Course Overview

GENERAL DESCRIPTION: The student will gain basic exposure to the subjects of energy, resources, ecology, physics and space science.

HOMEWORK OR READING NECESSARY: Some homework, outside reading, and sample collection is required.

FORMAT: Lecture, discussions, daily work, lab work, and research with varying combinations in format, depending upon the topic.

PROJECTS, REPORTS, PAPERS: Students will complete hands-on lab exercises and projects as directed.

TESTS: Periodic major tests, as well as other tests and quizzes. Good test preparation is needed.

Scope And Sequence

Timeframe	Unit	Instructional Topics
1 Week(s)	PS Unit 1: Introduction to Physical Sciences	An Introduction to Physical Science
3 Week(s)	PS Unit 2: Forces and Motion	Motion Forces and Motion
3 Week(s)	PS Unit 3: Energy	 Work, Power, and Machines Energy Thermal Energy and Heat
3 Week(s)	PS Unit 4: Waves	Mechanical Waves and Sound The Electromagnetic Spectrum and Light
2 Week(s)	PS Unit 5: Magnetism and Electricity	Electricity Magnestism
3 Week(s)	ES Unit 1 Part 1: Building Blocks	Introduction to Earth Science Minerals
3 Week(s)	ES Unit 1 Part 2: Building Blocks	Rocks Earth's Resources
3 Week(s)	ES Unit 2: Changing Earth's Surface	 Weathering, Soil, and Mass Movements Running Water and Groundwater Glaciers, Deserts, and Wind
4 Week(s)	ES Unit 3: Dynamic Planet	Earthquakes and Earth's Interior Plate Tectonics Volcanoes and Other Igneous Activity Mountain Building
3 Week(s)	ES Unit 4: Historical Geology	Geologic Time Earth's History
5 Week(s)	ES Unit 5: The Earth's Envelope of Air	
2 Week(s)	ES Unit 6: Our Place in Space	

Materials and Resources

Prentice Hall Physical Science Concepts in Action with Earth and Space Science

Prentice Hall Earth Science

Prerequisites

PREREQUISITE: None. Students may take concurrently with Biology, with teacher recommendation.

Course Details

Unit: PS Unit 1: Introduction to Physical Sciences

Duration: 1 Week(s)

Science

Grade(s) 9th - 12th, Duration 1 Year, 1 Credit Required Course

Unit Overview

Introduction to the skills needed to be proficient in science including the metric system, proper meausrement techniques, scientific method, and presenting scientific data. Student will also learn to utilize tables to organize data.

Materials and Resources

Prentice Hall Physical Science Concepts in Action Chapter 1

Academic Vocabulary

science, technology, chemistry, physics, geology, astronomy, biology, scientific method, observation, hypothesis, manipulated variable, responding variable, controlled experiment, scientific theory, scientific law, model, scientific notation, length, mass, volume, density, conversion factor, precision, significant figures, accuracy, thermometer, slope, direct proportion, inverse proportion

Summative Assessment

Various measurement activities completed within a certain level of accuracy.

Topic: An Introduction to Physical Science

Duration: 1 Week(s)

Topic Overview

Throughout this unit we will discuss the scientific process.

Learning Targets

What is Science?

Students will develop an understanding of the relationship between science and technology as well as describe the overlap within the branches of natural science.

Using a Scientific Approach

The scientific method will be investigated as well as the relationship between scientific theories and laws. The importance of models within science will assist in developing understanding.

Measurement

Students will learn to measure using the metric system as well as how to convert between the metric and English systems. Students will perform calculations necessary to complete the conversions.

Presenting Scientific Data

Students will learn how gathering data and analyzing data to show relationships are sometimes more useful when submitted in a graph or table format. Communicating data about determined relationships are an important part of the review process with peers.

Unit: PS Unit 2: Forces and Motion

Duration: 3 Week(s)

Unit Overview

Students will investigate the relationship between force, mass, and acceleration. Newton's 3 Laws of motion and inertia are introduced. Basic mathematic relationships are used but at this point the information presented deals more with an understanding of the relationship.

