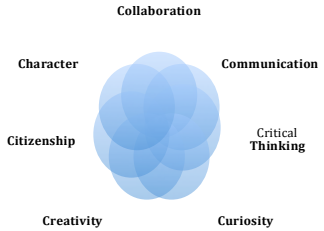
Content Area: Science	Course: Life Science	Grade Level: 6-8
	**R14 The Seven Cs of Learning** 	

Unit Titles	Length of Unit
• Structure, Function, and Information Processing	• 5-6 weeks
• Matter and Energy in Organisms and Ecosystems	• 5-6 weeks
• Interdependent Relationships in Ecosystems	• 5-6 weeks
• Growth, Development, and Reproduction of Organisms	• 5-6 weeks
• Natural Selection and Adaptations	• 5-6 weeks

Strands	Course Level Expectations
Structures and Processes	• Conduct an investigation to provide evidence that living things are made of cells; either one cell or many different numbers and types of cells. • Develop and use a model to describe the function of a cell as a whole and ways the parts of cells contribute to the function. • Use argument supported by evidence for how the body is a system of interacting subsystems composed of groups of cells • Gather and synthesize information that sensory receptors respond to stimuli by sending messages to the brain for immediate behavior or storage as memories. • Develop and use a model to describe why structural changes to genes (mutations) located on chromosomes may affect proteins and may result in harmful, beneficial, or neutral effects to the structure and function of the organism.
Biological Evolution	• Use argument based on empirical evidence and scientific reasoning to support an explanation for how characteristic animal behaviors and specialized plant structures affect the probability of successful reproduction of animals and plants respectively. • Construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms. • Develop and use a model to describe why asexual reproduction results in offspring with identical genetic information and sexual reproduction results in offspring with genetic variation. • Gather and synthesize information about technologies that have changed the way humans influence the inheritance of desired traits in organisms. • Analyze and interpret data for patterns in the fossil record that document the existence, diversity, extinction, and change of life forms throughout the history of life on Earth under the assumption

	that natural laws operate today as in the past. • Apply scientific ideas to construct an explanation for the anatomical similarities and differences among modern organisms and between modern and fossil organisms to infer evolutionary relationships. • Analyze displays of pictorial data to compare patterns of similarities in the embryological development across multiple species to identify relationships not evident in the fully formed anatomy. • Construct an explanation based on evidence that describes how genetic variations of traits in a population increase some individuals' probability of surviving and reproducing in a specific environment. • Use mathematical representations to support explanations of how natural selection may lead to increases and decreases of specific traits in populations over time.
Ecosystems: Interactions, Energy and Dynamics	• Construct a scientific explanation based on evidence for the role of photosynthesis in the cycling of matter and flow of energy into and out of organisms. • Develop a model to describe how food is rearranged through chemical reactions forming new molecules that support growth and/or release energy as this matter moves through an organism. • Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem. • Develop a model to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem. • Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations. • Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems. • Evaluate competing design solutions for maintaining biodiversity and ecosystem services.

Unit Title	Structure, Function, and Information Processing	**Length of Unit**	5-6 weeks

Inquiry Questions **(Engaging & Debatable)**	• How do the structures of organisms contribute to life's functions?
Standards*	MS-LS1-1, MS-LS1-2, MS-LS1-3, MS-LS1-8
Unit Strands & Concepts	**DISCIPLINARY CORE IDEAS (DCI):** • Structure and Function • Information Processing **Cross Cutting Concepts (CCC)** • Cause and Effect • Scale, Proportion, and Quantity • Structure and Function
Key Vocabulary	Unicellular, Multicellular, Nucleus, Chloroplasts, Mitochondria, Cell Membrane, Cell Wall, Data, Observations

*Standards based on the Next Generation Science Standards (NGSS) and the National Research Council (NRC)
For more information visit: http://portal.ct.gov/SDE/Science/Science-Standards-and-Resources

Unit Title	Structure, Function, and Information Processing	Length of Unit	5-6 Weeks

