

# Fairfield Public Schools Science Curriculum

## Biology



**FAIRFIELD  
PUBLIC SCHOOLS**

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## Biology: Description

Students in high school develop understanding of key concepts that will help them make sense of life science. The ideas are built upon students' science understanding of disciplinary core ideas, science and engineering practices, and crosscutting concepts from earlier grades.

There are four life science disciplinary core ideas in high school: 1) From Molecules to Organisms: Structures and Processes, 2) Ecosystems: Interactions, Energy, and Dynamics, 3) Heredity: Inheritance and Variation of Traits, 4) Biological Evolution: Unity and Diversity.

The performance expectations for high school life science blend core ideas with scientific and engineering practices and crosscutting concepts to support students in developing usable knowledge that can be applied across the science disciplines. While the performance expectations in high school life science couple particular practices with specific disciplinary core ideas, instructional decisions include use of many practices underlying the performance expectations.

**Standards for this course are taken from the Next Generation Science Standards and are of three types:**

**Disciplinary Core Ideas (DCIs):** Shown as content objectives, these standards define what students should know about the most essential ideas in the major science disciplines. The focus is on a limited number of core ideas in science and engineering both within and across the disciplines to avoid the shallow coverage of a large number of topics and to allow more time for teachers and students to explore each idea in greater depth. Reduction of the sheer sum of details to be mastered is intended to give time for students to engage in scientific investigations and argumentation and to achieve depth of understanding of the core ideas presented.

**Science and Engineering Practices (SEP):** These standards enable students to apply the content in the DCI's and the skills of practicing scientists and engineers to explain phenomena and solve real world problems. Engaging in the practices of science helps students understand how scientific knowledge develops; such direct involvement gives them an appreciation of the wide range of approaches that are used to investigate, model, and

explain the world. Engaging in the practices of engineering likewise helps students understand the work of engineers, as well as the links between engineering and science.

**Crosscutting Concepts:** These standards provide students with connections and intellectual tools that are related across the differing areas of disciplinary content and can enrich their application of practices and their understanding of core ideas. These broad concepts tie together the influence of engineering, technology, and science on society and the natural world.

## Biology

### Enduring Understandings

Over many generations variations in the living organisms arise allowing them to survive in an ever changing Earth. The structure of biological components determines the role they play in survival of a species. All living organisms maintain a balance internally and between individuals, this equilibrium can be disturbed by natural or human events.

### Course Essential Questions

- How do organisms live and grow?
- Why do interactions vary among organisms and their environments?
- Why are some characteristics passed on and some characteristics changed over time?

## Course: Year-at-a Glance

Unit	Title	Unit Essential Questions
1	Biological Evolution: Unity and Diversity	How does natural selection lead to a change in species over time?

2	Heredity: Inheritance and Variation of Traits	Why do individuals of the same species and even siblings have different characteristics? How does genetic variation arise and how is it distributed in a population?
3	From Molecules to Organisms: Structures and Processes	How do organisms use matter and energy found in their environment to sustain life processes? What mechanisms do organisms use to grow, develop and maintain homeostasis?
4	Ecosystems: Interactions, Energy, and Dynamics	How do organisms cycle matter and energy? How do stable and changing environmental conditions affect species populations?

## Unit 1: Natural Selection and Evolution

### Overview

Evolution is the unifying theme of biology. Natural selection incorporates how species and populations change and adapt over time depending on changes in environmental conditions. There are multiple lines of scientific evidence that can be evaluated to support the processes of natural selection including the role of genetic variation in evolution.

### Performance Expectations

**At the conclusion of this unit, students will be able to:**

**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 or revise a simulation to test a solution to mitigate adverse impacts of human activity on biodiversity

## Unit Essential Question

- How does natural selection lead to a change in species over time?

## Crosscutting Concepts

### Cause and Effect

- Empirical evidence is required to differentiate between cause and correlation and make claims about specific causes and effects. (HS-LS4-2), (HS-LS4-4), (HS-LS4-4), (HS-LS4-5), (HS-LS4-6).