Materials and Resources

Prentice Hall Physical Science Concepts in Action Chapters 11 & 12

Academic Vocabulary

frame of reference, relative motion, distance, vector, resultant vector, speed, average speed, instantaneous speed, velocity, acceleration, free fall, constant acceleration, linear graph, nonlinear graph, force, newton, net force, friction, static friction, sliding friction, rolling friction, fluid friction, air resistance, gravity, terminal velocity, projectile motion, inertia, mass, weight, momentum, law of conservation of momentum, electromagnetic force, strong nuclear force, weak nuclear force, gravitational force, centripetal force

Summative Assessment

Laboratories and teacher created assessment.

Topic: Motion Duration: 5 Period(s)

Topic Overview

The relationships between distance, displacement, speed, velocity, and acceleration will be developed.

Learning Targets

Distance vs. Displacement

Students will develop an understanding that distance is a scalar and displacement is a vector quantity which requires distance and direction.

Speed vs. Velocity

Students will develop and understanding the speed and velocity are related. Speed is a scalar quantity and velocity is a vector quantity requiring information on how fast an object is moving as well as the direction of movement.

Acceleration

This learning target requires students to understand that acceleration is a vector quantity and that an object can accelerate by speeding up, slowing down, and/or change directions.

Science

Grade(s) 9th - 12th, Duration 1 Year, 1 Credit

Required Course **Duration:** 5 Period(s)

Duration: 3 Week(s)

Duration: 1 Week(s)

Topic: Forces and Motion

Topic Overview

What is a force and how does it relate to motion? We will discover this through the investigation of Newton's three laws of motion, momentum, and universal forces.

Learning Targets

Forces

What is a force and how is it measured in the SI system? Forces will be discussed in terms of how they relate to movement of objects and how friction can oppose that motion.

Newton's First and Second Laws of Motion

The relationship between intertia and Newton's First Law as well as the relationship between force, mass, and acceleration in Newton's Second Law.

Newton's Third Law of Motion and Momentum

Student will determine how action and reaction forces are related. Students will also determine the momentum of an object before and after a collision.

Universal Forces

There are four fundamental forces that we believe can be found throughout the universe. They are electromagnetic forces, strong nuclear force, weak nuclear force, and gravity.

Unit: PS Unit 3: Energy

Unit Overview

Students are introduced to information dealing with work, power, and energy.

Materials and Resources

Prentice Hall Physical Science Concepts in Action Chapters 14, 15, & 16

Academic Vocabulary

work, joule, power, watt, horsepower, machine, input force, input distance, work input, output force, output distance, work input, work output, mechanical advantage, actual mechanical advantage, ideal mechanical advantage, efficiency, lever, fulcrum, input arm, output arm, wheel and axle, inclined plane, wedge, screw, pulley, compound machine, energy, kinetic energy, potential energy, gravitational potential energy, elastic potential energy, mechanical energy, thermal energy, chemical energy, electrical energy, electromagnetic energy, nuclear energy, energy conversion, nonrenewable energy resources, fossil fuels, renewable energy resources, hydroelectric energy, solar energy, geothermal energy, biomass energy, hydrogen fuel cell, energy conservation, heat, temperature, absolute zero, thermal expansion, specific heat, calorimeter, conduction, thermal conductor, thermal insulator, convection, convection current, radiation, thermodynamics, heat engine, waste heat, external combustion engine, internal combustion, central heating system, heat pump, refrigerant

Summative Assessment

Laboratories and teacher created test.

Topic: Work, Power, and Machines

Topic Overview

Students will determine the relationship between work and power and how machines are able to change the force we are able to apply, change the direciton of the force, or change the distance over which the force is applied.

Learning Targets

Work and Power

Work is defined as a force acting over a distance and power is how fast you are able to complete the work.

Work and Machines

Students will discover how machines make work easier to accomplish by looking at the input and output of the machine.

Mechanical Advantage and Efficiency

The ideal and actual mechanical advantage to each machine will be different relating to the machines efficiency to do work.

Simple Machines

Simple machines are used in daily life to make work easier, but which machines are the most efficient?

Topic: Energy Duration: 1 Week(s)

Topic Overview

The different forms of energy will be investgated as well as energy conversions, conservation, and resources.

Learning Targets

Energy and Its Forms

Science

Grade(s) 9th - 12th, Duration 1 Year, 1 Credit Required Course

Duration: 1 Week(s)

The relationship between work and energy will be determined. The other major forms of energy will be discussed. These include kinetic, potential (gravitational and elastic), mechanical, thermal, chemical, electrical, electromagnetic, and nuclear energy.

Energy Conversion and Conservation

Energy cannot be created nor destroyed. It can be converted from one form to another. The Law of Conservation of Energy will be discussed in relationship to the transfer of energy between forms of energy.

Energy Resources

Students will discover benefits and drawbacks to renewable and nonrenewable resources and how to conserve our energy resources for future generations.

Topic: Thermal Energy and Heat

Topic Overview

Within this unit students will investigate the relationship between thermal energy, matter, heat, thermodynamics, and how heat can be used to do work.

Learning Targets

Thermal Energy and Matter

Students determine how heat and work transfer energy and how temperature and thermal energy are related.

Heat and Thermodynamics

The three modes of heat transfer (conduction, convection, and radiation) as well as the relationship to thermal conductors and insulators will be investigated. Students will also apply the law of conservation of energy, the second law of thermodynamics, and the third law of thermodynamics.

Unit: PS Unit 4: Waves Duration: 3 Week(s)

Unit Overview

Students will be introduced to information and materials related to mechanical waves, sound, light, and the electromagnetic spectrum.

Materials and Resources

Prentice Hall Physical Science Concepts in Action Chapters 17 & 18

Academic Vocabulary

mechanical wave, medium, cresst, trough, transverse wave, compression, rarefaction, longitudinal wave, surface wave, periodic motion, period, frequency, hertz, wavelength, amplitude, reflection, refraction, diffraction, interference, constructive interference, destructive interference, standing wave, node, antinode, sound waves, intensity, decibel, loudness, pitch, sonar, Dopler effect, resonance, electromagnetic waves, electric field, magnetic field, electromagnetic radiation, photoelectric effect, photons, intensity, electromagnetic spectrum, amplitude, modulation, frequency modulation, thermograms, transparent, translucent, opaque, image, regular reflection, diffuse reflection, mirage, polarized light, scattering, dispersion, primary colors, secondary color, complementary colors of light, complementary colors of pigments, luminous, incandescent, flurescence, phosphor, laser, coherent light

Summative Assessment

Laboratories and teacher created test.

Topic: Mechanical Waves and Sound

Topic Overview

Student will investigate mechanical waves, their properties, their behavior, and how it relates to sound and hearing.

Learning Targets

Mechanical Waves

Students will relate mechanical waves to energy using transverse, longitudinal, and surface waves. There will be activities to describe the way these waves move, how they are produced, and that they must have a medium to travel.

Properties of Mechanical Waves

Student will define frequency, period, wavelength, amplitude, and wave speed to describe the different types of waves. We will also solve equations relating wave speed to wavelength and frequency or period.

Behavior of Waves

Students will develop a rule during class that explains refraction of a wave when it passes from one medium to another by observing how relfection, refraction, diffraction, and interference influence waves. Students will also look at the factors that affect the amount of refraction, diffraction, and constructive and destructive interference.

Sound and Hearing

Students will describe the properties of sound and how sound is produced. Students will investigate how sounds waves behave in applications such as ultrasound, music, and doppler effect.

Duration: 4 Day(s)

Science

Grade(s) 9th - 12th, Duration 1 Year, 1 Credit Required Course

Duration: 5 Day(s)

Duration: 2 Week(s)

Topic: The Electromagnetic Spectrum and Light

Topic Overview

Students will investigate electromagnetic waves and their relationship to the electromagnetic spectrum, light, and color.

Learning Targets

Electromagnetic Waves

Students will describe the characteristics of EM waves in a vacuum including the wavelength, frequency, and speed. Students will investigate the dual nature of light and how the intensity of light changes with distance.

The Electromagnetic Spectrum

Students will rank and classify electromagnetic waves based on their frequencies and wavelengths and describe uses for the types of EM waves.

Behavior of Light

Students will describe what happens when light is reflected, refracted, polarized, scattered, or transmitted.

Colo

Students will investigate and be able to explain that white light disperses into different colors. They will also analyze what causes materials to be a certain color and distinguish primary, secondary, and complementary colors of light and pigments.

Sources of Light

Students will explain how light is produced by common sources of light and how the uses of different light sources can result in different uses, for example lasers moving information from one place to another.