Critical Content: **My students will Know…**	**Key Skills:** **My students will be able to (Do)…**
• All living things are made up of cells, which is the smallest unit that can be said to be alive. • An organism may consist of one single cell (unicellular) or many different numbers and types of cells (multicellular). • Within cells, special structures are responsible for particular functions, and the cell membrane forms the boundary that controls what enters and leaves the cell. • In multicellular organisms, the body is a system of multiple interacting subsystems. These subsystems are groups of cells that work together to form tissues and organs that are specialized for particular body functions. • Each sense receptor responds to different inputs (electromagnetic, mechanical, chemical), transmitting them as signals that travel along nerve cells to the brain. The signals are then processed in the brain, resulting in immediate behaviors or memories.	• Conduct an investigation to provide evidence that living things are made of cells; either one cell or many different numbers and types of cells. • Develop and use a model to describe the function of a cell as a whole and ways the parts of cells contribute to the function • Use arguments supported by evidence for how the body is a system of interacting subsystems composed of groups of cells. • Gather and synthesize information that sensory receptors respond to stimuli by sending messages to the brain for immediate behavior or storage as memories.

Assessments:	• Performance Task(s) focused on demonstrating an understanding that all organisms are made of cells, that special structures ar responsible fo particular functions i organisms, and that for many organisms the body is system of multiple interacting subsystems that form a hierarchy from cells to the body.
Teacher Resources:	NGSS Frameworks, Region 14 Science Implementation Guide, Model Based Inquiry Investigations, Foss Kits, NGSS Phenomenon Resources, Stem Teaching Tools

Unit Title	Matter and Energy in Organisms and Ecosystems	**Length of Unit**	5-6 weeks

Inquiry Questions (Engaging & Debatable)	• How do organisms obtain and use matter and energy? • How do matter and energy move through an ecosystem?
Standards	MS-LS1-6, MS-LS1-7, MS-LS2-1, MS-LS2-3., MS-LS2-4
Unit Strands & Concepts	**DISCIPLINARY CORE IDEAS (DCI):** • Organization for Matter and Energy Flow in Organisms • Interdependent Relationships in Ecosystems • Cycle of Matter and Energy Transfer in Ecosystems • Ecosystem Dynamics, Functioning, and Resilience • Energy in Chemical Processes and Everyday Life **Cross Cutting Concepts (CCC)** • Cause and Effect • Energy and Matter • Stability and Change
Key Vocabulary	Photosynthesis, Matter, Energy, Ecosystem, Producer, Consumer, Decomposer, Cellular Respiration, Data, Observations

Unit Title	Matter and Energy in Organisms and Ecosystems	**Length of Unit**	5-6 weeks

Critical Content: My students will Know…	**Key Skills: My students will be able to (Do)…**
• Plants, algae (including phytoplankton), and many microorganisms use the energy from light to make sugars (food) from carbon dioxide from the atmosphere and water through the process of photosynthesis, which also releases oxygen. These sugars can be used immediately or stored for growth or later use. • Within individual organisms, food moves through a series of chemical reactions in which it is broken down and rearranged to form new molecules, to support growth, or to release energy. • Organisms, and populations of organisms, are dependent on their environmental interactions both with other living things and with nonliving factors. • In any ecosystem, organisms and populations with similar requirements for food, water, oxygen, or other resources may compete with each other for limited resources, access to which consequently constrains their growth and reproduction. • Growth of organisms and population increases are limited by access to resources • Foo webs are models that demonstrate how matter and energy is transferred between producers, consumers, and decomposers as the three groups interact within an ecosystem. Transfers of matter into and out of the physical environment occur at every level. Decomposers recycle nutrients from dead plant or animal matter back to the soil in terrestrial environments or to the water in aquatic environments.	• Construct a scientific explanation based on evidence for the role of photosynthesis in the cycling of matter and flow of energy into and out of organisms. • Develop a model to describe how food is rearranged through chemical reactions forming new molecules that support growth and/or release energy as this matter moves through an organism. • Develop a model to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem. • Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations. • Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem.

• The atoms that make up the organisms in an ecosystem are cycled repeatedly between the living and nonliving parts of the ecosystem. • Ecosystems are dynamic in nature; their characteristics can vary over time • Disruptions to any physical or biological component of an ecosystem can lead to shifts in all its populations. • Cellular respiration in plants and animals involve chemical reactions with oxygen that release stored energy. In these processes, complex molecules containing carbon react with oxygen to produce carbon dioxide and other materials	

Assessments:	• Performance Task(s) focused on demonstrating an understanding of the transfer of energy and cycling of matter within an ecosystem. How organisms interact to obtain the matter and energy from the ecosystem to survive and grow.
Teacher Resources:	NGSS Frameworks, Region 14 Science Implementation Guide, Model Based Inquiry Investigations, Foss Kits, NGSS Phenomenon Resources, Stem Teaching Tools

