

# Wyoming Department of Education Required Virtual Education Course Syllabus

## BIG HORN COUNTY SCHOOL DISTRICT #1

Program Name	WYCA	Content Area	Science
Course ID	CASC80310	Grade Level	9, 10, 11, 12
Course Name	Honors Biology B	# of Credits	0.5
SCED Code	03051H0.5022	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 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-ESS2-6.	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
<p><b>Unit 1: Evolution</b></p> <p>In this unit, you will consider the observations Charles Darwin made that led him to propose his theory of evolution. You will explore the range of diversity of living organisms as well as the methods biologists use to classify them, which are rooted in evolutionary theory. As a portfolio assessment, you will develop a dichotomous key for identifying a group of organisms in your local area.</p>	<p>HS-LS1-5, HS-LS1-6, HS-LS3-1, HS-LS3-2, HS-LS3-3, HS-LS4-1, HS-LS4-2, HS-LS4-3, HS-LS4-4, HS-LS4-5, HS-ESS2-7, HS-PS1-1, HS-LS1-4, HS-LS1-5, HS-LS1-7, HS-LS1-1, HS-ESS1-2, HS-ESS2-7</p>	<ul style="list-style-type: none"> <li>• Explain the concept of natural selection</li> <li>• Explain how species evolve</li> <li>• Describe the classification of organisms by biologists</li> <li>• Explain why fossils have been important in establishing current thinking about the history of life on Earth</li> </ul>

<p><b>Unit 2: From Microorganisms to Plants</b>          In this unit, you will explore the structure, function, reproduction, and evolution of viruses and the organisms in the kingdoms of Eubacteria, Archaeobacteria, "Protista," Fungi, and Plantae. You will discover the ways in which plants respond to their environments and why they do so. You will research and prepare a presentation about an organism that causes human disease as a portfolio assessment.</p>	<p>HS-LS1-1, HS-LS1-2, HS-LS1-3, HS-LS2-4, HS-LS4-1, HS-LS4-4, HS-LS4-2, HS-ESS1-2, HS-LS2-8</p>	<ul style="list-style-type: none"> <li>• Differentiate between viruses and prokaryotes, and explain how their structures and life cycles allow each to be successful</li> <li>• Describe the distinguishing features of protists and fungi and explain their ecological roles</li> <li>• Identify the four main groups of plants and describe the adaptations of each that have allowed them to be successful in terrestrial habitats</li> <li>• Describe the structures and functions of cells, tissues, and organs in seed plants</li> <li>• Explain the effects of environmental factors on plant reproduction, growth, and development</li> </ul>
<p><b>Unit 3: Animals</b>          In this unit, you will explore the evolution and diversity of the animal kingdom. You will discover how scientists classify animals, how their body systems work together to maintain homeostasis, and how animal behavior affects their survival. You will research and prepare a presentation explaining how animal body structures are related to their function and as a portfolio assignment, and you will explore some trends in animal evolution.</p>	<p>HS-LS1-2, HS-LS1-3, HS-LS2-8, HS-LS4-1, HS-LS4-4, HS-LS4-5, 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-PS3-2, HS-PS3-5</p>	<ul style="list-style-type: none"> <li>• Describe the traits that distinguish animals from other organisms</li> <li>• Explain the diversity of invertebrates, chordates, and primates using the theory of evolution</li> <li>• Describe the structures and body systems of animals that allow them to maintain homeostasis</li> <li>• Describe the structures and body systems of animals that allow them to sense and respond to their environment</li> <li>• Describe animal behavior</li> </ul>
<p><b>Unit 4: The Human Body</b>          In this unit, you will explore the structure and function of the human body systems and how they work together to maintain homeostasis. You will form hypotheses about the function of enzymes in the digestive system, design an experiment, and test your hypotheses as a portfolio assignment. You will also develop a healthy meal and exercise plan to include in your portfolio.</p>	<p>HS-LS1-2, HS-LS1-3, HS-LS1-6, HS-LS1-7, HS-PS1-1, HS-LS1-4, HS-LS1-5</p>	<ul style="list-style-type: none"> <li>• Describe the human circulatory, respiratory, digestive, and excretory systems and explain how these systems work together to maintain homeostasis</li> <li>• Describe the human nervous system and explain how this system controls body functions</li> <li>• Describe the human skeletal, muscular, and integumentary systems and explain how they function to provide physical support for the body</li> <li>• Describe the human endocrine and reproductive systems and explain their importance to the body as a whole</li> <li>• Describe the human immune system and explain its role in protecting the body from disease</li> </ul>
<p><b>Unit 5: Biology Semester B Review and Test</b>          The Biology B semester exam will cover objectives from all lessons you have completed this semester.</p>		<ul style="list-style-type: none"> <li>• Review the concepts presented throughout the course</li> <li>• Students demonstrate their knowledge of the concepts covered in this course</li> </ul>