Wyoming Department of Education Required Virtual Education Course Syllabus

BIG HORN COUNTY SCHOOL DISTRICT

Program Name	WYCA	Content Area	Science
Course ID	CASC80268	Grade Level	9, 10, 11, 12
Course Name	Honors Biology A	# of Credits	0.5
SCED Code	03051H0.5012	Curriculum Type	Connections Academy

COURSE DESCRIPTION

In this course, the student will study the science of life. The student will explore the idea that living things are extremely diverse in form, yet are unified by certain core characteristics that they all share. In learning about these core characteristics, the student will be able to critically evaluate data and information related to biological problems, connect many ideas to the student's own life, and see the world in a new way. This Honors level course includes ample opportunities for the student to engage in open-ended extension activities and independent research and demonstrate critical thinking skill. There are ample opportunities for students to engage in open-ended extension activities, conduct independent research, and demonstrate critical thinking skills. In addition, the course includes assessments that are differentiated from those in the standard course. Students complete a long-term research project throughout the second semester of the course.

WYOMING CONTENT AND PERFORMANCE STANDARDS

STANDARD#	BENCHMARK
HS-PS1-1.	Use the periodic table as a model to predict the relative properties of elements based on the patterns of electrons in the outermost energy level of atoms.
HS-PS4-2.	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-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-LS2-1.	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-LS2-5.	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-LS3-1.	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.
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
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-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-ESS2-5.	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-ESS2-7.	Construct an argument based on evidence about the simultaneous coevolution of Earth's systems and life on Earth.
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-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-ETS1-4.	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.

SCOPE AND SEQUENCE

UNIT OUTLINE	STANDARD#	OUTCOMES
Unit 1: The Nature of Life In this unit, you will begin by considering the fundamental nature of science and the role it plays in the study of biology. You will lay a foundation for the remainder of the course by exploring the unifying factors that are common to all living things.	HS-PS1-1, HS-PS4-2, HS-LS1-3, HS-LS1-5, HS-LS1-6, HS-LS1-7, HS-LS3-1, HS-LS4-1, HS-ETS1-1, HS-PS2-5, HS-PS3-4, HS-ESS2-5,HS-ESS3-2	•Explain the role of science in the study of life •Describe the chemical basis of life
Unit 2: Ecology In this unit, you will study the environmental factors, both living and non-living, that affect the survival of organisms. You will learn how matter and energy move in and between ecosystems, creating networks and links that connect all of the organisms on Earth. You will complete a unit portfolio assessment in which you measure the biodiversity of organisms in a simulated ecosystem.	HS-LS2-1, HS-LS2-2, HS-LS2-4, HS-LS2-6, HS-LS2-7, HS-LS4-5, HS-LS4-6, HS-ESS2-4, HS-ESS2-6, HS-ESS3-3, HS-ESS3-4, HS-ETS1-4, HS-ESS2-4, HS-PS3-1, HS-PS3-3, HS-PS4-4, HS-LS3-2	•Explain how the survival of organisms is affected by interactions between the organisms and the living and non-living things in their environment •Analyze the factors that shape ecosystems •Explain the factors that influence the sizes of populations •Evaluate the effects of humans on ecosystems

Unit 3: Cells In this unit, you will focus on the cell as the smallest unit of life. You will investigate cell size, structure, and organization, and link these characteristics to the many functions that the cell performs. As a unit portfolio assessment, you will carry out a lab exercise to study the effect of cell size on diffusion of materials into the cell.	HS-LS1-2, HS-LS1-3, HS-LS1-4, HS-LS1-5, HS-LS1-7, HS-LS2-3, HS-LS2-5, HS-PS1-1, HS-PS1-1, HS-LS1-4, HS-LS1-5	•Describe the cell as the fundamental unit of life and explain how cell structure supports the various life functions it must carry out •Explain how photosynthetic organisms convert radiant energy from the sun to chemical energy •Explain how organisms use chemical energy to drive basic life functions •Describe the cell cycle and cell division and explain their importance to an organism
Unit 4: Genetics In this unit, you will learn how biological information is encoded and passed from an organism to its offspring. You will begin with the work of Gregor Mendel to understand the basis for the patterns of inheritance that can be observed any time the features of parents and their young are compared. You will move on to develop an understanding of the basic unit of biological information, the gene, as a sequence of DNA. As part of this unit, you will complete a portfolio assessment in which you will make and present a model to describe the process of meiosis.	HS-LS1-1, HS-LS3-1,HS-LS3-2, HS-LS3-3, HS-LS4-1, HS-LS4-3, HS-ESS1-1, HS-ESS2-1, HS-ESS2-3, HS-ESS2-6, HS-PS1-4, HS-PS1-8, HS-LS2-5, HS-LS1-2, HS-PS3-5, HS-LS4-2, HS-LS4-4, HS-ESS1-2, HS-ESS2-2, HS-PS2-1, HS-PS4-5, HS-LS2-6, HS-PS4-3, HS-ESS3-2	•Explain how traits of organisms are passed from one generation to the next using the principles of Mendel and the concept of meiosis •Explain the chemical basis of biological information •Describe the flow of biological information from gene to protein •Describe ways that the study of genetics is being applied to understand human biology and to understand and manipulate the traits of other organisms
Unit 5: Semester Review and Final The Biology A semester exam will cover objectives from all lessons you have completed throughout this course.	HS-PS1-1, HS-LS1-1, HS-LS1-2, HS-LS1-3, HS-LS1-5, HS-LS1-6, HS-LS1-7, HS-LS2-1, HS-LS2-2, HS-LS2-3, HS-LS2-4, HS-LS2-5, HS-LS2-6, HS-LS2-7, HS-LS3-1, HS-LS3-2, HS-LS3-3, HS-LS4-1, HS-LS4-3, HS-LS4-5, HS-LS4-6, HS-ESS2-4, HS-ESS3-3, HS-ESS3-4, HS-ETS1-1, HS-ESS1-1, HS-ESS2-1, HS-ESS2-3, HS-ESS2-6, HS-PS1-4, HS-PS1-8, HS-LS2-5, HS-PS3-2, HS-PS3-5, HS-PS1-3, HS-PS2-5, HS-PS3-4, HS-LS1-3, HS-ESS2-5, HS-LS2-1, HS-ESS2-2, HS-PS2-1, HS-ESS3-2	•Review the concepts presented throughout the course •Students demonstrate their knowledge of the concepts covered in this course