



Broward Community College

Course Outline

STATUS: A

COMMON COURSE NUMBER: BSC 1811

COURSE TITLE: Biology Principles for Teachers II

CREDIT HOURS: 3

CONTACT HOURS BREAKDOWN:

Lecture/Discussion 48

Lab

Other

Contact Hours/Week 3

CATALOG COURSE DESCRIPTION:

Prerequisite: BSC 1810

Corequisite: None

This course is designed for middle and high school science teachers. It is the second course in a two-course sequence and covers the basic principles of modern biology, while focusing on the nature and activities of living organisms and their relationship to our planet. This course will not satisfy the General Education Requirements for the A.A. degree.

General Education Requirements - Associate of Arts Degree, meets Area(s):
 General Education Requirements - Associate in Science Degree, meets Area(s):

UNIT TITLES:

1. The New Genetics: Modern Methodologies and Applications
2. A Survey of the Five Kingdoms: Patterns in Progress
3. Our Green Providers: Development, Controls, and Responses
4. Animal Behavior: Gathering Information and Responding
5. Human Reproduction and Embryology
6. Introduction to Microbiology and Immunology
7. Modern Concepts in the Theory of Evolution
8. Ecological Concepts and Consequences

I. Course Overview:

Upon successful completion of this course, the students should be able to demonstrate an understanding of the principles of biology and the modern concepts, innovations, and discoveries which have been built on the fundamental foundations of biological science.

II. Units:

Unit 1. The New Genetics: Modern Methodologies and Applications

General Outcome:

- 1.0 The students should be able to demonstrate an understanding of the concept of gene control, DNA and protein sequencing, natural recombination in the prokaryotes, viral transduction, and the role of restriction enzymes in artificial recombinations.

Specific Learning Outcomes:

Upon successful completion of this unit, the students should be able to:

- 1.1 Distinguish between DNA and extrachromosomal DNA.
- 1.2 Discuss transformation, transduction, and conjugation.
- 1.3 Describe the significance of the discovery of the mode of viral transduction.
- 1.4 Discuss the induction and repression of protein synthesis as evidenced by the operon model.
- 1.5 Describe the action of endonucleases.
- 1.6 Describe some benefits and dangers inherent in recombinant DNA experiments and processes.
- 1.7 Identify mechanical and chemical steps in DNA extraction.
- 1.8 Model a recombinant DNA procedure.

1.9 Identify biochemical procedures for separation and identification of amino acids in a sequence.

Unit 2. A Survey of the Five Kingdoms: Patterns in Progress

General Outcome:

2.0 The students should be able to demonstrate an understanding of the diversity of living organisms while noting the pattern of evolutionary sequence.

Specific Learning Outcomes:

Upon successful completion of this unit, the students should be able to:

- 2.1 Describe the structure and reproduction of viral types.
- 2.2 Differentiate between the eubacteria and the cyanobacteria.
- 2.3 Identify harmful and useful prokaryotes.
- 2.4 Compare and contrast the true algal divisions.
- 2.5 Trace the cell lines of the algal divisions.
- 2.6 Investigate the life cycles of isogamous and heterogamous forms.
- 2.7 Describe the major protozoan protists.
- 2.8 Compare the major taxonomic groups of fungi.
- 2.9 Explain the significance of mycorrhizae.
- 2.10 Describe the characteristics of such diverse organisms as slime molds and lichens.
- 2.11 Describe characteristics common to all vascular plants.
- 2.12 Explain the evolutionary significance of seed plant advancements.
- 2.13 Describe the reproductive process in gymnosperms.
- 2.14 Compare and contrast the angiosperm classes.
- 2.15 Differentiate among acoelomate, pseudocoelomate, and coelomate forms.

2.16 Describe animal lifestyles and apply to major phyla.

2.17 Compare body plans and symmetry.

- 2.18 Insert some "missing links" into the taxonomic tree.
- 2.19 Describe the chordates, their subphyla and basic characteristics and representatives.
- 2.20 Compare and contrast algal forms.
- 2.21 Identify an unknown by using a dichotomous key.
- 2.22 Describe a plasmodial slime mold.
- 2.23 Identify the major parts of a vascular plant.
- 2.24 Locate and identify the organs of a vertebrate.

Unit 3. Our Green Providers: Development, Controls, and Responses

General Outcome:

3.0 The students should be able to demonstrate an understanding of the structure and function of major plant tissues, the regulation of plant activities, plant culture techniques, and the pharmacological contributions of the photosynthetic organisms.

Specific Learning Outcomes:

Upon successful completion of this unit, the students should be able to:

- 3.1 Compare and contrast basic plant cell types and identify those that differentiate.
- 3.2 List and describe four major plant tissue systems.
- 3.3 Describe transport of materials into, through, and out of plants.
- 3.4 List and explain the actions of the major plant hormones, identify their effects, and analyze their interactions.
- 3.5 Describe, identify and quantify plant behaviors and tropisms.
- 3.6 Describe photoperiodism and induction of flowering.
- 3.7 Describe the in vitro culture of plant tissue.
- 3.8 List some medicinal plants and their modes of action.
- 3.9 Identify areas of metabolic activity in a germinating seed.

Unit 4. Animal Behavior: Gathering Information and Responding

General Outcome:

4.0 The students should be able to demonstrate an understanding of behavioral responses as they relate to brain function, hormonal interactions, and nervous transmission.

