Effective Date: August 2008

Hamburg Area School District

Name of Course: Earth Space Science
Department: Science

Grade Level: 8th
Instructional Time:
Length of Course: 1 year
Period Per Cycle: 1 period every day
Length of Period: 54-minute period

Texts and Resources:
Textbook -Prentice Hall Science Explorer Series Grade 8
National Science Teachers Assoc. activity books
Internet Resources
Graphic Organizers
Illustrations
Models
Graphs
Demonstrations

Assessments:
Text generated test
Teacher generated test
Laboratories
Production of projects
Informal/Formal observation

Hamburg Area School District
Course Plan
Grade 8 Science

Course Name: Earth and Space Science
Unit: Introduction to Earth Science **Time Line: One Week**

Essential Content/ Essential Questions	Performance Objectives	Standards/Anchors
What is Earth Science?	Define Earth Science Differentiate among the four major branches of Earth Science	3.2.7.A, 3.2.7.B/ **S8.A.1 1**
How is Earth a system? What is a system?	Describe the primary goal of Earth system science and define the term system. Identify the difference between an open system and closed system. Examine and understand how the Earth's systems are connected.	3.1.7.E, 4.7.7.C, 4.8.7.C/ **S8.A.1.3** 3.1.7.A, 3.4.7.B, 4.3.7.C, 4.2.7.D, 4.6.7.A/**S8.A.3.1** 3.1.7.C, 3.2.7.B/ **S8.A.3.3**
What is Scientific Inquiry?	List the steps used in scientific investigations (scientific method). Compare an contrast experimental variables and controls Identify and apply basic SI (International System of Units). Define hypothesis and theory.	3.2.7.A, 3.2.7.B/ **S8.A.1 1** 3.2.7.B, 3.2.7.D, 3.1.7.C, 3.1.7.D**/S8.A.2.1** ***3.3.7.A, 3.7.7.B, 3.1.7.D/*** **S8.A.2.2**
What are the methods of communication in Earth Science?	Classify, review, and produce ways in which scientific information is communicated (i.e. lab reports, graphs, and models)	3.2.7.A, 3.2.7.B/ **S8.A.1 1** 3.1.7.B, 3.2.7.B, 4.1.7.B/ **S8.A.3.2**

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Course Plan
Grade 8 Science

Course Name: Earth and Space Science
Unit: Composition of Earth – Matter and Atomic Structure **Time Line: One Week**

Essential Content/ Essential Questions	Performance Objectives	Standards/Anchors
What is an element?	Explain how elements are related to minerals. Identify the kinds of particles that make up atoms. Explain the differences between ions and isotopes.	***3.4.7.A/*** **S8.C.1.1**
How do atoms combine?	Describe the chemical bonds that unite atoms to form compounds. Relate the nature of chemical bonds that hold compounds together to the physical structures of compounds. Distinguish among different types of mixtures and solutions.	***3.4.7.A/*** **S8.C.1.1**
What are the states of matter?	Describe the states of matter on Earth. Explain the reasons that matter exists in these states. Relate the role of thermal energy to changes of state in matter.	***3.4.7.A*** **/S8.C.1.1**

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Grade 8 Science

Course Name: Earth and Space Science
Unit: Inside Earth - Minerals **Time Line: Two Week**

Essential Content/ Essential Questions	Performance Objectives	Standards/Anchors
What is a mineral?	List five characteristics of minerals. Describe the processes that result in mineral formation. Identify the most common elements in Earth's crust. List the major groups of minerals.	3.1.7.C, 3.2.7.B/ **S8.A.3.3**
What are the properties of minerals and how are they used to identify minerals?	Define the terms luster, crystal form, streak, and Moh's scale. Explain why color is often not a useful property in identifying minerals. Distinguish between cleavage and fracture. Explain density and how it can be used to identify substances. Describe other properties that can be used to identify minerals. Discuss how minerals are used.	***3.4.7.A/*** **S8.C.1.1**

