

Wyoming Department of Education Required Virtual Education Course Syllabus

Niobrara County School District # 1

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| Program Name | Wyoming Virtual Academy | Content Area | SC |
| Course ID | D-SCI-203BV2-K | Grade Level | 9-12 |
| Course Name | Summit Biology Core - Semester 2 | # of Credits | 0.5 |
| SCED Code | 03051G0.5022 | Curriculum Type | K12 Inc |

COURSE DESCRIPTION

In this course, students focus on the chemistry of living things: the cell, genetics, evolution, the structure and function of living things, and ecology. The program consists of online lessons including extensive animations, an associated reference book, collaborative activities, virtual laboratories, and hands-on laboratory experiments students can conduct at home.

WYOMING CONTENT AND PERFORMANCE STANDARDS

| STANDARD# | BENCHMARK (Standard/Indicator) Use the Standards and Benchmarks as Spreadsheets |
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| 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-LS1-5 | 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. | |
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| HS-LS2-8 | Evaluate the evidence for the role of group behavior on individual and species' chances to survive and reproduce. | |
| 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 results 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-PS1-7 | Use mathematical representations to support the claim that atoms, and therefore mass, are conserved during a chemical reaction. | |
| 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-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. | |
| 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 OBJECTIVES/STUDENT CENTERED GOALS |
| Unit 1: Molecular Genetics Lesson 1: Semester Introduction | | Complete the Semester Introduction. 0 Complete the Semester Introduction student activity. |

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| | | <p>Know that the Central Dogma of biology outlines the flow of information from transcription of RNA in the nucleus to translation of proteins on ribosomes in the cytoplasm.</p> <p>Explain how the flow of genetic information can be summarized in the Central Dogma of biology: DNA is transcribed into RNA, and RNA is translated into proteins.</p> <p>Know that the two main stages of protein production are transcription and translation.</p> |
| Unit 1: Molecular Genetics Lesson 2: DNA, RNA, and Proteins | 0 | <p>Explain that nucleic acids store information about how to build and run an organism.</p> <p>Understand that there are two types of nucleic acids: DNA and RNA.</p> <p>Explain that nucleic acids are the primary tools for sending information to the next generation.</p> <p>Explain that DNA is a double-stranded molecule that forms a double helix.</p> <p>Understand that nitrogenous bases from one strand of DNA bond to bases on the other strand in a very specific way.</p> |
| Unit 1: Molecular Genetics Lesson 3: Structure of DNA | 0 | |

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| | <p>Know that the Central Dogma of biology outlines the flow of information from transcription of RNA in the nucleus to translation of proteins on ribosomes in the cytoplasm.</p> <p>Explain how the flow of genetic information can be summarized in the Central Dogma of biology: DNA is transcribed into RNA, and RNA is translated into proteins.</p> <p>Know that the two main stages of protein production are transcription and translation.</p> <p>Explain that nucleic acids store information about how to build and run an organism.</p> <p>Understand that there are two types of nucleic acids: DNA and RNA.</p> <p>Explain that nucleic acids are the primary tools for sending information to the next generation.</p> <p>Explain that DNA is a double-stranded molecule that forms a double helix.</p> <p>Understand that nitrogenous bases from one strand of DNA bond to bases on the other strand in a very specific way.</p> | 0 |
| Unit 1: Molecular Genetics Lesson 4: Review Structure of DNA | | |

