

# Wyoming Department of Education Required Virtual Education Course Syllabus

## Natrona County School District # 1

Program Name	Natrona Virtual Learning	Content Area	SC
Course ID	NVA07700222	Grade Level	7
Course Name	SCI107B MS Life Science	o Credits	
SCE Code	77002	Curriculum Type	K12 Inc

### COURSE DESCRIPTION

*The K12 Life Science Sem.2 program invites students to investigate the world of living things—at levels both large and small—by reading, observing, and experimenting with aspects of life on Earth. Students explore a amazing variety of organisms, the complex workings of the cell, the relationship between living things and their environments, and discoveries in the world of modern genetics. Practical, hands-on lesson activities help students discover how scientists investigate the living world. Students perform laboratory activities and full-unit investigation to learn about the application of scientific methods*

### WYOMING CONTENT AND PERFORMANCE STANDARDS

STANDARD#	<a href="#">BENCHMARK (Standard/Indicator) Use the Standards and Benchmarks as Spreadsheets</a>
8.1.1	Levels of Organization in Living Systems: Students model the cell as the basic unit of a living system. They realize that all functions that sustain life act within single cell and cells differentiate into specialized cells, tissues, organs, and organ systems.
8.1.2	Reproduction and Heredity: Students describe reproduction as a characteristic of all living systems, which is essential to the continuation of species, and identify and interpret traits, patterns of inheritance, and the interaction between genetics and environment.
8.1.3	Evolution as Theory: Students explain evolution as theory and apply the theory to the diversity of species, which results from natural selection and the acquisition of unique characteristics through biological adaptation.
8.1.5	Behavior and Adaptation: Students recognize behavior as a response of an organism to an internal or environmental stimulus and connect the characteristics and behaviors of an organism to biological adaptation.
8.1.6	Interrelationships of Populations and Ecosystems: Students illustrate populations of organisms and their interconnection within an ecosystem, identifying relationships among producers, consumers, and decomposers

### SCOPE AND SEQUENCE

UNIT OUTLINE	STANDARD#	OUTCOMES OBJECTIVES/STUDENT CENTERED GOALS
Module 1: Interdependence of Life Lesson 1.01: Organisms and Their Needs	8.1.6	Define and describe adaptation and the environmental conditions that are basic needs of living organisms: temperature, shelter, and space.

		Examine views of others and revise own views if warranted. Explain the importance of water to living organisms. Identify the basic needs of living organisms: food, water, oxygen (animals) or carbon dioxide Use technology to collaborate with peers by publishing writing which links and cites sources.
Module 1: Interdependence of Life Lesson 1.02: Staying Balanced	8.1.6 8.1.1	Define homeostasis as the tendency of an organism to regulate its internal conditions to maintain good health. Describe different feedback mechanisms in the body that help to maintain homeostasis. Examine views of others and revise own views if warranted. Explain and give examples of how organisms maintain internal stability as external environments change. Explain that the normal growth, development, maintenance, and reproduction of an organism may be altered by changes in the external environment. Use technology to collaborate with peers by publishing writing which links and cites sources.
Module 1: Interdependence of Life Lesson 1.03: Responses	8.1.6	Describe ways that organisms respond to external stimuli, such as the presence or absence of heat or light. Describe ways that organisms respond to internal stimuli, such as hunger or thirst. Examine views of others and revise own views if warranted. Explain how plants respond to changed conditions or external stimuli. Use technology to collaborate with peers by publishing writing which links and cites sources.
Module 1: Interdependence of Life Lesson 1.04: Aquarium Ecosystem	8.1.6	Define an ecosystem as a community of organisms living together and interacting in a particular physical environment. Distinguish between biotic and abiotic factors of an environment. Recognize that the number and types of organisms an ecosystem can support depend on available resources and abiotic factors (light and water, temperature range, soil composition, etc.).
Module 1: Interdependence of Life Lesson 1.04: Aquarium Ecosystem (cont.)		
Module 1: Interdependence of Life Lesson 1.05: Population Limits	8.1.6	Define community as a group of organisms or populations living and interacting within a specific environment, and give examples. Define population as a group of individuals of the same species that exist together at a given place and time. Describe and give examples of how overpopulation may affect an ecosystem.
Module 1: Interdependence of Life Lesson 1.06: Populations	8.1.6	Describe and give examples of how overpopulation may affect an ecosystem. Research and describe populations of organisms in various biomes.
Module 1: Interdependence of Life Lesson 1.07: Cycles in Nature	8.1.6	Describe energy flow in ecosystems, including the role of producers and consumers. Describe how to create a food chain diagram in order to determine the trophic level of each organism in the chain. Recognize that the amount of usable energy available to organisms decreases at each trophic