Hamburg Area School District
Course Plan
Grade 8 Science

Course Name: Earth and Space Science
Unit: Earth's Materials – Earth's Resources **Time Line: Two Weeks**

Essential Content/ Essential Questions	Performance Objectives	Standards/Anchors
What types of energy and mineral resources are available?	Distinguish between renewable and nonrenewable resources. Identify which energy resources are fossil fuels. Predict which energy resources might replace dwindling petroleum supplies in the future. Describe the processes that concentrate minerals into large deposits as they form. Recognize how nonmetallic mineral resources are used.	***3.2.7.C, 3.8.7.A, 3.8.7.B, 4.3.7.A/*** **S8.A.1.2** ***3.6.7.A, 4.4.7.A, 4.4.7.C, 4.5.7.C, 3.8.7.C/*** **S8.B.3.3** ***3.4.7.B, 4.2.7.B/*** **S8.C.2.2** ***3.5.7.B, 3.6.7.A, 4.2.7.C/*** **S8.D.1.2**
What types of alternate energy sources are available?	Evaluate the advantages of solar energy. Explain how nuclear power plants use nuclear fission to produce energy. Evaluate wind power's potential for providing energy in the future. Relate how hydroelectric power, geothermal energy, and tidal power contribute to our energy resources.	***3.2.7.C, 3.8.7.A, 3.8.7.B, 4.3.7.A/*** **S8.A.1.2** ***3.6.7.A, 4.4.7.A, 4.4.7.C, 4.5.7.C, 3.8.7.C/*** **S8.B.3.3** ***3.4.7.B, 4.2.7.B/*** **S8.C.2.2** ***3.5.7.B, 3.6.7.A, 4.2.7.C/*** **S8.D.1.2**
Why are water, air, and land vital resources?	Explain why fresh water is a vital resource. Recognize why the chemical composition of at the atmosphere is important. Identify Earth's important land resources.	***3.2.7.C, 3.8.7.A, 3.8.7.B, 4.3.7.A/*** **S8.A.1.2** ***3.6.7.A, 4.4.7.A, 4.4.7.C, 4.5.7.C, 3.8.7.C/*** **S8.B.3.3** ***3.4.7.B, 4.2.7.B/*** **S8.C.2.2** ***3.5.7.B, 3.6.7.A, 4.2.7.C/*** **S8.D.1.2**
How do we protect our resources?	Identify the first laws passed to deal with water pollution. Name the most important law passed to deal with air pollution. Explain what is involved in protecting land resources.	***3.2.7.C, 3.8.7.A, 3.8.7.B, 4.3.7.A/*** **S8.A.1.2** ***3.6.7.A, 4.4.7.A, 4.4.7.C, 4.5.7.C, 3.8.7.C/*** **S8.B.3.3** ***3.4.7.B, 4.2.7.B/*** **S8.C.2.2** 3.5.7.B, 3.6.7.A, 4.2.7.C/ S8.D.1.2

Hamburg Area School District
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Grade 8 Science

Course Name: Earth and Space Science
Unit: Inside Earth - Rocks **Time Line: Two Weeks**

Essential Content/ Essential Questions	Performance Objectives	Standards/Anchors
What is the rock cycle?	Define the term rock. Identify the three major types of rocks and explain how they differ. Describe the rock cycle. List the forces that power Earth's rock cycle.	***3.5.7.A, 4.4.7.B./*** **S8.D.1.1**
What is an igneous rock?	Compare and contrast intrusive and extrusive igneous rocks. Demonstrate how the rate of cooling affects an igneous rock's texture. Classify igneous rocks according to texture and composition.	***3.5.7.A, 4.4.7.B/*** **S8.D.1.1**
What is a sedimentary rock?	Describe the major processes involved in the formation of sedimentary rocks. Distinguish between clastic sedimentary rocks and chemical sedimentary rocks. Identify the features of sedimentary rocks.	***3.5.7.A, 4.4.7.B/*** **S8.D.1.1**
What is a metamorphic rock?	Compare and contrast the different types and causes of metamorphism. Explain how mineral and compositional changes occur during metamorphism (i.e. foliated and non-foliated)	***3.5.7.A, 4.4.7.B/*** **S8.D.1.1**

