

Wyoming Department of Education Required Virtual Education Course Syllabus

BIG HORN COUNTY SCHOOL DISTRICT #1

Program Name	WYCA	Content Area	Science
Course ID	CASC86335	Grade Level	9, 10, 11, 12
Course Name	AP Environmental SC A	# of Credits	0.5
SCED Code	03207E0.5021	Curriculum Type	Connections Academy

COURSE DESCRIPTION

The goal of AP Environmental Science is to provide the student with the scientific principles, concepts, and methodologies required to understand the interrelationships of the natural world and to identify and analyze environmental problems that are natural and made by humans. The student will evaluate the relative risks associated with these problems and examine alternative solutions for resolving or preventing problems. Laboratory experiments support student content mastery in both hands-on and virtual experiences.

WYOMING CONTENT AND PERFORMANCE STANDARDS

STANDARD#	BENCHMARK
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-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-LS1-2	Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multi-cellular organisms.
HS-LS1-5	Use a model to illustrate how photosynthesis transforms light energy into stored chemical energy.
HS-LS1-7	Use a model to illustrate that cellular respiration is a chemical process whereby the bonds of sugar molecules are broken and the bonds in new compounds are formed resulting in a net transfer of energy.
HS-LS2-2	Use mathematical representations to support and revise explanations based on evidence about factors affecting biodiversity and populations in ecosystems of different scales.
HS-LS2-4	Use mathematical representations to support claims for the cycling of matter and flow of energy among organisms in an ecosystem.
HS-LS2-5	Develop a model to illustrate the role of photosynthesis and cellular respiration in the cycling of carbon among the biosphere, atmosphere, hydrosphere, and geosphere.
HS-LS2-6	Evaluate the claims, evidence, and reasoning that the complex biotic and abiotic interactions in ecosystems maintain relatively consistent numbers and types of organisms in stable conditions, but changing conditions may result in a modified ecosystem.
HS-LS2-7	Evaluate and assess impacts on the environment and biodiversity in order to refine or design a solution for detrimental impacts or enhancement for positive impacts.
HS-LS2-8	Evaluate the evidence for the role of group behavior on individual and species' chances to survive and reproduce.
HS-LS3-3	Apply concepts of statistics and probability to explain the variation and distribution of expressed traits in a population.
HS-LS4-2	Construct an explanation based on evidence that the process of evolution primarily results from four factors: (1) the potential for a species to increase in number, (2) the heritable genetic variation of individuals in a species due to mutation and sexual reproduction, (3) competition for
HS-LS4-4	Construct an explanation based on evidence for how natural selection leads to adaptation of populations.
HS-LS4-5	Evaluate the evidence supporting claims that changes in environmental conditions may result in: (1) increases in the number of individuals of some species, (2) the emergence of new species over time, and (3) the extinction of other species.
HS-LS4-6	Create and/or use a simulation to evaluate the impacts of human activity on biodiversity.
HS-ESS1-5	Evaluate evidence of the past and current movements of continental and oceanic crust and the theory of plate tectonics to explain the ages of crustal rocks.
HS-ESS2-5	Plan and conduct an investigation of the properties of water and its effects on Earth materials and surface processes.
HS-ESS2-6	Develop a quantitative model to describe the cycling of carbon among the hydrosphere, atmosphere, geosphere, and biosphere.
HS-ESS3-3	Use computational tools to illustrate the relationships among management of natural resources, the sustainability of human populations, and biodiversity.
HS-ESS3-4	Evaluate or refine a technological solution that reduces impacts of human activities on natural systems.
HS-ESS3-6	Use the results of a computational representation to illustrate the relationships among Earth systems and how those relationships are being modified due to human activity.

