

LEARNING OUTCOMES	LEARNING ACTIVITIES	EVALUATION METHODS
4. Explain the relationship of atoms, ions, molecules within the living and nonliving universe.	Lectures Class Discussions Field Trips Class Presentations	Laboratory Exercises and Reports Quizzes and Exams Essays
5. Discuss the scope, breadth, and interrelatedness of life on earth.	Lectures Class Discussions Field Trips Class Presentations	Laboratory Exercises and Reports Quizzes and Exams Essays
6. Explain the crucial role of water in biological and nonbiological systems.	Lectures Class Discussions Field Trips Class Presentations	Laboratory Exercises and Reports Quizzes and Exams Essays
7. Analyze the role of cells in organisms and what is unique about the cellular level of biological organization.	Lectures Class Discussions Field Trips Class Presentations	Laboratory Exercises and Reports Quizzes and Exams Essays
8. Analyze the basic processes of all cells and living organisms.	Lectures Class Discussions Field Trips Class Presentations	Laboratory Exercises and Reports Quizzes and Exams Essays
9. Analyze the distinctiveness of prokaryotic cells and their incredible importance to the biosphere.	Lectures Class Discussions Field Trips Class Presentations	Laboratory Exercises and Reports Quizzes and Exams Essays
10. Apply the scientific method and critical thinking skills to biological and scientific problems.	Lectures Class Discussions Field Trips Class Presentations	Laboratory Exercises and Reports Quizzes and Exams Essays
11. Analyze a complex process to determine the main idea and make connections across concepts in biology.	Lectures Class Discussions Field Trips Class Presentations	Laboratory Exercises and Reports Quizzes and Exams Essays

III. Evolution by Natural Selection

- A. Explain the historical context, include fixity of species.
- B. Discuss Darwin's contributions: Theory o

C. Lipids

1. Describe the structure and biological importance:

a. fatty acids

b. triglyceri01 0 0 1 216.05 667.3f6 reW*nBT/F1 9r2 Tf1 0 c3BT/F1 12 Tf1 0 0

- F. Describe organelle structure and function. Compare and contrast plant and animal organelles.
1. chloroplast
 2. central vacuole
 3. cell wall
 4. mitochondria
 5. nucleus
 6. reticular (endomembrane) system
include rER, sER, Golgi, lysosomes, peroxisomes

III. Membrane Functions: Passive Transport

- A. Define.
- B. Explain the role of concentration gradients and the role of kinetic energy.
- C. Describe types of passive transport:
 - 1. Diffusion. Use the terms direct and simple diffusion
 - a. Definition
 - b. Discuss the random movement of particles (Brownian motion)
 - c. Describe the net movement of particles and dynamic equilibrium
 - d. List factors affecting the rate of diffusion
 - e. Explain the importance of diffusion of oxygen and carbon dioxide across the cell membrane
 - f. Hypothesize and test via hands-on experimentation which substances may pass through a semipermeable membrane.
 - 2. Osmosis
 - a. Definition
 - b. Explain: isotonic, hypotonic and hypertonic solutions
 - c. Give examples of osmotic regulation in some aquatic and terrestrial organisms
 - d. Hypothesize and test via hands-on experimentation the outcome of exposing cells to hypertonic, hypotonic, and isotonic solutions

7.

- II. Meiosis I
 - A. Describe the basic activities in prophase I, metaphase I, anaphase I and telophase I.
 - B. Compare and contrast meiosis I to mitotic division.
 - C. Describe the importance of recombination and crossing over to genetic variability and evolution. Include terms such as bivalents, tetrads, chiasmata, synapsis.
 - D. Describe the importance of independent assortment to genetic variability and evolution.
- III. Meiosis II
 - A. Describe the basic activities in prophase II, metaphase II, anaphase II and telophase II.
 - B. Compare and contrast meiosis II to mitotic division.
- IV. Gametogenesis
 - A. Define gametogenesis.
 - B. List the importance of oogenesis and spermatogenesis.
 - C. Starting with a primary oogonium or spermatogonium, show the unequal cytoplasm and organelle distribution in oogenesis and explain the reason for one ovum vs. four spermatids. (Details of cell types are not important.)
 - D. Briefly describe spermatozoa differentiation and the organelles which remain. Explain why all mitochondria are from maternal descent.
- V. Summarize the Aspects of Meiosis and Sexual Reproduction As They Relate to Evolution

11. OBSERVABLE PATTERNS OF INHERITANCE

- I. Concepts of Heredity Before Mendel's Time
 - A. Discuss spontaneous generation and Louis Pasteur.
 - B. Introduce the blending inheritance theory.
- II. Mendelian Genetics
 - A. History of Mendel
 - 1. Introduce his background in physics and mathematics
 - 2. Discuss the choice of garden pea plant's four characteristics
 - 3. Explain his experim1.54 363.6C /P MCID 18BDp /P MCID 18BDp 0 g0 G 0.04

2. Transfer RNA
 - a. Define anticodon
 - b. Define the amino acid attachment site-the aminoacyl site
 - c. Explain the function as an adapter molecule between mRNA and protein
 3. Messenger RNA
 - a. Explain the basic structure
 - b. Discuss the importance of the nucleotide sequence in determining the amino acid sequence
 - c. Define codon. Show the relationship of complementary pairing and importance to the tRNA anticodon
 - B. Explain the overall basic concepts behind the events of the stages of translation.
 1. Initiation
 2. Elongation and translocation
 3. Termination
- IV. Antibiotics
- A. Define and list some sources for antibiotics.
 - B. List some reasons for specificity for prokaryotes.
 - C. Briefly describe the effects on translation and on other processes including the interruption of the cell cycle.
- V. Mutations
- A. List and define the types
 1. Point mutations: silent, missense (radical and conservative), nonsense
 2. Frameshift
 3. Students should be able to solve gene mutation problems when given hypothetical mRNA, the genetic code table and any of the above mutations
 - B.

LEARNING MATERIALS:

Textbook:

Reece, J., Taylor, M., Simon, E., Dickey J., and Hogan, K. (2014). Campbell Biology: