



7th Grade Life Science

Approved by KSD Board of Education: (May 19, 2025)

Course Description:

In 7th grade life science, students delve deeper into the intricacies of the living world. Through a combination of hands-on experiments, engaging discussions, and real-world applications, students explore the fundamental concepts of biology.

Grade Level: 7th Grade

Unit Scope and Sequence

Unit 1: From Molecules to Organisms

Unit 2: Genetics

Unit 3: Natural Selection and Changes Over Time

Unit 4: Ecosystem Dynamics

Course Enduring Understandings:

- Organisms' structures are closely linked to their functions; the systems made of these structures depend on each other.
- Genetic information is inherited from one generation to the next.
- Characteristics of populations of organisms change over time.
- Organisms interact with their environment.

Course Essential Questions:

- How do the structures and systems of organisms relate to their functions and interact with each other?
- How does genetics affect the probability of successful reproduction?
- How does natural selection shape the diversity of life?
- How do organisms interact with their environment to maintain diverse and balanced ecosystems?

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Unit 1: From Molecules to Organisms

Students will work toward formulating an answer to the question, “How can one explain the ways cells are organized to contribute to the function of living organisms?” Students will gather evidence and use this information to support explanations of the structure and function relationship of cells and how they work to support the life functions of the organism. The understanding of cells provides a context for understanding the relationship between photosynthesis and cellular respiration. Along the way, students investigate the structure and function of major human body systems.

Unit Essential Learning Targets	
<i>Enduring Understandings</i>	<i>Essential Questions</i>
• All living things are made of one or more cells. • All cells share common functions. • Cells may work together to form more complex structures with complex functions.	• What are the characteristics of living things? • How do cells (or groups of cells) carry out the functions necessary for survival?
<i>Students must know:</i>	<i>Students must be able to:</i>
• The characteristics of life. • The three components of the cell theory. • Cellular levels of organization, focusing on digestive, respiratory, and cardiovascular systems. • The structures and functions of cells, including nucleus, chloroplasts, mitochondria, cell membrane, and cell wall. • The relationship between cells, tissues, organs, and organ systems.	• Identify whether something is living or nonliving. • Use a microscope to identify the parts and structures in cells. • Differentiate between an animal and a plant cell. • Create a conceptual model/analogy of a basic cell. • Demonstrate the relationship between photosynthesis and cellular respiration. • Describe the pathway of gasses and nutrients in an organism as well as organisms' systems for movement and protection. • Develop an argument supported by evidence about how multicellular organisms are organized. Use a Claim-Evidence-Reasoning format.

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Unit 1: From Molecules to Organisms

Missouri Learning Standards

Priority Standard: Provide evidence that organisms (unicellular and multicellular) are made of cells and that a single cell must carry out all of the basic functions of life (6-8.LS1.A.1).

Priority Standard: Develop and use a model to describe the function of a cell as a whole and ways parts of cells contribute to the function (6-8.LS1.A.2).

Priority Standard: Develop an argument supported by evidence for how multicellular organisms are organized by varying levels of complexity; cells, tissue, organs, organ systems (6-8.LS1.A.3).

Priority Standard: Present evidence that body systems interact to carry out key body functions, including providing nutrients and oxygen to cells, removing carbon dioxide and waste from cells and the body, controlling body motion/activity and coordination, and protecting the body (6-8.LS1.A.4).

Priority Standard: Construct a scientific explanation based on evidence for the role of photosynthesis and cellular respiration in the cycling of matter and flow of energy into and out of organisms (6-8.LS1.C.1).

Priority Standard: Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved (6-8.ETS1.B.3).

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Unit 2: Genetics

Students will take a look at how organisms, through sexual and asexual reproduction, pass traits on to their offspring. Further, they will examine how adaptations, the environment, and human interactions have an impact on species survival.

Unit Essential Learning Targets	
<i>Enduring Understandings</i>	<i>Essential Questions</i>
- Sexual reproduction mixes the DNA from two organisms, creating variation in offspring. - Humans and the environment can impact the characteristics of offspring that are produced. - Traits produced by genes can increase the reproductive success in organisms. - Specific behaviors and structures affect the probability of reproduction. - DNA codes for proteins in an organism.	- How do humans influence the inheritance of traits and genetic variation? - How do environmental factors affect the traits of organisms? - How do adaptations such as animal behaviors and specific plant structures affect the reproductive success of organisms? - In what ways can genetic variations change the probability of reproduction and survival in organisms?
<i>Students must know:</i>	<i>Students must be able to:</i>
- The function and location of DNA, genes, and chromosomes. - The definitions of: sexual reproduction, asexual reproduction, species, artificial selection, genetic variation, and probability. - Examples of factors that affect growth in organisms (food, fertilizer, etc.) - Examples of animal behaviors and plant structures that affect plant and animal reproduction.	- Compare and contrast sexual and asexual reproduction. - Construct an argument that shows the effect of the environment on organisms' growth and/or development. - Research and give evidence to support the benefits to humans of artificial selection. - Construct and explain a monohybrid Punnett square.