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| | | <p>Explain that nucleic acids store information about how to build and run an organism.</p> <p>Understand that there are two types of nucleic acids: DNA and RNA.</p> <p>Explain the main differences between DNA and RNA.</p> <p>Explain that most types of RNA exist as single-stranded molecules.</p> <p>Relate the structure of RNA to its function.</p> |
| Unit 1: Molecular Genetics Lesson 5: Structures of RNA | 0 | <p>Explain that nucleic acids store information about how to build and run an organism.</p> <p>Understand that there are two types of nucleic acids: DNA and RNA.</p> <p>Explain the main differences between DNA and RNA.</p> <p>Explain that most types of RNA exist as single-stranded molecules.</p> <p>Relate the structure of RNA to its function.</p> |
| Unit 1: Molecular Genetics Lesson 6: Review Structures of RNA | 0 | <p>Describe how the way DNA replicates is the basis for inheritance.</p> <p>Explain that when DNA replicates, the two strands separate and each strand serves as a template for a new strand.</p> <p>Apply base-pairing rules to explain precise copying of DNA during replication.</p> |
| Unit 1: Molecular Genetics Lesson 7: DNA Replication | 0 | |

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| | | Describe how the way DNA replicates is the basis for inheritance. Explain that when DNA replicates, the two strands separate and each strand serves as a template for a new strand. Apply base-pairing rules to explain precise copying of DNA during replication. |
| Unit 1: Molecular Genetics Lesson 8: Review DNA Replication | 0 | Construct a model of DNA. Determine the accurate pairing of nitrogenous bases. |
| Unit 1: Molecular Genetics Lesson 9: Laboratory: Modeling DNA | 0 | Construct a model of DNA. Determine the accurate pairing of nitrogenous bases. |
| Unit 1: Molecular Genetics Lesson 10: Laboratory: Modeling DNA Replication | 0 | Describe the relationship between the different types of RNA, and explain the function and importance of each one. Apply base-pairing rules to explain precise RNA synthesis. Describe the process by which RNA migrates out of the nucleus to the ribosomes. |
| Unit 1: Molecular Genetics Lesson 11: DNA Makes RNA | 0 | Describe the process of transcription. |
| Unit 1: Molecular Genetics Lesson 12: Review DNA Makes RNA | 0 | Describe the relationship between the different types of RNA, and explain the function and importance of each one. Describe the process by which RNA migrates out of the nucleus to the ribosomes. |

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| | | Describe the process of transcription. |
| Unit 1: Molecular Genetics Lesson 13: RNA Makes Protein | 0 | Understand the general pathway by which ribosomes synthesize proteins. Interpret a diagram of protein synthesis. |
| Unit 1: Molecular Genetics Lesson 14: Review RNA Makes Protein | 0 | Understand the general pathway by which ribosomes synthesize proteins. Interpret a diagram of protein synthesis. |
| Unit 1: Molecular Genetics Lesson 15: The Genetic Code | 0 | Describe what is meant by the genetic code, and explain its universal nature among living things. Use the genetic code to determine a sequence of amino acids from a sequence of mRNA codons. Describe and summarize how the sequence of bases of DNA is the key to protein synthesis. |
| Unit 1: Molecular Genetics Lesson 16: Review The Genetic Code | 0 | Use the genetic code to determine a sequence of amino acids from a sequence of mRNA codons. Describe and summarize how the sequence of bases of DNA is the key to protein synthesis. |
| Unit 1: Molecular Genetics Lesson 17: Your Choice | 0 | 0 |
| Unit 1: Molecular Genetics Lesson 18: Unit Test | HS-LS1-1, HS-LS1-6 | 0 |
| Unit 2: Evolution Lesson 1: Evolution and Biology | 0 | Recognize that an adaptation is a characteristic that helps an organism survive and reproduce in its environment. |

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| | | Recognize that evolution is defined as change over time. |
| Unit 2: Evolution Lesson 2: Evolution of Populations | 0 | <p>Explain that evolution is the genetic change in a population over time.</p> <p>Explain that a population is a spatially connected, interbreeding group belonging to the same species.</p> <p>Understand that all of the alleles within the genes of a population make up the gene pool.</p> |
| Unit 2: Evolution Lesson 3: Review Evolution and Populations | 0 | <p>Recognize that an adaptation is a characteristic that helps an organism survive and reproduce in its environment.</p> <p>Recognize that evolution is defined as change over time.</p> <p>Explain that a population is a spatially connected, interbreeding group belonging to the same species.</p> <p>Understand that all of the alleles within the genes of a population make up the gene pool.</p> |
| Unit 2: Evolution Lesson 4: Variation in Populations | 0 | <p>Explain the source of variability of traits in a population, such as mutation and recombination.</p> <p>Describe the overall idea of natural selection as the mechanism for evolution.</p> <p>Explain the three things that must be present for natural selection to occur:</p> |

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| | | heritability, variability, and differential reproductive success. |
| Unit 2: Evolution Lesson 5: Types of Natural Selection | 0 | <p>Describe some of the different processes of selection: directional, stabilizing, and disruptive.</p> <p>Demonstrate how to interpret graphs of the different processes of selection.</p> <p>Explain how evolution can result from natural selection, genetic drift, mutation, or migration.</p> |
| Unit 2: Evolution Lesson 6: Review Variation and Natural Selection | 0 | <p>Explain the source of variability of traits in a population, such as mutation and recombination.</p> <p>Describe the overall idea of natural selection as the mechanism for evolution.</p> <p>Explain the three things that must be present for natural selection to occur: heritability, variability, and differential reproductive success.</p> <p>Describe some of the different processes of selection: directional, stabilizing, and disruptive.</p> <p>Demonstrate how to interpret graphs of the different processes of selection.</p> <p>Explain how evolution can result from natural selection,</p> |

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| | | genetic drift, mutation, or migration. |
| Unit 2: Evolution Lesson 7: Evidence for Evolution 1 | 0 | <p>Discuss at least five lines of evidence that evolution has occurred and is occurring on earth.</p> <p>Describe how evidence from homology supports the idea of evolution.</p> <p>Describe how evidence from comparative embryology supports the idea of evolution.</p> <p>Describe how evidence from vestigial structures supports the idea of evolution.</p> |
| Unit 2: Evolution Lesson 8: Evidence for Evolution 2 | 0 | <p>Discuss at least five lines of evidence that evolution has occurred and is occurring on earth.</p> <p>Describe how evidence from comparative DNA studies supports the idea of evolution.</p> |
| Unit 2: Evolution Lesson 9: Evolution and Earth History | 0 | <p>Explain how the fossil record preserves information about the structure of organisms from the past and that fossils provide information about the chronological order in which organisms lived.</p> <p>Explain how radioactive dating gives absolute dates of fossils.</p> |

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| | | <p>Describe how evidence from homology supports the idea of evolution.</p> <p>Describe how evidence from comparative embryology supports the idea of evolution.</p> <p>Describe how evidence from vestigial structures supports the idea of evolution.</p> <p>Describe how evidence from comparative DNA studies supports the idea of evolution.</p> <p>Explain how the fossil record preserves information about the structure of organisms from the past and that fossils provide information about the chronological order in which organisms lived.</p> <p>Explain how radioactive dating gives absolute dates of fossils.</p> |
| Unit 2: Evolution Lesson 10: Review Evidence for Evolution and Earth History | 0 | |
| Unit 2: Evolution Lesson 11: Your Choice | 0 | |
| Unit 2: Evolution Lesson 12: Mid-Unit Test | 0 | |
| Unit 2: Evolution Lesson 13: Laboratory: Process of Natural Selection 1 | HS-LS2-1, HS-LS4-1, HS-LS4-2, HS-LS4-3, HS-LS4-4, HS-LS4-5, HS-LS4-6 | <p>Demonstrate that natural selection is the differences of survival rates and reproduction of members of a population with particular variations of an inheritable trait.</p> <p>Understand that natural selection results in differences of survival rates and reproduction of members of a population with variations of an inheritable trait.</p> <p>Understand that under natural selection pressures,</p> |