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Course Name: Earth and Space Science
Unit: Inside Earth – Plate Tectonics **Time Line: One Week**

Essential Content/ Essential Questions	Performance Objectives	Standards/Anchors
What is continental drift?	Describe and evaluate one piece of early evidence that led people to suggest the Earth's continents may have once been joined. Describe the hypothesis of continental drift. Explain why continental drift was not accepted when it was first proposed by Wegener.	***3.5.7.A, 4.4.7.B./*** **S8.D.1.1**
What is seafloor spreading?	Summarize the evidence that led to the discovery of seafloor spreading. Explain how paleomagnetism and magnetic reversals provide evidence that supports the theory of plate tectonics. Explain the process of seafloor spreading.	***3.5.7.A, 4.4.7.B./*** **S8.D.1.1**
What is the theory of plate tectonics?	Explain the theory of plate tectonics. Compare and contrast the three types of plate boundaries and features associated with each.	***3.5.7.A, 4.4.7.B./*** **S8.D.1.1**
What causes the motion of plate tectonics?	Explain the process of convection. Summarize how convection in the mantle is related to the movements of tectonic plates. Compare the mechanisms of slab-pull and ridge-push as contributing to plate motion.	***3.5.7.A, 4.4.7.B./*** **S8.D.1.1**

Hamburg Area School District
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Course Name: Earth and Space Science
Unit: Inside Earth – Volcanoes **Time Line: One Week**

Essential Content/ Essential Questions	Performance Objectives	Standards/Anchors
What is intrusive igneous activity?	Describe the origin of magma. Describe factors that affect the formation of magma. Compare and contrast different types of magma. Classify and describe intrusive igneous features.	***3.5.7.A, 4.4.7.B./*** **S8.D.1.1**
How do plate tectonics and igneous activity relate?	Explain the relationship between plate tectonics and volcanism. Explain the relationship between volcanism and hot spots.	***3.5.7.A, 4.4.7.B./*** **S8.D.1.1**
How do volcanoes work?	Describe the major parts of a volcano. Explain the factors that determine the type of volcanic eruptions that occur. Describe the various types of volcanic materials that are ejected from volcanoes. List the three main types of volcanoes.	***3.5.7.A, 4.4.7.B./*** **S8.D.1.1**

Hamburg Area School District
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Grade 8 Science

Course Name: Earth and Space Science
Unit: Inside Earth – Earthquakes **Time Line: One Week**

Essential Content/ Essential Questions	Performance Objectives	Standards/Anchors
What are the layers of the Earth?	List the layers of Earth based on composition and physical properties. Describe the composition of each layer of Earth. Explain how seismic waves have been used to determine the structure and composition of Earth's interior.	***3.5.7.A, 4.4.7.B./*** **S8.D.1.1**
What forces are within Earth?	Define stress and strain as they apply to rocks. Distinguish among the three types of faults. Compare and contrast the epicenter and focus of an earthquake. Identify the cause of earthquakes. Compare and contrast aftershocks and foreshocks.	***3.5.7.A, 4.4.7.B./*** **S8.D.1.1**
How are earthquakes measured and located?	Contrast three types of seismic waves. Describe how a seismometer works and how it measures earthquakes. Compare and contrast earthquake magnitude and intensity and the scales used to measure each. Explain why data from at least three seismic stations are needed to locate an earthquake's epicenter. Describe Earth's seismic belts.	***3.5.7.A, 4.4.7.B./*** **S8.D.1.1**
What type of destruction do earthquakes cause?	Describe the factors contributing to earthquakes damage. Identify other dangers associated with earthquakes. Explain the potential for earthquake prediction.	***3.5.7.A, 4.4.7.B./*** **S8.D.1.1**