Unit: PS Unit 5: Magnetism and Electricity

Unit Overview

Students will be introduced to materials covering information on magnetism including electromagnets and electricity including electrical circuits.

Materials and Resources

Prentice Hall Physical Science Concepts in Action Chapters 20 & 21

Academic Vocabulary

electric charge, electric force, electric field, static electricity, law of conservation of charge, induction, electric current, direct current, alternating current, electrical conductor and insulator, resistance, superconductor, potential difference, voltage, battery, Ohm's law, electric circuit, series circuit, parallell circuit, electric power, fuse, circuit breaker, grounding, electronics, electronic signal, semiconductor, diode, transistor, integrated circuit, computer, magnetic force, magnetic pole, magnetic field, magnetosphere, magnetic domain, ferrmagnetic material, electromagnetic force, solenoid, electromagnet, galvanometer, electric motor, electromagnetic induction, generator, transformer, turbine

Topic: Electricity Duration: 3 Day(s)

Topic Overview

Students will investigate the properties of electricity including charges, ohm's law, circuits, and electronic devices.

Learning Targets

Electric Charge and Static Electricity

Students will analyze the factors that affect the strength and direction of electric forces and fields.

Electric Current and Ohm's Law

Students will investigate how voltage produces electric current and how the current, resistance and voltage is used in Ohm's law to determine the law of conservation of charge.

Electric Circuits

Students will analyze circuit diagrams for series and parallel circuits. They will also describe devices and procedures for electrical safety.

Electronic Devices

Students will explain how electonics conveys information with analog or digital signals. They will also decribe and illustrate how solid state components and vacuum tubes control electon flow.

Topic: Magnestism Duration: 3 Day(s)

Topic Overview

Students will investigate magnets, magnetic fields, electromagnetsim, and how these relate to energy generation and transmission.

Learning Targets

Magnets and Magnetic Fields

Students will describe the effect of magnetic forces and magnetic fields and explain how magnetic poles determine the direction of magnetic force. They will also investigate Earth's own magnetic field.

Electromagnetism

Science

Grade(s) 9th - 12th, Duration 1 Year, 1 Credit Required Course

Duration: 3 Week(s)

Duration: 4 Day(s)

Students will describe how a moving elelctric charge creates a magnetic field and determine the direction of the magnetic field based on the type of charge and its direction of motion. Students will also describe factors that affect the field strength of solenoids and electromagnets.

Electical Energy Generation and Transmission

Students will describe how electric current is generated, how AC and DC generators work, and how electrical energy is produced, transmitted, and converted for use in the home.

Unit: ES Unit 1 Part 1: Building Blocks

Unit Overview

Students are introduced to the different areas of earth science, mapping, and the basic mineral groups.

Materials and Resources

Prentice Hall Earth Science Chapters 1 & 2

Academic Vocabulary

Earth science, geology, oceanography, meteorology, astronomy, hydrosphere, atmosphere, geosphere, biosphere, core, mantle, crust, latitude, longitude, topographic map, contour line, contour interval, system, hypothesis, theory, element, atomic number, energy level, isotope, mass number, compound, chemical bond, ion, ionic bond, covalent bond, metallic bond, mineral, silicate, silicon-oxygen tetrahedron, streak, luster, crystal form, hardness, Mohs scale, cleavage, fracture, density

Summative Assessment

Reading/producing topographic maps, mineral identification, and teacher created test.

Topic: Introduction to Earth Science

Topic Overview

Students will learn about the information we will cover in class in addition to learning about representing the Earth's surface through various mapping techniques.

Learning Targets

What is Earth Science?

Students will describe the formation of Earth and the solar system.

A View of Earth

Students will discover the four major spheres of Earth and differentiate among the three parts of the geosphere.

Representing Earth's Surface

Students will learn the advantages and disadvantages of different types of maps including topographic maps, topographic profiles, Mercator projection, conic projections, Robinson projection, and gnomic projection maps.

Earth System Science

Students will describe the two major sources of energy and how human affect Earth's systems.

Topic: Minerals Duration: 5 Day(s)

Topic Overview

Students will see how the three major types of chemical bonds are able to create the minerals we observe on the Earth's surface and which properties are useful in identification of those minerals.

Learning Targets

Matter

Students will explain how elements are related to minerals through the formation of compounds.

Minerals

Students will investigate how minerals are formed and five characteristics of minerals and describe how the minerals can be classified.

Properties of Minerals

Of the five characteristics students know about minerals they will determine which are most reliable in identifying minerals. They will also investigate each property in depth and look at examples of each property. Students will also explain the special properties associated with some minerals.

Unit: ES Unit 1 Part 2: Building Blocks

Duration: 3 Week(s)

Science

Grade(s) 9th - 12th, Duration 1 Year, 1 Credit Required Course

Unit Overview

Students are introduced to the 3 groups of rocks, the rock cycle, and Earth's resources.

Materials and Resources

Prentice Hall Earth Science Chapters 3 & 4

Academic Vocabulary

rock, igneous rock, sedimentary rock, metamorphic rock, rock cycle, magma, lava, weathering, sediments, intrusive igneous rock, extrusive igneous rock, porphyritic texture, granitic composition, basaltic composition, andesitic composition, ultramafic, erosion, deposition, compaction, cementation, clastic sedimentary rock, chemical sedimentary rock, metamorphism, contact metamorphism, regionals metamorphism, hydrothermal solution, foliated metamorphic rock, nonfoliated metamorphic rock, renewable resources, nonrenewable resource, fossil fuel, hydroelectric power, geothermal energy, point source pollution, nonpoint source pollution, runoff, global warming, conservation, compost, recycling

Summative Assessment

Laboratories and teacher created test.

Topic: Rocks Duration: 5 Day(s)

Topic Overview

Students will investigate the three main types of rocks. They will compare and contrast their formation, and how they all fit into the rock cycle.

Learning Targets

The Rock Cycle

Students will describe the rock cycle and how each of the three types of rocks are different from each other.

Igneous Rocks

Students will compare and contrast intrusive and extrusive igneous rocks in terms of cooling location, time, and texture.

Sedimentary Rocks

Students will describe the major processes involved in the formation of sedimentary rocks and distinguish between clastic and chemical sedimentary rocks.

Metamorphic Rocks

Students will identify the three agents of metamorphism and explain what changes they cause.

Topic: Earth's Resources

Duration: 4 Day(s)

Topic Overview

Students will investigate energy and mineral resources, alternate energy resources, and protecting our resources.

Learning Targets

Energy and Mineral Resources

Students will be able to distinguish between renewable and nonrewnewable resources and how they are utilized in our society.

Alternate Energy Sources

Students will evaluate the advantages and disadvantages of alternate energy resources such as solar, wind, nuclear, etc.

Water, Air, and Land Resources

Students will recognize why fresh water is a vital resource, why the chemical composition of the atmosphere is important, as well as land as a resource.

Protecting Resources

Students will learn about the important laws passed to protect our water and air resources.

Unit: ES Unit 2: Changing Earth's Surface

Duration: 3 Week(s)

Science

Grade(s) 9th - 12th, Duration 1 Year, 1 Credit Required Course

Duration: 3 Day(s)

Duration: 3 Day(s)

Duration: 3 Day(s)

Unit Overview

Students are introduced to weathering, soil, and mass movements. Information dealing with running water, deserts, and glaciers will be covered.

Materials and Resources

Prentice Hall Earth Science Chapters 5, 6, & 7

Academic Vocabulary

mechanical weathering, frost wedging, talus, exfoliation, chemical weathering, regolith, soil, soil horizon, pedlafer, pedocal, laterite, mass movement, rockfall, rockslide, slump, mudflow, earthflow, creep, water cycle, infiltration, transpiration, gradient, stream channel, discharge, tributary, meaner, bed load, capacity, delta, natural levee, floodplain, flood, drainage basin, divide, zone of saturation, groundwater, water table, porosity, permeability, aquifer, spring, geyser, well, artesian well, cavern, travertine, karst topography, sinkhole, ice age, glacier, snowline, valley glacier, ice sheet, glacial trough, till, stratified drift, moraine, alluvial fan, playa lake, deflation, desert pavement, loess, dune

Summative Assessment

Laboratories and teacher created test.

Topic: Weathering, Soil, and Mass Movements

Topic Overview

Students will investigate mechanical and chemical weathering effect on the Earth's surface and the relationship to soil and mass movements.

Learning Targets

Weathering

Students will explain mechanical and chemical weathering and the factors that affect the rate of weathering.

Soil

Students will recognize the major components of soil and list the most important factors in soil formation.

Mass Movements

Students will identify factors that trigger mass movements.

Topic: Running Water and Groundwater

Topic Overview

Students will investigate how water changes the surface of the Earth and how it moves underground.

Learning Targets

Running Water

Students will explain the water cycle and how water circulates through each area. They will also explain how balance is kept in the water cycle.

The Work of Streams

Students will explain how streams erode their channels, stream deposition, and the relationship between streams and drainage basins.

Water Beneath the Surface

Students will describe the location and movement of groundwater.

Topic: Glaciers, Deserts, and Wind

Topic Overview

Students will investigate the various features formed from glaciers, deserts, and wind.

Learning Targets

Glaciers

Students will explain different types of glaciers, how glaciers move and describe the different types of glacial drift.

Deserts

Students will explain the roles of mechanical and chemical weathering in the formation of deserts and how running water affects these areas.

Landscapes Shaped by Wind

Students will identify types of landforms that are deposited by the wind.

Unit: ES Unit 3: Dynamic Planet

Duration: 4 Week(s)

Science

Grade(s) 9th - 12th, Duration 1 Year, 1 Credit Required Course

Duration: 3 Day(s)

Duration: 3 Day(s)

Duration: 3 Week(s)

Unit Overview

Students are introduced to topics including earthquakes, earth's interior, plate tectonics, volcanoes, and mountain building.

Materials and Resources

Prentice Hall Earth Science Chapters 8, 9, 10, & 11

Topic: Earthquakes and Earth's Interior

Topic Overview

Students will begin investigating earthquakes and how they have lead to the current understanding of the earth's interior.

Learning Targets

What is an Earthquake?

Students will identify the cause of earthquakes and determine the epicenter and focus of the quake.

Measuring Earthquakes

Students will explain how to locate the epicetner of an earthquake using seismic waves.

Destruction from Earthquakes

Students will describe factors that contribute to earthquake damage and identify dangers associated with earthquakes.

Earth's Layered Structure

Students will list the layers of Earth based on composition and physical properties. They will also understand that this information results from the information gathered from earthquake wave data.

Topic: Plate Tectonics Duration: 3 Day(s)

Topic Overview

Students will investigate plate tectonics from the beginning idea of continental drift and then explore more information about the interactions at plate boundaries.

Topic: Volcanoes and Other Igneous Activity

Topic Overview

Students will describe the different types of volcanic materials ejected from volcanoes in addition to intrusive igneous activities and their results.

Topic: Mountain Building Duration: 3 Day(s)

Topic Overview

Students will learn about rock deformation and identify how mountains are classified based on their formation.

Unit: ES Unit 4: Historical Geology

Unit Overview

The general topics in this unit include geologic time and Earth History.

Materials and Resources

Prentice Hall Earth Science Chapters 12 & 13

Topic: Geologic Time Duration: 5 Day(s)

Topic Overview

Students will be introduced to geologic history and how rocks allow geologists to interpret Earth's history.

Topic: Earth's History Duration: 4 Day(s)

Topic Overview

Earth's history is broken down into the Precambrian, Paleozoic, Mesozoic, and Cenozoic eras to help students identify differences in plant and animal life during each time era.

Unit: ES Unit 5: The Earth's Envelope of Air

Duration: 5 Week(s)

Science

Grade(s) 9th - 12th, Duration 1 Year, 1 Credit Required Course

Unit Overview

This unit is split into two sections. Part 1 will focus on the basic structure of the atmosphere and how moisture within the atmosphere contributes to clouds and precipitation. Part 2 will focus more on how changes in the atmosphere contribue to pressure differences, wind, weather patterns, and global climates.

Materials and Resources

Prentice Hall Earth Science Chapters 17, 18, 19, 20, & 21

Topic: Duration:

Unit: ES Unit 6: Our Place in Space

Duration: 2 Week(s)

Unit Overview

During this unit we will delve into the origin of astronomy and look at how this science has evolved from the beginnings of human . We will also take a tour of our solar system and how our solar system fits into the universe.

Materials and Resources

Prentice Hall Earth Science Chapters 22 & 23

Topic: Duration: