

B R O O K D A L E C O M M U N I T Y C O L L E G E

# Biology 126 Syllabus

## Exploring Biology: Cycles of Life





**CODE:** BIOL 126

**TITLE:** Exploring Biology: Cycles of Life

**INSTITUTE:** STEM

**DEPARTMENT:** Biology

**COURSE DESCRIPTION:** Exploring Biology: Cycles of Life is a general study of the basic concepts of biology for the non-science major. Topics include: chemistry of life, cell structure and function, genetics, evolution, diversity of life and ecology. Topics are covered at an introductory level to provide students an overview of biological science and its relevance in the world.

**PREREQUISITES:** A grade of "C" or higher in MATH 012, MATH 015 or passing score in computation on Basic Skills Test and READ 095 or passing score on reading on Basic Skills Test, ENGL 095 or passing score in writing on Basic Skills test

**PREREQUISITES OR COREQUISITES:**

**CREDITS:** 3

**LECTURE HOURS:** 3

**LAB/STUDIO HOURS:** 0

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**REQUIRED MATERIALS:**

**CAMPBELL** Campbell Essential Biology e-book with MyLab & Mastering by Simon, Dickey, & Reece & 7th Edition, 2019 Pearson Education, Inc.

**ADDITIONAL TIME REQUIREMENTS:**

Work online is required to complete the course.

**COURSE LEARNING OUTCOMES:** The student will be able to:

- Demonstrate application of basic biological concepts:
  - properties of life
  - chemistry of life
  - cell structure & function
  - genetics
  - evolution and diversity of life
  - ecology
- Use the scientific method of inquiry to explore biological phenomena.
- Employ appropriate technology and resources to collect and interpret biological information and data.

**COURSE CONTENT:**

Unit One: Introduction to Biology  
Unit Two: Chemical Basis of Life  
Unit Three: Cell Structure and Function  
Unit Four: Genetics & Reproduction  
Unit Five: Evolution and Diversity of Life  
Unit Six: Ecology

**GRADING STANDARD:**

Upon completion of the course, grades will be assigned as follows:

|           |          |                  |
|-----------|----------|------------------|
| <b>A</b>  | <b>=</b> | <b>92 - 100%</b> |
| <b>A-</b> | <b>=</b> | <b>89 - 91%</b>  |
| <b>B+</b> | <b>=</b> | <b>86 - 88%</b>  |
| <b>B</b>  | <b>=</b> | <b>82 - 85%</b>  |
| <b>B-</b> | <b>=</b> | <b>79 - 81%</b>  |
| <b>C+</b> | <b>=</b> | <b>76 - 78%</b>  |
| <b>C</b>  | <b>=</b> | <b>70 - 75%</b>  |
| <b>D</b>  | <b>=</b> | <b>65 - 69%</b>  |
| <b>F</b>  | <b>=</b> | <b>&lt;65%</b>   |

**In calculating the course grade, 0.5 will round up to the next numerical grade and 0.4 will round down to the next lower numerical grade.**

A grade of C or higher is required in all pre-requisite courses. Career studies courses must have a grade of C or higher to count toward the Mathematics / Science Program – Biology Option.

Students are permitted to withdraw from the course without penalty until approximately 80% of the semester is complete. Please see term schedule for the exact deadline.

At the end of the semester, application for an Incomplete may be made if a student with proper documentation needs to complete no more than one lecture exam. The granting of an Incomplete is at the discretion of the instructor. Please see Instructor's syllabus for additional policies.

**DEPARTMENT POLICIES:**

Active participation is strongly recommended for optimum performance in biology courses.

Exams must be taken at the times designated by the instructor. A student who misses an exam must provide prior notification and proper documentation in order to take a make-up exam. The instructor will determine the acceptance of said prior notification and proper documentation.

A student who is unable to provide acceptable documentation for a missed exam will be given a grade of zero for that exam. Students may not re-take exams on which they perform poorly.

Requirements for course completion are listed in individual instructor syllabi.

**COLLEGE POLICIES:**

For information regarding:

- ◆ Brookdale's Academic Integrity Code
- ◆ Student Conduct Code
- ◆ Student Grade Appeal Process

Please refer to the **STUDENT HANDBOOK AND BCC CATALOG.**

**NOTIFICATION FOR STUDENTS WITH DISABILITIES:**

Brookdale Community College offers reasonable accommodations and/or services to persons with disabilities. Students with disabilities who wish to self-identify must contact the Disabilities Services Office at 732-224-2730 or 732-842-4211 (TTY), provide appropriate documentation of the disability, and request specific accommodations or services. If a student qualifies, reasonable accommodations and/or services, which are appropriate for the college level and are recommended in the documentation, can be approved.

***ADDITIONAL SUPPORT/LABS:***

BIOL 126 course resources are available in Canvas, Brookdale's Learning Management System, available via the Brookdale website: [www.brookdalecc.edu](http://www.brookdalecc.edu)

Independent Study Laboratory (Open Lab) - MAS 041 - is available to students enrolled in biology courses.

Brookdale Biology Department course and program information is available on the Biology Department website:

<https://www.brookdalecc.edu/stem-institute/biology/>

Name of Unit: **Introduction to Biology**

Textbook: Chapter 1

Method of Evaluation: Exam, quizzes, assignments, discussion

Recommended Learning Experiences: Class discussion, textbook readings, assignments

| <b>Learning Objectives:</b>  | <b>Textbook Readings:</b> |
|--|---------------------------|
| The student will be able to:   |                           |
| 1. Identify the process of science and the scientific method.  | Section 1.1               |
| 2. List and describe the properties of life: <ul style="list-style-type: none"><li>• Order</li><li>• Cells</li><li>• Growth &amp; development</li><li>• Energy processing</li><li>• Regulation</li><li>• Response to environment</li><li>• Reproduction</li><li>• Evolution</li></ul>                | Section 1.2               |
| 3. Describe life's hierarchy of levels of organization.<br>(Interconnections within Biological Systems)  | Section 1.3 & Figure 1.18 |
| 4. Describe the pattern of energy flow through the earth.<br>(Pathways that Transform Energy & Matter)   | Section 1.3 & Figure 1.17 |
| 5. Describe the following major themes in biology: <ul style="list-style-type: none"><li>• Evolution</li><li>• Relationship of Structure to Function</li><li>• Information Flow</li><li>• Pathways that Transform Energy &amp; Matter</li><li>• Interconnections within Biological Systems</li></ul> | Section 1.3               |

Name of Unit: **Chemical Basis of Life**

Textbook: Chapters 2 & 3

Method of Evaluation: Exam, quizzes, assignments, discussion

Recommended Learning Experiences: Class discussion, textbook readings, assignments

| <b>Learning Objectives:</b> | <b>Textbook Readings:</b> |
|-----------------------------|---------------------------|
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The student will be able to:

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|---|--------------------------|
| 1. Define the following: <ol style="list-style-type: none"> <li>a. Molecule and compound</li> <li>b. matter – 3 states</li> <li>c. isotope</li> <li>d. element</li> </ol>   | Section 2.1              |
| 2. Describe atomic structure, using atomic number and atomic mass to determine the numbers of protons, neutrons and electrons in atoms of carbon, hydrogen, oxygen and nitrogen.  | Section 2.1 & Appendix B |
| 3. Describe chemical bonds and differentiate between ionic, covalent, and hydrogen bonds.   | Section 2.1              |
| 4. Describe the properties of water and their importance to biological systems: <ul style="list-style-type: none"> <li>• cohesion</li> <li>• temperature stability</li> <li>• density</li> <li>• solvent properties</li> </ul>      | Section 2.2              |
| 5. Define pH and draw a simple pH scale indicating the range for acid and basic solutions. Give examples of acids and bases, and describe the role of buffers in biological systems.  | Section 2.2              |
| 6. Demonstrate a basic understanding of chemical reactions with macromolecules, and distinguish between hydrolysis and dehydration reactions.   | Section 3.1 & Figure 3.4 |
| 7. Describe the role of carbon in organic molecules and distinguish between organic and inorganic molecules.  | Section 3.1              |
| 8. Demonstrate an understanding of the structure and functions of the four major types of organic molecules: carbohydrates, lipids, proteins and nucleic acids.   | Section 3.2              |
| 9. Demonstrate an understanding of the current Dietary Guidelines for Americans developed by the USDA.<br><a href="http://health.gov/dietaryguidelines/2015/guidelines/">http://health.gov/dietaryguidelines/2015/guidelines/</a> . |                          |

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| <u>Name of Unit:</u>                     | <b>Cell Structure and Function</b>               |
| <u>Textbook:</u>                         | Chapters 4, 5, 6 & 7                             |
| <u>Method of Evaluation:</u>             | Exam, quizzes, assignments, discussion           |
| <u>Recommended Learning Experiences:</u> | Class discussion, textbook readings, assignments |

| <b>Learning Objectives:</b>  | <b>Textbook Readings:</b>  |
|--|--|
| The student will be able to:   |  |
| 1. Demonstrate an understanding of the Cell Theory.  | Chapter 4:<br>Section 4.1  |
| 3. Compare prokaryotic and eukaryotic cells in terms of size, complexity and examples of organisms composed of each cell type.   | Section 4.1 & Table 4.1  |
| 4. Identify and describe the structure and functions of the following cell components: <ul style="list-style-type: none"> <li>• Nucleus</li> <li>• Cytoplasm</li> <li>• Ribosome</li> <li>• Endoplasmic reticulum – rough and smooth</li> <li>• Golgi apparatus</li> <li>• Lysosome</li> <li>• Chloroplast</li> <li>• Mitochondria</li> <li>• Central vacuole</li> <li>• Centrioles</li> <li>• Flagella and cilia</li> <li>• Plasma membrane</li> <li>• Cell wall</li> </ul> | Section 4.1<br>Section 4.2<br>Section 4.3<br>Section 4.4<br>Section 4.5<br>Section 4.6<br>BioFlix: Tour of a Plant Cell<br>BioFlix: Tour of an Animal Cell |
| 4. Describe the role of ATP as cellular energy.  | Chapter 5:<br>Section 5.2  |
| 5. Compare and contrast the following transport mechanisms: <ul style="list-style-type: none"> <li>• passive mechanisms:<br/>diffusion, osmosis &amp; facilitated diffusion</li> <li>• active mechanisms:<br/>active transport, exocytosis &amp; endocytosis</li> </ul>  | Section 5.4  |
| 6. Briefly describe the cellular processes of cellular respiration and photosynthesis. Compare the processes in terms of function, location in cells, products and types of cells that carry out the processes.  | Chapter 6:<br>Section 6.1<br>Section 6.2 (Overview) & Figure 6.4<br>Chapter 7:<br>Section 7.1 (Overview)   |

Name of Unit: **Genetics & Reproduction**

Textbook: Chapters 8, 9, 10, 11 & 12

Method of Evaluation: Exam, quizzes, assignments, discussion

Recommended Learning Experiences: Class discussion, textbook readings, assignments

| <b>Learning Objectives:</b>   | <b>Textbook Readings:</b>  |
|---|--|
| The student will be able to:  |  |
| 1. Describe the process of cell division to include the stages and the reasons that cells divide.   | <b>Chapter 8:</b><br>Section 8.1<br>Section 8.2  |
| 2. Compare sexual and asexual reproduction. Describe each type of reproduction, the process by which it occurs and list examples of organisms capable of each.  | Section 8.1<br>Section 8.2<br>Section 8.3 & Figure 8.15  |
| 3. Discuss mutations that may result from nondisjunction during meiosis of sexual reproduction.   | Section 8.3, Table 8.1, Figure 8.20 & Figure 8.21  |
| 4. Describe the human genome as seen on a karyotype.  | Section 8.3 & Figure 8.11  |
| 5. Demonstrate an understanding of Gregor Mendel's contributions to the field of genetics.  | <b>Chapter 9:</b><br>Section 9.1   |
| 6. Use Punnett squares to determine the possible genetic make-up of offspring, given the parents' genetic makeup.   | Section 9.1 & Figures 9.6, 9.11, 9.14 & 9.15   |
| 7. Describe a pedigree and apply it to various examples of human recessive and dominant genetic disorders.  | Section 9.1 & Figure 9.12  |
| 8. Describe the following variations on Mendel's Laws: <ul style="list-style-type: none"> <li>• Incomplete dominance</li> <li>• Multiple alleles</li> <li>• Pleiotropy</li> <li>• Polygenic Inheritance</li> <li>• Sex-linked inheritance</li> </ul>              | Section 9.2 & Section 9.3  |
| 9. Review the structure of DNA and RNA and describe the roles of each in the process of protein synthesis.  | <b>Chapter 10:</b><br>Sec10.1 Fig10.1,10.2.10.3,10.4, 10.5<br>Sec10.2 Fig. 10.8 & 10.9   |
| 10. Describe mutations that may occur during protein synthesis.   | Section 10.2 & Figure 10.21  |
| 11. Discuss genetic technology and applications: <ul style="list-style-type: none"> <li>• cloning</li> <li>• stem cells</li> <li>• forensics</li> <li>• recombinant DNA technology</li> <li>• human gene therapy</li> <li>• genetically modified foods</li> </ul> | <b>Chapters 11 &amp; 12:</b><br>Section 11.2<br>Section 11.2<br>Section 12.2<br>Section 12.1<br>Section 12.1 & Figure 12.11<br>Section 12.1 & Section 12.4 |

12. Discuss the Human Genome Project to include its goals, findings and benefits.

Section 12.2

Name of Unit: **Evolution and Diversity of Life**

Textbook: Chapters 13, 14, 15, 16 & 17

Method of Evaluation: Exam, quizzes, assignments, discussion

Recommended Learning Experiences: Class discussion, textbook readings, assignments

| <b>Learning Objectives:</b> | <b>Textbook Readings:</b> |
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The student will be able to:

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| 1. Describe Darwin's Theory of Natural Selection as the mechanism of evolution. Cite evidence that supports the Theory of Evolution.   | Sections 13.2 & 13.4<br>Section 13.3   |
| 2. Demonstrate an understanding of a general geologic time scale, focusing on the following: <ul style="list-style-type: none"> <li>• origin of the earth</li> <li>• evolution of the prokaryotes</li> <li>• evolution of the first eukaryotes</li> <li>• oxygen accumulation in the atmosphere</li> <li>• evolution of the first animals</li> <li>• evolution of the land plants</li> </ul> | Table 14.1 and Section 15.1  |
| 3. Review the biological system of classification, describing the grouping of organisms into three domains and five kingdoms.  | Sections 13.1 & 14.4   |
| 4. Describe the universal system of scientific naming of living organisms (binomial nomenclature).   | Section 13.1   |
| 5. Compare and contrast characteristics of organisms in the following five kingdoms and identify common name examples of organisms in each kingdom: <ul style="list-style-type: none"> <li>• Kingdom Monera</li> <li>• Kingdom Protista</li> <li>• Kingdom Plantae</li> <li>• Kingdom Fungi</li> <li>• Kingdom Animalia</li> </ul>   | Section 15.3<br>Section 15.4<br>Section 16.2<br>Section 16.3<br>Sections 17.1, 17.2 & 17.3 |
| 6. Discuss the positive and negative effects of microorganisms (bacteria, protozoa, algae and fungi) on the earth today.   | See sections (above) for each group  |

Name of Unit:                      **Ecology**

Textbook:                      Chapters 18 & 20

Method of Evaluation:                      Exam, quizzes, assignments, discussion

Recommended Learning Experiences:                      Class discussion, textbook readings, assignments

| <b>Learning Objectives:</b> | <b>Textbook Readings:</b> |
|-----------------------------|---------------------------|
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The student will be able to:

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|--|----------------------|
| 1. Define and differentiate: populations, communities, ecosystems and the biosphere.   | Section 18.1         |
| 2. Describe biotic and significant abiotic components of the ecosystem.  | Section 18.2         |
| 3. Describe types and examples of adaptations of organisms in their environments.  | Section 18.2         |
| 4. Describe and distinguish among aquatic biomes:<br>Freshwater: lakes & ponds, rivers & streams, wetlands<br>Marine: Coral reef, intertidal zone, estuary, benthic & pelagic  | Section 18.3         |
| 5. Describe and distinguish among terrestrial biomes:<br>tropical rain forest, savanna, desert, chaparral, temperate forest, coniferous forest, tundra, polar ice  | Section 18.3         |
| 6. Discuss human impact on biological ecosystems.  | Section 18.3         |
| 7. Describe the greenhouse effect and global climate change in terms of causes and effects.  | Section 18.4         |
| 8. Demonstrate an understanding of the importance of biodiversity and its decline by describing three main causes of the decline. Discuss some conservation strategies that can be carried out by individuals to address the current problems. | Sections 20.1 & 20.4 |

*The syllabus is intended to give student guidance in what may be covered during the semester and will be followed as closely as possible. However, the faculty member reserves the right to modify, supplement, and make changes as the need arises.*