Unit Title	Interdependent Relationships in Ecosystems	**Length of Unit**	5-6 weeks

Inquiry Questions (Engaging & Debatable)	• How do organisms interact with each other within an ecosystem?
Standards*	MS-LS2-2, MS-LS2-5, ETS1-1, ETS1-2
Unit Strands & Concepts	**DISCIPLINARY CORE IDEAS (DCI):** • Interdependent Relationships in Ecosystems • Ecosystem Dynamics, Functioning, and Resilience • Biodiversity and Humans **Cross Cutting Concepts (CCC)** • Patterns • Stability and Change
Key Vocabulary	Interdependent Relationship, Biodiversity, Competitive Relationship, Predatory Relationship, Mutually Exclusive Relationship, Data, Observations

Unit Title	Interdependent Relationships in Ecosystems	**Length of Unit**	5-6 weeks

Critical Content: **My students will Know…**	**Key Skills:** **My students will be able to (Do)…**
• Predatory interactions may reduce the number of organisms or eliminate whole populations of organisms. Mutually beneficial interactions, in contrast, may become so interdependent that each organism requires the other for survival. • Although the species involved in competitive, predatory, and mutually beneficial interactions vary across ecosystems, the patterns of interactions of organisms with their environments, both living and nonliving, are shared • Biodiversity describes the variety of species found in Earth's terrestrial and oceanic ecosystems. The completeness or integrity of an ecosystem's biodiversity is often used as a measure of its health. • Changes in biodiversity can influence humans' resources, such as food, energy, and medicines, as well as ecosystem services that humans rely on—for example, water purification and recycling.	• Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems. • Evaluate competing design solutions for maintaining biodiversity and ecosystem services.

Assessments:	• Performance Task(s) focused on demonstrating an understanding of how organisms and populations of organisms are dependent on their environmental interactions both with other organisms and with nonliving factors. Also how the limits of resources influence the growth of organisms and populations interactions in ecosystems and the scientific, economic, political, and social justifications used in making decisions about maintaining biodiversity in ecosystems.
Teacher Resources:	NGSS Frameworks, Region 14 Science Implementation Guide, Model Based Inquiry Investigations, Foss Kits, NGSS Phenomenon Resources, Stem Teaching Tools

Unit Title	Growth, Development, and Reproduction of Organisms	**Length of Unit**	5-6 weeks

Inquiry Questions (Engaging & Debatable)	• How do parents transmit genes to offspring? • What environmental and genetic factors influence the growth of organisms? • What is the influence of humans on genetic outcomes in artificial selection?
Standards*	MS-LS1-4, MS-LS1-5, MS-LS3-1, MS-LS3-2, MS-LS4-5
Unit Strands & Concepts	**DISCIPLINARY CORE IDEAS (DCI):** • Growth and Development of Organisms • Inheritance of Traits • Variation of Traits • Natural Selection **Cross Cutting Concepts (CCC)** • Cause and Effect • Structure and Function
Key Vocabulary	Genetic Mutation, Chromosomes, Sexual Reproduction, Asexual Reproduction, Artificial Selection, Gene Modification, Data, Observations

Unit Title	Growth, Development, and Reproduction of Organisms	Length of Unit	5-6 weeks

Critical Content: **My students will Know…**	**Key Skills:** **My students will be able to (Do)…**
• Organisms reproduce, either sexually or asexually, and transfer their genetic information to their offspring. • Animals engage in characteristic behaviors that increase the odds of reproduction. • Plants reproduce in a variety of ways, sometimes depending on animal behavior and specialized features for reproduction • Genetic factors as well as local conditions affect the growth of the adult plant. • Genes are located in the chromosomes of cells, with each chromosome pair containing two variants of each of many distinct genes. Each distinct gene chiefly controls the production of specific proteins, which in turn affects the traits of the individual. • Changes (mutations) to genes can result in changes to proteins, which can affect the structures and functions of the organism and thereby change traits. • Variations of inherited traits between parent and offspring arise from genetic differences that result from the subset of chromosomes (and therefore genes) inherited. • In sexually reproducing organisms, each parent contributes half of the genes acquired (at random) by the offspring. • Individuals have two of each chromosome and hence two alleles of each gene, one acquired from each parent. These versions may be	• Use argument based on empirical evidence and scientific reasoning to support an explanation for how characteristic animal behaviors and specialized plant structures affect the probability of successful reproduction of animals and plants respectively. • Construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms. • Develop and use a model to describe why structural changes to genes (mutations) located on chromosomes may affect proteins and may result in harmful, beneficial, or neutral effects to the structure and function of the organism. • Develop and use a model to describe and justify why asexual reproduction results in offspring with identical genetic information and sexual reproduction results in offspring with genetic variation. • Gather and synthesize relevant information about technologies that have changed the way humans influence the inheritance of desired traits in organisms.

