

Wyoming Department of Education Required Virtual Education Course Syllabus

BIG HORN COUNTY SCHOOL DISTRICT #1

Program Name	WYCA	Content Area	Science
Course ID	CASC80474	Grade Level	9, 10, 11, 12
Course Name	Physical Science B	# of Credits	0.5
SCED Code	03159G0.5022	Curriculum Type	Connections Academy

COURSE DESCRIPTION

This is the first of two courses that comprise Physical Science. The course is designed to provide students with an understanding of essential chemistry concepts. The course extends the student's prior knowledge of the properties, states, and structure of matter, explores the dynamics of chemical bonding and reactions, and introduces the student to nuclear chemistry. Physical Science A includes hands-on explorations and virtual simulations to enhance the student's comprehension of key concepts.

WYOMING CONTENT AND PERFORMANCE STANDARDS

STANDARD#	BENCHMARK
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 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, and revise, as needed.
HS-PS1-3.	Plan and conduct an investigation to gather evidence to compare the structure of substances at the macroscopic 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-PS1-5.	Apply scientific principles and use 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.	Evaluate the design of a chemical system by changing conditions to produce increased amounts of products at equilibrium, and refine the design, as needed.
HS-PS1-7.	Use mathematical representations to support the claim that atoms, and therefore mass, are conserved during a chemical reaction.
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-PS2-2.	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.
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.
HS-PS2-4.	Use mathematical representations to predict the gravitational and/or electrostatic forces between objects using Newton's Law of Gravitation and/or Coulomb's Law, respectively.
HS-PS2-6.	Communicate scientific and technical information about why the molecular-level structure is important in the functioning of materials.
HS-PS3-1.	Create or apply 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-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-PS4-1.	Use mathematical representations to support a claim regarding relationships among the frequency, wavelength, and speed of waves traveling in various media.
HS-PS4-2.	Evaluate the advantages and disadvantages of using digital transmission and storage of information.
HS-PS4-3.	Evaluate evidence 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-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-ESS1-2.	Construct an explanation of the Big Bang theory based on astronomical evidence of light spectra, motion of distant galaxies, and composition of matter in the universe.

HS-ESS1-4.	Use mathematical or computational representations to predict the motion of orbiting objects in the solar system.
HS-ESS3-2.	Evaluate competing design solutions for developing, managing, and using energy and mineral resources based on cost -benefit ratios.
HS-ESS3-4.	Evaluate or refine a technological solution that reduces impacts of human activities on natural systems.
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.

SCOPE AND SEQUENCE

UNIT OUTLINE	STANDARD#	OUTCOMES
<p>Unit 1: Forces and Motion</p> <p>In this unit, you will study forces and motion. Your studies will focus on distance, displacement, speed, velocity, and acceleration—moving on to balanced and unbalanced forces, momentum, and universal forces. You will examine Newton's three laws of motion as well as Pascal's principle and Bernoulli's principle. You will also learn how to calculate pressure and what effects buoyancy has on the apparent weight of an object.</p>	HS-PS2-1, HS-PS2-2, HS-PS2-4, HS-ETS1-3, HS-ESS2-7	<ul style="list-style-type: none"> •Identify SI units for measuring distances and speed •Calculate displacement, speed, and acceleration •Interpret distance-time and speed-time graphs •Compare and contrast the four kinds of friction •Describe Newton's three laws of motion and the law of universal gravitation
<p>Unit 2: Work and Energy</p> <p>In this unit, you will study work, power, machines, and energy. You will begin by learning how to calculate work and power; later on, you will learn how to calculate mechanical advantage and efficiency. You will study the six types of simple machines and learn how to identify compound machines. You will learn about heat, temperature, and thermal energy, and you will study conductors, insulators, and the laws of thermodynamics in order to better understand heat and how it can be used.</p>	HS-PS2-2, HS-PS2-4, HS-PS3-1, HS-PS3-2, HS-PS3-3, HS-ESS3-2, HS-ESS3-4, HS-ETS1-3, HS-ESS3-3, HS-LS2-7, HS-ESS2-7	<ul style="list-style-type: none"> •Describe and calculate work and power •Explain how machines make work easier to do •Compare actual mechanical advantage to ideal mechanical advantage •Calculate a machine's efficiency •Give an example of the six types of simple machines
<p>Unit 3: Waves</p> <p>In this unit, you will study the properties and behavior of waves. You will learn about different types of mechanical waves and examine how waves are affected by reflection and refraction. You will learn how sound is produced and how the ear is able to detect sound. As you study the electromagnetic spectrum, you will focus on the characteristics of electromagnetic waves and how different waves of the electromagnetic spectrum are used. You will study how light behaves, how light is produced, and how color is determined.</p>	HS-PS4-1, HS-PS4-3, HS-PS4-5, HS-PS4-1, HS-ESS1-6, HS-ETS1-2, HS-ETS1-3	<ul style="list-style-type: none"> •Define mechanical waves and explain how transverse, longitudinal, and surface waves are produced •Define frequency, period, wavelength, and wave speed •Relate amplitude to a wave's energy •Explain reflection, refraction, diffraction, and interference •Explain how sound waves are produced and how the human ear detects sound

<p>Unit 4: Electricity and Magnetism</p> <p>In this unit, you will study electricity and magnetism. You will primarily focus on electric charge, current, and circuits; however, you will also learn about common electronic devices and how they work. You will identify the two types of electric current and you will study circuit diagrams for series and parallel circuits. In the latter part of the unit, you will study magnets, magnetic fields and how electromagnets work. By completing this unit, you will have a better understanding of how electricity and magnetism are related.</p>	<p>HS-PS2-2, HS-PS2-4, HS-PS3-2, HS-PS3-3, HS-PS4-2, HS-ETS1-2, HS-LS2-7, HS-PS4-2, HS-ESS2-7</p>	<ul style="list-style-type: none"> • Explain how electric forces and fields affect electric charges • Describe electric current • Explain Ohm's law • Interpret diagrams for series and parallel circuits • Describe different types of electronic devices and how they convey information
<p>Unit 5: Earth in the Universe</p> <p>In this unit, you will explore various aspects of the solar system, including the different models of the solar system, the Earth-moon system, the eight planets, and the origin of the solar system. You will also study the sun and stars. By completing this unit, you will have a better understanding of how the sun produces energy for the solar system and how stars form.</p>	<p>HS-ESS1-1, HS-ESS1-2, HS-ESS1-4, HS-PS1-7, HS-ESS1-6</p>	<ul style="list-style-type: none"> • Define the geocentric and heliocentric models of the solar system • Identify the components of the solar system • Explain what the moon's surface looks like • Explain why the moon has phases and why tides occur • Identify and compare the terrestrial planets and gas giants
<p>Unit 6: Semester Exam and Review</p> <p>In this unit, you will prepare for and take the final exam. The exam may include any material that has been presented throughout the semester. Since the final exam is comprehensive, it may be helpful to organize your notes and answers to section and chapter assessments before you begin to review.</p>		<ul style="list-style-type: none"> • Identify strategies that will help you prepare for the final exam • Organize your time and study materials • Review your notes, answers to lesson questions and assessments, and essential vocabulary terms