Effective Date: *2008-2009*

Hamburg Area School District

Name of Course: *Biology (Standards Based)*
Department: *Science*

Grade Level: *10*
Instructional Time:
Length of Course: *Full Year*
Period Per Cycle: *6*
Length of Period: *42 Minutes*

Texts and Resources:

Biology
Author: *Stephen Nowicki*
Publisher: *McDougall Littell*
Year: *2008*

Student Study Guide for Biology
Student Laboratory Procedural Manual
Student Laboratory Notebook

Assessments:

Homework
Chapter quizzes
Vocabulary Quizzes
Laboratory Reports
Chapter Tests
Greenhouse Project
Independent Projects

Hamburg Area School District
Course Plan
(Science)

Course Name: Biology
Unit: What is Life? **Time Line: 1-2 Cycles**

Essential Content/ Essential Questions	Performance Objectives	Standards/Anchors
What does it mean to be alive?	Identify the unifying themes of Biology. Model the themes of Biology using real-world examples.	S.11.A.1.3.2 S.11.A.3.1.2 S.11.B.3.1.3
What are the characteristics of living things?	Identify the characteristics that all living things share. Explain how living and non-living things differ.	S.11.A.1.3.2 S.11.A.3.1.2 S.11.B.3.1.3
What tools do Biologists use to study life?	Learn to use a light microscope. Complete an introductory microscope lab.	S.11.A.2.2.1 S.11.A.2.2.2
What role does Biology play in my life?	Identify current uses of Biological technology Examine the usefulness and practicality of science technology.	S.11.A.1.1.4 S.11.A.1.2.1 S.11.A.2.2.2

Hamburg Area School District
Course Plan
(Science)

Course Name: Biology
Unit: Scientific Measurements/Science as a Process **Time Line: 2-3 Cycles**

Essential Content/ Essential Questions	Performance Objectives	Standards/Anchors
What measurements are used in science?	Identify the basic units of the metric system: length, mass, and volume. Practice measuring length, mass and volume. Know how to make metric conversions. Differentiate between weight and mass.	S.11.A.2.2.1 S.11.A.3.1.1
How do scientists conduct experiments?	Describe the steps of the scientific method. Design and conduct original experiment using the scientific method. Describe the difference between a theory and a law. Draw and interpret data in a graph.	S.11.A.1.1.1 S.11.A.1.2.1 S.11.A.2.1.4 S.11.A.1.1.2 S.11.A.1.3.1 S.11.A.2.1.5 S.11.A.1.1.3 S.11.A.2.1.1 S.11.A.3.1.3 S.11.A.1.1.4 S.11.A.2.1.2 S.11.A.3.1.4 S.11.A.1.1.5 S.11.A.2.1.3

Hamburg Area School District
Course Plan
(Science)

Course Name: Biology
Unit: Cells and Cellular Processes **Time Line: 6-7 Cycles**

Essential Content/ Essential Questions	Performance Objectives	Standards/Anchors
What is a cell?	Describe the cell theory. Locate and label the organelles of a cell. Differentiate between eukaryotic and prokaryotic cells. Identify the differences between plant and animals cells. Use a microscope to compare and contrast animal and plant cells.	S.11.B.1.1.1 S.11.B.1.1.2 S.11.A.2.2.2
How are multicellular organisms arranged?	Explain cell specialization. Explain how cells, tissues, organs and organ systems are arranged.	S.11.B.1.1.1 S.11.B.1.1.2
What are the functions of large molecules in the cell?	Identify the role of lipids, carbohydrates, fats and nucleic acids in homeostasis. Identify the unique properties of water. Explain why water is important for cellular reactions. Explain how water supports life on Earth.	S.11.B.1.1.1 S.11.B.1.1.2 S.11.B.1.1.3
Why do cells need energy?	Summarize how cells obtain and store energy. Discuss the interdependence between producer and consumer. Describe the processes of photosynthesis and cellular respiration.	S.11.B.1.1.3 S.11.B.3.1.3
How do cells exchange materials with their environment?	Compare active and passive transport. Identify real world examples of diffusion and osmosis. Describe the structure of the cell membrane. Explain how surface area affects transport rates. Observe osmosis through the membrane of an egg.	S.11.A.2.1.3 S.11.A.2.1.5 S.11.A.3.1.3 S.11.B.1.1.1 S.11.B.1.12 S.11.B.1.1.3

