

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	W03159G0.5012	Grade Level	9-12
Course Name	WOL-Physical Science-A	# of Credits	0.5
SCED Code	03159G0.5012	Curriculum Type	K-12 Fuel Education

COURSE DESCRIPTION

In the first semester of Physical Science, students explore the relationship between matter and energy by investigating matter and energy; force and motion; the application of forces including friction, gravity, motion, and vectors; fluid forces; energy; simple machines and mechanical advantage; waves; light including speed of light, reflection and refraction, electromagnetic spectrum, and color; and electricity.

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-PS1-3	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-PS1-8	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-PS2-1	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-PS3-5	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-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-PS4-4	See HS-ETS1-5. Evaluate the validity and reliability of claims in a variety of materials.
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.
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-ETS1-4	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.
HS-ETS1-5	Evaluate the validity and reliability of claims in a variety of materials.

Scope and Sequence

UNIT OUTLINE	STANDARD#	OUTCOMES OBJECTIVES/STUDENT CENTERED GOALS
<p>COURSE OUTLINE:</p> <p>Unit 1: Matter and Energy</p> <ul style="list-style-type: none"> • Semester Introduction • Dimensions: Distance, Time, and Mass • Matter, Energy, and the Scientific Method • Creating and Analyzing Graphs • Laboratory: Drop and Bounce 1 • Laboratory: Drop and Bounce 2 	<p>HS-PS1-8</p>	<p>Through online reading of scientific text, analysis of virtual diagrams, manipulating virtual simulations, and completing hands on activities, students will recognize and use the metric system, comparing the metric system of measurement with the English system, describe physical science as the study of matter and energy, identify the ways that physics is a part of the day-to-day world, explain the basic principles of physics, explore the relationship between matter and energy, explain a scientific approach to problem solving and a scientific method, recognize the relationship between matter and energy, construct a graph demonstrating observed results, interpret and draw conclusions about relationships from graphs, identify sources of error or uncertainty within the investigation, and observe the interaction between matter and energy.</p> <p>Throughout the course during regularly scheduled labs students will identify a question and develop a hypothesis; select and use appropriate methods to gather data; interpret a plan of action for a scientific investigation; organize and analyze data to report, review, and discuss; construct a graph showing the relationship between an independent variable and a dependent variable; interpret and draw conclusions about relationships from graphs; and identify sources of error or uncertainty within the investigation.</p>
<p>Unit 2: Forces and Motion</p> <ul style="list-style-type: none"> • Describing and Measuring Motion • Acceleration • Forces • Laboratory: Drop and Bounce Revisited • Newton's First Law of Motion • Newton's Second Law of Motion • Newton's Third Law of Motion • Laboratory: Mass in Motion 1 • Laboratory: Mass in Motion 2 	<p>HS-PS2-1 HS-PS2-2 HS-PS2-3 HS-ETS1-4</p>	<p>Through online reading of scientific text, analysis of virtual diagrams, manipulating virtual simulations, and answering critical thinking questions, students learn about Newton's Laws of Motion. Students complete hands-on activities to gather data and analyze that data to mathematically support Newton's Laws of Motion.</p> <p>Through online reading of scientific text, analysis of virtual diagrams, manipulating virtual simulations, and answering critical thinking questions, students learn about momentum conservation and net force. Students complete hands-on activities to gather data and analyze that data to mathematically support the concept of the conservation of momentum and net force.</p> <p>Through online reading of scientific text, analysis of virtual diagrams, manipulating virtual simulations, and answering critical thinking questions, students learn about momentum conservation and net force. Students complete hands-on activities to design a device that minimizes the force exerted during a collision.</p> <p>Through online reading of scientific text, analysis of virtual diagrams, manipulating virtual simulations, I can complete</p>

Scope and Sequence

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		hands-on activities exploring the Doppler effect in various situations. I can communicate how these devices work and measure wave behavior when completing their written lab report.
Unit 3: Application of Forces <ul style="list-style-type: none"> • Friction • Gravity • Gravity and Motion • Forces and Vectors • Laboratory: Net Force 1 • Laboratory: Net Force 2 	HS-PS2-1 HS-PS2-2 HS-PS2-3 HS-PS2-4 HS-ETS1-4	<p>Through online reading of scientific text, analysis of virtual diagrams, manipulating virtual simulations, and answering critical thinking questions, students learn about Newton's Second Law of Motion. Students complete hands-on activities to gather data and analyze that data to mathematically support Newton's Second Law of Motion.</p> <p>Through online reading of scientific text, analysis of virtual diagrams, manipulating virtual simulations, and answering critical thinking questions, students learn about momentum conservation and net force. Students complete hands-on activities to gather data and analyze that data to mathematically support the concept of the conservation of momentum and net force.</p> <p>Through online reading of scientific text, analysis of virtual diagrams, manipulating virtual simulations, and answering critical thinking questions, students learn about momentum conservation and net force. Students complete hands-on activities to design a device that minimizes the force exerted during a collision.</p> <p>Students learn about gravitational and electrostatic forces through online and offline activities.</p> <p>Through online reading of scientific text, analysis of virtual diagrams, manipulating virtual simulations, I can complete hands-on activities exploring the Doppler effect in various situations. I can communicate how these devices work and measure wave behavior when completing their written lab report.</p>
Unit 4: Fluid Forces <ul style="list-style-type: none"> • Pressure • Buoyancy • Laboratory: Density and Buoyancy 1 • Laboratory: Density and Buoyancy 2 • Pascal's Principle • Bernoulli's Principle • Laboratory: Shapes and Fluid Forces 1 • Laboratory: Shapes and Fluid Forces 2 		<p>Through online reading of scientific text, analysis of virtual diagrams, manipulating virtual simulations, and answering critical thinking questions, student explore the difference between pressure and buoyancy, define and describe <i>buoyancy and pressure</i>, explain the relationship between force and pressure and pressure and buoyancy, calculate pressure, and explain fluid pressure.</p> <p>Students will explain Pascal's principle and Bernoulli's principle, explain hydraulic machines in terms of Pascal's principle, describe everyday examples of Bernoulli's principle, and describe "drag" in terms of fluid friction.</p>
Unit 5: Energy <ul style="list-style-type: none"> • Energy • Energy Change 	HS-PS1-8 HS-PS3-1 HS-ETS1-2	<p>Through online reading of scientific text, analysis of virtual diagrams, manipulating virtual simulations, and answering critical thinking questions, students learn about the nucleus</p>