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| | | genes are passed on to the next generation in numbers that are not the same as in the original population. |
| Unit 2: Evolution Lesson 14: Laboratory: Process of Natural Selection 2 | 0 | Demonstrate that natural selection is the differences of survival rates and reproduction of members of a population with particular variations of an inheritable trait. Understand that natural selection results in differences of survival rates and reproduction of members of a population with variations of an inheritable trait. Understand that under natural selection pressures, genes are passed on to the next generation in numbers that are not the same as in the original population. |
| Unit 2: Evolution Lesson 15: Genetic Basis of Evolution | 0 | State the biological significance of shifts in the Hardy-Weinberg equilibrium. Explain the fundamental idea that changes in allele frequencies in a population lead to evolutionary change over time. Explain that the Hardy-Weinberg principle is a mathematical model for how alleles in a sexually reproducing population would remain constant over generations unless affected by processes other than sexual recombination. |

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| | | Recognize that lethal alleles carried by heterozygotes can be maintained in the gene pool. |
| Unit 2: Evolution Lesson 16: Review Genetic Basis of Evolution | 0 | <p>Explain the fundamental idea that changes in allele frequencies in a population lead to evolutionary change over time.</p> <p>Explain that the Hardy-Weinberg principle is a mathematical model for how alleles in a sexually reproducing population would remain constant over generations unless affected by processes other than sexual recombination.</p> <p>Recognize that lethal alleles carried by heterozygotes can be maintained in the gene pool.</p> |
| Unit 2: Evolution Lesson 17: Classification and Taxonomy | 0 | <p>Compare and contrast the processes of taxonomy and classification.</p> <p>Relate how biologists arrange organisms into a hierarchy of groups and subgroups based on similarities and differences.</p> <p>Describe how modern DNA studies are revising the process of classification.</p> |
| Unit 2: Evolution Lesson 18: Modern Classification | 0 | <p>Explain the hierarchy of the modern classification schemes.</p> <p>Describe the complete taxonomy of a few</p> |

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| | | <p>organisms.</p> <p>List the three domains of life, and give examples of organisms in each.</p> |
| Unit 2: Evolution Lesson 19: Review Classification and Taxonomy | 0 | <p>Compare and contrast the processes of taxonomy and classification.</p> <p>Relate how biologists arrange organisms into a hierarchy of groups and subgroups based on similarities and differences.</p> <p>Describe how modern DNA studies are revising the process of classification.</p> <p>Explain the hierarchy of the modern classification schemes.</p> <p>Describe the complete taxonomy of a few organisms.</p> <p>List the three domains of life and give examples of organisms in each.</p> |
| Unit 2: Evolution Lesson 20: Laboratory: Dichotomous Keys | 0 | Relate how biologists arrange organisms into a hierarchy of groups and subgroups based on similarities and differences. |
| Unit 2: Evolution Lesson 21: Your Choice | 0 | 0 |
| Unit 2: Evolution Lesson 22: Unit Test | HS-LS2-8, HS-LS4-1, HS-LS4-2, HS-LS4-3, HS-LS4-4, HS-LS4-5, HS-LS4-6, HS-ETS1-3, | 0 |
| Unit 3: Systems of Living Things Lesson 1: Getting Energy | 0 | Explain the importance of obtaining energy for all organisms. Discuss how each of the three representative organisms (a flatworm, a human, and a plant) acquires energy. Explain the role of cells in the processing of food to the ultimate production of ATP. Recognize |