Hamburg Area School District
Course Plan
(Science)

Course Name: Biology
Unit: Cells and Cellular Processes **Time Line: 6-7 Cycles**

Essential Content/ Essential Questions	Performance Objectives	Standards/Anchors
What are the benefits of cell division?	Explain that all cells come from other cells. Determine how organisms grow, develop and repair themselves.	S.11.B.1.1.3 S.11.B.2.2.1
How do cells divide?	Describe the cell cycle including interphase and mitosis. Analyze what happens in the steps of mitosis. Use a microscope to observe mitosis in plant cells. Make a model of the steps of mitosis. Describe how mistakes in the cell cycle can lead to cancer.	S.11.A.1.3.1 S.11.A.2.1.3 S.11.A.2.1.5 S.11.A.3.1.3 S.11.B.1.1.3 S.11.B.2.2.2
What are the various types of cell division?	Compare and contrast sexual and asexual reproduction. Describe budding, fragmentation, and binary fission. Complete a plant project that utilizes asexual reproduction.	S.11.B.2.2.2

Hamburg Area School District
Course Plan
(Science)

Course Name: Biology
Unit: DNA, Chromosomes and Heredity **Time Line: 6-8 Cycles**

Essential Content/ Essential Questions	Performance Objectives	Standards/Anchors
How is genetic material organized in a cell?	Explain the structure of a chromosome. Identify what a gene is. Describe how genes are arranged on a chromosome. Know that different chromosomes contain different genes. Identify the chromosome number of organisms. Construct a karyotype of human chromosomes.	S.11.B.2.2.1
How do offspring inherit traits from their parents?	Describe the discoveries made by Gregor Mendel. Know that genes have dominant and recessive alleles. Describe independent assortment and the law of segregation. Identify an organism's genotype and phenotype.	S.11.B.2.1.2 S.11.A.1.3.1 S.11.A.3.1.3 S.11.B.2.2.1 S.11.A.2.1.3 S.11.B.2.2.2 S.11.A.2.1.5 S.11.B.2.2.3 S.11.A.2.2.1
How can heredity patterns be predicted?	Use punnett squares to understand heredity patterns. Calculate ratios and probabilities of genetic outcomes. Evaluate human pedigrees. Construct models of genetic organisms. Analyze experimental and real world examples to find probabilities.	S.11.B.2.1.2 S.11.B.2.2.1 S.11.B.2.2.2 S.11.B.2.2.3
How does the process of meiosis distribute genes to cells?	Explain how meiosis shuffles genetic information. Describe the steps of meiosis. Recognize how meiosis differs from mitosis. Model the steps of meiosis. Know that meiosis creates haploid gametes.	S.11.B.2.1.2 S.11.B.2.2.1 S.11.B.2.2.2

Hamburg Area School District
Course Plan
(Science)

Course Name: Biology
Unit: DNA, Chromosomes and Heredity **Time Line: 6-8 Cycles**

Essential Content/ Essential Questions	Performance Objectives	Standards/Anchors
What is DNA?	Discuss early experiments that led to the discovery of the double helix. Describe the structure of DNA. Explain how DNA is replicated. Model DNA replication. Understand that organisms use the same nitrogen bases but that every genome is unique.	S.11.B.1.1.1 S.11.B.1.1.2 S.11.B.1.1.3 S.11.B.2.2.1
How are DNA and RNA used to make proteins?	Identify what proteins are and what they do for the body. Explain how RNA is made in a cell. Recognize the steps of protein synthesis. Model protein synthesis.	S.11.B.1.1.1 S.11.B.1.1.3 S.11.B.2.2.1
How do changes in DNA produce variation among organisms?	Define mutation. Describe the different types and affects of mutations. Know the mutations in gametes can be passed to offspring. Explain how mutations can be beneficial. Discuss human genetic disorders as a result of DNA mutations.	S.11.A.1.1.3 S.11.A.1.1.4 S.11.A.1.1.5 S.11.B.2.1.2 S.11.B.2.2.3
What is DNA technology?	Identify what genetically modified organisms are. Describe the applications (benefits and risks) of DNA technology. Discuss the ethical issues of DNA technology. Examine current uses of cloning and gene therapy.	S.11.A.1.2.1 S.11.A.2.2.2 S.11.B.2.1.3

