Wyoming Department of Education
Required Virtual Education Course Syllabus

Washakie County School District No. 1

Program Name	Washakie #1 Online	Content Area	SC
Course ID	WOL-BIOB-CR	Grade Level	9-12
Course Name	WOL-Biology-B CR	# of Credits	0.5 Total
SCED Code	03051G0.5022	Curriculum Type	K-12 Fuel Education

COURSE DESCRIPTION

In second semester of this comprehensive course, students continue to investigate the chemistry of living things: the cell, genetics, evolution, the structure and function of living things, and ecology going deeper into Biology concepts. The program consists of in depth online lessons, including extensive animations, an associated reference book, collaborative explorations, virtual laboratories, and hands-on laboratory experiments students can conduct at home.

In this credit recovery course, students will progress through content on an individual need basis. Required content will be assigned based on previous performance in the regular Biology B course. Students will be assigned lessons and objectives not mastered during the original Biology B course. This course can be taken only as Pass/Fail option.

WYOMING CONTENT AND PERFORMANCE STANDARDS	
STANDARD#	BENCHMARK (Standard/Indicator) Use the Standards and Benchmarks as Spreadsheets
HS-LS1-1	Construct an explanation based on evidence for how the structure of DNA determines the structure of proteins which carry out the essential functions of life through systems of specialized cells.
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-LS1-3	Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis.
HS-LS2-1	Use mathematical and/or computational representations to support explanations of factors that affect carrying capacity of ecosystems at different scales.
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-LS2-3	Construct an explanation based on evidence for the cycling of matter and flow of energy in aerobic and anaerobic conditions, and revise as needed.
HS-LS2-4	Use mathematical representations to support claims for the cycling of matter and flow of energy among organisms in an ecosystem.
HS-LS2-6	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-LS3-1	Ask questions to clarify relationships about the role of DNA and chromosomes in coding the instructions for characteristic traits passed from parents to offspring.
HS-LS3-2	Make and defend a claim based on evidence that inheritable genetic variations may result from: (1) new genetic combinations through meiosis, (2) viable errors occurring during replication, and /or (3) mutations caused by environmental factors.
HS-LS3-3	Apply concepts of statistics and probability to explain the variation and distribution of expressed traits in a population.
HS-LS4-1	Communicate scientific information that common ancestry and biological evolution are supported by multiple lines of empirical evidence.

WYOMING CONTENT AND PERFORMANCE STANDARDS	
STANDARD#	BENCHMARK (Standard/Indicator) Use the Standards and Benchmarks as Spreadsheets
HS-LS4-2	Construct an explanation based on evidence that the process of evolution primarily result s 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 limited resources, and (4) the proliferation of those organisms that are better able to survive and reproduce in the environment.
HS-LS4-3	Apply concepts of statistics and probability to support explanations that organisms with an advantageous heritable trait tend to increase in proportion to organisms lacking this trait.
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-ETS1-1	Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants.
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
Semester 2		
Unit 1: Gene Expression • Semester Introduction • Proteins Express DNA • How Proteins Work • Gene Expression 1 • Gene Expression 2 • Biotechnology • Genetic Engineering	HS-LS1-1	Students read scientific text and analyze diagrams outlining the structure of DNA and learning how important it is for all living things. Students learn about proteins as carriers of oxygen, enzymes and providing structure and support for cells.
Unit 2: Evolution • Evolution and Biology • Evolution of Populations • Multiplying Variation in Populations • Types of Natural Selection • History of Evolutionary Thought • Evidence for Evolution 1 • Evidence for Evolution 2 • Evolution and Earth History • Laboratory: Process of Natural Selection 1 • Laboratory: Process of Natural Selection 2 • Genetic Basis of Evolution • The Hardy-Weinberg Equation • Geographic Isolation • Genetic Isolation	HS-LS2-2 HS-LS2-6 HS-LS2-7 HS-LS3-1 HS-LS3-2 HS-LS3-3 HS-LS4-1 HS-LS4-2 HS-LS4-3 HS-LS4-4 HS-LS4-5	Students read scientific text and analyze diagrams to understand how changes in ecosystems affect biodiversity. Many real world examples are given to support the explanations including loss of habitat and loss of predators. Students read scientific text and complete online activities about ecosystem changes, including a story about the arc-crested fruitdove to show the ratios of alleles for any given trait are not fixed and can change. Students read scientific text and complete online activities examining biodiversity, human impact, and environmental challenges, including a fictional story about a human-introduced predator to a system and a laboratory experiment exploring patterns of succession at Mount Saint Helens in an area of clear-cut. Students read scientific text and complete online activities to understand inheritance and how physical traits are passed from parent to offspring.

