Physical Science Grade 9

Instruction Materials Referenced	Curriculum: CPO Science Physical, Earth, and Space Science CR 2016 Textbook: Physical, Earth, and Space Science An Integrated Approach byTom Hsu, Ph.D. ISBN-13-978-1-62571-835-8

Overview information for this document
The **Next Generation Science Standards** are broken up into three parts. The Science and Engineering Practices, The Cross Cutting Concepts and the Disciplinary Core Ideas.

Science and Engineering Practices
Asking questions (for science) and defining problems (for engineering) Developing and using models Planning and carrying out investigations Analyzing and interpreting data Using mathematics and computational thinking Constructing explanations (for science) and designing solutions (for engineering) Engaging in argument from evidence Obtaining, evaluating, and communicating information

Cross-Cutting Concepts
Patterns Cause and effect Scale, proportion, and quantity. Systems and system model Energy and matter: Flows, cycles, and conservation Structure and function Stability and change

9th Grade Physical Science

Unit 1 (4 Weeks)	Science Skills (Chapters 1-3)
Standards Taught	● HS-ETS1-1.Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants. ● HS-ETS1-2.Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering. ● HS-ETS1-3.Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics as well as possible social, cultural, and environmental impacts. ● HS-ETS1-4.Use a computer simulation to model the impact of proposed solutions to a complex real-world problem with numerous criteria and constraints on interactions within and between systems relevant to the problem.
How will students demonstrate the learning?	● End of chapter tests ● Successful completion of multiple labs

Unit 2 (5 Weeks)	Motion, Force, and Energy (Chapters 4-7)
Standards Taught	● 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-PS3-1. 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. ● 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.
How will students	● End of chapter tests ● Successful completion of multiple labs

demonstrate the learning?	● Forces Research Project

Unit 3 (5 Weeks)	**Matter, Energy, and Earth (Chapters 8-11)**
Standards Taught	● 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. ● 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-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).
How will students demonstrate the learning?	● End of chapter tests ● Successful completion of multiple labs ● Viscosity Lab Report

Unit 4 (6 weeks)	**Matter and Its Changes (Chapters 12-15)**
Standards Taught	● 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. ● 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-PS1-7. Use mathematical representations to support the claim that atoms, and therefore mass, are conserved during a chemical reaction. ● HS-PS1-3. Plan and conduct 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-PS1-4. 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-PS2-6. Communicate scientific and technical information about why the molecular-level structure is important in the functioning of designed materials.
How will students demonstrate the learning?	• End of chapter tests • Successful completion of multiple labs • Element Slide Show • Periodic Table Tiles

Unit 5 (5 weeks)	**Electricity and Magnetism (Chapters 16-17)**
Standards Taught	• 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-PS3-3.Design, build, and refine a device that works within given constraints to convert one form of energy into another form of energy. • 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.
How will students demonstrate the learning?	• End of chapter tests • Successful completion of multiple labs • Electricity Production Proposal Poster

Unit 6 (5 weeks)	**Waves (Chapters 24-25)**
Standards Taught	• HS-PS4-1. Use mathematical representations to support a claim regarding relationships among the frequency, wavelength, and speed of waves traveling in various media. • 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-PS4-5. 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.
How will students demonstrate the learning?	● End of chapter tests ● Successful completion of multiple labs ● Electromagnetic Spectrum and the Eye Poster

Unit 7 (5 Weeks)	**Matter and Motion in the Universe (Chapters 26-28)**
Standards Taught	● HS-PS2-4.Use mathematical representations of Newton's Law of Gravitation and Coulomb's Law to describe and predict the gravitational and electrostatic forces between objects. ● HS-ESS1-1. Develop a model based on evidence to illustrate the life span of the sun and the role of nuclear fusion in the sun's core to release energy that eventually reaches Earth in the form of radiation. ● HS-ESS1-3.Communicate scientific ideas about the way stars, over their life cycle, produce elements. ● HS-ESS1-4.Use mathematical or computational representations to predict the motion of orbiting objects in the solar system.
How will students demonstrate the learning?	● End of chapter tests ● Successful completion of multiple labs ● Astronomer Timelines ● Solar System Models