

#941 SCIENCE 9B SMALL GROUP

GRADE: 10

LEVEL: Small Group

CREDITS: 2.5

PREREQUISITES: An Individualized Educational Plan with this component

BASIC TEXT: Prentice Hall Science Explorer series or Miller and Levine Biology

REQUIRED MATERIALS: Scientific calculator, notebook, agenda book, writing tool

MISSION RELATED GOALS:

- Foster communication
- Foster problem solving
- Academic excellence
- Intellectual curiosity
- Respect rights of others
- Successful, contributing society
- Self-confidence

COURSE DESCRIPTION: Students in Science 9B will receive small group instruction which addresses concepts and factual information in a manner consistent with their identified special needs. Characteristics of living things will be explored as a continuous theme. Commonalities include chemistry of life, structure and function of cells, evolution, biodiversity, and ecological relationships. These commonalities will be explored using the local habitat as a laboratory whenever possible. Students will also be able to make a personal connection by applying the topics above to the study of their own human Anatomy and Physiology.

SCHOOLWIDE LEARNING EXPECTATIONS:

Students will enhance their intellectual curiosity through exposure to inquiry style teaching. Students will foster problem-solving skills while producing products that demonstrate academic excellence. Students will communicate effectively and work towards a common goal while developing appropriate problem solving skills. The students will respect the rights of others while promoting personal growth in accepting responsibility and working individually within a group setting.

GENERAL PERFORMANCE OBJECTIVES: The students will be able to:

- Become familiar with measuring techniques
- Improve graphing skills
- Apply the scientific method to problem solving
- Collect and analyze data
- Arrive at conclusion
- Develop skills to use the microscope properly
- Identify examples of the six kingdoms of organisms in the local habitat
- Describe nutrient cycles

- Compare and contrast various cycles exhibited by organisms
- Demonstrate understanding of the interrelationship of cycles
- Demonstrate an understanding of primary producers and consumers
- Illustrate food webs, food chains, and energy pyramids
- Compare/Contrast the four organic compounds
- Create a cell model to describe structure and function of organelles
- Explain how a change in variables will effect the rate of photosynthesis
- Describe the interrelated nature of photosynthesis and cellular respiration
- Create a visual representation of how the eleven organ systems work together to achieve homeostasis
- Relate and discuss current events and their role in changing an ecosystem

CURRICULUM FRAMEWORK LEARNING STANDARDS:

1. The Chemistry of Life

Broad Concept: Living things are made of atoms bonded together to form organic molecules.

- 1.1 Explain the significance of carbon in organic molecules.
- 1.2 Recognize the six most common elements in organic molecules (C, H, N, O, P, S).
- 1.3 Describe the composition and functions of the four major categories of organic molecules (carbohydrates, lipids, proteins, and nucleic acids).

2. Structure and Function of Cells

Broad Concept: All living things are composed of cells. Life processes in a cell are based on molecular interactions.

- 2.1 Relate cell parts/organelles to their functions.
- 2.2 Differentiate between prokaryotic cells and eukaryotic cells, in terms of their general structures and degrees of complexity.
- 2.3 Distinguish between plant and animal cells.
- 2.4 Explain the role of cell membranes as a highly selective barrier (diffusion, osmosis, and active transport).
- 2.5 Identify the reactants and products in the general reaction of photosynthesis.
- 2.6 Provide evidence that the organic compounds produced by plants are the primary source of energy and nutrients for most living things.
- 2.7 Identify how cellular respiration is important for the production of ATP.
- 2.8 Explain the interrelated nature of photosynthesis and cellular respiration.

3. Genetics

Broad Concept: Genes are a set of instructions encoded in the DNA sequence of each organism that specify the sequence of amino acids in proteins characteristic of that organism.

- 3.1 Describe the structure and function of DNA, including replication.

4. Human Anatomy and Physiology

Broad Concept: There is a relationship between structure and function in organ systems of humans.

- 4.1 Explain how major organ systems in humans (e.g., kidney, muscle, lung) have functional units (e.g., nephron, sarcome, alveoli) with specific anatomy that perform the function of that organ system.

- 4.2 Describe how the function of individual systems within humans are integrated to maintain a homeostatic balance in the body.
5. Evolution and Biodiversity
Broad Concept: Evolution and biodiversity are the result of genetic changes that occur in constantly changing environments.
- 5.1 Explain how the fossil record, comparative anatomy, and other evidence support the theory of evolution.
- 5.2 Describe how the taxonomic system classifies living things into domains (eubacteria, archeabacteria, and eukaryotes) and kingdoms (animals, plants, fungi, protists...)
6. Ecology
Broad Concept: Ecology is the interaction between living organisms and their environment.
- 6.1 Explain how biotic and abiotic factors cycle in an ecosystem (water, carbon, oxygen, and nitrogen).
- 6.2 Use a food web to identify and distinguish producers, consumers, and decomposers, and explain the transfer of energy through trophic levels.
- 6.3 Identify the factors in an ecosystem that influence fluctuations in population size.
- 6.4 Analyze changes in an ecosystem resulting from natural causes, changes in climate, human activity, or introduction of non-native species.
- 6.5 Explain how symbiotic behavior produces interactions within ecosystems.

COURSE OUTLINE:

The Chemistry of Life

Structure and Function of Cells

Genetics: DNA structure and function
Included in 1 week of chemistry of life

Human Anatomy and Physiology
Evolution and Biodiversity

Ecology

SUGGESTED INSTRUCTIONAL STRATEGIES: videos (process skills and curriculum oriented), visual aids, models, preserved specimens, songs

SUGGESTED INTEGRATED ACTIVITIES:

Possible integrated activities:

- Discussing how organic compounds are used to form art and determine the authenticity of a piece.
- Relating naming system of taxonomy with languages offered at TMHS
- Debate the theory of nature vs. nurture as it may apply to infamous historical figures (ie. Hitler)
- Use science current events as a forum for class discussion
- Have students act the role of historical figures in Biology
- Use the concepts of exponential growth and graphing to discuss changes in population size
- As specified by Individual Education Plan

USE OF TOOLS/TECHNOLOGY: Video programs, powerpoint presentations, microscope video adapter, Vernier probes, internet webquests, incubation chamber, electrophoresis, digital cameras

ASSESSMENT TECHNIQUES:

All assessments follow the school wide rubric.