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| | | the importance of obtaining oxygen for all organisms. |
| Unit 3: Systems of Living Things Lesson 2: Review Getting Energy | 0 | <p>Recognize the importance of obtaining oxygen for all organisms.</p> <p>Discuss how each of the three representative organisms (a flatworm, a human, and a plant) acquires energy.</p> <p>Explain the role of cells in the processing of food to the ultimate production of ATP.</p> |
| Unit 3: Systems of Living Things Lesson 3: Digestion in Humans | 0 | <p>Describe the process of digestion in a human, citing examples from anatomy.</p> <p>Know the individual functions and sites of secretion of digestive enzymes.</p> <p>Explain digestion in humans.</p> |
| Unit 3: Systems of Living Things Lesson 4: Laboratory: Human Digestion Actions 1 | 0 | <p>Explain digestion and waste removal in representative organisms.</p> <p>Describe the process of digestion in a human, citing examples from anatomy.</p> <p>Know the individual functions and sites of secretion of digestive enzymes.</p> |
| Unit 3: Systems of Living Things Lesson 5: Review Digestion in Human | 0 | <p>Describe the process of digestion in a human, citing examples from anatomy.</p> <p>Know the individual functions and sites of secretion of digestive</p> |

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| | | enzymes. Explain digestion in humans. |
| Unit 3: Systems of Living Things Lesson 6: Laboratory: Human Digestion Actions 2 | 0 | Explain digestion and waste removal in representative organisms. Describe the process of digestion in a human, citing examples from anatomy. Know the individual functions and sites of secretion of digestive enzymes. |
| Unit 3: Systems of Living Things Lesson 7: Oxygen and the Human Body | 0 | Describe the process of obtaining and distributing oxygen in a human. Describe the role of the lungs in the exchange of gases. Interpret a diagram showing the function of a human lung. Interpret a diagram showing the structure of the human circulatory system. |
| Unit 3: Systems of Living Things Lesson 8: Review Oxygen and the Human Body | 0 | Describe the process of obtaining and distributing oxygen in a human. Describe the role of the lungs in the exchange of gases. Interpret a diagram showing the function of a human lung. Interpret a diagram showing the structure of the human circulatory system. |

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| | | Understand how the nervous system mediates communication between the body and the environment. |
| Unit 3: Systems of Living Things Lesson 9: Human Nervous System | 0 | Describe the structure of the nervous system. State how the nervous system mediates communication between different parts of the body and the body's interactions with the environment. Explain how the structure of a neuron relates to its role in the nervous system. |
| Unit 3: Systems of Living Things Lesson 10: Review Human Nervous System | 0 | Describe the structure of the nervous system. State how the nervous system mediates communication between different parts of the body and the body's interactions with the environment. Explain how the structure of a neuron relates to its role in the nervous system. |
| Unit 3: Systems of Living Things Lesson 11: Your Choice | 0 | 0 |
| Unit 3: Systems of Living Things Lesson 12: Mid-Unit Test | 0 | 0 |
| Unit 3: Systems of Living Things Lesson 13: Muscular Systems | 0 | Describe the structure and function of the muscular system. Describe muscular systems of a flatworm and a human. |
| Unit 3: Systems of Living Things Lesson 14: Review Muscular Systems | 0 | Describe the muscular systems of a flatworm and a human. |
| Unit 3: Systems of Living Things Lesson 15: How Muscles Contract | 0 | Explain the relationship between bone and muscles with regard to movement. Describe the cellular and |

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| | | molecular basis of muscle contractions. |
| Unit 3: Systems of Living Things Lesson 16: Review How Muscles Contract | 0 | Explain the relationship between bone and muscles with regard to movement. Describe the cellular and molecular basis of muscle contractions. |
| Unit 3: Systems of Living Things Lesson 17: Laboratory: Chicken Muscles 1 | 0 | Explain the relationship between bone and muscles with regard to movement. |
| Unit 3: Systems of Living Things Lesson 18: Laboratory: Chicken Muscles 2 | 0 | Explain the relationship between bone and muscles with regard to movement. |
| Unit 3: Systems of Living Things Lesson 19: Fern Reproduction | 0 | Understand the basics of plant sexual and asexual reproduction. Interpret a diagram of the life cycle of a flowering plant. Describe the reproductive patterns in living things. |
| Unit 3: Systems of Living Things Lesson 20: Review Fern Reproduction | 0 | Understand the basics of plant sexual and asexual reproduction. Interpret a diagram of the life cycle of a flowering plant. Describe the reproductive patterns in living things. |
| Unit 3: Systems of Living Things Lesson 21: Human Reproduction | 0 | Interpret a diagram of the life cycle of a human. Understand the basics of human reproduction. Describe the reproductive patterns in living things. |

