \*3.17 List the nutritional requirements common to plants and explain the specialized ways some plants acquire them.
- \*3.18 Explain the roles of plant hormones in regulating plant growth and response.
- \*3.19 Explain the basis for plant movements and responses such as phototropism, gravitropism, thigmotropism, and solar tracking.
- \*3.20 Distinguish among short-day, long-day, and day-neutral plants and explain how day length and flowering are related.

\*Optional

**Common Course Number: BSC1011**

**Unit 4 Animal Biology**

**General Outcome:**

**4.0 The student shall:** be able to explain contrasting features of animal anatomy and physiology among taxa and recognize these features.

**Specific Measurable Learning Outcomes:**

**Upon successful completion of this unit, the student shall be able to:**

- 4.1 List the distinguishing characteristics that separate the protostomes from the deuterostomes, and explain the evolutionary implications of the contrast.
- 4.2 List characteristics which will distinguish members of the Phyla Porifera, Cnidaria, Ctenophora, Platyhelminthes, Nematoda, Rotifera, Mollusca, Annelida, Arthropoda, Onychophora, Echinodermata, Hemichordata, and Chordata.
- 4.3 Distinguish among the major phyla, subphyla, and classes of animals, and give examples of each.
- 4.4 Explain the relationship of the three germ layers and body cavities in the metazoans.
- 4.5 Detail representative life cycles for ~~each of~~ selected organisms of major phyla.
- 4.6 Describe the coelom and its use in defining the major phyla of animals.
- 4.7 Compare representative types of invertebrate and vertebrate skeletal support systems and explain how they relate to protection and movement.
- 4.8 Contrast and compare representative invertebrate and vertebrate sense organs and nervous systems.

- 4.9 Contrast and compare mechanisms of thermoregulation, osmoregulation, and excretion among invertebrates and vertebrates in marine, freshwater, and terrestrial habitats.
- 4.10 Explain how hormones work to coordinate control of function in representative invertebrates and vertebrates.
- 4.11 Contrast and compare representative invertebrate and vertebrate feeding patterns and digestive systems.
- 4.12 Contrast and compare how materials are exchanged in representative invertebrates and vertebrates including those lacking a circulatory system, those with an open circulatory system, and those with a closed circulatory system.
- 4.13 Contrast and compare mechanisms of gas exchange among representative invertebrates and vertebrates.
- 4.14 Outline the various patterns of asexual and sexual reproduction found among representative invertebrates and vertebrates.
- 4.15 Contrast fertilization and early embryogenesis in major representative taxa.

**Unit 5 Evolution and Population Dynamics**

**General Outcome:**

**5.0 The student shall:** be able to explain natural selection as it relates to evolutionary theory, describe the basic tenets of population genetics.

**Specific Measurable Learning Outcomes:**

**Upon successful completion of this unit, the student shall be able to:**

- 5.1 Describe natural selection as outlined by Darwin.
- 5.2 Summarize evidence of paleontology, comparative anatomy, comparative embryology, comparative biochemistry, comparative molecular biology, and biogeography that supports our present-day understanding of evolution.
- 5.3 Define a species.
- 5.4 Contrast methods utilized in taxonomic classification of organisms.
- 5.5 Outline known mechanisms of speciation.
- 5.6 List reproductive isolating mechanisms which impede two species from producing fertile hybrids.
- 5.7 Explain various evolutionary patterns observed in various groups of organisms, including divergent evolution, convergent evolution, and coevolution, and discuss examples of each.
- 5.8 Compare and contrast gradual and punctuated interpretations of speciation.
- 5.9 Describe the Hardy-Weinberg equilibrium formula and explain how it is related to gene frequency in a population.

- 5.10 Discuss the factors that can alter the gene frequencies in populations: genetic drift, gene flow (migration), mutation, nonrandom mating, and natural selection.
- 5.11 Compare and contrast stabilizing selection, directional selection, and disruptive selection, and describe how each plays a role in evolution.
- 5.12 Explain and contrast logistic and exponential mathematical population growth curve models.
- 5.13 Define the carrying capacity of a population and explain how it is related to the rate of population growth.
- 5.14 List examples of biotic and abiotic population growth controls and categorize these as density-dependent or density-independent.
- 5.15 Compare and contrast reproductive patterns of various organisms and describe how they maximize reproductive success.
- 5.16 Summarize the process of extinction, listing factors attributed to the decline of various species in the past and present.

**Common Course Number: BSC1011**

**\*Unit 6 Ecology**

**General Outcome:**

**6.0 The student shall:** be able to explain interactions between organisms and their environment as energy and matter flows through ecosystems, discuss environmental problems and their solutions.

**Specific Measurable Learning Outcomes:**

**Upon successful completion of this unit, the student shall be able to:**

- \*6.1 Describe the physical characteristics of the biosphere and explain how they affect climate.
- \*6.2 Compare and contrast the principal terrestrial biomes of the Earth, with attention to the abiotic factors that influence biome distribution and identity and to the types of organisms supported in each.
- \*6.3 Compare and contrast the principle aquatic and marine communities, with attention to the abiotic and biotic characteristics of each, and to the types of organisms supported in each.
- \*6.4 Describe the various trophic levels found in major ecosystems, and identify the types of organisms found in each.
- \*6.5 Describe the relationships among trophic levels as represented graphically by pyramids of numbers, biomass, and energy.
- \*6.6 Distinguish between gross primary productivity and net primary productivity, and describe various factors affecting rates of productivity.
- \*6.7 Summarize the major biogeochemical cycles.
- \*6.8 Explain the concept of the ecological niche as it relates to the competitive exclusion principle.

- \*6.9 Discuss the roles of competition and predation as they relate to species distribution and diversity in community structure.
- \*6.10 Define and provide examples illustrating the major interspecific symbiotic relationships.
- \*6.11 Outline and provide examples illustrating the concept of ecological succession.
- \*6.12 Discuss selected examples of human alterations of ecosystems and outline the resulting consequences.
- \*6.13 Discuss ecological concerns associated with identification and protection of endangered species, introduction of exotic species, and the use of biological control agents.
- \*6.14 Discuss global environmental concerns regarding the major air pollutants, water pollutants, and land pollutants, with regard to existing regulations controlling use, emissions and disposal.

**\*Optional**