### Patterns

- Different patterns may be observed at each of the scales at which a system is studied and can provide evidence for causality in explanations of phenomena. (HS-LS4-1, HS-LS4-3)

### Scientific Knowledge Assumes an Order and Consistency in Natural Systems

- Scientific knowledge is based on the assumption that natural laws operate today as they did in the past, and will continue to do so in the future. (HS-LS4-1, HS-LS4-4)

## NGSS Unit Standards

### DISCIPLINARY CORE IDEAS (DCI):

#### LS4.A : Evidence of Common Ancestry and Diversity

- Genetic information provides evidence of evolution. DNA sequences vary among species, but there are many overlaps; in fact, the ongoing branching that produces multiple lines of descent can be inferred by comparing the DNA sequences of different organisms. Such information is also derivable from the similarities and differences in amino acid sequences and from anatomical and embryological evidence. (HS-LS4-1)

#### LS4.B: Natural Selection

- Natural selection occurs only if there is both (1) variation in the genetic information between organisms in a population and (2) variation in the expression of that genetic information—that is, trait variation—that leads to differences in performance among individuals. (HS-LS4-2),(HS-LS4-3)
- The traits that positively affect survival are more likely to be reproduced, and thus are more common in the population. (HS-LS4-3)

#### LS4.C: Adaptation

- Evolution is a consequence of the interaction of four factors: (1) the potential for a species to increase in number, (2) the genetic variation of individuals in a species due to mutation and sexual reproduction, (3) competition for an environment’s limited supply of the resources that individuals need in order to survive and reproduce, and (4) the ensuing proliferation of those organisms that are better able to survive and reproduce in that environment. (HS-LS4-2)
- Natural selection leads to adaptation that is, to a population dominated by organisms that are anatomically, behaviorally, and physiologically well suited to survive and reproduce in a specific environment. That is, the differential survival and reproduction of organisms in a population that have an advantageous heritable trait leads to an increase in the proportion of individuals in future generations that have the trait and to a decrease in the proportion of individuals that do not. (HS-LS4-3),(HS-LS4-4)
- Adaptation also means that the distribution of traits in a population can change when conditions change. (HS-LS4-3)
- Changes in the physical environment, whether naturally occurring or human induced, have thus contributed to the expansion of some species, the emergence of new distinct species as populations diverge under different conditions, and the decline—and sometimes the extinction—of some species. (HS-LS4-5),(HS-LS4-6)

**SCIENCE AND ENGINEERING PRACTICES (SEP):**

**Constructing Explanations and Designing Solutions**

- Construct an explanation based on valid and reliable evidence obtained from a variety of sources (including students’ own investigations, models, theories, simulations, peer review) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future. (HS-LS4-2),(HS-LS4-4)

**Engaging in Argument from Evidence**

- Evaluate the evidence currently accepted explanations of solutions to determine the merits of arguments. (HS-LS4-5)

**Using Mathematical and Computational Thinking**

- Create or revise a simulation of a phenomenon, designed device, process, or system. (HS-LS4-6)

**Analyzing and Interpreting Data**

- Apply concepts of statistics and probability (including determining function fits to data, slope, intercepts, and correlation coefficient for linear fits) to science and engineering questions and problems, using digital tools when feasible. (HS-LS4-3)

**Obtaining, Evaluating, and Communicating Information**

- Communicate scientific information (e.g., about phenomena and/or the process of development and the design and performance of a proposed process or system) in multiple formats (including orally, graphically, textually, and mathematically). (HS-LS4-1)

**Science Models, Laws, Mechanisms, and Theories Explain Natural Phenomena**

- A scientific theory is a substantiated explanation of some aspect of the natural world, based on a body of facts that have been repeatedly confirmed through observation and experiment and the science community validates each theory before it is accepted. If new evidence is discovered that the theory does not accommodate, the theory is generally modified in light of this new evidence. (HS-LS4-1)

**Corresponding CT Core Standards:**

**ELA/Literacy** – RST.11-12.1, WHST.9-12.1, SL 11-12.5

**Mathematics** – MP.2, MP.4, HSN-Q.A.1, HSN-Q.A.2, HSN-Q.A.3

## Unit 2 Heredity: Inheritance and Variation of Traits

### Overview

Scientists have observed variations in species that are caused by factors including the inheritance of genes and a changing environment. These genetic variations can be predicted and quantified using mathematical concepts.

