

Biology –Grades 9-10

Course Goal and Description: The overall goal of high school Biology is for students to understand the important ideas in the life sciences by being involved in active scientific investigation and by connecting those ideas to their own lives. Biology is a course that studies the complexities of living things from the microscopic to the macroscopic. Emphasis is placed on the biochemical processes of life, including life cycles and the interaction of life with the non-living environment. In particular, several theories of science are examined, including Cell Theory, Germ Theory, Genetics and Chromosomal theory, and Evolutionary Theory. Ecosystems and a study of human interaction with the living and nonliving world are included in ecology, the study of how organisms interact with their environments.

| Related Links | QUARTER 1 | QUARTER 2 |
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| | <p><u>Students will:</u> inquire into the history and nature of science and investigate cell theory, including: the structure and function of the cell, cellular biochemical and physiological processes, and the cell cycle as basic to life.</p> <p>Big Idea / Enduring Understanding</p> <ul style="list-style-type: none"> ↘ The functions and processes of the cell are basic to the cycle of life. <p>Essential Questions</p> <ul style="list-style-type: none"> ↘ How is science different from other forms of knowledge? ↘ How has science changed over time? ↘ What factors determine whether something is alive? ↘ How is cell theory basic to life? ↘ How does photosynthesis provide a vital connection between the sun's energy and other living things? ↘ What is the role of mitosis and meiosis in the cycle of life? <p>Content Topics</p> <ul style="list-style-type: none"> ↘ Review of: <ul style="list-style-type: none"> - basic chemistry, including carbohydrates/proteins/fats/acids - microscope basics - scientific ways of thinking and knowledge - science and its relationship to technology - scientific experimentation ↘ Historical contexts of biology ↘ Structure and function of cell parts ↘ Cell membranes ↘ Diffusion/osmosis ↘ Photosynthesis ↘ Cell respiration ↘ Enzymes ↘ Metabolism ↘ Cell cycle/mitosis/meiosis <p>Skills</p> <ul style="list-style-type: none"> ↘ Science process skills, which may include: observing, inferring, measuring, performing experiments, etc. ↘ Lab equipment skills, which may include: use of the balance, bunsen burner, thermometer, etc. ↘ Literacy skills, which may include: math computation, writing, reading, scientific literacy etc. ↘ Affective skills, which may include: communication, cooperation, media preference, use of technology, etc. <p>Assessments</p> <ul style="list-style-type: none"> ↘ Communicate the structure and function of a specialized cell. | <p><u>Students will:</u> answer questions about heredity, genetics, reproduction, DNA, evolution and classification. Continue inquiry into the history and nature of science.</p> <p>Big Ideas / Enduring Understandings</p> <ul style="list-style-type: none"> ↘ The gene is the basic unit of inheritance, and the replication of the DNA molecule is basic to the reproduction of living things. ↘ Natural selection is the mechanism of modern evolution ↘ Evolution is inherent in the classification of living things. <p>Essential Questions:</p> <ul style="list-style-type: none"> ↘ What are the structures and processes involved in the genetic replication of a cell, and in the inheritance of living things? ↘ How do anatomy, homology and biochemical characteristics provide data for the classification of organisms? ↘ How is the modern theory of Natural Selection used to support the modern theory of Evolution? <p>Content Topics</p> <ul style="list-style-type: none"> ↘ DNA/RNA ↘ Genes/chromosomes ↘ Replication/transcription/translation ↘ Human reproduction/chromosomes ↘ Punnett squares/crosses ↘ Genotype/phenotype ↘ Darwinian evolution and natural selection ↘ Classification/speciation/taxonomy ↘ Historic perspectives of genetics and evolution ↘ Related nature of science topics <p>Skills</p> <ul style="list-style-type: none"> ↘ Science process skills, which may include: observing, inferring, measuring, performing experiments, etc. ↘ Lab equipment skills, which may include: use of the balance, bunsen burner, thermometer, etc. ↘ Literacy skills, which may include: math computation, writing, reading, scientific literacy etc. ↘ Affective skills, which may include: communication, cooperation, media preference, use of technology, etc. <p>Assessments</p> <ul style="list-style-type: none"> ↘ Design and conduct an original experiment. |

| | QUARTER 3 | QUARTER 4 |
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| | <p>Students will: continue inquiry into the history and nature of science; study the comparative anatomy of the circulatory, digestive, and nervous systems across the animal kingdom; study the behavior of plants, animals and humans; and investigate homeostasis.</p> <p>Big Idea / Enduring Understanding</p> <ul style="list-style-type: none"> ↘ Homeostasis and behavior are biological processes that enable the survival of plants and animals across the kingdoms of life. <p>Essential Questions</p> <ul style="list-style-type: none"> ↘ How is the concept of homeostasis used to explain the relationship of organ systems in the animal kingdom, including humans? ↘ How does the adaptation of behavior influence the survival of organisms? ↘ How does the anatomy of the circulatory, digestive and nervous system compare across the animal kingdom? ↘ How does the anatomy and physiology of plants compare across the plant kingdom? <p>Content Topics</p> <ul style="list-style-type: none"> ↘ Comparative anatomy of the circulatory, digestive, and nervous systems across the animal kingdom ↘ Behavior stimuli in plants and animals ↘ Homeostasis in humans, other animals and plants ↘ Human behavior ↘ Human organ systems <p>Skills</p> <ul style="list-style-type: none"> ↘ Science process skills, which may include: observing, inferring, measuring, performing experiments, etc. ↘ Lab equipment skills, which may include: use of the balance, bunsen burner, thermometer, etc. ↘ Literacy skills, which may include: math computation, writing, reading, scientific literacy etc. ↘ Affective skills, which may include: communication, cooperation, media preference, use of technology, etc. <p>Assessments</p> <ul style="list-style-type: none"> ↘ Design and conduct an original experiment. | <p>Students will: continue inquiry into the history and nature of science; investigate ecosystems, populations, biomes, trophic levels, and energy in earth systems; and study the complexities of human interaction with ecosystems.</p> <p>Big Idea / Enduring Understandings</p> <ul style="list-style-type: none"> ↘ A constant input of energy is necessary to maintain a delicate balance in the ecosystems of the world. Human intervention in these ecosystems is changing that balance - sometimes for the better, and sometimes for the worse. <p>Essential Questions</p> <ul style="list-style-type: none"> ↘ How is energy utilized and dissipated in its transfer through living systems? ↘ What are the elements of any ecosystem? ↘ What defines a population, and what variables affect its fluctuation? ↘ What are the biotic and abiotic factors in the biome in which you live? ↘ How does the environment impact humans, and how do humans impact the environment? <p>Content Topics</p> <ul style="list-style-type: none"> ↘ Biotic and abiotic cycles ↘ Respiration, photosynthesis, and total energy in a system ↘ Biomes and trophic levels ↘ Webs, pyramids, and loss of heat energy ↘ Ecosystems ↘ Populations and carrying capacity ↘ Coevolution, mutualism, and parasitism ↘ Native and invasive species ↘ Ecology and the environment ↘ Human intervention and pollution <p>Skills</p> <ul style="list-style-type: none"> ↘ Science process skills, which may include: observing, inferring, measuring, performing experiments, etc. ↘ Lab equipment skills, which may include: use of the balance, bunsen burner, thermometer, etc. ↘ Literacy skills, which may include: math computation, writing, reading, scientific literacy etc. ↘ Affective skills, which may include: communication, cooperation, media preference, use of technology, etc. <p>Assessments</p> <ul style="list-style-type: none"> ↘ Do an in depth study of a local environment, including the ethics and economic factors of an issue in that environment. ↘ District post test |