identical or may differ from each other. • In addition to variations that arise from sexual reproduction, genetic information can be altered because of mutations. • Though rare, mutations may result in changes to the structure and function of proteins. Some changes are beneficial, others harmful, and some neutral to the organism. • In artificial selection, humans have the capacity to influence certain characteristics of organisms by selective breeding. One can choose desired parental traits determined by genes, which are then passed on to offspring	

Assessments:	• Performance Task(s) focused on demonstrating an understanding of how the environment and genetic factors determine the growth of an individual organism. The structures and behaviors that increase the likelihood of successful reproduction by organisms. The role of technology, genetic modification, and the nature of ethical responsibilities related to selective breeding.
Teacher Resources:	NGSS Frameworks, Region 14 Science Implementation Guide, Model Based Inquiry Investigations, Foss Kits, NGSS Phenomenon Resources, Stem Teaching Tools

Unit Title	Natural Selection and Adaptations	**Length of Unit**	5-6 weeks

Inquiry Questions **(Engaging & Debatable)**	• What evidence exists of the relationships between fossils and modern organisms to support the theory of evolution? • How does genetic variation of traits in a population increase some individuals' probability to survive and reproduce in a specific environment? • How does the environment influence genetic traits in populations over multiple generations?
Standards*	MS-LS4-1, MS-LS4-2, MS-LS4-3, MS-LS4-4, MS-LS4-4
Unit Strands & Concepts	**DISCIPLINARY CORE IDEAS (DCI):** • Evidence of Common Ancestry and Diversity • Natural Selection • Adaptation **Cross Cutting Concepts (CCC)** • Cause and Effect • Patterns
Key Vocabulary	Fossil Record, Extinction, Traits, Genetic Variation, Natural Selection, Data, Observations

Unit Title	Natural Selection and Adaptations	**Length of Unit**	5-6 weeks

Critical Content: **My students will Know…**	**Key Skills:** **My students will be able to (Do)…**
• The collection of fossils and their placement in chronological order (e.g., through the location of the sedimentary layers in which they are found or through radioactive dating) is known as the fossil record. It documents the existence, diversity, extinction, and change of many life forms throughout the history of life on Earth. • Anatomical similarities and differences between various organisms living today and between them and organisms in the fossil record enable the reconstruction of evolutionary history and the inference of lines of evolutionary descent. • Comparison of the embryological development of different species also reveals similarities that show relationships not evident in the fully-formed anatomy. • Natural selection leads to the predominance of certain traits in a population, and the suppression of others. • Adaptation by natural selection acting over generations is one important process by which species change over time in response to changes in environmental conditions. • Traits that support successful survival and reproduction in the new environment become more common; those that do not become less common. Thus, the distribution of traits in a population changes.	• Analyze and interpret data for patterns in the fossil record that document the existence, diversity, extinction, and change of life forms throughout the history of life on Earth under the assumption that natural laws operate today as in the past. • Apply scientific ideas to construct an explanation for the anatomical similarities and differences among modern organisms and between modern and fossil organisms to infer evolutionary relationships. • Analyze displays of pictorial data to compare patterns of similarities in the embryological development across multiple species to identify relationships not evident in the fully formed anatomy. • Construct an explanation based on evidence that describes how genetic variations of traits in a population increase some individuals' probability of surviving and reproducing in a specific environment. • Use mathematical representations to support explanations of how natural selection may lead to increases and decreases of specific traits in populations over time.

Assessments:	• Performance Task(s) focused on demonstrating an understanding of how the fossil record can be used as evidence of the history of life on earth, and he role of variation in natural selection and how this leads to speciation.
Teacher Resources:	NGSS Frameworks, Region 14 Science Implementation Guide, Model Based Inquiry Investigations, Foss Kits, NGSS Phenomenon Resources, Stem Teaching Tools