

WCSD High School Physical Science Unit Summary

This course model arranges the Performance Expectations for High School Physical Science into different units with guiding questions. *The performance expectations marked with an asterisk integrate traditional science content with engineering through a Practice or Disciplinary Core Idea.

Semester 1: Chemistry

Unit Titles and Guiding Questions	Performance Expectations
<p>Unit Title: Structure and Properties of matter</p> <p>Guiding Question: How can one explain the structure, properties, and interactions of matter?</p> <p>How do particles combine to form the variety of matter one observes?</p>	<p>HS-PS1-3 Plan and conducting an investigation to gather evidence to compare the structure of substances at the bulk scale to infer the strength of electrical forces between particles.</p> <p>HS-PS1-1 Use the periodic table as a model to predict the relative properties of elements based on the patterns of electrons in the outermost energy level of atoms.</p>
<p>Unit title: Chemical Reactions</p> <p>Guiding Question: How do substances combine or change (react) to make new substances? How does one characterize and explain these reactions and make predictions about them?</p>	<p>HS-PS1-4 Develop a model to illustrate that the release or absorption of energy from a chemical reaction system depends upon the changes in total bond energy.</p> <p>HS-PS1-2 Construct and revise an explanation for the outcome of a simple chemical reaction based on the outermost electron states of atoms, trends in the periodic table, and knowledge of the patterns of chemical properties.</p> <p>HS-PS1-5 Apply scientific principles and evidence to provide an explanation about the effects of changing the temperature or concentration of the reacting particles on the rate at which a reaction occurs.</p> <p>HS-PS1-6 Refine the design of a chemical system by specifying a change in conditions that would produce increased amounts of products at equilibrium. *</p>

Semester 2: Physics

<p>Unit title: Motion and Stability</p> <p>Guiding Question: How can one predict an object's continued motion, changes in motion, or stability?</p> <p>How can one predict interactions between objects and within systems of objects?</p>	<p>HS-PS2-1 Analyze data to support the claim that Newton's second law of motion describes the mathematical relationship among the net force on a macroscopic object, its mass, and its acceleration.</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>
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<p>Unit title: Energy (Types of Interactions)</p> <p>Guiding Questions: What underlying forces explain the variety of interactions observed?</p> <p>How is energy transferred or conserved?</p> <p>What is meant by conservation of energy?</p> <p>How is energy transferred between objects or systems?</p>	<p>HS-PS3-2 Develop and use models to illustrate that energy at the macroscopic scale can be accounted for as a combination of energy associated with the motions of particles (objects) and energy associated with the relative position of particles (objects).</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>HS-PS2-5 Plan and conduct an investigation to provide evidence that an electric current can produce a magnetic field and that a changing magnetic field can produce an electric 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>HS-PS2-4 Plan and conduct an investigation to provide evidence that an electric current can produce a magnetic field and that a changing magnetic field can produce an electric current.</p> <p>HS-PS3-4 Plan and conduct an investigation to provide evidence that the transfer of thermal energy when two components of different temperature are combined within a closed system results in a more uniform energy distribution among the components in the system (second law of thermodynamics).</p>
<p>Unit title: Nuclear Processes</p> <p>Guiding Question: What forces hold nuclei together and mediate nuclear processes?</p>	<p>HS-PS1-8 Develop models to illustrate the changes in the composition of the nucleus of the atom and the energy released during the processes of fission, fusion, and radioactive decay.</p>
<p>Unit title: Waves</p> <p>Guiding Question: What are the characteristic properties and behaviors of waves?</p> <p>How are waves used to transfer energy and information?</p>	<p>HS-PS 4-1 Use mathematical representations to support a claim regarding relationships among the frequency, wavelength, and speed of waves traveling in various media.</p> <p>HS-PS4-2 Evaluate questions about the advantages of using a digital transmission and storage of information.</p> <p>HS-PS4-3 Evaluate the claims, evidence, and reasoning behind the idea that electromagnetic radiation can be described either by a wave model or a particle model, and that for some situations one model is more useful than the other.</p> <p>HS-PS4-4 Evaluate the validity and reliability of claims in published materials of the effects that different frequencies of electromagnetic radiation have when absorbed by matter.</p> <p>HS-PS4-5 Communicate technical information about how some technological devices use the principles of wave behavior and wave interactions with matter to transmit and capture information and energy. *</p>