

# Biology II Objectives

## Ms. Barbara Waters

### Standard #1 --Cells

CLE 3216.1.1 Compare the characteristics of prokaryotic and eukaryotic cells.

- Compare the organization and function of prokaryotic and eukaryotic cells.

CLE 3216.1.2 Describe how fundamental life processes depend on chemical reactions that occur in specialized parts of the cell.

- Describe how carbohydrates, proteins, lipids, and nucleic acids function in the cell.

CLE 3216.1.3 Explain how materials move into and out of cells.

- Conduct an experiment or simulation to demonstrate the movement of molecules through diffusion, facilitated diffusion, and active transport.

CLE 3216.1.4 Describe the enzyme-substrate relationship.

- Describe the composition and function of enzymes.
- Analyze the rate of reactions in which variables such as temperature, pH, and substrate and enzyme concentration are manipulated.

CLE 3216.1.5 Investigate how proteins regulate the internal environment of a cell through communication and transport.

- Develop a flow chart that tracks a protein molecule from transcription through export from the cell.
- Describe the role of the ribosomes, endoplasmic reticulum, and Golgi apparatus in the production and packaging of proteins.

CLE 3216.1.6 Describe the relationship between viruses and their host cells.

- Illustrate the interactions between a virus and a host cell.

### Standard # 2 - Interdependence

CLE 3216.2.3 Describe the varying degrees to which individual organisms are able to accommodate changes in the environment.

- Contrast accommodations of individual organisms with the adaptation of a species.

### Standard #3 - Flow of Matter and Energy

CLE 3216.3.1 Describe the role of biotic and abiotic factors in the cycling of matter in the ecosystem.

- Describe how water, carbon, oxygen, and nitrogen cycle between the biotic and abiotic elements of the environment.

CLE 3216.3.2 Explain how sunlight is captured by plant cells and converted into usable energy.

CLE 3216.3.4 Examine how macromolecules are synthesized from simple precursor molecules.

CLE 3216.3.3 Describe how mitochondria make stored chemical energy available to cells.

CLE 3216.3.5 Analyze the role of ATP in the storage and release of cellular energy.

- Calculate the amount of energy transfer through an ecosystem.
- Design an experiment to separate plant leaf pigments.
- Develop a concept map or flow chart to compare the sequence of molecular events during photosynthesis and cellular respiration.
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- Sequence the steps involved in sugar production during photosynthesis.
- Trace the breakdown of sugar molecules during cellular respiration.
- Compare the amount of ATP produced during aerobic and anaerobic respiration.

#### Standard #4 - Heredity

CLE 3216.4.1 Describe how mutation and sexual reproduction contribute to the amount of genetic variation in a population.

- Illustrate the movement of chromosomes and other cellular organelles involved in meiosis.
- Provide a detailed explanation of how meiosis and fertilization result in new genetic combinations.

CLE 3216.4.2 Describe the relationship between phenotype and genotype.

CLE 3216.4.3 Predict the probable outcome of genetic crosses based on Mendel's laws of segregation and independent assortment.

- Compare the expected outcome with the actual results of a cross in an organism such as a fruit fly or fast plant.

CLE 3216.4.4 Describe the relationship among genes, the DNA code, production of protein molecules, and the characteristics of an organism.

CLE 3216.4.5 Explain how the different shapes and properties of proteins are determined by the type, number, and sequence of amino acids.

- Develop a model to illustrate the stages of protein synthesis.
- Apply the genetic coding rules to predict the sequence of amino acids from a sequence of codons in RNA.
- Recognize how various types of mutations affect gene expression and the sequence of amino acids in the encoded protein.

- Distinguish among the characteristics of various structural levels found in protein molecules.

CLE 3216.4.6 Explain how the genetic makeup of cells can be engineered.

- Describe the formation of recombinant DNA molecules.
- Recognize that genetic engineering can be applied to develop novel biomedical and agricultural products.

### *Standard #5 - Biodiversity and Change*

CLE 3216.5.1 Identify factors that determine the frequency of an allele in the gene pool of a population.

CLE 3216.5.2 Determine how mutation, gene flow, and migration influence population structure.

- Predict how variation within a population affects the survival of a species.
- Recognize that natural selection acts on an organism's phenotype rather than its genotype.
- Use fossil evidence, DNA structure, amino acid sequences, and other data sources to construct a cladogram that illustrates evolutionary relationships.

### *Standard #6 - Comparative Anatomy and Physiology*

CLE 3216.6.1 Investigate the unity and the diversity among living things.

- Observe, model, manipulate, and/or dissect representative specimens of major animal groups.
- Compare and contrast the function of the major organ systems found in representative animal species.

### *Standard #7 - Botany*

CLE 3216.7.1 Describe different plant types plants based on their anatomy and physiology.

CLE 3216.7.2 Investigate the relationship between form and function for the major plant structures.

CLE 3216.7.4 Describe the difference between plants and fungi.

- Describe the function of plant cellular organelles.
- Employ a dichotomous key to identify plants based on their structural characteristics.
- Distinguish between the following: vascular and nonvascular plants, spore and seed, gymnosperms and angiosperms, and monocots and dicots.