Wyoming Department of Education Required Virtual Education Course Syllabus

Platte County School District # 1

Program Name	Peak High School	Content Area	SC
Course ID	O400002	Grade Level	Grades 9-12
Course Name	Biology I	# of Credits	1.0
SCED Code	03051G1.0011	Curriculum Ty	Online Edgenuity Course

COURSE DESCRIPTION

This compelling full-year course engages students in the study of life and living organisms and examines biology and biochemistry in the real world. It encompasses traditional concepts in biology and encourages exploration of new discoveries in this field of science. The components include biochemistry, cell biology, cell processes, heredity and reproduction, the evolution of life, taxonomy, human body systems, and ecology.

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-LS1-4	Use a model to illustrate the role of cellular division (mitosis) and differentiation in producing and maintaining complex organisms.
HS-LS1-5	Use a model to illustrate how photosynthesis transforms light energy into stored chemical energy.
HS-LS1-6.	Construct explanations and revise, as needed, based on evidence for: 1) how carbon, hydrogen, and oxygen may combine with other elements to form amino acids and/ or other large carbon-based molecules, and 2) how other hydrocarbons may also combine to form large carbon-based molecules.
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-LS2-3	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-LS2-5	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-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-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-LS4-1	Communicate scientific information that common ancestry and biological evolution are supported by multiple lines of empirical evidence.
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
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-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-ESS1-6	Apply scientific reasoning and evidence from ancient Earth materials, meteorites, and other planetary surfaces to construct an account of Earth's formation and early history.
HS-ESS2-2	Analyze geoscience data to make the claim that one change to Earth's surface can create feedbacks that cause changes to
HS-ESS2-4	Use a model to describe how variations in the flow of energy into and out of Earth's systems result in changes in climate.
HS-ESS2-6	Develop a quantitative model to describe the cycling of carbon among the hydrosphere, atmosphere, geosphere, and biosphere.
HS-ESS2-7	Construct an argument based on evidence about the simultaneous coevolution of Earth's systems and life on Earth.
HS-ESS3-1	Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and changes in climate have influenced human activity.
HS-ESS3-2	Evaluate competing design solutions for developing, managing, and using energy and mineral resources based on cost - benefit ratios.
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-ESS3-5	Analyze data and the results from global climate models to make an evidence-based forecast of the current rate of global or regional climate change and associated future impact s to Earth 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.
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-ETS1-3	Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics as well as possible social, cultural, and environmental impacts.

SCOPE AND SEQUENCE

UNIT OUTLINE	STANDARD#	OUTCOMES OBJECTIVES/STUDENT CENTERED GOALS
Building Blocks of Life	**HS-LS1-2** HS-LS1-6. HS-LS1-7. HS-LS2-5. HS-LS3-1. HS-LS3-2. HS-PS1-4. HS-PS1-5.	Students will understand: How do living and nonliving organisms work together to create the hierarchical and cyclical orders? How do the six most common elements make living on Earth possible?What is the role of Carbohydrates in living organisms? What is the role of lipids within living organisms? What are the roles of proteins and nucleic acids in living organisms? How do catalysts affect the rate of a chemical reaction?
Cell Biology	**HS-LS1-5**. HS-LS1-6. HS-LS1-7. HS-LS2-3. HS-LS2-4. HS-LS2-5. HS-PS1-2.	Why are organelles important in cells? What are the main differences between plant and animal cells, why are these differences important? How do living organisms rely on ATP to survive? What are the steps for light-dependent reactions in photosynthesis?

Cellular Processes	HS-LS1-1. HS-LS1-2. HS-LS1-3. HS-LS1-4. HS-LS1-6. HS-LS3-1. HS-LS3-2. HS-LS3-3. HS-LS4-2. HS-LS4-4.	How did microscopes affect how we learn about cells today?Why is it important to understand the difference between prokaryotic and eukaryotic cells? Why is it important that cells maintain homeostasis? Why is mitosis important to living organisms? Why is meiosis important to living organisms? How is mitosis and meiosis important to cellular reproduction? Why is important that living organisms have specialized cells?
Molecular Genetics	HS-LS1-1. HS-LS1-6. HS-LS2-2. HS-LS3-1. HS-LS3-2. HS-LS3-3. HS-LS4-4.	How are does DNA, genes, and chromosomes work together to determine living organisms genetic information?What are the main differences between DNA and RNA?How do the different chromosomes express themselves in living organisms? Why is it important that Proteins are translated correctly? Why is it important that DNA goes through transcription and translation? How do mutations affect living organisms? How do the different chromosomes express themselves in living organisms?
Ecology	HS-ESS1-6. HS-ESS2-2. HS-ESS2-4. HS-ESS2-6. HS-ESS3-1. HS-ESS3-2. HS-ESS3-3. HS-ESS3-4. HS-ESS3-5. HS-ESS3-6. HS-ETS1-1. HS-ETS1-3. HS-LS1-5. HS-LS2-5 HS-LS2-6.	Students will demonstrate hierarchy of organisms by creating a flow chart. How do symbiotic relationships create dependency among species? Students will understand how organisms in the environment work together to survive and maintain homeostasis in the ecosystem.How do producers, consumers, and decomposers work together through the food web? What are some of the main factors that disturb ecosystem stability? How do biotic and abiotic factors work together within an ecosystem? Why is it important to understand how humans affect the environment?

Heredity	**HS-LS1-1.** **HS-LS1-2.** **HS-LS1-6.** **HS-LS3-1.** **HS-LS3-3.**	Students will show understanding of: How did Gregor Mendel change the way scientists work with genetics? How can you calculate genetic possibilities using punnett squares? Describe how the principle of dominance applies to genes? How do dominant and recessive alleles get passed from parents to offspring? How do incomplete dominance and codominance show their effects on organisms through genetics? How do sex-linked traits get passed from parents to offspring?
Evolution of Life	**HS-ESS1-5** **HS-ESS1-6.** **HS-ESS2-7.** **HS-LS1-1.** **HS-LS1-3.** **HS-LS1-6.** **HS-LS2-2.** **HS-LS3-1.** **HS-LS3-2.** **HS-LS4-2.** **HS-LS4-3.** **HS-LS4-5.**	Students will demonstrate an understanding of: What was Darwin's Theory? How do environmental factors affect evolution? How does natural selection affect organisms over time? Why is it important to understand the Hardy-Weinberg Principle? Why is biological diversity important to the environment? How does biogeographic isolation affect an organism? How does the fossil record support the theory of evolution? How do scientists use evolutionary relationships to determine shared characteristics between organisms? How do hominid fossils show the evolution of modern humans?
Taxonomy	**HS-LS1-1.** **HS-LS1-2.** **HS-LS1-3.** **HS-LS1-6.** **HS-LS2-2.** **HS-LS2-3.** **HS-LS2-4.** **HS-LS2-5.** **HS-LS3-1.** **HS-LS4-1.** **HS-LS4-2.**	Students will demonstrate an understanding of: Why is it important that scientists use a biological taxonomy system? Why did scientists split the biological classification system to six different kingdoms? How does the function of a plant affect the way it is grouped? Why is it important that plants have the function to complete transport, reproduction, and response? Why are protists and fungi not listed under they plant phyla? How does good and bad bacteria function differently in the environment?