		level of a food chain or web.
Module 1: Interdependence of Life Lesson 1.08: Energy Flow in Ecosystems	8.1.6	Describe energy flow in ecosystems, including the role of producers and consumers. Describe how to create a food chain diagram in order to determine the trophic level of each organism in the chain. Recognize that the amount of usable energy available to organisms decreases at each trophic level of a food chain or web.
Module 1: Interdependence of Life Lesson 1.09: Food Chains	8.1.6	Define and give examples of producers, consumers, and decomposers in an ecosystem. Describe the interaction of producers, consumers, and decomposers in an ecosystem. Interpret a diagram of a food chain and explain the interactions represented.
Module 1: Interdependence of Life Lesson 1.10: A Decomposer Food Chain	8.1.6	Define and give examples of producers, consumers, and decomposers in an ecosystem. Describe the interaction of producers, consumers, and decomposers in an ecosystem. Describe the primary characteristics of a decomposer food chain. Interpret a diagram of a food chain and explain the interactions represented.
Module 1: Interdependence of Life Lesson 1.11: Food Webs	8.1.6	Categorize populations by the functions they serve in an ecosystem. Create and interpret a diagram of a food web and explain the interactions represented. Compare and contrast food chains and food webs. Recognize that all organisms are part of and depend on two main interconnected global food webs: the ocean food web and the land food web.
Module 1: Interdependence of Life Lesson 1.12: Making a Desert Food Web	8.1.6	Compare and contrast food chains and food webs. Create and interpret a diagram of a food web and explain the interactions represented. Explain what happens when an organism is removed from an existing food web. Recognize that all organisms are part of and depend on two main interconnected global food webs: the ocean food web and the land food web.
Module 1: Interdependence of Life Lesson 1.13: A New Organism in the Food Web	8.1.6	Recognize that the introduction of a new species to an ecosystem can disrupt the balance of that ecosystem. Research and describe what happens when an organism becomes part of a new ecosystem as the result of human activities.
Module 1: Interdependence of Life Lesson 1.14: Competitive Relationships	8.1.6	Describe the interaction of predators and prey in a specific area and relate the interaction to competition for resources. Explore and describe reasons why populations of organisms may change over time. Give examples of competition in specific environments (freshwater, ocean, forest, desert, grassland, mountain region, etc.).
Module 1: Interdependence of Life Lesson 1.15: Cooperative Relationships	8.1.6	Define and explain mutualism, commensalism, parasitism. Differentiate cooperative and competitive relationships among organisms (predator-prey, parasitism, mutualism, and

		commensalism).
Module 1: Interdependence of Life Lesson 1.16: Symbiotic Partners	8.1.6	Differentiate cooperative and competitive relationships among organisms (predator-prey, parasitism, mutualism, and commensalism). Research and describe different examples of symbiosis and symbiotic partners.
Module 1: Interdependence of Life Lesson 1.17: Module Review		
Module 1: Interdependence of Life Lesson 1.18: Module Exam		
Module 2: Adaptation and Change Lesson 2.01: Change over Time	8.1.3	Describe different examples of species that have changed over time. Explain that diversity develops gradually over many generations in response to different influences.
Module 2: Adaptation and Change Lesson 2.02: Galapagos Island Changes	8.1.3	Describe different examples of species that have changed over time. Explain that diversity develops gradually over many generations in response to different influences. Use technology and online research to gather and synthesize information, which also cites and links sources.
Module 2: Adaptation and Change Lesson 2.03: Structural Adaptations	8.1.5	Define adaptation as a change that improves the chances of survival for a species in a specific environment. Describe and give examples of how diversity of animals in a population combined with selection pressures over time can change population characteristics. Identify and give specific examples of structural adaptations in animals. Identify and give specific examples of structural adaptations in plants.
Module 2: Adaptation and Change Lesson 2.04: Organisms and Biomes	8.1.5	Identify and give specific examples of structural adaptations in animals. Use technology and online research to gather and synthesize information, which also cites and links sources.
Module 2: Adaptation and Change Lesson 2.05: Behavioral Adaptations	8.1.5	Explain how behavioral adaptations differ from structural adaptations. Explain how behavioral adaptations help animals survive. Explain how behavioral adaptations help plants survive. Give an example of how behavioral responses may be determined by heredity or past experience.
Module 2: Adaptation and Change Lesson 2.06: Extinct or Endangered?	8.1.5	Distinguish between extinct and endangered species and give examples of each. Explain that extinction may result from mismatch of adaptations and the environment. Give examples of specific traits of different species that helped them survive.
Module 2: Adaptation and Change Lesson 2.07: Meet an Endangered Species	8.1.5	Explain that extinction may result from mismatch of adaptations and the environment. Use technology and online research to gather and synthesize information, which also cites and links sources. Give examples of specific traits of different species that helped them survive.

