

Subject: Physics Grade Level: 11/12	NJSL Standards (NGSS)	NJ Model Curriculum Unit	Essential Questions	Content	Skills	Essential Vocabulary
September @16 days	<p>HS-PS2-1.- Analyze data to support the claim that Newton’s second law</p> <p>HS-PS2-2.- Use mathematical representations to support the claim that the total momentum of a system of objects is conserved (note: P is used more extensively after force)</p> <p>HS-ETS1.B: Both physical models and computers can be used in various ways to aid in the engineering design process.</p>	Unit 1- Force and Motion	<p>How can one explain & predict interactions b/t objects & within systems of objects.</p> <p>How can physical relations be represented mathematically with proper notation and units?</p> <p>How can an object’s position be properly described as a function of time?</p>	<p>Determining position of an object with constant acceleration as a function of time.</p> <p>Deconstructing & reconstructing the vertical and horizontal components of 2-D vectors.</p>	Given a graph of position or velocity as a function of time, recognize in what time intervals the position, velocity and acceleration of an object are positive, negative, or zero and sketch a graph of each quantity as a function of time.	<p>Names for metric units and prefixes milli & kilo.</p> <p>Velocity, position, acceleration,</p> <p>Vector, direction, scalar, magnitude</p>
October @ 20 days	<p>HS-PS2-1.- Analyze data to support the claim that Newton’s second law</p> <p>HS-PS2-2.- Use mathematical representations to support the claim that the total momentum of a system of objects is</p>	Unit 1- Force and Motion Unit 2-Fundamental Forces	<p>How can physical relations be represented mathematically with proper notation and units?</p> <p>How does the net force of an object affect the change in the object’s velocity</p>	<p>Determining the acceleration and position of a function based on net force.</p> <p>Determining the net force on an object by looking at angle of forces and nature of forces(frictional,</p>	<p>Represent forces in diagrams mathematically using appropriate labelled vectors with direction and units during the analysis of a situation.</p> <p>Analyze data to support the claim that Newton’s second</p>	Force and related terms (kinetic, static, frictional, gravitational)

	<p>conserved</p> <p>HS-PS2-3.-Apply scientific and engineering ideas to design, evaluate, and refine a device that minimizes the force on a macroscopic object during a collision.</p> <p>HS-ETS1.B: Both physical models and computers can be used in various ways to aid in the engineering design process.</p>		for a given mass?	gravitational,etc.)	law of motion describes the mathematical relationship among the net force on a macroscopic object, its mass, and its acceleration.	
<p>November</p> <p>@17 days</p> <p>**4 of these days are ½ days</p>	<p>HS-PS2-2.- Use mathematical representations to support the claim that the total momentum of a system of objects is conserved when there is no net force on the system.</p> <p>HS-PS2-3.-Apply scientific and engineering ideas to design, evaluate, and refine a device that minimizes the force on a macroscopic object during a collision.</p>	Unit 1- Force and Motion (focus on momentum component)	How does the property of momentum affect an object during elastic and inelastic collisions?	Using conditions from the initial state to determine the final state through properties of conservation of momentum.	Determining the initial and final states of objects that go through inelastic and elastic collisions.	Closed system, elastic momentum, inelastic momentum, impact,

<p>December</p> <p>@16 days ** 1 of these days are ½ days</p>	<p>HS-PS3-2- Develop and use models to illustrate that energy at the macroscopic scale</p> <p>HS-PS3-1- Create a computational model to calculate the change in the energy of one component in a system when the change in energy of the other component(s) and energy flows in and out of the system are known.</p> <p>HS-PS3-3_Design, build, and refine a device that works within given constraints to convert one form of energy into another form of energy.</p>	<p>Unit 4-Energy</p>	<p>How does energy manifest in different forms (i.e. kinetic, potential) while preserving conservation?</p> <p>How does doing work upon an object in a closed system affect the potential energy of the system?</p>	<p>Conservation of potential and kinetic energy in a closed system.</p> <p>Understanding doing work on a system as a means of adding energy into a system.</p>	<p>·Understand energy as a quantitative property.</p> <p>Using properties of conservation of energy to show how energy transforms between potential and kinetic energies and use these conversions to determine properties of the final state. ·</p>	<p>Kinetic Energy, Potential Energy, Work,</p>

