

Wyoming Department of Education Required Virtual Education Course Syllabus

2201000 - Washakie County School District No. 1

Program Name	Washakie #1 Online	Content Area	SC
Course ID	W03159G0.5022	Grade Level	9-12
Course Name	WOL-Physical Science-B	# of Credits	0.5
SCED Code	03159G0.5022	Curriculum Type	K-12 Fuel Education

COURSE DESCRIPTION

Students explore the relationship between matter and energy by investigating force and motion, the structure of atoms, the structure and properties of matter, chemical reactions, and the interactions of energy and matter. Students develop skills in measuring, solving problems, using laboratory apparatuses, following safety procedures, and adhering to experimental procedures. Students focus on inquiry-based learning, with both laboratory investigations and experiences.

WYOMING CONTENT AND PERFORMANCE STANDARDS

STANDARD#	BENCHMARK_(Standard/Indicator) Use the Standards and Benchmarks as Spreadsheets
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-PS1-4	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-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-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-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.
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.

Scope and Sequence

UNIT OUTLINE	STANDARD#	OUTCOMES OBJECTIVES/STUDENT CENTERED GOALS
<p>Unit 1: Nature of Matter</p> <ul style="list-style-type: none"> • Semester Introduction • Nature of Matter • Classification of Matter • Matter and Energy • Laboratory: Viscosity 1 • Laboratory: Viscosity 2 	<p>HS-PS1-8 HS-PS1-6 HS-PS1-7</p>	<p>Through online reading of scientific text, analysis of virtual diagrams, manipulating virtual simulations, and answering critical thinking questions, students learn about the nucleus of the atom. They apply this knowledge to fission and fusion by analyzing the processes and observing how the nucleus is changed.</p> <p>Students learn about chemical reactions, equilibrium, products and reactants but need further guidance to understand how to design a chemical system to produce increased amounts of products at equilibrium.</p> <p>Through online reading of scientific text, analysis of virtual diagrams, manipulating virtual simulations, and answering critical thinking questions, students complete worked problems involving balancing chemical equations which demonstrate the process of nuclear conservation mathematically.</p>
<p>Unit 2: States of Matter</p> <ul style="list-style-type: none"> • States of Matter • Matter Changes State • Kinetic Theory of Matter • Laboratory: Evaporation 1 • Laboratory: Evaporation 2 • Laboratory: Phase Change 1 • Laboratory: Phase Change 2 • Laws of Thermodynamics • Heat Energy and Matter • Laboratory: Endothermic Process 1 • Laboratory: Endothermic Process 2 	<p>HS-PS1-5 HS-PS1-6 HS-PS3-1 HS-PS3-2 HS-PS3-3 HS-PS3-4 HS-ETS1-2</p>	<p>Through online reading of scientific text, analysis of virtual diagrams, manipulating virtual simulations, and answering critical thinking questions, students apply various principles in determining the rates of chemical reactions such as temperature, solubility, and stirring.</p> <p>Students learn about chemical reactions, equilibrium, products and reactants but need further guidance to understand how to design a chemical system to produce increased amounts of products at equilibrium.</p> <p>Through online reading of scientific text, analysis of virtual diagrams, manipulating virtual simulations, and answering critical thinking questions, students learn about energy, changes of energy and systems.</p> <p>Through online reading of scientific text, analysis of virtual diagrams, manipulating virtual simulations, and answering critical thinking questions, students learn about energy and the motion and position of particles. Students create and manipulate virtual models to demonstrate these concepts.</p> <p>Through online reading of scientific text, analysis of virtual diagrams, manipulating virtual simulations, and completing hands-on labs, students create devices that convert energy from one form to another or prevent energy from being transferred.</p> <p>Through online reading of scientific text, analysis of virtual diagrams, manipulating virtual simulations, and completing hands-on activities, students complete endothermic experiments. Students collect data and provide an analysis</p>

Scope and Sequence

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		<p>and conclusion that supports the transfer of energy within a closed system.</p> <p>Through online reading of scientific text, analysis of virtual diagrams, manipulating virtual simulations, and completing hands-on labs, students create a thermos that convert energy from one form to another or prevent energy from being transferred.</p>
<p>Unit 3: Gas Laws</p> <ul style="list-style-type: none"> • Gases • Pressure, Temperature, and Volume • Introduction to the Gas Laws • Laboratory: Gas Laws 1 • Laboratory: Gas Laws 2 		<p>Through online reading of scientific text, analysis of virtual diagrams, manipulating virtual simulations, and answering critical thinking questions, students explore the properties of gases that can be measured: volume, temperature, and pressure; explain the laws governing gases; demonstrate the nature and behavior of gases.</p> <p>Through online reading of scientific text, analysis of virtual diagrams, manipulating virtual simulations, and answering critical thinking questions, students describe the relationship between volume, temperature and pressure of gas; recognize that the relationship between volume, temperature, and pressure is explained by gas laws; and describe the relationship between the pressure, volume, and temperature of gas.</p>
<p>Unit 4: Atoms</p> <ul style="list-style-type: none"> • Atoms • Atomic Model • Atomic Number • Atomic Mass • Nucleus of the Atom • Radioactivity • Radioactive Dating • Fusion and Fission 	HS-PS1-8	<p>Through online reading of scientific text, analysis of virtual diagrams, manipulating virtual simulations, and answering critical thinking questions, students learn about the nucleus of the atom. They apply this knowledge to fission and fusion by analyzing the processes and observing how the nucleus is changed.</p>
<p>Unit 5: Elements</p> <ul style="list-style-type: none"> • Elements • Periodic Table 1 • Periodic Table 2 • Properties of Metals and Nonmetals • Elements and Compounds 	HS-PS1-1	<p>Through online reading of scientific text, analysis of virtual diagrams, manipulating virtual simulations, and answering critical thinking questions, students use the periodic table in relation to valence electrons. Students use the information learned to predict patterns of electrons and predict elemental reactivity.</p>
<p>Unit 6: Mixtures</p> <ul style="list-style-type: none"> • Introduction to Mixtures • Introductions to Solutions • Laboratory: Mixtures 1 • Laboratory: Mixtures 2 • Laboratory: Solubility 1 • Laboratory: Solubility 2 • Factors That Influence Solubility 	HS-PS1-5	<p>Through online reading of scientific text, analysis of virtual diagrams, manipulating virtual simulations, and answering critical thinking questions, students apply various principles in determining the rates of chemical reactions such as temperature, solubility, and stirring.</p>
<p>Unit 7: Bonds</p> <ul style="list-style-type: none"> • Electron Configurations • Valence Electrons 	HS-PS1-1	<p>Through online reading of scientific text, analysis of virtual diagrams, manipulating virtual simulations, and answering critical thinking questions, students use the periodic table</p>

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<ul style="list-style-type: none"> • Ionic Bonds • Covalent Bonds • Polar Covalent Bonds and Electronegativity • Hydrogen Bonding and Metallic Bonding 		<p>in relation to valence electrons. Students use the information learned to predict patterns of electrons and predict elemental reactivity.</p>
<p>Unit 8: Chemical Reactions</p> <ul style="list-style-type: none"> • Introduction to Chemical Reactions • Laboratory: Chemical Reactions 1 • Laboratory: Chemical Reactions 2 • Laboratory: Copper-Plating Solution 1 • Laboratory: Copper-Plating Solution 2 • Chemical Reactions Explained • How to Balance a Chemical Equation • Solution Chemistry 	<p>HS-PS1-2 HS-PS1-4 HS-PS1-5 HS-PS1-7</p>	<p>Through online reading of scientific text, analysis of virtual diagrams, manipulating virtual simulations, and answering critical thinking questions, students apply knowledge of valence electrons and elemental trends in predicting the outcomes of various chemical reactions.</p> <p>Through online reading of scientific text, analysis of virtual diagrams, manipulating virtual simulations, and completing hands-on labs, students demonstrate the energy change in a chemical reaction.</p> <p>Through online reading of scientific text, analysis of virtual diagrams, manipulating virtual simulations, and answering critical thinking questions, students apply various principles in determining the rates of chemical reactions such as temperature, solubility, and stirring.</p> <p>Through online reading of scientific text, analysis of virtual diagrams, manipulating virtual simulations, and answering critical thinking questions, students complete worked problems involving balancing chemical equations which demonstrate the process of nuclear conservation mathematically.</p>
<p>Unit 9: Acids and Bases</p> <ul style="list-style-type: none"> • Acids • Bases • pH Scale • Acid and Base Reaction • Buffers • Laboratory: Acid Neutralization 1 • Laboratory: Acid Neutralization 2 		<p>Through online reading of scientific text, analysis of virtual diagrams, manipulating virtual simulations, and answering critical thinking questions, students identify and list the principal properties of acids and bases, define and explain pH, identify and explain acid-base reactions, and define and describe buffers.</p>
<p>Unit 10: Organic Chemistry</p> <ul style="list-style-type: none"> • Organic Chemistry • Functional Groups • Macromolecules 	<p>HS-PS2-6</p>	<p>Through online reading of scientific text, analysis of virtual diagrams, manipulating virtual simulations, and answering critical thinking questions, students learn about modern products and materials designed from various molecules.</p>
<p>Unit 11: Semester Review and Test</p> <ul style="list-style-type: none"> • Semester Review • Semester Test 		