Grade: 9th Grade
Course: Physics/Earth Science
Discipline: Science

Additional Course Information:

Course Description

1 credit. Required.

Objectives:

Unit

01 Physics

Local Objective

Describe how gravity, as an attractive force, is affected between two objects, when the mass and distance change.

Learning Target 1: Describe the attraction between objects, using the force of gravity.

Learning Target 2: Compare the gravitational forces between two objects with different masses and distances between them.

Vocabulary Words
gravity
mass

Unit

02 Physics

Local Objective

Analyze how mass and weight is affected when gravity changes, and **explain** that all falling objects accelerate at the same rate, regardless of mass.

Learning Target 1: Compare and contrast mass and weight.

Learning Target 2: Predict the acceleration of two objects of different mass, in free fall, and explain the results, using the Law of Gravity

Learning Target 3: Demonstrate how mass, volume, shape and material type affect the rate of fall of an object

Vocabulary Words
weight
free-fall

Unit

03 Physics

Local Objective

Compare and Contrast the forces acting on an object and the resulting motion: centripetal force, projectile motion, circular motion.

Learning Target 1: Analyze the motion of an object, depending on the type of force, the direction, and the magnitude in Newtons (ie. friction and balanced and unbalanced forces)

Learning Target 2: Compare and contrast circular motion and projectile motion and explain the forces causing this motion.

Vocabulary Words
centripetal force
projectile motion
circular motion

Unit

04 Physics

Local Objective

Measure, calculate, graph, and explain the motion of an object, in terms of speed, velocity and acceleration. (DOK 3)

Learning Target 1: Calculate speed and acceleration, and label answers correctly with correct units.

Learning Target 2: Graph the motion of an object, using distance and time, speed and acceleration.

Learning Target 3: Differentiate between graphs showing speed and acceleration, and be able to explain your answer.

Vocabulary Words
velocity
acceleration

Unit

05 Physics

Local Objective

Students will apply Newton's Laws of Motion to objects at rest and in motion.
Learning Target 1: Define inertia and relate the inertia of an object to the object's mass.

Learning Target 2: Apply mass and inertia to Newton's 1st Law of Motion.

Learning Target 3: Calculate force, given mass and acceleration.

Learning Target 4: Using Newton's 2nd Law, analyze the relationship between force, mass, and acceleration, and predict what will happen if one of the variables change.

Learning Target 5: Describe the magnitude and direction of action/reaction forces.

Learning Target 6: Using Newton's 3rd Law, predict the motion of an object when it is acted upon by the equal and opposite force of another object.

Vocabulary Words

inertia

Unit

06 Physics

Local Objective

Compare the momentum of two objects with regard to the Law of Conservation of Momentum.

Learning Target 1: Compare the momentum of two objects, with different mass and velocities.

Learning Target 2: Interpret the Law of Conservation of Momentum with regard to a collision.

Vocabulary Words

Law of Conservation of Momentum

Unit

07 Physics

Local Objective

Compare the efficiency of simple machines, in terms of work input and work output and power, and **describe** how efficiency is affected by friction.

Learning Target 1: Given a variety of simple machines, students will describe the work input and work output of each.

Learning Target 2: Analyze how power can be increased or decreased on a simple machine, in terms of work and time.

Learning Target 3: Explain how the net force applied to an object affects the distance the object moves, and the amount of work done.

Learning Target 4: Outline the effect of friction on energy as it changes to heat energy.

Vocabulary Words

work input

work output

efficiency

Unit

08 Physics

Local Objective

Classify and explain the different forms of energy, given a scenario, and **label** the examples of conductors and insulators, and **explain** how they relate to the Law of Conservation of Energy.

Learning Target 1: Compare chemical, nuclear, thermal, mechanical, and electromagnetic energy, and describe the sources of that energy and the common uses.

Learning Target 2: Compare and Contrast heat energy, temperature and thermal energy.

Learning Target 3: Identify and explain examples and differences of conductors and insulators

Learning Target 4: Outline the Law of Conservation of Energy as it applies to a scenario.

Vocabulary Words

insulator

conductor

Law of Conservation of Energy

Unit

09 Physics

Local Objective

Relate potential and kinetic energy to objectives at rest and motion, in regard to mass, velocity, weight, height, and the Law of Conservation of Energy.

Learning Target 1: Distinguish between objects with kinetic energy and potential energy and the types of potential energy (gravitational or elastic).

Learning Target 2: Calculate kinetic energy of an object, in regard to its mass and velocity, and explain what happens to the energy when the mass and velocity change.

Learning Target 3: Calculate the potential energy of an object, in regard to its height and mass, and explain what happens to the energy when the height and mass change.

Learning Target 4: Identify places where energy changes from potential to kinetic or vise versa in a diagram, and explain what is happening.

Vocabulary Words

kinetic energy

potential energy

Unit

10 Physics

Local Objective

Predict the effects of an electromagnetic force on the motion of objects and explain how electrical currents can be produced by

magnetic fields.

Learning Target 1: Explain the relationship between electricity and magnetism.

Learning Target 2: Predict what will happen to a charged particle's motion when it moves through a magnetic field.

Vocabulary Words

magnetic field

Unit

11 Physics

Local Objective

Describe the relationship among wavelength, energy and frequency in the electromagnetic spectrum and how it relates to living organisms.

Learning Target 1: Describe how wavelength and frequency change as energy increases or decreases on the electromagnetic spectrum.

Learning Target 2: Outline the dangers and uses of the various radiations on the electromagnetic spectrum and compare how each of the radiations travel through space.

Learning Target 3: Identify the sources of electromagnetic energy from space.

Vocabulary Words

frequency

wavelength
Unit

12 Physics

Local Objective

Describe how humans use various renewable and nonrenewable energy sources to benefit human life, and evaluate the advantages and disadvantages of each energy source.

Learning Target 1: Compare and contrast renewable and non-renewable energy.

Learning Target 2: Evaluate the advantages and disadvantages of all the various renewable and non-renewable energy sources.

Learning Target 3: Explain and give examples of how heat can be transferred through conduction and convection.

Vocabulary Words

donduction

convection
Unit

Earth Science 07

Local Objective

Apply the positions and motions of our solar system and the universe to units of time, phases of the moon, and eclipses, and explain how the electromagnetic spectrum and various tools can be used to determine motion of celestial bodies and gather information about the universe.

Learning Target 1: Explain what kind of galaxy the Milky Way is and its position in relation to the rest of the universe.

Learning Target 2: Compare and contrast the different tools used to gather information about the universe.

Learning Target 3: Explain the information that the electromagnetic spectrum gives us about the universe.

Learning Target 4: Explain how the motion of the planets and their position in the Solar System causes days, months, and years and moon rise/set times, phases, and eclipses.

Unit

Earth Science 08

Local Objective

Support the fact that the Earth rotates on its axis and revolves around the sun, using seasonal phenomena, tides, and gravitational forces as evidence.

Learning Target 1: Give data to show how Earth's rotation/tilt and revolution causes weather, length of day, temperature, and intensity of sunlight.

Learning Target 2: Explain what causes orbital motions, and height and frequency of tides.

Vocabulary Words

rotation

revolution

Unit

Earth Science 09

Local Objective

Using factors needed to support life, **debate** the possibility of life on other planets, comparing Earth's environmental characteristics to other planets.

(discuss atmosphere, temperature, orbital path, magnetic field, mass-gravity, and location in solar system. Video Savage Sun)

Unit

Earth Science 01

Local Objective

Outline the processes involved in the Theory of Plate Tectonics (uneven heating of the mantle, convection currents, and movement of crustal plates), and **describe** evidence from relative and real dating techniques that support that theory.

Learning Target 1: Explain how convection currents cause movement of crustal plates.

Learning Target 2: Explain how the densities of materials in continental and oceanic plates result in each type of plate boundaries.

Learning Target 3: Explain how crustal plate movements can cause earthquakes, sea floor spreading, mountains, and volcanic eruptions.

Learning Target 4: Interpret data from various dating techniques to analyze geologic history.

Learning Target 5: Explain how the energy from an earthquake provides evidence for the layers of the geosphere.

Vocabulary Words

radioactive decay

density

geosphere

Unit

Earth Science 02

Local Objective

Given a scenario, explain and give examples of evidence that shows how human activity and natural phenomena cause changes in the Earth's climate, natural resources, and atmosphere, hydrosphere, and geosphere (using an example of an earthquake scenario).

Learning Target 1: Create and defend a theory of climate change due to natural phenomena and/or human activity.

Learning Target 2: Predict the chain reaction that will occur when humans have a negative effect on the composition of the atmosphere, hydrosphere, or geosphere.

Vocabulary Words

climate

atmosphere

hydrosphere

Unit

Earth Science 06

Local Objective

Analyze the uses of various Missouri mineral resources, such as lead mining, gravel dredging, strip mining, coal burning, and the production of fertilizers and explosives, and describe how Missouri soil and rock materials, and availability of water, affect human populations and development of land use.

Learning Target 1: Analyze how types of soil and rock (limestone, granite, clay, loam) and land formations (caves, glaciated plains, river channels) affects land use.

Learning Target 2: Explain why there is a limited amount of fresh water and mineral resources in the United States.

Learning Target 3: Analyze the economic, political, social, and ethical limitations of gathering and using natural resources.

Learning Target 4: Discuss the impact of the selling of Diamonds in the United States and wars in other countries.

Vocabulary Words

lead mining

gravel dredging

strip mining

loam

Unit

Earth Science 03

Local Objective

Analyze and give examples of the external processes that affect the Earth's topography (weathering, erosion, deposition, slope, run-off, rock/soil types).

Learning Target 1: Explain and give examples of roles water plays as a solvent in the environment.

Learning Target 2: Analyze the effect of weathering, erosion, and deposition of sediment on Earth's features.

Vocabulary Words

weathering

erosion

deposition

solvent

Unit

Earth Science 04

Local Objective

Analyze the effect of changing temperature, and composition of gases, in each layer of the atmosphere, including the ozone layer, on cloud formation and transmission of radiation.

Learning Target 1: Cite evidence of what causes cloud formation.

Learning Target 2: Label and describe the effects of radiation in the troposphere, stratosphere, and the ionosphere.

Learning Target 3: Interpret the causes and effects of changes in the ozone layer.

Vocabulary Words

troposphere

stratosphere

ionosphere

Unit

Earth Science 05

Local Objective

Explain how global winds and ocean currents are produced, what factors cause changes in then, and how they affect weather phenomena and regional climates.

Learning Target 1: Explain how global wind and ocean currents are produced on Earth's surface.

Learning Target 2: Predict weather at a given location using weather maps and weather data.

Learning Target 3: Explain how large bodies of water, ocean/ice currents, location, wind currents, and solar radiation affect climate and weather patterns.

Learning Target 4: Describe how natural phenomena (e.g., burning organic material, volcanic eruptions, lightning, changes in global wind and ocean currents) affect the atmosphere.