



BROWARD COMMUNITY COLLEGE COURSE OUTLINE

LAST REVIEW: 2010-2011

(i.e. 2003-2004)

NEXT REVIEW: 2016-2017

(i.e. 2008-2009)

STATUS: A

(A, I, D)

COURSE TITLE: General Biology

COMMON COURSE NUMBER: BSC 1005

CREDIT HOURS: 3

CONTACT HOUR BREAKDOWN

(per 16 week term)

CLOCK HOURS:

(Voc. Course ONLY)

Lecture: **48**

Lab:

Clinic:

Other:

PREREQUISITE(S): None

COREQUISITE(S): None

PRE/COREQUISITE(S): None

COURSE DESCRIPTION *(750 characters, maximum):*

Course designed to give students an understanding of biological principles, while focusing on the nature and activities of living organisms. Course primarily for non-science majors (see BSC 1005L).

General Education Requirements – Associate of Arts Degree (AA), meets Area(s): 4A

General Education Requirements – Associate in Science Degree (AS), meets Area(s): 4A

UNIT TITLES

1. Reading and Writing in the Biological Sciences
2. Introduction
3. Atoms, Chemical Bonding, and Compounds
4. Cell Structure and Function
5. Energetics
6. Transmission Genetics
7. Molecular Genetics
8. Selected Additional Topics Included at Discretion of Instructor



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***** Complete the following only if course is seeking general education status *****

GENERAL EDUCATION Competencies and Skills *:

In the box to the right of the Competency/Skill, enter all specific **student learning outcome** unit numbers, as indicated in the course outline (i.e. 1.1, 2.7, 4.2, 4.0 and 5.12) that apply.

Course must include <u>all</u> of the following:	
1. Read with critical comprehension**	1.1, 1.2, 1.4, 7.1, 7.2, 8.0
2. Write clearly and coherently**	1.1, 1.2, 1.3
3. Demonstrate literacy as appropriate within a given discipline** a) Information b) Technology c) Workplace d) Cultural e) Quantitative f) Scientific g) Environmental	(a) 1.1, 1.2 (d) 2.5, 7.11 (e) 6.6 (f) 2.0-8.0 (g) 5.1, 8.1.2
4. Apply problem solving skills or methods to make informed decisions in a variety of contexts**	1.0, 2.2, 2.4, 2.5, 7.11, 8.1
Course must include at least <u>one</u> of the following:	
5. Differentiate between ethical and unethical behavior	
6. Demonstrate an understanding of the physical, biological, and social environments and how individual behaviors impact this complex system.	2.5, 5.1, 5.7, 5.10, 8.0
7. Demonstrate an understanding of and appreciation for human diversities and commonalities.	6.4, 6.9, 6.10, 7.8, 8.1.4, 8.1.6
8. Speak and listen effectively.	

**General Education Competencies and Skills endorsed by 2010-2011 General Education Task Force*

****Required Competencies**

1) Read with critical comprehension.

The student will be introduced to the basic texts, concepts, vocabulary, and methods necessary for developing an understanding of the discipline and meeting the required benchmarks as stated in the course outline.

2) Write clearly and coherently.

The student will demonstrate an understanding and mastery of subject matter in a variety of ways, including writing. Writing activities may include both graded and ungraded essays, short answer quizzes, summaries, reactions, journals, and various other reports.

3) Demonstrate and apply literacy across all the disciplines (indicate which ones apply).

- a) **Information literacy** means understanding how to locate needed information, using the appropriate technology for the task, managing and evaluating the extracted information and using it effectively and ethically.
- b) **Technology literacy** is the ability to responsibly and effectively use appropriate technology to access, manage, integrate, or create information, and/or use technology to accomplish a given task.
- c) **Workplace literacy** is having the appropriate knowledge and skills to communicate and work with others effectively and perform job duties, whether it is through the use of computers and/or other technology.
- d) **Cultural literacy** is recognizing, understanding, and appreciating the similarities and differences between one's own culture and the cultures of others through a study of the arts, customs, beliefs, values, and history that define a culture.
- e) **Quantitative literacy** is having the ability to formulate, solve and interpret mathematical/statistical operations and graphical/tabular representations to make informed decisions.



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- f) **Scientific literacy** means understanding the methodology and application of the scientific process, the physical and biological worlds, and recognizing that scientific knowledge is continuously updated or revised as new information is discovered.
- g) **Environmental literacy** is creating a context within which environmental issues can be viewed, imparting knowledge to enhance one's ability to analyze the issues, make the connections between humans' decisions and actions and the challenges facing the environment, and instilling the desire to sustain the environment through ethical practices in both one's professional and personal lives.

4. Apply problem-solving skills or methods to make informed decisions in a variety of contexts.

The student will use acquired skills or methods to recognize, analyze, adapt, and apply critical thinking to solve problems and make informed decisions.



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EVALUATION:

In the box to the right of the Methods of Assessment, enter all specific learning outcome numbers (i.e. 1.1, 2.7, 4.0, 4.2 and 5.12) that apply.

1. Portfolio	
2. Short essays	1.0 – 8.0
3. Research Papers	1.0 – 8.0
4. Group projects	8.0
5. Discussions (In class and online)	2.0 – 8.0
6. Multiple Choice tests	2.0 – 8.0
7. Presentations	8.0
8. Service Learning Projects	8.0
9. Quizzes (pop, announced, etc.)	2.0 – 8.0
10. Take-home tests	
11. Summaries, critiques, and analyses	1.0 – 8.0
12. Reaction papers	
13. Surveys	8.0
14. Performance	
15. Short answer tests	1.0 – 8.0
16. Classroom debates and colloquia	
17. Blogs, wikis, web pages	1.0, 8.0
18. Other (Please explain)	



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Common Course Number: BSC 1005

UNITS

Unit 1: Reading and Writing in the Biological Sciences

General Outcome:

- 1.0 The student shall be able to clearly communicate in writing information derived from course related readings the major concepts and themes in the biological sciences.

Specific Measurable Learning Outcomes:

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

- 1.1 Demonstrate in writing the ability to analyze, evaluate, compare, and/or extract data relevant to biology from course related readings.
- 1.2 Evaluate the validity of information from a variety of sources, including but not limited to such sources as electronic, print sources, and data bases.
- 1.3 Illustrate using diagrams, drawings, outlines, concept maps, and/or other methods connections among biological concepts.
- 1.4 Demonstrate the ability to use the appropriate technology to carry out course requirements.



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Unit 2 Introduction

General Outcome:

2.0 The students should be able to recognize the basic characteristics of life and describe the scientific process.

Specific Measurable Learning Outcomes:

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

- 2.1 List the major characteristics of life.
- 2.2 Explain how science is distinguished from other ways of seeking understanding of life.
- 2.3 Evaluate the significance of major unifying principles of modern biology.
- 2.4 Illustrate the limitations of science.
- 2.5 Demonstrate how the scientific process has led to significant advances in human society and cultural and environmental issues



Unit 3 Atoms, Chemical Bonding, and Compounds

General Outcome:

- 3.0 The students should be able to explain the structure of atoms, chemical bonding, properties of water, and the groups of organic molecules associated with life.

Specific Measurable Learning Outcomes:

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

- 3.1 Explain how the structure of an atom determines its chemical properties and the kinds of bonds (ionic, covalent and hydrogen) it can form.
- 3.2 Name the elements that make up the majority of all living matter.
- 3.3 Recognize the structure of a water molecule and be able to distinguish areas of positive and negative charge.
- 3.4 List the major chemical and physical properties of water which result from the hydrogen bonding between water molecules.
- 3.5 Describe the ionization of water and how it is measured using the pH scale.
- 3.6 Explain why the carbon atom plays a central role in the formation of organic molecules.
- 3.7 Describe and diagram the condensation and hydrolysis of macromolecules (carbohydrates, proteins, lipids, and nucleic acids).
- 3.8 Differentiate the structures of the four main classes of macromolecules (carbohydrates, proteins, lipids, and nucleic acids) and interpret how their structure relates to their function.



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Unit 4 Cell Structure and Function

General Outcome:

- 4.0 The students should be able to describe a theory of the origin of cells, distinguish prokaryotic and eukaryotic cells, list cell organelles and their functions, describe membrane function, and detail the phases of mitosis and their significance.

Specific Measurable Learning Outcomes:

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

- 4.1 Justify the theories and significant experiments regarding the origin of life on earth.
- 4.2 Define the terms heterotroph, autotroph, prokaryote and eukaryote.
- 4.3 Describe the structure of a cell membrane and a cell wall and conclude how they differ in function.
- 4.4 Describe and categorize the following cell organelles: nucleus, ribosome, endoplasmic reticulum (rough and smooth), Golgi body, lysosome, chloroplast, mitochondrion, and vacuole according to their structure and function.
- 4.5 Summarize cellular structure and relate structure to function.
- 4.6 Discuss and justify the biological importance of maintaining a chemical composition that is different from that of the surrounding medium.
- 4.7 Describe the fluid mosaic model of membrane structure.
- 4.8 Compare and contrast movement through the cell membrane by diffusion, osmosis, facilitated diffusion, and active transport (including endocytosis and exocytosis).
- 4.9 List essential life processes that depend on production of new cells identical to the parent cell.
- 4.10 Diagram the life cycle of a cell, describe the major events which occur in each phase and the regulation of these phases and discuss the consequences arising from errors in cell cycle regulation, such as cancer.
- 4.11 List the phases of mitosis in the order that they occur and describe the significant events occurring in each.
- 4.12 Compare and contrast cytokinesis in plant and animal cells.



Common Course Number: BSC 1005

Unit 5 Energetics

General Outcome:

5.0 The students should be able to explain the energy requirements of cells, the central role of ATP, the generation of ATP during cellular respiration, the production of food by photosynthesis, and the role of enzymes in controlling chemical processes in cells.

Specific Measurable Learning Outcomes:

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

- 5.1 Explain how most living things are dependent upon the radiant energy of the sun.
- 5.2 Relate the laws of thermodynamics to the constant energy requirement of cells.
- 5.3 Describe an oxidation-reduction reaction.
- 5.4 Describe the biological importance of enzymes and coenzymes and explain how they work.
- 5.5 Explain why ATP is often called the "universal currency" of the cell and describe how it performs its important function.
- 5.6 Recognize the overall equations for cellular respiration.
- 5.7 Detail the anaerobic process of fermentation in microorganisms and the production of lactic acid in human muscle during vigorous exercise.
- 5.8 Describe the four stages of cellular respiration (glycolysis, acetyl-CoA production, Krebs' cycle, and the electron transport chain); list where each occurs, relative energy yield, and major events of each phase.
- 5.9 Recognize the overall equation for photosynthesis
- 5.10 Justify the fact that life depends upon the visible portion of the electromagnetic spectrum and the chemical process of photosynthesis.
- 5.11 Arrange the events of the light dependent and light independent reactions of photosynthesis, explaining how the latter reactions depend on the products of the former reactions, and list where each occurs within the chloroplast.
- 5.12 Compare and contrast photosynthesis and respiration.



Common Course Number: BSC 1005

Unit 6 Transmission Genetics

General Outcome:

- 6.0 The students should be able to understand the principles of heredity as first worked out by Gregor Mendel and extended by others both in regard to chromosome behavior and to the statistical ratios of traits among offspring.

Specific Measurable Learning Outcomes:

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

- 6.1 Differentiate the two divisions of meiosis and their effect on chromosome number.
- 6.2 Describe the important events of meiosis
- 6.3 Compare and contrast meiosis to mitosis
- 6.4 Compare and contrast spermatogenesis and oogenesis in humans.
- 6.5 Explain Mendel's first and second principles of inheritance using appropriate examples.
- 6.6 Explain Mendel's ratios in terms of probability and predict the ratios that will be observed from different crossings.
- 6.7 Define and give examples of incomplete dominance and codominance, multiple allele inheritance, and polygenic inheritance.
- 6.8 Explain Mendel's principles of segregation and independent assortment in terms of chromosome behavior during meiosis.
- 6.9 Illustrate a chromosomal explanation of sex determination.
- 6.10 Analyze the genetics of sex-linked traits and disorders.
- 6.11 Illustrate the effect of gene linkage on the ratio expected in a dihybrid test cross and define the terminology required.
- 6.12 Describe the use of genetic recombination to construct chromosome maps.
- 6.13 Evaluate the effects of chromosome mutations on a living organism.



Common Course Number: BSC 1005

Unit 7 Molecular Genetics

General Outcome:

7.0 The students should be able to understand the chemical and physical structure of the gene and its operation in the synthesis of polypeptides.

Specific Measurable Learning Outcomes:

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

- 7.1 Chronicle the experimental evidence accumulated by key researchers that led to the Watson/Crick model of DNA.
- 7.2 Interpret the experimental evidence leading to an understanding of gene function.
- 7.3 Describe DNA replication.
- 7.4 Define gene expression.
- 7.5 Compare and contrast an RNA nucleotide with a DNA nucleotide.
- 7.6 Describe the transcription of RNA.
- 7.7 Discuss the structure and function of tRNA, mRNA, and rRNA.
- 7.8 Define codon and demonstrate its relationship to the tabulated genetic code.
- 7.9 Characterize the three stages of polypeptide synthesis with regard to the structure of the ribosome.
- 7.10 Discuss and contrast gene regulation in prokaryotes with gene regulation in eukaryotes.
- 7.11 Discuss mutations such as point mutation, substitution, insertion, deletion and interpret how those changes may affect humans in a biological, cultural and social context.



Common Course Number: BSC1005

Unit 8 Selected Additional Topics Included at Discretion of Instructor

General Outcome:

8.0 The students should be able to discuss various aspects of topics in biology (selected by the instructor) based on information from class, peer reviewed journals, mass media, text, and/or electronic resources.

Specific Measurable Learning Outcomes:

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

- 8.1 Discuss and evaluate various aspects of topics in biology selected by the instructor from the following list:
- 8.1.1 Animal Behavior
 - 8.1.2 Ecology
 - 8.1.3 Reproduction and Development
 - 8.1.4 Human Evolution
 - 8.1.5 Biotechnology
 - 8.1.6 Human Anatomy and Physiology
 - 8.1.7 Human Diseases
 - 8.1.8 Evolution
 - 8.1.9 Diversity of Life
 - 8.1.10 Current Topics in Biology
 - 8.1.11 Bioethical Issues