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Grade 8 Science

Course Name: Earth and Space Science
Unit: Earth's Changing Surface – Weathering, Erosion, Deposition, and Soil Formation Time Line: Three Weeks

Essential Content/ Essential Questions	Performance Objectives	Standards/Anchors
What is weathering?	Define mechanical weathering. Explain chemical weathering. Identify the factors that affect the rate of weathering.	***3.5.7.A, 4.4.7.B/*** **S8.D.1.1**
What is erosion?	Analyze the impact on living and nonliving things on the processes of weathering and erosion. Describe the relationship of gravity to all agents of erosion.	***3.5.7.A, 4.4.7.B/*** **S8.D.1.1** ***3.6.7.A, 4.4.7.A, 4.4.7.C, 4.5.7.C, 3.8.7.C/*** **S8.B.3.3**
How does soil form?	Recognize the major components of soil and list the most important factors in soil formation. Explain how soil varies with depth. Compare and contrast the three common types of soil. Demonstrate how human activities affect the rate of soil erosion.	***3.5.7.A, 4.4.7.B/*** **S8.D.1.1**
What is a mass movement?	Define mass movement. Identify the factors that trigger mass movements. Classify mass movements.	***3.5.7.A, 4.4.7.B/*** **S8.D.1.1**

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Course Name: Earth and Space Science
Unit: Earth's Changing Surface – Geologic Time **Time Line: Two Weeks**

Essential Content/ Essential Questions	Performance Objectives	Standards/Anchors
How is Earth's history explained?	Explain how rocks allow geologists to interpret Earth's history. Recognize how uniformitarianism helps explain Earth's features. List the key principles of relative dating and describe how geologists use relative dating in their work. Describe the importance of unconformities in unraveling Earth's history.	***3.5.7.A, 4.4.7.B/*** **S8.D.1.1**
How do fossils represent evidence of past life?	Define fossils and explain how fossils are made. Identify the factors that determine if an organism will become a fossil. State the principle of fossil succession.	***3.5.7.A, 4.4.7.B/*** **S8.D.1.1**
What is radioactive dating?	Define radioactivity and half-life. Explain radiometric dating. Describe how carbon-14 is used in radiometric dating.	***3.5.7.A, 4.4.7.B/*** **S8.D.1.1**
What is the geologic time scale?	Describe the geologic time scale. Explain how the geologic time scale is organized. Identify some complications in dating rocks.	***3.5.7.A, 4.4.7.B/*** **S8.D.1.1**

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Course Name: Earth and Space Science
Unit: Earth's Waters – Running Water **Time Line: Two Weeks**

Essential Content/ Essential Questions	Performance Objectives	Standards/Anchors
How does running water function on Earth?	Explain how the water cycle circulates Earth's water supply in an unending cycle. Explain how the water cycle is kept in balance. Describe the ability of a stream to erode and transport material. Compare and contrast the changes in gradient and discharge between a stream's headwaters and mouth.	***3.5.7.D, 4.3.7.B, 4.1.7.A, 4.1.7.B, 4.1.7.C/*** **S8.D.1.3**
How do streams work?	Explain how streams erode their channels and transport sediments. Explain how stream deposition occurs. Identify the two general types of stream valleys. Predict the causes of floods and describe major flood control measures. Explain the relationship between streams and drainage basins.	***3.5.7.B, 3.6.7.A, 4.2.7.C/*** **S8.D.1.2** ***3.5.7.D, 4.3.7.B, 4.1.7.A, 4.1.7.B, 4.1.7.C/*** **S8.D.1.3**
What does water do beneath the surface of the Earth?	Describe the location and movement of groundwater. Describe the formation of a spring. Explain environmental threats to water supplies. Describe the formation of caverns. Describe landforms in karst areas.	***3.5.7.D, 4.3.7.B, 4.1.7.A, 4.1.7.B, 4.1.7.C/*** **S8.D.1.3**

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Course Name: Earth and Space Science
Unit: Weather and Climate – The Atmosphere **Time Line: Two Weeks**