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| | | Understand the basics of human reproduction. |
| Unit 3: Systems of Living Things Lesson 22: Review Human Reproduction | 0 | Interpret a diagram of the life cycle of a human. Describe the reproductive patterns in living things. |
| Unit 3: Systems of Living Things Lesson 23: Human Immune Response 1 | 0 | State the role of various immune response cells in the immune system. State the role of antibodies in the body's response to infection. Describe the structure and function of the human immune system. |
| Unit 3: Systems of Living Things Lesson 24: Human Immune Response 2 | 0 | Describe how a compromised immune system may be unable to respond to common infections. Describe differences between bacteria and viruses with respect to the body's primary defenses against these infectious organisms. Describe the structure and function of the human immune system. |
| Unit 3: Systems of Living Things Lesson 25: Review Human Immune Response | 0 | State the role of antibodies in the body's response to infection. State the role of various immune response cells in the immune system. Describe differences between bacteria and viruses with respect to the body's primary defenses against these infectious organisms. |

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| | | <p>Describe how a compromised immune system may be unable to respond to common infections.</p> <p>Describe the structure and function of the human immune system.</p> |
| Unit 3: Systems of Living Things Lesson 26:Your Choice | 0 | |
| Unit 3: Systems of Living Things Lesson 27: Unit Test | HS-LS1-2, HS-LS1-5, HS-LS1-7, HS-PS1-7 | 0 |
| Unit 4: Ecology and the Environment Lesson 1: Ecosystems | | <p>Understand that an ecosystem can be defined and described in many forms and may vary in size.</p> <p>Give examples of the natural world, and be able to determine various types of ecosystems.</p> <p>Identify the relationships among organisms within ecosystems and biomes.</p> |
| Unit 4: Ecology and the Environment Lesson 2: Biomes | | <p>Explain that a biome is a large geographic area dominated by specific kinds of plants and animals.</p> <p>Understand that there are many different aquatic and terrestrial biomes.</p> <p>Explain that aquatic biomes occupy the largest part of the world.</p> <p>Given photographs of natural areas, tell the name of the biome, and describe its characteristic plants and animals.</p> <p>Identify the relationships among organisms within ecosystems and biomes.</p> |

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| | | Give examples of the natural world, and be able to determine various types of ecosystems. Explain that a biome is a large geographic area dominated by specific kinds of plants and animals. Understand that there are many different aquatic and terrestrial biomes. Explain that aquatic biomes occupy the largest part of the world. Given photographs of natural areas, tell the name of the biome, and describe its characteristic plants and animals. Identify the relationships among organisms within ecosystems and biomes. Understand that an ecosystem is defined and described in many forms and may vary in size. |
| Unit 4: Ecology and the Environment Lesson 3: Review Ecosystems and Biomes | 0 | <p>Explain how matter cycles and energy flows through the different levels of organization of living systems (cells, organs, organisms, and communities) and their environment.</p> <p>Describe how matter and energy flow through the different levels of organization of living systems.</p> <p>Explain how energy flows through all feeding levels: producers, primary consumers, secondary consumers, and tertiary consumers.</p> <p>Describe how all trophic levels are subject to action by decomposers and detritivores.</p> |
| Unit 4: Ecology and the Environment Lesson 4: Energy Flow in Ecosystems | 0 | |

