Wyoming Department of Education Required Virtual Education Course Syllabus

Sheridan County School District # 1

Program Name	Sheridan County School District #1 Virtual School	Content Area	SC
Course ID	AC03052	Grade Level	10 - 12
Course Name	Honors Biology	# of Credits	1
SCED Code	03052	Curriculum Type	Acellus

COURSE DESCRIPTION

Acellus Honors Biology provides an in-depth introduction to biology, the study of life. A major focus of this course is the cell – its structure and function, cell transport and cellular energy, and how cells divide. Students will explore genetics and learn about DNA. Units on ecology and evolution are also included. Additional lessons have been included in this course to provide students with the more in-depth understanding that they will require for AP Biology.

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-LS1-3	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-LS2-8	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 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.

SCOPE AND SEQUENCE

UNIT OUTLINE	STANDARD#	OUTCOMES OBJECTIVES/STUDENT CENTERED GOALS
Unit 1 – Ecology	HS-LS2-1; HS-LS2-2; HS-LS2-3; HS-LS2-4; HS-LS2-6; HS-LS2-8	In this unit students learn about ecology and interdependence, the organization of the biosphere, producers, consumers, decomposition, the capturing of energy, the food web and food chain, ecological pyramids, the water, carbon, and nitrogen cycles, energy versus nutrients, primary productivity, and symbiotic relationships. They also learn about competition, mutualism and commensalism, predation, camouflage and mimicry, parasitism, significant species, population growth, carrying capacity, limits on population growth, and ecological succession.
Unit 2 – Carbon Compounds	HS-LS1-6	In this unit students study carbon compounds. They learn about carbon, monomers and polymers, carbohydrates, variation of polysaccharides, lipids, nucleic acids, proteins, enzymes, and chemical reactions.
Unit 3 – Cell Structure and Function	HS-LS1-2; HS-LS1-3	In this unit students study cell structure and function. They learn about cell organelles, the nucleus, mitochondria, ribosomes, cell theory, eukaryotes versus prokaryotes golgi apparatus – endoplasmic reticulum, vacuoles and lysosome, chloroplast, and endosymbiosis.
Unit 4 – Cell Transport	HS-LS1-2	In this unit students study cell transport. They learn about cell membranes, cell walls, strength of solutions, osmosis, diffusion, active versus passive transport, endo and exocytosis, and facilitated diffusion.

Unit 5 – Cellular Energy	HS-LS1-3; HS-LS1-5; HS-LS2-5; HS-LS1-7	In this unit students learn about how photosynthesis was discovered, the equation for photosynthesis and rates of photosynthesis. They also learn about the equation for cellular respiration, ATP and ADP, chlorophyll, pigments, stages of cellular respiration, fermentation, and photosynthesis and cellular respiration.
Unit 6 – Cell Division	HS-LS1-4	In this unit students study cell division. They learn about mitosis, why cells divide, cancer, meiosis and crossing over, haploid and diploid, mitosis and meiosis, asexual and sexual reproduction, the cell cycle, and cytokinesis.
Unit 7 – Genetics	HS-LS3-1; HS-LS3-2; HS-LS3-3	In this unit students learn about the contributions of Gregor Mendel to the science of genetics. They also learn about characters and traits, genotypes and phenotypes, genes and alleles, homozygous and heterozygus, fertilization, probability, Mendel's F1 cross, the law of segregation, Mendel's F2 Generation, incomplete dominance, codominance, multiple alleles, and polygenic versus single gene traits. In addition, they learn about sex and autosomal chromosomes and karyotypes, genetic engineering, sex-linked genes, and genetic disorders.
Unit 8 – DNA	HS-LS1-1; HS-LS3-1; HS-LS3-2; HS-LS3-3	In this unit students study DNA. They learn about the history, shape, and structure of DNA, as well as nucleosomes, replication, transcription, RNA, genetic code, translation, mutations, and gene regulation.
Unit 9 – Evolution	HS-LS2-8; HS-LS4-1; HS-LS4-2; HS-LS4-3; HS-LS4-4; HS-LS4-5	In this unit students study evolution. They learn about the work of Charles Darwin, the galapagos, inherited variation and artificial selection, the evidence of evolution, natural selection, vestigial structures, allele frequencies, changes in the population, and coevolution.