enCompass Academy 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
Unit Title: Structure and Properties of matter **Guiding Question:** How can one explain the structure, properties, and interactions of matter? How do particles combine to form the variety of matter one observes?	**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. **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.
Unit title: **Chemical Reactions** **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?	**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. **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. **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. **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. *

Semester 2: Physics

Unit title: **Motion and Stability** **Guiding Question:** How can one predict an object's continued motion, changes in motion, or stability? How can one predict interactions between objects and within systems of objects?	**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. **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. *

Unit title: **Energy** **(Types of Interactions)** **Guiding Questions:** What underlying forces explain the variety of interactions observed? How is energy transferred or conserved? What is meant by conservation of energy? How is energy transferred between objects or systems?	**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). **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.* **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. **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. **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. **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).

Unit title: Waves **Guiding Question:** What are the characteristic properties and behaviors of waves? How are waves used to transfer energy and information?	**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. **HS-PS4-2** Evaluate questions about the advantages of using a digital transmission and storage of information. **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. **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. **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. *
***Unit title:** **Nuclear Processes** **Guiding Question:** What forces hold nuclei together and mediate nuclear processes? *If time allows	**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.