SCOPE AND SEQUENCE

UNIT OUTLINE	STANDARD#	OUTCOMES
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<p>Unit 1: Environmental Problems and Sustainability This unit provides you with an overview of environmental issues. You will experience the interdisciplinary nature of the course, with lessons on politics, economics, and history.</p>	<p>HS-LS2-7, HS-LS4-5, HS-ESS3-4</p>	<ul style="list-style-type: none"> •define and discuss the implications of sustainability, sustainable society, sustainable yield, and environmental degradation •describe modern environmental problems and potential solutions •describe changes that occurred in human population distribution, employment, and relationships between societies as the Agricultural Revolution unfolded •discuss the Industrial Revolution, focusing on changes in energy consumption •compare and contrast hunter-gatherer societies, agricultural societies, and industrial societies and the impact of their societies on the environment •construct a timeline showing the relationship between environmental change and cultural change •distinguish among non-renewable, renewable, and potentially renewable resources; products that can be reduced, reused and recycled; point source of pollution and non-point source of pollution; and degradable, slowly •discuss the difference between science and non-science •explain the differences between science and technology •analyze a list and flow chart that represent the Scientific Method •apply the use of models in environmental science •describe the relationship among natural resources, manufactured capital, and human capital •identify negative externalities in a product life cycle •compare and contrast economic systems •evaluate measurement systems for valuing economies •describe the process through which an environmental
<p>Unit 2: The Living World In this unit, you will investigate the components of the living world: species, populations, symbiotic relationships like predator-prey, food webs, and the energy involved in the living systems. This unit draws on your previous knowledge of biology courses. Biogeochemical cycles and biodiversity are included in this unit.</p>	<p>HS-LS1-5, HS-LS1-7, HS-LS2-2, HS-LS2-4, HS-LS2-5, HS-LS2-6, HS-LS2-7, HS-LS4-2, HS-LS4-4, HS-LS4-6, HS-ESS2-5, HS-ESS2-6, HS-ESS3-4</p>	<ul style="list-style-type: none"> •describe the levels of organization in ecology •identify and describe the characteristics of life •differentiate between biotic and abiotic components of an ecosystem •explain the difference between food chains and food webs •predict changes in ecosystem services resulting from environmental degradation •define the terms lithosphere, hydrosphere, and atmosphere •distinguish between the first and second law of thermodynamics •draw and label an energy pyramid •explain the differences between a closed system and an open system •draw, label, and describe the process and importance of the following cycles: water, carbon, nitrogen, phosphorous, and sulfur •describe a biological community •explain the difference between primary and secondary succession
<p>Unit 3: The Physical World In this unit, the physical world is the focus. Climate, biomes, ocean circulation, and the structure of the lithosphere, hydrosphere, and atmosphere are included in this unit.</p>	<p>HS-LS1-2, HS-ESS1-5, HS-ESS3-4, HS-ESS3-6</p>	<ul style="list-style-type: none"> •analyze the properties of layers of the atmosphere •distinguish between weather and climate •describe global air-circulation patterns •explain the relationship between solar intensity, latitude, and seasons •define the term biome •compare and contrast major terrestrial biome types •describe adaptations required for organisms to thrive in each biome •describe ocean circulation patterns •analyze ocean-atmosphere interactions •evaluate current fishing practices and relevant laws •identify the location, seasonality, and effects of ENSO •describe the different types of aquatic biomes •explain the components of a watershed •outline the ecological functions performed by wetlands

		<ul style="list-style-type: none"> •differentiate among the layers of Earth's interior •compare and contrast plate boundaries and resulting geologic features •describe the rock cycle and the interrelationships among the different rock types •explain the environmental impacts of extracting, processing, and consuming mineral resources •summarize the differences between mineral resources and mineral reserves •describe the commercial and ecological significance of forests •distinguish between the goals of even-aged management and uneven-aged management •evaluate the types of tree harvesting in industrial forestry and sustainable forestry
<p>Unit 4: Population In this unit, Population, you are introduced to population dynamics, demographics, and urbanization.</p>	<p>HS-LS2-8, HS-LS3-3, HS-LS4-2, HS-ESS3-3, HS-ESS3-4</p>	<ul style="list-style-type: none"> •develop equations to describe the relationship between birth rate, death rate, emigration, and immigration rates and the rate of population change •describe how fertility rate and reproductive strategies affect population growth •examine factors that affect birth rate and factors that affect death rate •describe three approaches to slowing human population growth and overpopulation •evaluate the controversies that surround controlling human population growth •interpret age-structure diagrams •summarize social impacts resulting from declining populations •describe demographic transitions and how they affect birth rate/death rate •evaluate the relationship between age and population
<p>Unit 5: Energy This unit is a very important unit that introduces all types of energy: energy units of measurement, calculations and conversions, fossil fuels, nuclear power, and alternative energy sources.</p>	<p>HS-PS1-8, HS-PS3-1, HS-ESS3-4</p>	<ul style="list-style-type: none"> •distinguish among amps, volts, and watts •describe how electricity is generated and flows •describe the relationship between the first law of thermodynamics and energy resources •describe the relationship between the second law of thermodynamics and the efficiency of energy generation •distinguish among types of oil •describe the advantages and disadvantages of using conventional oil, oil from oil shale, and oil from tar sands as an energy source •distinguish among types of gas •describe the advantages and disadvantages of using natural gas as an energy source •distinguish among types of coal •describe the advantages and disadvantages of using coal as an energy source •examine the factors that affect demand for fossil fuels •analyze the ways in which future demand for fossil fuels can be anticipated •describe fossil fuel reserves and resources •describe the components of a conventional nuclear reactor •examine advantages and disadvantages of using •compare and contrast renewable energy sources •evaluate using hydrogen gas as an energy source •anticipate sources of tension in a sustainable energy revolution •evaluate geothermal, hydrogen, solar, and biomass energy as energy sources •compare and contrast forms of energy generated from water •describe how wind energy is generated •construct arguments for and against the use of hydroelectric energy •describe the advantages and disadvantages of improving energy efficiency •examine cogeneration

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| | | <ul style="list-style-type: none">•evaluate potential actions for energy efficiency to decrease your own energy use•analyze the interactions of economic policy and energy resources•analyze the future of sustainable energy use in the United States |
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