Effective Date: 2008-2009

Hamburg Area School District

Name of Course: Biology PS Department: Science Grade Level: 9 - 10 Instructional Time: One period Length of Course: Full Year Period Per Cycle: 6 Length of Period: 42 min.

Texts and Resources: Biology Johnson & Raven Holt, Reinhart & Winston Pub. Assessments: Quizzes Laboratory Reports Tests Projects

Course Name: Biology PS Unit: Introduction to Biology

Essential Content/ Essential Questions	Performance Objectives	Standards/Anchors
What does it mean to be alive?	-Apply the seven properties of life to a living organism.	S11.A.3.3.1 S11.B.1.1.2
What are the unifying themes of biology?	-Describe the seven themes of biology. -Construct a poster to show examples of each unifying theme	S.11.A.3.3.1 S11.B.1.1.2 S11.B.2.1.1 S11.B.3.1.3
What are the stages of scientific investigation?	 -Differentiate between the stages of scientific investigation. -Evaluate sample investigations to identify the different stages of the scientific process. -Apply the scientific method to solve a lab experiment. 	S11.A.1.1.4S11.A.2.1.1S11.A.2.1.2S11.A.2.1.3S11.A.2.1.4S11.A.2.1.5S11.A.2.2.1S11.A.2.2.2S11.A.1.1.3

Course Name: Biology PS Unit: The Chemistry of Life

Essential Content/ Essential Questions	Performance Objectives	Standards/Anchors
Why is water important to living things?	-Analyze the properties of water. -Explain how water dissolves substances.	S11.B.1.1.1 S11.A.3.2.3 S11.A.3.3.1 S11.C.1.1.2
What are organic compounds?	-Compare and contrast the structures and functions of different biomolecules. -Evaluate the role in ATP in cells.	S11.B.1.1.1 S11.A.3.2.3 S11.A.3.3.1
How is energy used for life processes?	 -Evaluate the importance of energy in living things. -Illustrate the role of enzymes in chemical reactions. -Analyze how enzymes help organisms maintain homeostasis. 	S 11.B.1.1.1 S11.A.3.2.1 S11.A.3.3.1

Course Name: Biology PS Unit: Photosynthesis & Cellular Respiration

Essential Content/ Essential Questions	Performance Objectives	Standards/Anchors
What is photosynthesis?	-Summarize the process of photosynthesis. -Analyze three environmental factors that affect the rate of photosynthesis. -Analyze the pigments involved in photosynthesis.	S11.A.1.3.2 S11.A.3.1.1 S11.B.1.1.1 S11.B.1.1.3
What is cellular respiration?	 -Describe the role of ATP is metabolism. -Describe how energy is released from ATP. -Demonstrate cellular respiration using yeast. -Differentiate between aerobic and anaerobic respiration. -Summarize the process of cellular respiration. -Compare and contrast photosynthesis and cellular respiration. 	S11.A.1.3.2 S11.A.3.3.1 S11.B.1.1.1 S11.B.1.1.3

Course Name: Biology PS Unit: Cell Structure

Essential Content/ Essential Questions	Performance Objectives	Standards/Anchors
Why are microscopes important to biologists?	 -Demonstrate how to properly use the light microscope. -Prepare a wet-mount slide. -Differentiate between light, electron and scanning tunneling microscopes. 	S11.A.2.2.1 S11.A.2.2.2
What are the components of the cell theory?	-Identify the three parts of the cell theory. -Relate the advances of microscope technology to findings about cells and their structures.	S11.A.1.1.1 S11.B.1.1.1 S11.A.1.1.4 S11.B.1.1.2 211.A.3.3.1 S11.B.1.1.3
What are the common features of cells?	 -Identify the organelles of the cell. -Distinguish between the divisions of labor in cells. -Design a travel brochure of cell organelles. -Illustrate how organelles work together for a common function. 	S11.A.3.1.1 S11.A.3.2.1
What are the different types of cells?	-Compare and contrast prokaryotic and eukaryotic cells. -Differentiate between plant and animal cells.	S11.B.1.1.1 S11.B.1.1.2

