

Horizon Biology Syllabus

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All biology students in South Carolina are required to an End of Course Test at the conclusion of instruction on the five standards outlined in the SC Standards for Biology 2005. The scores on this test will eventually be counted as the student's final exam grade and on our school report card. Since the test is in its pilot year, we do not know when (or if) scores will be returned. In preparation for this test, we will follow the curriculum below. If we adhere to this schedule, you should be more than adequately prepared for the benchmark tests. It is your responsibility to come to class prepared for each day's lesson. Dates are approximate.

Unit 1 Standard B-3: *The student will demonstrate an understanding of the flow of energy within and between living systems.*

Indicators

- B-3.1 Summarize the overall process by which photosynthesis converts solar energy into chemical energy and interpret the chemical equation for the process.
- B-3.2 Summarize the basic aerobic and anaerobic processes of cellular respiration and interpret the chemical equation for cellular respiration.
- B-3.3 Recognize the overall structure of adenosine triphosphate (ATP)—namely, adenine, the sugar ribose, and three phosphate groups—and summarize its function (including the ATP-ADP [adenosine diphosphate] cycle).
- B-3.4 Summarize how the structures of organic molecules (including proteins, carbohydrates, and fats) are related to their relative caloric values.
- B-3.5 Summarize the functions of proteins, carbohydrates, and fats in the human body.
- B-3.6 Illustrate the flow of energy through ecosystems (including food chains, food webs, energy pyramids, number pyramids, and biomass pyramids).

Note: The indicator below will be also be taught and tested with Standard 3

- B-2.8 Explain the factors that affect the rates of biochemical reactions (including pH, temperature, and the role of enzymes as catalysts).

Unit 2 Standard B-2: *The student will demonstrate an understanding of the structure and function of cells and their organelles.*

Indicators

- B-2.1 Recall the three major tenets of cell theory (all living things are composed of one or more cells; cells are the basic units of structure and function in living things; and all presently existing cells arose from previously existing cells).
- B-2.2 Summarize the structures and functions of organelles found in a eukaryotic cell (including the nucleus, mitochondria, chloroplasts, lysosomes, vacuoles, ribosomes, endoplasmic reticulum [ER], Golgi apparatus, cilia, flagella, cell membrane, nuclear membrane, cell wall, and cytoplasm).
- B-2.3 Compare the structures and organelles of prokaryotic and eukaryotic cells.
- B-2.4 Explain the process of cell differentiation as the basis for the hierarchical organization of organisms (including cells, tissues, organs, and organ systems).
- B-2.5 Explain how active, passive, and facilitated transport serve to maintain the homeostasis of the cell.
- B-2.6 Summarize the characteristics of the cell cycle: interphase (called G1, S, G2); the phases of mitosis (called prophase, metaphase, anaphase, and telophase); and plant and animal cytokinesis.

- B-2.7 Summarize how cell regulation controls and coordinates cell growth and division, and allows cells to respond to the environment, and recognize the consequences of uncontrolled cell division.

Unit 3 Standard B-4:*The student will demonstrate an understanding of the molecular basis of heredity.*

Indicators

- B-4.1 Compare DNA and RNA in terms of structure, nucleotides, and base pairs.
B-4.2 Summarize the relationship among DNA, genes, and chromosomes.
B-4.3 Explain how DNA functions as the code of life and the blueprint for proteins.
B-4.4 Summarize the basic processes involved in protein synthesis (including transcription and translation).
B-4.5 Summarize the characteristics of the phases of meiosis I and II.
B-4.6 Predict inherited traits by using the principles of Mendelian genetics (including segregation, independent assortment, and dominance).
B-4.7 Summarize the chromosome theory of inheritance and relate that theory to Gregor Mendel's principles of genetics.
B-4.8 Compare the consequences of mutations in body cells with those in gametes.
B-4.9 Exemplify ways that introduce new genetic characteristics into an organism or population by applying the principles of modern genetics.

Unit 4 Standard B-5:*The student will demonstrate an understanding of biological evolution and the diversity of life.*

Indicators

- B-5.1 Summarize the process of natural selection.
B-5.2 Explain how genetic processes result in the continuity of life-forms over time.
B-5.3 Explain how diversity within a species increases the chances of its survival.
B-5.4 Explain how genetic variability and environmental factors lead to biological evolution.
B-5.5 Exemplify scientific evidence in the fields of anatomy, embryology, biochemistry, and paleontology that underlies the theory of biological evolution.
B-5.6 Summarize ways that scientists use data from a variety of sources to investigate and critically analyze aspects of evolutionary theory.
B-5.7 Use a phylogenetic tree to identify the evolutionary relationships among different groups of organisms.

Unit 5 Standard B-6:*The student will demonstrate an understanding of the interrelationships among organisms and the biotic and abiotic components of their environments.*

Indicators

- B-6.1 Explain how the interrelationships among organisms (including predation, competition, parasitism, mutualism, and commensalism) generate stability within ecosystems.
B-6.2 Explain how populations are affected by limiting factors (including density-dependent, density-independent, abiotic, and biotic factors).
B-6.3 Illustrate the processes of succession in ecosystems.
B-6.4 Exemplify the role of organisms in the geochemical cycles (including the cycles of carbon, nitrogen, and water).
B-6.5 Explain how ecosystems maintain themselves through naturally occurring processes (including maintaining the quality of the atmosphere, generating soils, controlling the hydrologic cycle, disposing of wastes, and recycling nutrients).

B-6.6 Explain how human activities (including population growth, technology, and consumption of resources) affect the physical and chemical cycles and processes of Earth.