

Glenwood Community High School
Physics Curriculum Grades: 9th - 12th
Date Approved - June 2022

Course Purpose: Students will learn to apply the concepts of forces and motion, conservation of energy, and interaction of energy and matter. Demonstration of this learning will occur through experimentation, problem solving investigations, presentations, and projects. This course will also focus on exploring the relationship between science and mathematics, engineering, and technology.

Course Outcomes	Outcome Components	Description
HS.PH.1	The student will analyze linear motion, projectile motion and freefall of objects.	
	HS.PH.1.1	Calculate resultant vectors by using graphical and mathematical methods (right triangle trigonometry) to describe the motion of an object.
	HS.PH.1.2	Compare and contrast graphical representations to describe the motion of accelerated and non-accelerated objects.
	HS.PH.1.3	Analyze collected data to explain the relationship between a position and velocity time graph.
	HS.PH.1.4	Solve for displacement, velocity, and time when acceleration is constant, using kinematic equations, using collected data.
	HS.PH.1.5	Define the state of freefall and the value of the acceleration due to gravity.
	HS.PH.1.6	Apply the kinematic equations to solve problems involving projectile motion.
HS.PH.2	The student will explain how Newton's Laws of Motion affect the motion of macroscopic objects.	
	HS.PH.2.1	Explain and use the relationship between Net Force, Mass, and Acceleration to describe the motion of macroscopic objects.
	HS.PH.2.2	Apply Newton's first law of motion to a scenario description.
	HS.PH.2.3	Calculate for an unknown value using collected data and Newton's second law of motion.
	HS.PH.2.4	Identify pairs of forces using Newton's third law of motion.
	HS.PH.2.5	Analyze a real world situation using Newton's laws of motion to explain the motion of an object.
HS.PH.3	Students will analyze the law of conservation of momentum.	
	HS.PH.3.1	Explain the relationship between force, mass, and momentum using collected data.
	HS.PH.3.2	Calculate for unknowns using the law of conservation of momentum.
	HS.PH.3.3	Compare and contrast an elastic and an inelastic collision.
	HS.PH.3.4	Explain how impulse is related to momentum.

HS.PH.4	Students will connect the concepts of energy, work, and power to explain the overall motion of an object in a system.	
	HS.PH.4.1	Analyze situations where various types of energy are present: gravitational potential, elastic potential, kinetic, and thermal energy
	HS.PH.4.2	Apply the law of conservation of energy to calculate unknowns in a system.
	HS.PH.4.3	Identify how energy can be converted from one form to another.
	HS.PH.4.4	Use data to calculate the change in kinetic energy due to a collision.
	HS.PH.4.5	Explain the flow of thermal energy within a closed system using collected data.
	HS.PH.4.6	Calculate the relationship between work done on, the energy of the object or system, and the power used by an object or system, using collected data.
HS.PH.5	The student will explain circular motion of objects.	
	HS.PH.5.1	Analyze and interpret uniform circular motion to explain centripetal force.
	HS.PH.5.2	Explain the properties of torque and how they can be manipulated for mechanical advantage.
	HS.PH.5.3	Calculate the angular momentum of a rotating object using collected data.
	HS.PH.5.4	Calculate the force of gravity acting on non Earth system objects.
	HS.PH.5.5	Compare Newton's Law of Gravitation to Kepler's Laws of Planetary Motion.
HS.PH.6	The student will analyze how waves transfer energy and can be manipulated.	
	HS.PH.6.1	Describe the measurable properties of waves such as frequency, wavelength, amplitude, and period through the use of models and calculations.
	HS.PH.6.2	Compare and contrast wave speeds through different mediums using collected data.
	HS.PH.6.3	Develop a model to demonstrate how sound waves are produced by resonance in both open and closed pipes.
	HS.PH.6.4	Calculate and explain the relationships between frequency, wavelength and energy of an electromagnetic wave/particle, using collected data.
	HS.PH.6.5	Apply the doppler effect to calculate unknowns and explain various phenomena.
	HS.PH.6.6	Explain how various lenses form images.
	HS.PH.6.7	Explain the properties of diffraction, refraction, and reflection.
HS.PH.7	The student will explain how two objects interact through changes to forces and energy within electric and magnetic fields.	
	HS.PH.7.1	Explain the concept of electric field, using a model.
	HS.PH.7.2	Calculate the magnitude and direction of the electric force on a charged particle in an electric field.

	HS.PH.7.3	Compare and contrast gravitational fields, electric fields and magnetic fields.
	HS.PH.7.4	Explain how electric current and magnets exert forces on each other, using collected data.
	HS.PH.7.5	Solve problems involving moving charges, and current carrying wires in the presence of magnetic fields.
HS.PH.8	The student will analyze the relationships between voltage, resistance, and current in both series, parallel and mixed circuits.	
	HS.PH.8.1	Describe the basic properties of an electric current through the use of a model.
	HS.PH.8.2	Calculate resistance, current, and potential difference, by applying Ohm's Law to collected data.
	HS.PH.8.3	Determine factors affecting resistance in a wire, using collected data.
	HS.PH.8.4	Interpret circuit diagrams.
	HS.PH.8.5	Calculate the equivalent resistance for a circuit of resistors and capacitors in series, parallel; and mixed circuits, using collected data.