Course Name: Biology PS Unit: Cells & Their Environment

Essential Content/ Essential Questions	Performance Objectives	Standards/Anchors
In what ways do materials pass through cell membranes?	 -Relate concentration gradients, diffusion and equilibrium. -Predict the direction of water movement in various sample cells. -Compare and contrast the roles of carrier proteins and ion channels. -Compare and contrast active and passive transport. -Distinguish between exocytosis and endocytosis. -Identify three ways receptor proteins change cell activity. 	S11.A1.3.1 S11.A.1.3.2 S11.A.3.1.2 S11.B.1.1.3

Course Name: Biology PS Unit: Cell Reproduction

Essential Content/ Essential Questions	Performance Objectives	Standards/Anchors
Why is chromosome number important?	-Differentiate between haploid and diploid cells. -Construct a normal and abnormal karyotype. -Evaluate karyotypes to identify genetic defects.	S11.A.1.1.5S11.A.3.1.2S11.A.1.3.1S11.B.2.2.1S11.A.2.1.3
What is the purpose of mitosis?	 -Identify the major events of the cell cycle. -Distinguish between the five phases of the cell cycle using microscope slides. -Differentiate cytokinesis in plant and animal cells. -Explain how cancer is related to mitosis. 	S11.A.1.1.5 S11.B.1.1.3 S11.B.2.2.2
Why is meiosis important?	-Summarize the events that occur during meiosis. -Compare and contrast meiosis and mitosis. -Illustrate how meiosis results in genetic variation.	S11.A.1.1.5 S11.B.1.1.3 S11.B.2.2.2
How can you produce a plant asexually?	-Reproduce a plant asexually. -Employ correct care (watering, fertilizing, and pruning) to maintain a plant.	S11.A.3.2.3 S11.B.1.1.1

Course Name: Biology PS Unit: Mendel and Heredity

Essential Content/ Essential Questions	Performance Objectives	Standards/Anchors
What are Gregor Mendel's contributions to the study of heredity?	 Distinguish between the four major concepts Mendel developed. Demonstrate the major steps of Mendel's pea plant experiments. Relate the ratios Mendel observed in his crosses to his data. 	S11.A.1.1.1 S11.A.1.1.2 S11.A.2.1.3 S11.A.3.2.3 S11.B.2.2.3
How do you use Punnett squares to predict genetic probabilities?	 -Predict the results of monohybrid crosses by using Punnett squares. - Predict the results of dihybrid crosses using Punnett squares. 	S11.A.1.1.4 S11.A.2.1.3 S11.A.3.1.1
Why is a pedigree important?	-Construct a simple pedigree. -Analyze a pedigree to predict the probability of inheritance of a trait.	S11.A.1.1.4 S11.A.1.1.5 S11.A.2.1.3
How do some complex patterns of heredity influence inheritance of traits?	-Predict the outcome of genetic crosses representing incomplete dominance, co-dominance, polygenic traits and multiple alleles.	S11.A.3.3.1 S11.A.3.2.1 S11.A.3.2.3 S11.B.2.2.3

Course Name: Biology PS Unit: Mendel and Heredity cont'd

Time Line: cont'd

Essential Content/ Essential Questions	Performance Objectives	Standards/Anchors
What are some common human genetic disorders?	-Evaluate symptoms to predict common human genetic disorders.	S11.A.2.1.3 S11.A.3.2.1 S11.B.2.2.3
What is a sex-linked trait?	-Demonstrate how a sex-linked trait is passed to offspring.	S11.A.2.1.3 S11.A.3.2.1 S11.B.2.2.3

Course Name: Biology PS Unit: DNA & Protein Synthesis

Essential Content/ Essential Questions	Performance Objectives	Standards/Anchors
What is DNA?	 -Evaluate the experimental results of Griffith, Avery and Hershey and Chase that led to the identification of the genetic material. -Evaluate the contributions of Chargaff, Franklin and Wilkins in helping Watson and Crick determine the structure of DNA. -Construct a model of DNA. 	S11.A.3.2.1 S11.B.1.1.1 S11.A.3.2.2 S11.B.2.2.1 S11.A.3.2.3 S11.A.3.3.1 S11.A.3.3.2 S11.A.3.3.2
How does DNA replicate?	-Illustrate the process of DNA replication. -Demonstrate how errors are corrected during DNA replication.	S11.A.3.2.1S11.B.1.1.3S11.A.3.2.3S11.B.2.2.1S11.A.3.3.1
How are proteins made?	 -Differentiate between the structures of DNA and RNA. -Explain the process of transcription. -Describe the major steps of translation. 	S11.A.1.1.5 S11.A.3.3.1 S11.B.1.1.3 S11.B.2.2.1
How do mutations occur?	-Evaluate ways that mutations can alter genetic material.	S11.A.3.1.2 S11.B.2.1.2 S11.B.2.2.1

