Wyoming Department of Education Required Virtual Education Course Syllabus

BIG HORN COUNTY SCHOOLD DISTRICT #1

Program Name	WYCA	Content Area	Science
Course ID	CASC80536	Grade Level	9, 10, 11, 12
Course Name	Physics B	# of Credits	0.5
SCED Code	03151G0.5022	Curriculum Type	Connections Academy

COURSE DESCRIPTION

The goal of physics is to describe the physical world using a small number of basic assumptions, concepts, and equations. In this course, emphasis is placed on relating physics to the everyday world. The student will learn the characteristics of waves and describe the behavior of waves with emphasis on light and sound. The student will understand the relationship between electricity and magnetism. Finally, the student will gain a simple understanding of atomic physics. Approximately 40 percent of the course involves virtual laboratory investigations. Some activities will require ordinary household items such as rulers, meter sticks, balls or marbles, string, paper, and pencils. Physics B focuses on waves, in particular sound and light. Then the course moves to understanding electricity and magnetism and the relationship between the two. It concludes with a basic exploration of atomic physics.

WYOMING CONTENT AND PERFORMANCE STANDARDS

STANDARD#	BENCHMARK
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-PS2-1.	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-PS2-5.	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 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-PS3-4.	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-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-PS4-3.	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-PS4-5.	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.

SCOPE AND SEQUENCE

UNIT OUTLINE	STANDARD#	OUTCOMES

Unit 1: Waves In this unit you will explore the behavior of oscillations and waves. You will study periodic motion, analyze the characteristics of sound and light, and learn how waves transport energy. You will perform virtual labs to investigate the relationship between the length and period of a pendulum, and the correlations among frequency, speed, and amplitude of sound waves.	HS-PS4-1, HS-PS4-3, HS-PS4-5, HS-PS2-6, HS-ESS1-3, HS-LS4-1	•Explain how force, velocity, and acceleration change as an object vibrates with simple harmonic motion •Apply the properties of sound waves to calculate period, frequency, intensity, and wave speed •Calculate the frequency or wavelength of electromagnetic radiation •Describe how the variables related to reflection, refraction, diffraction, and interference affect light waves
Unit 2: Electricity In this unit you will explore the properties of electric charges. You will calculate the electric force produced by point charges, interpret electric field lines, learn how capacitors store electrical energy, and compare series and parallel circuits. You will perform a virtual lab to investigate the relationships between voltage and current and resistance and current. In an interactive discussion with your classmates, you will debate if using hybrid electric vehicles may help to solve some of our energy problems and discuss some of the environmental problems associated with carbon emissions.	HS-PS2-2, HS-PS2-4, HS-PS3-5, HS-PS2-6, HS-ESS1-3, HS-LS4-1	•Apply the basic properties of electric charges to explain the transfer of charges by contact, induction, and polarization •Describe the basic properties of electric current to solve problems relating current, charge, and time •Calculate resistance, current, and potential difference in a circuit •Differentiate between direct current and alternating current •Analyze the physical components of a circuit in to deduce the potential difference across a circuit
Unit 3: Magnetism and Atomic Physics In this unit you will explore the relationship between electricity and magnetism. You will learn how electromagnets work, analyze the forces exerted on charges in a magnetic field, and study a field of physics known as quantum mechanics, which describes the physics of the particles that make up atoms. You will perform virtual labs to investigate the magnitude of the magnetic fields of solenoids and the relationship between kinetic energy, emitted electrons, and the wavelengths of light.	HS-PS2-5, HS-PS3-5, HS-PS4-1, HS-PS4-3, HS-PS4-5, HS-PS2-6, HS-ESS1-3, HS-LS4-1	•Identify the forces exerted on charged particles that are moving in a magnetic field •Describe the magnetic field produced by an electric current •Explain how changes in magnetic fields affects the magnitude and direction of an induced current •Differentiate between the means by which the waves of the electromagnetic spectrum transfer energy •Compare and contrast the theories of classical physics and quantum mechanics used to describe phenomena at the atomic level
Unit 4: Final Review and Exam In this unit, you will have the opportunity to prepare for and take the final exam. The final exam may include any material that has been presented throughout the semester. Since this is a comprehensive exam, it may be helpful to organize your notes and answers to questions before you begin to review.		•Review key concepts of the semester •Apply knowledge of key concepts