Essential Content/ Essential Questions	Performance Objectives	Standards/Anchors
What are the characteristics of the atmosphere?	Describe the composition on the atmosphere. Compare and contrast the various layers of the atmosphere. Identify three methods of transferring energy throughout the atmosphere. Describe the various properties of the atmosphere and how they interact. Explain why atmospheric properties change with changes in altitude.	***3.4.7.B, 4.2.7.B/*** **S8.C.2.1** ***3.4.7.B, 4.2.7.B/*** **S8.C.2.2** ***3.5.7.C/*** **S8.D.2.1**
How does heating differences affect the atmosphere?	Explain how heat and temperature are related. Describe how the atmosphere is affected by heat transfer mechanisms. Compare and contrast the heating of land and water. List four mechanisms that cause air to rise. Compare and contrast movements of stable and unstable air. Describe the conditions in air that favor condensation of water.	***3.4.7.B, 4.2.7.B/*** **S8.C.2.1** ***3.4.7.B, 4.2.7.B/*** **S8.C.2.2** ***3.5.7.C/*** **S8.D.2.1**
What are the different cloud types and precipitation?	Explain how clouds are formed. Identify the basic characteristics of different cloud groups. Describe the water cycle. Explain what must happen for precipitation to form. Identify what controls the type of precipitation that reaches Earth's surface.	***3.4.7.B, 4.2.7.B/*** **S8.C.2.1** ***3.4.7.B, 4.2.7.B/*** **S8.C.2.2** ***3.5.7.C/*** **S8.D.2.1**

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Course Plan
Grade 8 Science

Course Name: Earth and Space Science
Unit: Weather and Climate – Weather Factors **Time Line: One Week**

Essential Content/ Essential Questions	Performance Objectives	Standards/Anchors
What is air pressure?	Describe how air pressure is exerted on objects. Explain how changes in air pressure affect the mercury column of a barometer. Identify the ultimate energy source for wind. Describe how the Coriolis effect influences freely moving objects.	***3.5.7.C/*** **S8.D.2.1**
How do pressure centers create wind?	Explain how winds blow around pressure centers in the Northern and Southern Hemispheres. Describe the air pressure patterns within cyclones and anticyclones. Explain how the unequal heating of Earth's surface affects the atmosphere.	***3.5.7.C/*** **S8.D.2.1**
What are the regional wind systems of the United States?	Identify the causes of local winds. Describe the general movement of weather in the United States. Compare and contrast weather patterns characteristic of El Nino and La Nina events.	***3.5.7.C/*** **S8.D.2.1**

Hamburg Area School District
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Grade 8 Science

Course Name: Earth and Space Science
Unit: Weather and Climate – Weather Patterns and Severe Storms **Time Line: One Week**

Essential Content/ Essential Questions	Performance Objectives	Standards/Anchors
What is an air mass?	Define air mass. Explain how air masses are classified. Explain the characteristic features of each air mass class. Explain the influence of continental polar and maritime tropical air masses on the majority of North America.	***3.5.7.C/*** **S8.D.2.1**
What is a front?	Describe the formation of a front. Differentiate among the formation of a warm front, cold front, stationary front, and occluded front. Describe the weather patterns associated with each type of front.	***3.5.7.C/*** **S8.D.2.1**
What is a severe storm?	Explain the formation of a thunderstorm. Describe the conditions needed for a tornado to form. Identify the conditions that must exist for a hurricane to form.	***3.5.7.C/*** **S8.D.2.1**

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Course Name: Earth and Space Science
Unit: Weather and Climate – Climate and Climate Changes **Time Line: One Week**