Module 2: Adaptation and Change Lesson 2.08: Changes in Ecosystems	8.1.5 8.1.3	Analyze and predict the results of introducing or removing an organism from a food web. Describe how a change in one part of an ecosystem affected other parts of that same ecosystem. Give examples of changes within an ecosystem and explain why they occurred.
Module 2: Adaptation and Change Lesson 2.09: Ecosystems and Decomposition	8.1.6	Describe how a change in one part of an ecosystem affected other parts of that same ecosystem. Give examples of changes within an ecosystem and explain why they occurred. Use technology and online research to gather and synthesize information, which also cites and links sources.
Module 2: Adaptation and Change Lesson 2.10: Rates of Environmental Change	8.1.5 8.1.3	Describe environmental changes that occur rapidly, such as forest fires and decomposition. Describe environmental changes that occur slowly, such as forest and pond succession.
Module 2: Adaptation and Change Lesson 2.11: Mount St. Helens Succession	8.1.5	Describe environmental changes that occur slowly, such as forest and pond succession. Use technology and online research to gather and synthesize information, which also cites and links sources.
Module 2: Adaptation and Change Lesson 2.12: Population Changes	8.1.6	Analyze and predict the results of introducing an organism to a food web or removing an organism from a food web. Describe and give examples of the consequences of overpopulation in an ecosystem. Describe how overpopulation is often limited.
Module 2: Adaptation and Change Lesson 2.13: The Human Factor Part 1	8.1.5 8.1.3	Describe how human activity can affect the transfer of energy in ecosystems (for example, roads, oil spills, hurricanes). Examine views of others and revise own views if warranted. Explain how human activity may alter the balance of an ecosystem. Use technology to collaborate with peers by publishing writing which links and cites sources.
Module 2: Adaptation and Change Lesson 2.14: The Human Factor Part 2	8.1.6 8.1.5	Describe how human activity can affect the transfer of energy in ecosystems (for example, roads, oil spills, hurricanes). Examine views of others and revise own views if warranted. Explain how human activity may alter the balance of an ecosystem. Use technology to collaborate with peers by publishing writing which links and cites sources.
Module 2: Adaptation and Change Lesson 2.15: Module Review		
Module 2: Adaptation and Change Lesson 2.16: Module Exam		
Module 3: Genetics and Heredity Lesson 3.01: Genetics and Heredity	8.1.2	Describe DNA as a blueprint for life. Describe what happens to the chromosomes and genes during meiosis. Explain how genes and chromosomes determine hereditary traits. Explain how mutations and genetic engineering can alter genes. Explain Mendel's theory of how traits are passed

