

Wyoming Department of Education Required Virtual Education Course Syllabus

BIG HORN COUNTY SCHOOL DISTRICT #1

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| Program Name | WYCA | Content Area | Science |
| Course ID | CASC80498 | Grade Level | 9, 10, 11, 12 |
| Course Name | Physical Science A | # of Credits | 0.5 |
| SCED Code | 03159G0.5012 | Curriculum Type | Connections Academy |

COURSE DESCRIPTION

This is the second of two courses that comprise Physical Science. The course is designed to provide the student with an understanding of essential physics and earth science concepts. The physics-focused lessons cover motion, force, work, power, energy, wave mechanics, electricity, magnetism, and the electromagnetic spectrum. Earth science topics include an exploration of the Earth, sun, and planets. Physical Science B includes hands-on explorations and virtual simulations to enhance the student's comprehension of key concepts.

WYOMING CONTENT AND PERFORMANCE STANDARDS

| STANDARD# | BENCHMARK |
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| 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. |

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| 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 |
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| <p>Unit 1: Science Skills</p> <p>In this introductory unit, you will learn that physical science is a vast branch of science that covers the physics and chemistry of nonliving things. You will explore how the major branches of science overlap and you will learn how scientists solve problems using the scientific method. By completing this unit, you will have a general understanding of the International System of Units (SI) how to present scientific data.</p> | | <ul style="list-style-type: none"> •Recognize the ways in which science and technology are related •Explain how major branches of science overlap •Describe and apply the scientific method •Explain the importance of models and safety in science •Perform calculations involving scientific notation |
| <p>Unit 2: Properties and States of Matter</p> <p>In this first unit on chemistry, your studies will focus on the physical and chemical properties of matter. You will learn how to classify matter and how to identify physical and chemical changes in matter. By completing this unit, you will have a better understanding of the different states of matter, the gas laws, and the processes by which phase changes occur.</p> | HS-PS1-5, HS-PS1-6 | <ul style="list-style-type: none"> •Describe the characteristics of elements and compounds; Classify mixtures as heterogeneous or homogeneous •Describe physical and chemical properties of matter; Describe methods used to separate mixtures •Explain the difference between chemical and physical changes; •Describe the states of matter •Explain the behavior of solids, liquids, and gases; Explain Charles' Law, Boyle's Law, and the combined gas law •Describe phase changes; Define |
| <p>Unit 3: Atoms, Elements, and Bonds</p> <p>In this unit, you will learn how scientists' theories and models of the atom changed over time. You will study atomic structure, focusing on atomic number, mass number, and isotopes. By completing this unit, you will be more comfortable with how elements are organized within the modern periodic table of elements. You will also have a better understanding of chemical bonds.</p> | HS-PS1-1, HS-PS1-3, HS-PS1-1, HS-PS2-3. | <ul style="list-style-type: none"> •Explain the contributions made to the atomic theory by Dalton, Thomson, and Rutherford •Identify and compare protons, neutrons, and electrons •Describe Bohr's model of the atom •Explain electron configurations •Explain how elements are arranged in the periodic table |

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| <p>Unit 4: Chemical Reactions, Acids, and Bases</p> <p>In this unit, you will study different types of chemical reactions, energy changes that occur during chemical reactions, and how to describe chemical reactions using chemical equations. You will learn about reaction rates and how to identify physical and chemical equilibrium. You will also study the physical properties of a solution and the general properties and strengths of acids and bases. By completing this unit, you will have a better understanding of changes that occur during chemical reactions.</p> | <p>HS-PS1-2, HS-PS1-3, HS-PS1-4, HS-PS1-2, HS-PS1-5, HS-PS1-6, HS-PS1-7, HS-PS2-3, HS-PS2-6, HS-PS1-1</p> | <ul style="list-style-type: none"> • Interpret and balance chemical equations • Explain the different types of chemical reactions • Describe energy changes that take place during chemical reactions • Explain endothermic and exothermic reactions • Describe factors affecting rates of chemical reactions |
| <p>Unit 5: Nuclear Chemistry</p> <p>In this unit, you will learn about nuclear chemistry—the study of the processes that take place within an atom's nucleus. You will focus on the decay processes of a radioactive substance, half-life, radiocarbon dating, and artificial transmutation. You will also study nuclear fission and nuclear fusion; by completing this unit, you will be able to recognize the conditions that are required for these nuclear processes to occur.</p> | <p>HS-PS1-5, HS-ESS1-1, HS-PS1-1</p> | <ul style="list-style-type: none"> • Describe the process of nuclear decay • Classify nuclear radiation • Define half-life and explain how nuclear reactions are different from chemical reactions • Explain transmutation • Define fission and fusion and explain how nuclear reactors are used to produce energy |
| <p>Unit 6: Physical Science A Review and Exam</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> | <p>HS-PS1-1, HS-PS1-2, HS-PS1-1, HS-PS1-2, HS-PS1-5, HS-PS1-7,</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 |