Essential Content/ Essential Questions	Performance Objectives	Standards/Anchors
What factors affect climate?	Describe how latitude affects climate. Describe how elevation and mountain ranges affect climate. Describe how large bodies of water affect climate. Describe how global winds affect climate. Describe how vegetation affects climate.	***3.5.7.C/*** **S8.D.2.1**
How are the World climates classified?	Explain the Koppen climate classification system. Describe humid tropical climates. Compare and contrast humid mid-latitude climates. List the characteristics of dry climates. List the characteristics of polar climates. Compare and contrast highland climates with nearby lowland climates.	***3.5.7.C/*** **S8.D.2.1**
What processes influence climate change?	Describe natural processes that can cause changes in climate. Explain the greenhouse effect. Define global warming. List some of the consequences of global warming.	***3.5.7.C/*** **S8.D.2.1**

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Course Name: Earth and Space Science
Unit: Astronomy – Earth, Moon, and Sun **Time Line: One Week**

Essential Content/ Essential Questions	Performance Objectives	Standards/Anchors
Who were the early astronomers?	Describe the contributions of ancient Greeks to astronomy. Compare and contrast the geocentric and heliocentric models of the solar system. Explain the contributions to astronomy of Copernicus, Brahe, Kepler Galileo, and Newton.	***3.4.7.D*/S8.D.3.1** ***3.1.7.A, 3.4.7.B, 4.3.7.C, 4.2.7.D, 4.6.7.A*/ S8.A.3.1**
How is the Earth, Moon, and Sun a system?	Describe the movements of Earth know as rotation, revolution, and precession. Explain how the moon goes through phases. Explain how eclipses occur. Describe how the physical features of the lunar surface were created. Explain the history of the moon.	***3.4.7.D*/S8.D.3.1** ***3.1.7.A, 3.4.7.B, 4.3.7.C, 4.2.7.D, 4.6.7.A*/ S8.A.3.1**

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Course Name: Earth and Space Science
Unit: Astronomy – Solar System **Time Line: One Week**

Essential Content/ Essential Questions	Performance Objectives	Standards/Anchors
What is the solar system?	List the major differences between the terrestrial and Jovian planets. Explain how the solar system formed.	***3.4.7.D*/S8.D.3.1** ***3.1.7.A, 3.4.7.B, 4.3.7.C, 4.2.7.D, 4.6.7.A*/ S8.A.3.1**
What are the terrestrial planets?	Describe the distinquishing characteristics of each terrestrial planet.	***3.4.7.D*/S8.D.3.1** ***3.1.7.A, 3.4.7.B, 4.3.7.C, 4.2.7.D, 4.6.7.A*/ S8.A.3.1**
What are the outer planets?	Describe the distinguishing characteristics of each Jovian planet.	***3.4.7.D*/S8.D.3.1** ***3.1.7.A, 3.4.7.B, 4.3.7.C, 4.2.7.D, 4.6.7.A*/ S8.A.3.1**
Who are the minor members of the solar system?	Identify the location within our solar system where most asteroids are found. Describe the structure of a comet. Explain the possible origins for a meteoroid.	***3.4.7.D*/S8.D.3.1** ***3.1.7.A, 3.4.7.B, 4.3.7.C, 4.2.7.D, 4.6.7.A*/ S8.A.3.1**

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Course Name: Earth and Space Science
Unit: Astronomy – Stars, Galaxies, and the Universe **Time Line: One Week**

Essential Content/ Essential Questions	Performance Objectives	Standards/Anchors
What are the properties of stars?	Describe what astronomers can learn by studying star properties. Explain how distance affects parallax. List the factors that determine a star's apparent magnitude. Describe the relationship shown on a Hertzprung-Russell diagram.	***3.4.7.D*/S8.D.3.1**
What are the stages of a star?	Identify which stage marks the birth of a star. Explain why all stars eventually die. List the stages of the sun's life cycle.	***3.4.7.D*/S8.D.3.1**
How large is the universe?	Describe the size and structure of the Milky Way Galaxy. List the ways in which galaxies differ from one another. Cite the evidence that indicates that the universe is expanding.	***3.4.7.D*/S8.D.3.1** ***3.1.7.A, 3.4.7.B, 4.3.7.C, 4.2.7.D, 4.6.7.A*/ S8.A.3.1**