Hamburg Area School District
Course Plan
(Science)

Course Name: Biology
Unit: Classification and the Kingdoms of Life **Time Line: 2-3 Cycles**

Essential Content/ Essential Questions	Performance Objectives	Standards/Anchors
Why are living things classified?	Understand how biological relationships are used to classify organisms. Describe evidence used by scientists to classify. Explain the early classification systems of Aristotle and Linnaeus. Use and construct a dichotomous key.	S.11.A.3.3.1 S.11.B.1.1.2
What are the levels of classification?	Explain how scientific names are determined and used. Know the seven levels of classification and apply them to common organisms such as humans. Understand that the more levels two organisms share the more closely related they are. Develop a two name system to classify everyday objects.	S.11.A.3.3.1 S.11.B.1.1.2
How can classification systems change over time?	Know the connection between new discoveries and taxonomy. Describe the 3 domains of life. Identify the characteristics of organisms in the 6 biological kingdoms.	S.11.A.3.3.1 S.11.B.1.1.2

Hamburg Area School District
Course Plan
Science

Course Name: Biology
Unit: Evolution **Timeline: 2-3 Cycles**

Essential Content/Essential Questions	Performance Objectives	Standards/Anchors
What is natural selection?	Describe the early ideas of evolution, including Lamarck's acquired characteristics. Know how Darwin used scientific observation to develop his theory of natural selection. Explain Darwin's theory of natural selection.	S.11.B.2.1.1 S.11.B.2.1.2 S.11.B.2.1.4
How does a species change over time?	Know why some organisms are more 'fit' for their environment. Know that 'fitness' is related to an organism's genotype. Describe how mutations can lead to new, 'fit' traits. Recognize that new species arise from older species.	S.11.B.2.1.2 S.11.B.3.1.3
What evidence supports evolution?	Discuss evidence from the fossil record. Explain how theories develop. Identify physical and molecular similarities between past and present organisms. Create a timeline of geological events.	S.11.B.1.1.2 S.11.B.2.1.1

Hamburg Area School District
Course Plan
Science

Course Name: Biology
Unit: Ecology **Timeline: 4-6 Cycles**

Essential Content/Essential Questions	Performance Objectives	Standards/Anchors
What is an ecosystem?	Explain what factors define an ecosystem. Describe living and non-living factors in an ecosystem. Discuss the importance of biodiversity.	S.11.B.3.1.1 S.11.B.3.1.2 S.11.B.3.1.5 S.11.B.3.2.2
How does energy flow through an ecosystem?	Describe the relationship between producer, consumer, and decomposer. Explain the feeding relationships in an ecosystem (food webs and food chains). Explain how energy is transformed through an ecosystem.	S.11.A.1.3.2 S.11.A.3.1.2 S.11.B.3.1.3
What is a biome?	Know that biomes contain many ecosystems. Describe how biomes vary by geographic regions. Describe various land and water biomes on Earth. Create a biome.	S.11.A.1.3.3 S.11.B.3.1.4
How do living things interact within an ecosystem?	Define population and community. Describe habitats and niches. Discuss carrying capacity and its relationship to population growth. Describe limiting factors in populations. Describe symbiotic relationships: competition, predation, mutualism, commensalisms, parasitism. Model a real world predator/prey relationship.	S.11.B.3.1.3 S.11.B.3.1.5

Hamburg Area School District
Course Plan
Science

Course Name: Biology
Unit: Ecology Cont. **Timeline: 4-6 Cycles**

Essential Content/Essential Questions	Performance Objectives	Standards/Anchors
How can ecosystems change over time?	Describe primary and secondary succession. Discuss real world examples of succession such as glacier retreat, forest fires and other natural disasters.	S.11.A.1.3.3 S.11.B.3.2.3
How do humans put pressure on ecosystems?	Discuss the carrying capacity for humans. Differentiate between renewable and non-renewable resources. Explain the effect of the disappearance of natural habitats for development. Discuss how pollution affects the environment. Explain the effect a loss of biodiversity has on the environment.	S.11.B.3.2.2 S.11.B.3.3.3
How can we protect the environment/	Define conservation and discuss examples currently in use. Identify government agencies and their role in conservation. Discuss current trends in environmental awareness such as: recycling, mass transit, alternative energy sources, etc.	S.11.A.1.2.1 S.11.A.2.2.1 S.11.B.3.3.3