Specific Learning Outcomes:

Upon successful completion of this unit, the students should be able to:

- 4.1 List the roles of hormones in animals.
- 4.2 Describe sources of and functions for the major vertebrate hormone groups, and explain the feedback mechanism for hormonal actions.
- 4.3 Compare the two major divisions of the vertebrate nervous system.
- 4.4 Explain the action involved in a reflex arc.
- 4.5 Describe the brain subregions and their functions.
- 4.6 Trace the transmission of a sensory and motor nervous impulse.
- 4.7 List and describe some chemicals utilized within the nervous system and describe how neurotoxins and chemical analogs work.
- 4.8 Categorize behavioral responses and patterns.
- 4.9 Compare and contrast the terms biological clock and circadian rhythms and graph human circadian patterns.
- 4.10 List types and give examples of learned behaviors.
- 4.11 Categorize animal adaptations.
- 4.12 Explain methods of animal communication.
- 4.13 Give examples of several dominance hierarchies.
- 4.14 Describe social behavior in insects.
- 4.15 Describe altruistic and kinship patterns.
- 4.16 Utilize protists and invertebrates to demonstrate unlearned behaviors.

4.17 Determine mean reaction times for human responses.

4.18 Describe and identify characteristic aggressive behaviors in fish.

Unit 5. Human Reproduction and Embryology

General Outcome:

5.0 The students should be able to demonstrate an understanding of the reproductive and embryologic processes.

Specific Learning Outcomes:

Upon successful completion of this unit, the students should be able to:

- 5.1 Describe the anatomy and physiology of the human male and female reproductive tracts.
- 5.2 Identify and explain the actions of the sex hormones.
- 5.3 Describe the hormone interactions within the female reproductive cycle.
- 5.4 Graphically relate the sequence of menstruation, ovulation, and implantation.
- 5.5 Explain how chemical birth control is accomplished.
- 5.6 Compare the processes of in vitro and in vivo fertilization.
- 5.7 Identify the membranes of the amniote egg.
- 5.8 Compare membrane roles in birds and mammals.
- 5.9 Describe germ layer formation and differentiation into major histological forms.
- 5.10 Outline human fetal development by trimester and describe parturition.
- 5.11 Identify fertilization, cleavage, and further stages in echinoderm development.
- 5.12 Identify specific chromosomal aberrations in karyotypes.
- 5.13 Identify carrier and unbalanced faults.

Unit 6. Introduction to Microbiology and Immunology

General Outcome:

6.0 The students should be able to demonstrate an understanding of the agents and types of disease, controls for the progress of disease, and the human body's defense against disease.

Specific Learning Outcomes:

Upon successful completion of this unit, the students should be able to:

- 6.1 List the six categories of disease and identify the causative agent.
- 6.2 Describe major pathogenic groups involved in disease generation and transmission.
- 6.3 Describe chemical and biologic agents of microbial control and their modes of action.
- 6.4 Explain the role of an epidemiologist.
- 6.5 Describe how pathogens can cause disease.
- 6.6 List the immunological lines of defense.
- 6.7 Differentiate among inborn, natural, and acquired immunity; active and passive immunity.
- 6.8 Differentiate among vaccine, anti-toxin, toxoid, and gamma globulin.
- 6.9 List and describe the origin of cells involved in the cellular immune response.
- 6.10 Diagram an immunoglobulin and its epitope.
- 6.11 Describe general and specific biochemical defenses.
- 6.12 Discuss the concepts involved in tissue transplants.
- 6.13 Describe some abnormal immune responses including cancer, AIDS, anaphylaxis, autoimmunity, and immune deficiency.

Unit 7. Modern Concepts in the Theory of Evolution

General Outcome:

7.0 The students should be able to discuss Darwin's theory of evolution and its relationship to contemporary theories of speciation, discoveries, relationships, and research methodology.

Specific Learning Outcomes:

Upon successful completion of this unit, the students should be able to:

- 7.1 Relate an historical overview of organic evolution concepts.
- 7.2 Describe the early hypotheses and modern experimentation related to the theory of chemical evolution.
- 7.3 Explain the statement "ontogeny recapitulates phylogeny."
- 7.4 Describe various mechanisms of speciation.
- 7.5 Differentiate among convergent evolution, adaptive radiation, and linear evolution.
- 7.6 Describe the cause for and effects of natural selection.
- 7.7 Discuss saltation, gradualism, and punctuated equilibrium.
- 7.8 Give the evolutionary history of Homo sapiens.
- 7.9 Solve probability problems utilizing the Hardy-Weinberg law.
- 7.10 Become acquainted with South Florida fossils; identification methods, deposition methods, and locations.
- 7.11 Recognize patterns of variability within a population.
- 7.12 Construct and analyze a frequency distribution table.

7.13 Demonstrate a biochemical test for showing evolutionary relationships.

Unit 8. Ecological Concepts and Consequences

General Outcome:

8.0 The students should be able to discuss the planet Earth as a complete ecological unit in terms of fact, complications, and implications for the future.

Specific Learning Outcomes:

Upon successful completion of this unit, the students should be able to:

- 8.1 Differentiate between abiotic and biotic components of ecosystems.
- 8.2 Contrast the flow of energy and matter in the biosphere.
- 8.3 Examine the essential element cycles.
- 8.4 Label and name attributes of basic population curves.
- 8.5 Differentiate between "r" and "k" life strategies.
- 8.6 Match flora and fauna forms to major aquatic, marine, and terrestrial biomes.
- 8.7 Describe the flow of matter and energy through the life forms constituting a food pyramid, web, and typical succession.
- 8.8 Identify major world resources nearing depletion and resultant problems.
- 8.9 Describe cause and effect and consequences for modern environmental problems such as acid rain, the ozone layer depletion, and the greenhouse effect.
- 8.10 Demonstrate the presence of specialized achlorophyllous cells.
- 8.11 Speculate as to the significance of plant defense mechanisms.
- 8.12 Develop a model for cycling populations and construct a semi-log graphic representation.

8.13 Observe a stained slide of nitrogen fixers and trace the path of atmospheric nitrogen into legume protein.