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| | | Discuss how stability of producers and decomposers is an important part of an ecosystem. |
| Unit 4: Ecology and the Environment Lesson 5: Food Chains and Food Webs | 0 | <p>Describe a food chain as a pathway along which food is transferred from one trophic level to another.</p> <p>Explain that when food chains are joined, their relationship is called a food web.</p> <p>Given an energy pyramid, explain the changes in energy among different trophic levels of an ecosystem.</p> |
| Unit 4: Ecology and the Environment Lesson 6: Review Energy Flow, Food Chains and Webs | 0 | <p>Describe how matter and energy flow through the different levels of organization of living systems.</p> <p>Explain how energy flows through all feeding levels: producers, primary consumers, secondary consumers, and tertiary consumers.</p> <p>Discuss how stability of producers and decomposers is an important part of an ecosystem.</p> <p>Describe a food chain as a pathway along which food is transferred from one trophic level to another.</p> |

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| | | <p>Explain that when food chains are joined, their relationship is called a food web.</p> <p>Given an energy pyramid, explain the changes in energy among different trophic levels of an ecosystem.</p> <p>Describe how all trophic levels are subject to action by decomposers.</p> |
| Unit 4: Ecology and the Environment Lesson 7: Your Choice | 0 | 0 |
| Unit 4: Ecology and the Environment Lesson 8: Mid-Unit Test | 0 | 0 |
| Unit 4: Ecology and the Environment Lesson 9: Succession | 0 | <p>Analyze changes in an ecosystem resulting from the introduction of nonnative species and changes in population size.</p> <p>Given a set of photographs showing ecological succession, describe what is happening, and suggest reasons for the changes.</p> |
| Unit 4: Ecology and the Environment Lesson 10: Review Succession | 0 | <p>Analyze changes in an ecosystem resulting from the introduction of nonnative species and changes in population size.</p> <p>Given a set of photographs showing ecological succession, describe what is happening, and suggest reasons for the changes.</p> |
| Unit 4: Ecology and the Environment Lesson 11: Laboratory: Patterns of Succession | 0 | Conduct an investigation to show patterns of change in an ecosystem. |
| Unit 4: Ecology and the Environment Lesson 12: Laboratory: The Effects of Acidity on Seed Germination 1 | 0 | Begin a lab by planting lettuce and bean seeds. |

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| Unit 4: Ecology and the Environment Lesson 13: Water and Nitrogen Cycles | | 0 | Interpret a diagram of the nitrogen cycle. Interpret a diagram of the water cycle. |
| Unit 4: Ecology and the Environment Lesson 14: Review Water and Nitrogen Cycles | | 0 | Interpret a diagram of the nitrogen cycle. Interpret a diagram of the water cycle. |
| Unit 4: Ecology and the Environment Lesson 15: Laboratory: Fixation in Root Nodules 1 | | 0 | Analyze root nodules, and relate their structure to function. Relate the nitrogen cycle to the presence of root nodules in some plants. |
| Unit 4: Ecology and the Environment Lesson 16: Laboratory: Fixation in Root Nodules 2 | | 0 | Analyze root nodules, and relate their structure to function. Relate the nitrogen cycle to the presence of root nodules in some plants. |
| Unit 4: Ecology and the Environment Lesson 17: Laboratory: The Effects of Acidity on Seed Germination 2 | | 0 | Conduct an investigation that shows how an environmental factor can affect a life-form. |
| Unit 4: Ecology and the Environment Lesson 18: Your Choice | | 0 | 0 |
| Unit 4: Ecology and the Environment Lesson 19: Unit Test | HS-LS2-2 HS-LS2-3 HS-LS2-4 HS-LS2-5 HS-LS2-6 HS-LS2-7 HS-LS4-6 HS-ETS1-3 HS-ESS2-4 HS-ESS2-5 | 0 | 0 |
| Unit 5: Semester Review and Test Lesson 1: Semester Review | | 0 | 0 |
| Unit 5: Semester Review and Test Lesson 2: Your Choice | | 0 | 0 |
| Unit 5: Semester Review and Test Lesson 3: Your Choice | | 0 | 0 |
| Unit 5: Semester Review and Test Lesson 4: Semester Test | | 0 | 0 |