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		Students read scientific text and perform online activities examining mutations by sexual reproduction and environmental factors and gain an understanding of how sexual reproduction increases variation in a population. Students read scientific text and perform a laboratory experiment examining genetic crosses to investigate variation in populations. Students read about a fictional fruit-dove population and changes in allele frequencies of a given trait and perform a laboratory experiment modeling natural selection on leg length in lizards and discuss their results with others. Students complete online activities to better understand the process of evolution and learn to craft an argument based on gathered evidence through their honors project work. Students perform a laboratory experiment modeling natural selection on leg length in lizards and discuss their results with others. Students read scientific text and complete online activities to better understand genetic variation and the importance of a diverse population in face of environmental variables such as weather extremes, changes in food supply, or disease. Students perform a laboratory experiment modeling natural selection on leg length in lizards and discuss their results with others. Students perform a laboratory experiment to model how natural selection will act on a hypothetical trait of leg length in lizards. Students read scientific text and analyze numerous examples of how environmental conditions, such as extreme weather, sudden impacts, and loss of habitat can change the composition of an ecosystem.
Unit 3: Survey of Living Things 1 • Classification and Taxonomy • Modern Classification • Laboratory: Dichotomous Key • Viruses and Prokaryotes Protists and Fungi • Animals • Plants • Three Representative Organisms • Getting Energy • Digestion • Digestion in Humans • Laboratory: Human Digestion Actions 1 • Waste Removal	HS-LS1-2 HS-LS1-3	Students read scientific text about various systems in life science and analyze organizational systems including cell structure, gene expression, organ systems in humans and other animals. Students read scientific text about homeostasis and feedback mechanisms in living systems. Students conduct a laboratory experiment on human digestion to better understand positive and negative feedback mechanisms. Students test different acids to determine those acting like our stomach acids and learn bicarbonate is released after a round of digestion

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• Laboratory: Human Digestion Actions 2 • Waste Removal in Humans • Obtaining Oxygen and the Human Body		to neutralize the acids and function in opposition to the acids.
Unit 4: Survey of Living Things 2 • How Organisms Monitor Their Environments • Human Nervous System • Feedback Mechanisms • How Living Things Respond to Their Environments • Muscular Systems • How Muscles Contract • Laboratory: Chicken Muscles 1 • Laboratory: Chicken Muscles 2 • Fern Reproduction • Flatworm Reproduction • Human Reproduction • How Organisms Defend Themselves • Human Immune Response 1 • Human Immune Response 2 • Plant Defenses	HS-LS1-2 HS-LS3-1	Students read scientific text about various systems in life science and analyze organizational systems including cell structure, gene expression, organ systems in humans and other animals. Students perform a laboratory experiment examining a chicken wing and contribute to a discussion on the relationship between the skeletal and muscular systems in relation to movement. Students read scientific text and complete online activities to understand inheritance and how physical traits are passed from parent to offspring.
Unit 5: Ecology and the Environment • Individuals and Populations Communities ● Ecosystems • Ecosystem Stability • Biomes • Biodiversity • Energy Flow in Ecosystems • Food Chains and Food Webs • Succession • Laboratory: Patterns of Succession • Changes in Ecosystems • Water and Nitrogen Cycles • Carbon and Oxygen Cycles • Laboratory: Fixation in Root Nodules 1 • Laboratory: Fixation in Root Nodules 2 • Laboratory: The Effects of Acidity on Seed Germination 1 • Natural Resources • Environmental Challenges • Global Temperatures • Pollution • Laboratory: The Effects of Acidity on Seed Germination 2	HS-LS2-3 HS-LS2-1 HS-LS2-2 HS-LS2-4 HS-LS2-6 HS-LS2-7 HS-LS4-6 HS-LS4-5 HS-ETS1-1 HS-ETS1-2	Students read scientific text, analyze diagrams, and complete online activities to understand systems of living things for aerobic conditions and for those living things, such as bacteria, that do not use oxygen. Students read scientific text and consider carrying capacity in a kelp, sea urchin, otter model. They define exponential growth and keystone species, examine numbers pyramids, and use trophic levels to gain a better understanding of the importance of balance in ecosystems. Students read scientific text and analyze diagrams to understand how changes in ecosystems affect biodiversity. Many real world examples are given to support the explanations including loss of habitat and loss of predators. Students read scientific text and complete online activities about ecosystem changes, including a story about the arc-crested fruitdove to show the ratios of alleles for any given trait are not fixed and can change Students read scientific text and complete online activities examining biodiversity, human impact, and environmental challenges, including a fictional story about a human-introduced predator to a system and a laboratory experiment exploring patterns of succession at Mount Saint Helens in an area of clear-cut.

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UNIT OUTLINE	STANDARD#	OUTCOMES OBJECTIVES/ STUDENT CENTERED GOALS
		Students read scientific text and complete online activities learning about human impact on living things and conduct an experiment observing acidic pollutants effect on seed germination and ways to mitigate it. Students read scientific text and analyze numerous examples of how environmental conditions, such as extreme weather, sudden impacts, and loss of habitat can change the composition of an ecosystem. Students will analyze, discuss (in threaded discussions), and specify qualitative and quantitative criteria and constraints for solutions to environment issues that confront modern society including (but not limited to) excessive use of nonrenewable resources, destructive practices in acquiring materials, inadequate policies in waste disposal, lack of planning for long-term effects, massive increases and spread of human populations. Students will discuss and evaluate solutions to discuss and design solutions to a real-world problem.
Unit 6: Semester Review and Test • Semester Review • Semester Test		