Course Name: Biology PS Unit: DNA and Protein Synthesis cont'd

Time Line: cont'd

Essential Content/ Essential Questions	Performance Objectives	Standards/Anchors
What is genetic engineering?	 -Describe the four major steps commonly used in genetic engineering. -Evaluate how restriction enzymes are used in genetic engineering. -Compare and contrast the benefits and risks of using genetically engineered organisms. 	S11.B.3.3.3

Course Name: Biology PS Unit: Evolution

Essential Content/ Essential Questions	Performance Objectives	Standards/Anchors
What are main parts of Darwin's Theory of Evolution?	 -Identify several observations that led Darwin to conclude that species evolved. - Apply the process of natural selection to its outcome. -Summarize the main points of Darwin's Theory of Evolution by natural selection. 	S11.B.2.1.1 S11.B.2.1.2 S11.B.2.1.3
What evidence do we have to support Darwin's Theory of Evolution?	 -Illustrate how fossil record supports evolution. -Demonstrate how biological molecules are used as evidence of evolution. -Analyze how comparing the anatomy and development of living species provides evidence of evolution. 	S11.B.2.1.1 S11.B.2.1.2 S11.B.2.1.4

Course Name: Biology PS Unit: Classification

Essential Content/ Essential Questions	Performance Objectives	Standards/Anchors
What are the categories of biological classification?	 -Identify the seven levels of classification. -Explain the scientific system for naming an organism. -Discuss Linnaeus's role in developing the modern classification system. 	S11.B.1.1.2
What are the six kingdoms of life?	-Compare and contrast the characteristics of life used to identify kingdoms. -Classify organisms into their appropriate kingdoms.	S11.B.1.1.2

Course Name: Biology PS Unit: Ecology

Essential Content/ Essential Questions	Performance Objectives	Standards/Anchors
What is an ecosystem?	 -Differentiate between an ecosystem and a community. -Illustrate the process of succession. -Evaluate biodiversity in an ecosystem. 	S11.B.3.1.1 S11.B.3.1.2
How does energy flow in an ecosystem?	-Differentiate between producers and consumers. -Illustrate the flow of energy in a food chain using trophic levels.	S11.B.3.1.3 S11.B.3.1.5
How do organisms interact in a community?	 -Predict how co-evolution can affect interactions between species. -Compare and contrast symbiosis, mutualism and commensalism. 	S11.B.3.1.3 S11.B.3.2.1

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Course Name: Biology PS Unit: Ecology cont'd

Time Line: cont'd

Essential Content/ Essential Questions	Performance Objectives	Standards/Anchors
How does competition affect communities?	 -Illustrate how the role of competition shapes the nature of communities. -Distinguish between fundamental and realized niches. -Describe how competition affects an ecosystem. -Evaluate the importance of biodiversity. 	S11.B.3.1.3 S11.B.3.2.2
What are the major biological communities?	 -Recognize the role of climate in determining a biological community. -Describe how elevation and latitude affect the distribution of biomes. -Distinguish between the key features of the Earth's major biomes. -Compare and contrast the types of plants and animals found in different biomes. -Design a biome. 	S11.B.3.1.4 S11.B.3.1.5 S11.B.3.2.3

Course Name: Biology PS Unit: Animal Anatomy

Essential Content/ Essential Questions	Performance Objectives	Standards/Anchors
What are the organs and systems of the earthworm?	 -Identify the body plan that distinguishes annelids from other organisms. -Identify the major organs of phylum annelida. -Compare the organ systems of the earthworm with mammals. 	S11.A.1.1.5 S11.A.1.3.2 S11.A.3.3.1 S11.A.3.3.2 S11.B.1.1.1 S11.B.1.1.2
What are the organs and systems of the frog?	 -Summarize the characteristics of modern amphibians. -Describe the major external and internal characteristics of the frog. -Compare and contrast amphibian and mammalian organs. 	S11.A.1.1.5 S11.A.1.3.2 S11.A.3.3.1 S11.A.3.3.2 S11.B.1.1.1 S11.B.1.1.2