Scope and Sequence

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<ul style="list-style-type: none"> • Potential and Kinetic Energy • Laboratory: Pendulum 1 • Laboratory: Pendulum 2 • Laboratory: Elasticity 1 • Laboratory: Elasticity 2 • Heat Energy • How Energy Moves • Laboratory: Heat Transfer 1 • Laboratory: Heat Transfer 2 • Laboratory: Design a Thermos 1 		<p>of the atom. They apply this knowledge to fission and fusion by analyzing the processes and observing how the nucleus is changed.</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, I can complete hands-on activities exploring the Doppler effect in various situations. I can communicate how these devices work and measure wave behavior when completing their written lab report.</p>
<p>Unit 6: Work</p> <ul style="list-style-type: none"> • Work • Simple Machines and Mechanical Advantage • Power • Laboratory: Levers 1 • Laboratory: Levers 2 • Laboratory: Pulleys 1 • Laboratory: Pulleys 2 		<p>Through online reading of scientific text, analysis of virtual diagrams, manipulating virtual simulations, and answering critical thinking questions, students will list and describe the six types of simple machines and explain the definition of mechanical advantage.</p> <p>Through online reading of scientific text, analysis of virtual diagrams, manipulating virtual simulations, and answering critical thinking questions, students will define and describe power.</p>
<p>Unit 7: Waves</p> <ul style="list-style-type: none"> • Introduction to Waves • Properties of Waves • Wave Energy • Transverse and Longitudinal Waves • Laboratory: Waves 1 • Laboratory: Waves 2 • Sound • Frequency, Wavelength, and Pitch • Laboratory: Doppler Effect 1 • Laboratory: Doppler Effect 2 	<p>HS-PS4-1 HS-PS4-5</p>	<p>Through online reading of scientific text, analysis of virtual diagrams, manipulating virtual simulations, and gathering data through hands-on activities, students mathematically represent waves and their properties. Complete worked examples comparing and contrasting the properties of waves traveling through various media.</p> <p>Through online reading of scientific text, analysis of virtual diagrams, manipulating virtual simulations, students complete hands-on activities exploring the Doppler effect in various situations. Communicate how these devices work and measure wave behavior when completing their written lab report.</p>
<p>Unit 8: Light</p> <ul style="list-style-type: none"> • Light • Speed of Light • Reflection and Refraction • Electromagnetic Spectrum • Color 	<p>HS-PS4-1 HS-PS4-2 HS-PS4-3 HS-PS4-4/ HS-ETS1-5</p>	<p>Through online reading of scientific text, analysis of virtual diagrams, manipulating virtual simulations, and gathering data through hands-on activities, students mathematically represent waves and their properties. Complete worked examples comparing and contrasting the properties of waves traveling through various media.</p> <p>Through online reading of scientific text, analysis of virtual diagrams, manipulating virtual simulations, and answering critical thinking questions, students learn about optical fibers and radio waves.</p> <p>Through online reading of scientific text, analysis of virtual</p>

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		<p>diagrams, manipulating virtual simulations, and answering critical thinking questions. Use virtual models to compare and contrast the various models of electromagnetic radiation. Examine case scenarios to determine which model is most useful.</p> <p>Through online reading of scientific text, analysis of virtual diagrams, manipulating virtual simulations, and answering critical thinking questions, students examine and explore the frequencies of electromagnetic radiation moving through various forms of matter</p>
<p>Unit 9: Electricity</p> <ul style="list-style-type: none"> • Electricity and Magnetism • Laboratory: Electric Motor 1 • Laboratory: Electric Motor 2 <p>Circuits</p>	<p>HS-PS1-3 HS-PS2-6 HS-PS2-4 HS-PS3-5</p>	<p>Through online reading of scientific text, analysis of virtual diagrams, manipulating virtual simulations, and answering critical thinking questions, students learn about magnetism and electrical forces while analyzing data provided by scientists to support the concepts.</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>Students learn about gravitational and electrostatic forces through online and offline activities.</p> <p>Through online reading of scientific text, analysis of virtual diagrams, manipulating virtual simulations, I can complete hands-on activities exploring the Doppler effect in various situations. I can communicate how these devices work and measure wave behavior when completing their written lab report.</p>
<p>Unit 10: Semester Review and Test</p> <ul style="list-style-type: none"> • Semester Review • Semester Test 		