January @21 days	HS-ESS1-4 Use mathematical or computational representations to predict the motion of orbiting objects in the solar system	Unit 2: Fundamental Forces Unit 3: Kepler's Laws	How does Newton's Law of Universal Gravity relate the attractive force of two bodies based on their masses and their relative distances to each other? How are the planets able to remain in orbit while constantly changing direction?	Knowing Kepler's 3 Laws of Orbiting Bodies and how they are consistent with the principles of angular momentum and Newton's Law of Universal Gravity.	Using Universal Gravitation to determine the gravitation field and show that acceleration is true for all objects. Determining the motion of the planets based on conservation of energy and conservation of angular momentum.	Universal Gravity Conservation of Angular Momentum Centripetal Force
Subject: Grade Level:	NJSLS Standards (NGSS)	NJ Model Curriculum Unit	Essential Questions	Content	Skills	Essential Vocabulary
February @19 days ** 3 of these days are ½ days	HS-PS4-1 Use mathematical representations to support a claim regarding relationships among the frequency, wavelength, and speed of the waves traveling in different mediums.	Unit 6: Wave Properties	How are waves used to transfer energy and send and store information? How are the properties of waves affected by the relative velocity of the observer?	The wavelength and frequency of a wave related to one another by the speed of travel of the wave, which depends on the type of wave and the medium through which it is passing. Empirical evidence is required to differentiate between cause and correlation and to make a claim regarding	Use mathematical representations to support a claim regarding relationships among the frequency, wavelength, and speed of waves traveling through various mediums. Use algebraic relationships to quantitatively describe relationships among the frequency,	Electromagnetic radiation Frequency Wavelength Doppler shifting Medium

				relationships among frequency, wavelength, and speed of waves traveling through different mediums.	wavelength, and speed of the waves traveling in various media.	
March and April @36 days	<p>HS-PS4-3 Evaluate the reasoning whether electromagnetic radiation supports both the wave and particle model.</p> <p>HS-PS4-4 Evaluate the validity of claims of the effects of materials that absorb different wavelengths</p> <p>HS-ETS1-1 Analyze a major global challenge and specify criteria and constraints for a solution.</p>	Unit 7: Electromagnetic Radiation	<p>How can electromagnetic radiation be both a wave and a particle at the same time?</p> <p>How can the benefits and drawbacks of solar panels be evaluated by the public?</p> <p>How do astronauts communicate with people on the ground?</p>	<p>Electromagnetic radiation can be modeled as a wave of changing electrical and magnetic fields or as particles called photons.</p> <p>A wave model or a particle model of EM radiation have been verified by the scientific community.</p> <p>When EM waves of short wavelength are absorbed by matter, they result in absorption of heat. When matter absorbs light of smaller wavelengths, it can ionize atoms and cause damage to living cells.</p>	<p>Evaluate the claims, evidence, and reasoning of the wave-particle nature of light.</p> <p>Evaluate the validity and reliability of claims in published materials about the effects that different frequencies of radiation have when absorbed by matter.</p>	<p>Electromagnetic radiation</p> <p>Wave-particle duality</p> <p>Constructive and destructive interference</p> <p>Ionization</p>
May @22 days	HS-PS2-5 Plan and conduct an investigation to provide evidence that an electric	Unit 8: Electricity and Magnetism	What are the relationships between electric currents and magnetic fields?	Forces at a distance are explained by fields (gravity, electric, & magnetic) that can	Plan and conduct an investigation to produce data that can serve as the basis for evidence	<p>Electric Field</p> <p>Magnetic field</p> <p>Current</p>

	<p>current can produce a magnetic field and that a changing magnetic field can produce a magnetic field and that a changing magnetic field can produce an electrical current.</p> <p>HS-PS3-5 Develop and use a model of two objects interacting through electric or magnetic fields to illustrate the forces between objects and the changes in energy of the objects due to the interaction.</p>		<p>How can forces be exerted without being touched?</p>	<p>transfer energy through space. Magnets or electrical currents cause magnetic fields; electric charges or changing magnetic fields cause electric fields.</p> <p>Understand the relationship between current</p>	<p>that an electrical current can produce a magnetic field.</p> <p>Develop and use an evidence-based model to predict the forces between charged objects placed in a magnetic field.</p> <p>Determine how the placement of components in a circuit will explain the voltage drop and current for those respective components.</p>	<p>Resistance</p> <p>Voltage</p>
<p>June</p> <p>@10 days</p> <p>This does not include the last week of school</p>	<p>HS-ESS2-1</p> <p>Develop a model to illustrate how Earth's internal and surface processes operate at different spatial and temporal scales to form continental and ocean-floor features.</p>	<p>Unit 5 - The Physics of the Geosphere</p>	<p>How are the properties of geological features such a mountains dependent on time?</p> <p>How much force is needed to move a continent?</p>	<p>Analyze evidence from seismic waves, reconstructions of historical changes in the Earth's surface, and its magnetic field to understand the physical and chemical</p>	<p>Develop a model of Earth's interior, based on evidence, to show that energy drives the cycling of matter by thermal convection.</p> <p>Analyze geoscience data</p>	<p>Geosphere</p> <p>Continental drift</p>

	<p>HS-ESS2-2 Develop data to make the claim that one change to Earth's surface can create feedbacks that causes changes to other of Earth's systems.</p>		<p>How do changes in the geosphere effect the atmosphere?</p>	<p>processes.</p> <p>How energy drives the cycling of matter between Earth's systems.</p> <p>Earth's systems, being dynamic and interacting, cause feedback effects that can increase or decrease the original changes.</p>	<p>using tools, technologies, and/or models to make the claim that one change to Earth's surface can create feedbacks that cause changes to other systems.</p>	
--	---	--	---	---	--	--