Henry County Schools

Life Science Scope and Sequence (2017-2018)

Graduation Competency MS7. Students will apply scientific and engineering practices to understand and analyze the structural similarities of organisms and how they can be compared scientifically.

Science GSE	Science and Engineering Practices	Cross-Cutting Concepts	Number of Weeks
S7L1. Obtain, evaluate, and communicate information to investigate the diversity of living organisms and how they can be compared scientifically. a. Develop and defend a model that categorizes organisms based on common characteristics. b. Evaluate historical models of how organisms were classified based on physical characteristics and how that led to the six kingdom system (currently archaea, bacteria, protists, fungi, plants, and animals). (Clarification statement: This includes common examples and characteristics such as, but not limited to, prokaryotic, eukaryotic, unicellular, multicellular, asexual reproduction, sexual reproduction, autotroph, heterotroph, and unique cell structures. Modern classification will be addressed in high school.)	• Obtaining, evaluating, and communicating information • Developing and using models • Analyzing and interpreting data	• Patterns • Systems and System Models	7 weeks July 31 – Sept 15

Graduation Competency MS4. Students will apply scientific and engineering practices to understand and analyze molecular, structural, and chemical biology as they relate to biological systems and each level of organization from cells to organ systems.

Science GSE	Science and Engineering Practices	Cross-Cutting Concepts	Number of Weeks
S7L2. Obtain, evaluate, and communicate information to describe how cell structures, cells, tissues, organs, and organ systems interact to maintain the basic needs of organisms. a. Develop a model and construct an explanation of how cell structures (specifically the nucleus, cytoplasm, cell membrane, cell wall, chloroplasts, lysosome, and mitochondria) contribute to the function of the cell as a system in obtaining nutrients in order to grow, reproduce, make needed materials, and process waste. (Clarification statement: The intent is for students to demonstrate how the component structures of the cell interact and work together to allow the cell as a whole to carry out various processes. Additional structures, beyond those listed, will be addressed in high school Biology.) b. Develop and use a conceptual model of how cells are organized into tissues, tissues into organs, organs into systems, and systems into organisms. c. Construct an argument that systems of the body (Cardiovascular, Excretory, Digestive, Respiratory, Muscular, Nervous, and Immune) interact with one another to carry out life processes. (Clarification statement: The emphasis is not on learning individual structures and functions associated with each system, but on how systems interact to support life processes.)	• Developing and using models • Constructing explanations and designing solutions • Engaging in argument from evidence	• Patterns • Structure and function • Cause and effect • Systems and system models	10.5 weeks Sept 25 – Dec 15 Flex Week Dec 18 – Dec 22

Graduation Competency MS6. Students will apply scientific and engineering practices to understand and analyze the relationship between genetics, adaptation, and biodiversity.

Science GSE	Science and Engineering Practices	Cross-Cutting Concepts	Number of Weeks
S7L3. Obtain, evaluate, and communicate information to explain how organisms reproduce either sexually or asexually and transfer genetic information to determine the traits of their offspring. a. Construct an explanation supported with scientific evidence of the role of genes and chromosomes in the process of inheriting a specific trait. b. Develop and use a model to describe how asexual reproduction can result in offspring with identical genetic information while sexual reproduction results in genetic variation. (Clarification statement: Models could include, but are not limited to, the use of monohybrid Punnett squares to demonstrate the heritability of genes and the resulting genetic variation, identification of heterozygous and homozygous, and comparison of genotype vs. phenotype.) c. Ask questions to gather and synthesize information about the ways humans influence the inheritance of desired traits in organisms through selective breeding. (Clarification statement: The element specifically addresses artificial selection and the ways in which it is fundamentally different from natural selection.)	• Developing and using models • Constructing explanations and designing solutions • Asking questions and defining problems • Obtaining, evaluating, and communicating information	• Patterns • Systems and System Models • Stability and Change • Cause and Effect	6 weeks Jan 9 – Feb 16

Graduation Competency MS6. Students will apply scientific and engineering practices to understand and analyze the relationship between genetics, adaptation, and biodiversity.

Science GSE	Science and Engineering Practices	Cross-Cutting Concepts	Number of Weeks
S7L5. Obtain, evaluate, and communicate information from multiple sources to explain the theory of evolution of living organisms through inherited characteristics. a. Use mathematical representations to evaluate explanations of how natural selection leads to changes in specific traits of populations over successive generations. (Clarification statement: Referencing data should be obtained from multiple sources including, but not limited to, existing research and simulations. Students should be able to calculate means, represent this data in a table or graph, and reference it when explaining the principles of natural selection.) b. Construct an explanation based on evidence that describes how genetic variation and environmental factors influence the probability of survival and reproduction of a species. c. Analyze and interpret data for patterns in the fossil record that document the existence, diversity, and extinction of organisms and their relationships to modern organisms. (Clarification statement: Evidence of evolution found in comparisons of current/modern organisms such as homologous structures, DNA, and fetal development will be addressed in high school.)	• Using mathematics and computational thinking • Constructing explanations and designing solutions • Analyzing and interpreting data • Obtaining, evaluating and communication information	• Patterns • Cause and Effect • Stability and Changes	3 weeks Feb 27 – Mar 16

Graduation Competency MS5. Students will apply scientific and engineering practices to understand and analyze the characteristics, functions, and behavioral interactions within an ecosystem.

Science GSE	Science and Engineering Practices	Cross-Cutting Concepts	Number of Weeks
S7L4. Obtain, evaluate, and communicate information to examine the interdependence of organisms with one another and their environments. **a.** Construct an explanation for the patterns of interactions observed in different ecosystems in terms of the relationships among and between organisms and abiotic components of the ecosystem. (Clarification statement: The interactions include, but are not limited to, predator-prey relationships, competition, mutualism, parasitism, and commensalism.) **b.** Develop a model to describe the cycling of matter and the flow of energy among biotic and abiotic components of an ecosystem. (Clarification statement: Emphasis is on tracing movement of matter and flow of energy, not the biochemical mechanisms of photosynthesis and cellular respiration.) **c.** Analyze and interpret data to provide evidence for how resource availability, disease, climate, and human activity affect individual organisms, populations, communities, and ecosystems. **d.** Ask questions to gather and synthesize information from multiple sources to differentiate between Earth's major terrestrial biomes (i.e., tropical rain forest, savanna, temperate forest, desert, grassland, taiga, and tundra) and aquatic ecosystems (i.e., freshwater, estuaries, and marine). (Clarification statement: Emphasis is on the factors that influence patterns across biomes such as the climate, availability of food and water, and location.)	• Developing and using models • Constructing explanations and designing solutions • Constructing explanations and designing solutions • Analyzing and interpreting data • Obtaining, evaluating, and communicating information • Asking questions and defining problems	• Patterns • Structure and function • Cause and effect • Systems and system models • Scale, Proportion and Quantity • Energy and Matter • Stability and Change	8 weeks Mar 19 – May 18 Flex Week May 21- May 25