		from parents to offspring. Use a Punnett Square to show the possible outcomes of various combinations of alleles from two parents.
Module 3: Genetics and Heredity Lesson 3.02: Mendel's Pea Plants	8.1.2	Distinguish between dominant and recessive traits. Identify traits as genetically determined characteristics and give examples of traits (for example, eye color, leaf shape). Summarize Mendel's contributions to the field of genetics.
Module 3: Genetics and Heredity Lesson 3.03: Genes and Alleles	8.1.2	Define allele as one of the form of a gene. Define gene as the basic unit of inheritance. Distinguish between dominant and recessive traits. Explain that dominant alleles result in the expression of dominant traits.
Module 3: Genetics and Heredity Lesson 3.04: Inheritance	8.1.2	Describe how a special set of homologous chromosomes determines gender in some species. Describe how new pairs of alleles come together for sexually reproducing organisms.
Module 3: Genetics and Heredity Lesson 3.05: Punnett Squares	8.1.2	Summarize Gregor Mendel's contributions to our understanding of genetics and heredity. Use a Punnett Square to show the possible outcomes of various combinations of alleles from two parents.
Module 3: Genetics and Heredity Lesson 3.06: Using Punnett Squares	8.1.2	Use a Punnett Square to show the possible outcomes of various combinations of alleles from two parents.
Module 3: Genetics and Heredity Lesson 3.07: Similarities Among Organisms	8.1.2	Define species as a group of organisms closely resembling one another and able to interbreed. Describe ways that external and internal anatomical features may be similar among organisms. Examine views of others and revise own views if warranted. Explain that anatomical similarities among organisms occur at the cellular level through genes and chromosomes. Use technology to collaborate with peers by publishing writing which links and cites sources.
Module 3: Genetics and Heredity Lesson 3.08: Chromosomes	8.1.2	Define chromosome as a structure that contains a single long DNA molecule and associated proteins. Describe how RNA acts like a messenger that delivers genetic code information. Describe the relationships of cells, chromosomes, and genes. Examine views of others and revise own views if warranted. Explain that DNA is a "blueprint for life" that is coded into a double-helix structure. Explain that one strand of DNA is made of many genes, and that DNA is packed into the chromosomes of a cell. Use technology to collaborate with peers by publishing writing which links and cites sources.
Module 3: Genetics and Heredity Lesson 3.09: Meiosis	8.1.2	Define meiosis as a process of cell division in organisms that reproduce sexually. Identify and label each stage of meiosis and describe what happens to the chromosomes and genes during this process. Recognize that the cells resulting from meiosis may serve as gametes. Use technology to collaborate with peers by publishing writing which links and cites sources.



Module 3: Genetics and Heredity Lesson 3.10: Making a Meiosis Mobile	8.1.2	Identify and label each stage of meiosis and describe what happens to the chromosomes and genes during this process. Recognize that the cells resulting from meiosis may serve as gametes.
Module 3: Genetics and Heredity Lesson 3.11: Meiosis and Mitosis	8.1.2	Describe what happens to each chromosome during mitosis. Describe what happens to the chromosomes and genes during meiosis. Distinguish meiosis from mitosis. Recognize and label each stage of meiosis. Recognize and label the phases of mitosis.
Module 3: Genetics and Heredity Lesson 3.12: Mutations	8.1.2 8.1.3	Describe the role of genetic technologies and their influence on genetic change. Explain how selective breeding and natural selection can change the genetic makeup of organisms.
Module 3: Genetics and Heredity Lesson 3.13: Karyotypes	8.1.2 8.1.3	Describe the role of genetic technologies and their influence on genetic change. Explain how selective breeding and natural selection can change the genetic makeup of organisms.
Module 3: Genetics and Heredity Lesson 3.14: Genetic Engineering		
Module 3: Genetics and Heredity Lesson 3.15: Debating Genetic Engineering		
Module 3: Genetics and Heredity Lesson 3.16: Module Review		
Module 3: Genetics and Heredity Lesson 3.17: Module Exam		
Module 4: How the Gene Works Lesson 4.01: How the Gene Works	8.1.1 8.1.2 8.1.3	Compare and contrast the structure and function of DNA and RNA. Define gene and explain how DNA makes RNA. Define gene expression and describe how genes are turned on and off. Define morphogenesis and recognize the role of differentiating cells in it, including cells that are programmed to die under certain conditions. Examine views of others and revise own views if warranted. Explain how gene expression leads to different kinds of cell differentiation. Explain how the cell uses different kinds of RNA to make proteins. Explain the various functions of proteins in and out of cells and how their functions are related to protein structure. Illustrate and explain the process of DNA replication. Use technology to collaborate with peers by publishing writing which links and cites sources.
Module 4: How the Gene Works Lesson 4.02: Structure of DNA and RNA	8.1.1 or	Compare and contrast the structures of DNA and RNA. Illustrate the structure of DNA and RNA and label all the parts. Recognize how bases are paired in DNA. Recognize the functions of DNA and RNA in the cell.
Module 4: How the Gene Works Lesson 4.03: Making a DNA Model	8.1.1 8.1.2	Illustrate the structure of DNA and RNA and label all the parts. Recognize how bases are paired in DNA.

Module 4: How the Gene Works Lesson 4.04: DNA Replication	8.1.1 8.1.2	Define replication. Explain how both new DNA molecules end up exactly alike after replication, if no mutation takes place. Explain how the double helix of DNA unwinds as an early step in replication. Recognize the role of DNA polymerase in the replication process.
Module 4: How the Gene Works Lesson 4.05: Modeling DNA Replication	8.1.1 8.1.2	Explain how both new DNA molecules end up exactly alike after replication, if no mutation takes place. Explain how the double helix of DNA unwinds as an early step in replication. Recognize the role of DNA polymerase in the replication process.
Module 4: How the Gene Works Lesson 4.06: What Is a Gene?	8.1.2	Define gene in terms of both its structure and its function. Explain the arrangement of genes on a DNA strand using the terms exon and intron. Recognize the functions of some genes found on a chromosome of a bacterium. Recognize the functions of some genes found on specific human chromosomes.
Module 4: How the Gene Works Lesson 4.07: Understand Exons and Introns	8.1.2	Define gene in terms of both its structure and its function. Explain the arrangement of genes on a DNA strand using the terms exon and intron.
Module 4: How the Gene Works Lesson 4.08: DNA Makes RNA Makes Protein	8.1.1 8.1.2	Explain the phrase "DNA makes RNA makes protein." Interpret a table showing the genetic code and recognize the meaning and importance of a codon. Recognize the meanings of transcription and translation and the process by which each occurs. Recognize the three main types of RNA and the function of each.
Module 4: How the Gene Works Lesson 4.09: Transcription and Translation	8.1.2	Interpret a table showing the genetic code and recognize the meaning and importance of a codon. Recognize the meanings of transcription and translation and the process by which each occurs.
Module 4: How the Gene Works Lesson 4.10: What Proteins Do	8.1.2	Describe the activation energy of a reaction and how enzymes lower it. Interpret an illustration of a chemical reaction involving an enzyme. List some of the roles that proteins play in the cell and in the organism. Recognize the primary, secondary, tertiary, and quaternary structure of a protein.
Module 4: How the Gene Works Lesson 4.11: Protein Power	8.1.2	List some of the roles that proteins play in the cell and in the organism. Recognize the primary, secondary, tertiary, and quaternary structure of a protein. Use technology and online research to gather and synthesize information, which also cites and links sources.
Module 4: How the Gene Works Lesson 4.12: Gene Expression	8.1.2	Define gene expression and describe the advantages of a bacterium being able to regulate a gene. Describe the process of the control of gene expression by use of the lac Operon.* Examine views of others and revise own views if warranted. Explain the structure of the lac Operon and its associated repressor protein gene*. State the number of genes in E. coli and describe that not all are active all the time. Use technology to collaborate with peers by publishing writing which



		links and cites sources.
Module 4: How the Gene Works Lesson 4.13: Gene Expression Eukaryotes	8.1.2	Diagram a segment of mRNA showing the relationship between exons and introns.* Diagram the process by which introns are sliced out of segment of mRNA and describe how the resulting segment is active in making proteins.* Distinguish between control at transcription and control after transcription. Examine views of others and revise own views if warranted. Interpret an illustration showing how control at transcription proceeds in a eukaryotic cell. Use technology to collaborate with peers by publishing writing which links and cites sources.
Module 4: How the Gene Works Lesson 4.14: Differentiation in Cells	8.1.1 8.1.2	Define cell differentiation and explain the process during development. Define morphogenesis and explain that, coupled with differentiation, cells organize into tissues, which form organs. Describe three examples in which programmed cell death is part of normal development of an organism. Examine views of others and revise own views if warranted. Interpret a diagram showing the pathway of cell differentiation in <i>C. elegans</i> . Use technology to collaborate with peers by publishing writing which links and cites sources.
Module 4: How the Gene Works Lesson 4.15: DNA Today	8.1.2	Examine views of others and revise own views if warranted. Use technology to collaborate with peers by publishing writing which links and cites sources.
Module 4: How the Gene Works Lesson 4.16: Module Review		
Module 4: How the Gene Works Lesson 4.17: Module Exam		
Module 5: History of Life on Earth Lesson 5.01: History of Life on Earth	8.1.3	Describe changes in scientific thinking about the development of life on earth and the origin of new species. Describe evidence supporting the theory of evolution. Explain the theory of evolution through the process of natural selection. Summarize major evidence supporting the theory of evolution.
Module 5: History of Life on Earth Lesson 5.02: Ancient Earth	8.1.3	Describe scientific hypotheses that explain how life-forms first arose on earth.
Module 5: History of Life on Earth Lesson 5.03: Origins of Life on Earth	8.1.3	Describe scientific hypotheses that explain how life-forms first arose on earth. Explain how the first organisms on earth contributed to change in the atmosphere. Identify specific fossil evidence for the earliest life-forms.
Module 5: History of Life on Earth Lesson 5.04: Redi and Pasteur Experiments	8.1.3	Describe scientific hypotheses that explain how life-forms first arose on earth.

Module 5: History of Life on Earth Lesson 5.05: Evidence for Change Over Time	8.1.3	Explain why scientists think evidence about homologous structures and vestigial structures supports the idea that life changes over time. Explain why scientists think evidence from embryology supports the idea that life changes over time. Explain why scientists think evidence from the fossil record supports the idea that life changes over time. Explain why scientists think evidence regarding DNA and other biochemicals supports the idea that life changes over time.
Module 5: History of Life on Earth Lesson 5.06: Finding Fossils	8.1.2	Use technology and online research to gather and synthesize information, which also cites and links sources.
Module 5: History of Life on Earth Lesson 5.07: The Theory of Evolution	8.1.3	Define evolution. Describe major findings in Charles Darwin's research that led to the theory of evolution by natural selection.
Module 5: History of Life on Earth Lesson 5.08: Darwin's Journal	8.1.3	Define evolution. Describe major findings in Charles Darwin's research that led to the theory of evolution by natural selection.
Module 5: History of Life on Earth Lesson 5.09: Natural Selection	8.1.3	Explain the process of natural selection. Identify specific adaptations that favor the survival of certain organisms in their environment. Recognize that environmental changes may affect the survival of particular organisms and entire species.
Module 5: History of Life on Earth Lesson 5.10: The Arms of a Sea Star	8.1.3	Explain the process of natural selection. Recognize that environmental changes may affect the survival of particular organisms and entire species.
Module 5: History of Life on Earth Lesson 5.11: Predator vs. Prey	8.1.6 8.1.3	Interpret the results of a scientific investigation. Recognize that scientific explanations come from observations. Record scientific data using charts, graphs, and written descriptions.
Module 5: History of Life on Earth Lesson 5.12: Origin of a New Species	8.1.3	Define biological species. Describe the sequential stages of speciation. Examine views of others and revise own views if warranted. Explain the meaning of the term speciation and the phrase origin of species. Use technology to collaborate with peers by publishing writing which links and cites sources.
Module 5: History of Life on Earth Lesson 5.13: Adaptations to New Environments	8.1.3	Describe the sequential stages of speciation. Examine views of others and revise own views if warranted. Use technology to collaborate with peers by publishing writing which links and cites sources.
Module 5: History of Life on Earth Lesson 5.14: Development of Life	8.1.3	Describe the development of life on earth. Examine views of others and revise own views if warranted. Identify the age of the earth, on the basis of current scientific theory. Use technology to collaborate with peers by publishing writing which links and cites sources.
Module 5: History of Life on Earth Lesson 5.15: Development of Life Timeline	8.1.3	Describe the development of life on earth. Explain why scientists think evidence from the fossil record supports the idea that life changes over time. Identify the age of the earth, on the basis of current scientific theory.

Module 5: History of Life on Earth Lesson 5.16: Module Review		
Module 5: History of Life on Earth Lesson 5.17: Module Exam		
Module 5: History of Life on Earth Lesson 5.17: Module Exam (cont.)		
Module 5: History of Life on Earth Lesson 5.18: Portfolio		
Module 5: History of Life on Earth Lesson 5.18: Portfolio (cont.)		
Module 5: History of Life on Earth Lesson 5.18: Portfolio (cont.)		