7th Grade Life Science Unit 2: Genetics

Missouri Learning Standards

Priority Standard: Construct an explanation for how characteristic animal behaviors as well as specialized plant structures affect the probability of successful reproduction of animals and plants respectively (6-8.LS1.B.1).

Priority Standard: Construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms (6-8.LS1.B.2).

Priority Standard: 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 (6-8.LS4.B.1).

Priority Standard: Gather and synthesize information about the technologies that have changed the way humans influence the inheritance of desired traits in organisms (6-8.LS4.B.2).

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Unit 3: Natural Selection and Changes Over Time

Students will explore how natural selection affects the frequency of traits in a population. Additionally, they will look at how genetic variation in a population improves the probability of species' survival. Attention will be given to utilizing fossil records to predict how environmental changes have affected species survival throughout Earth's history.

Unit Essential Learning Targets	
<i>Enduring Understandings</i>	<i>Essential Questions</i>
• Natural selection affects the relative frequency of traits in a population over time. • Fossil evidence provides a record of changes in organisms throughout Earth's history. • Different environments favor different traits for the same species.	• How has life changed over time? • Why do some species become extinct? • Why do some traits confer an advantage to an organism while others do not?
<i>Students must know:</i>	<i>Students must be able to:</i>
• The definitions of the following: species, extinction, fossil, natural selection, mutation, and gene. • How mutations affect reproductive success.	• Analyze a graphical display that shows a change in traits of a population over time. • Make inferences about the evolution of a species based on fossil evidence and/or anatomical structures. • Predict how mutations might change the reproductive success of an organism in a population. • Analyze and interpret data using a Claim-Evidence-Reasoning format.

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Unit 3: Natural Selection and Changes Over Time

Missouri Learning Standards

Priority Standard: Analyze and interpret evidence from the fossil record to infer patterns of environmental change resulting in extinction and changes to life forms throughout the history of the Earth (6-8.LS4.A.1).

Priority Standard: Interpret graphical representations to support explanations of how natural selection may lead to increases and decreases of specific traits in populations over time (6-8.LS4.C.1).

Priority Standard: Evaluate compelling design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem (6-8.ETS1.B.1).

Priority Standard: Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success (6-8.ETS1.B.2).

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Unit 3: Natural Selection and Changes Over Time

Missouri Learning Standards

Priority Standard: Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem (6-8.LS2.A.1).

Priority Standard: Construct an explanation that predicts the patterns of interactions among and between the biotic and abiotic factors in a given ecosystem (6-8.LS2.A.2).

Priority Standard: Develop a model to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem (6-8.LS2.B.1).

Priority Standard: Construct an argument supported by empirical evidence that explains how changes to physical or biological components of an ecosystem affect populations (6-8.LS2.C.1).

Priority Standard: Evaluate benefits and limitations of differing design solutions for maintaining an ecosystem (6-8.LS2.C.2).

Priority Standard: Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions (6-8.ETS1.A.1).

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Unit 4: Ecosystem Dynamics

Students will explore the characteristics of an ecosystem and the energy that flows into and out of it. They will use models and data to predict patterns and changes in ecosystems. Students will look closely at the interactions between organisms and how those interactions can support or harm an organism's or species' chances of survival.

Unit Essential Learning Targets	
<i>Enduring Understandings</i>	<i>Essential Questions</i>
• Resource availability affects populations of organisms. • Biotic and abiotic factors interact in a variety of ways within an ecosystem; changes to these components affect populations. • Ecosystems require maintenance to protect resources, and species. • Energy flows into and out of an ecosystem, but it is always conserved.	• How does the environment affect which species thrive? • How can humans and/or resource availability affect an ecosystem? • How does energy cycle in and out of an ecosystem?
<i>Students must know:</i>	<i>Students must be able to:</i>
• Definitions of the following: biotic, abiotic, food chain, food web, energy pyramid, Law of Conservation of Mass, Law of Conservation of Energy, biodiversity, abundant and scarce resources, population, ecosystem, competition, predation, and symbiosis. • That energy and matter cycle in an ecosystem. • Available energy decreases as you move up a trophic level.	• Explain the impact of humans on the environment both directly and indirectly. • Determine which traits might be more successful in an ecosystem. • Use a model and data to predict changes in populations in a food web as a result of resource disruptions. • Explain the cycling of energy and matter through an ecosystem. • Use evidence to support an explanation of how biotic and abiotic factors affect populations. Use a Claim-Evidence-Reasoning format. • Consider scientific, economic, and social constraints in designing solutions to maintain an ecosystem.

7th Grade Life Science Unit 4: Ecosystem Dynamics

Missouri Learning Standards

Priority Standard: Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem (6-8.LS2.A.1).

Priority Standard: Construct an explanation that predicts the patterns of interactions among and between the biotic and abiotic factors in a given ecosystem (6-8.LS2.A.2).

Priority Standard: Develop a model to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem (6-8.LS2.B.1).

Priority Standard: Construct an argument supported by empirical evidence that explains how changes to physical or biological components of an ecosystem affect populations (6-8.LS2.C.1).

Priority Standard: Evaluate benefits and limitations of differing design solutions for maintaining an ecosystem (6-8.LS2.C.2).

Priority Standard: Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions (6-8.ETS1.A.1).