### Performance Expectations

**At the conclusion of this unit, students will be able to:**

**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-LS3-1.** Ask questions to clarify relationships about the role of DNA and chromosomes in coding the instructions for characteristic traits passed from parents to offspring.

**HS-LS3-2.** Make and defend a claim based on evidence that inheritable genetic variations may result from: (1) new genetic combinations through meiosis, (2) viable errors occurring during replication, and/or (3) mutations caused by environmental factors

**HS-LS3-3.** Apply concepts of statistics and probability to explain the variation and distribution of expressed traits in a population.

### **Unit Essential Questions**

- What is the role of DNA in determining the traits passed from parents to offspring?
- How does genetic variation arise and how is it distributed in a population?

## Crosscutting Concepts

### Cause and Effect

- Empirical evidence is required to differentiate between cause and correlation and make claims about specific causes and effects. (HS-LS3-1), (HS-LS3-2)

### Scale, Proportion, and Quantity

- Algebraic thinking is used to examine scientific data and predict the effect of a change in one variable on another (e.g., linear growth v s. exponential growth). (HS-LS3-3)

### Science is a Human Endeavor

- Technological advances have influenced the progress of science and science has influenced advances in technology. (HS-LS3-3)
- Science and engineering are influenced by society and society is influenced by science and engineering. (HS-LS3-3)

## NGSS Unit Standards

### DISCIPLINARY CORE IDEAS (DCI):

#### LS1.A: Structure and Function

- All cells contain genetic information in the form of DNA molecules. Genes are regions in the DNA that contain the instructions that code for the formation of proteins. (secondary to HS-LS3-1) (Note: This Disciplinary Core Idea is also addressed by HS-LS1-1.)

#### LS3.A : Inheritance of Traits

- Each chromosome consists of a single very long DNA molecule, and each gene on the chromosome is a particular segment of that DNA . The instructions for forming species' characteristics are carried in DNA. All cells in an organism have the same genetic content, but the genes used (expressed) by the cell may be regulated in different ways. Not all DNA codes for a protein; some segments of DNA are involved in regulatory or structural functions, and some have no as-yet known function. (HS-LS3-1)

#### LS3.B: Variation of Traits

- In sexual reproduction, chromosomes can sometimes swap sections during the process of meiosis (cell division), thereby creating new genetic combinations and thus more genetic variation. Although DNA replication is tightly regulated and remarkably accurate, errors do occur and result in mutations, which are also a source of genetic variation. Environmental factors can also cause mutations in genes, and viable mutations are inherited. (HS-LS3-2)

- Environmental factors also affect expression of traits, and hence affect the probability of occurrences of traits in a population. Thus the variation and distribution of traits observed depends on both genetic and environmental factors. (HS-LS3-2),(HS-LS3-3)

### **LS1.B: Growth and Development of Organisms**

- The organism begins as a single cell (fertilized egg) that divides successively to produce many cells, with each parent cell passing identical genetic material (two variants of each chromosome pair) to both daughter cells. (Note: This Disciplinary Core Idea has been divided between unit 2 and 3)

### **SCIENCE AND ENGINEERING PRACTICES (SEP):**

#### **Engaging in Argument from Evidence**

- Make and defend a claim based on evidence about the natural world that reflects scientific knowledge, and student-generated evidence. (HS-LS3-2)

#### **Analyzing and Interpreting Data**

- Apply concepts of statistics and probability (including determining function fits to data, slope, intercept, and correlation coefficient for linear fits) to scientific and engineering questions and problems, using digital tools when feasible. (HS -LS3-3)

#### **Asking Questions and Defining Problems**

Ask questions that arise from examining models or a theory to clarify relationships. (HS-LS3-1)

### **Corresponding CT Core Standards:**

**ELA/Literacy** – RST.11-12.1, RST.11-12.8, WHST.9-12.1, RST.11-12.2, RST.11-12.7

**Mathematics** – MP.2, MP.4, HSN-Q.A.1, HSN-Q.A.2, HSN-Q.A.3

# Unit 3 From Molecules to Organisms: Structures and Processes

## Overview

Organisms are built on a hierarchical structure, with each level providing the foundation for the next. The structure and function of these foundational molecules is determined by an organism's genetic code which is inherited from the previous generation. As matter and energy flow through different organizational levels of living systems, these building blocks are rearranged and used to perform essential life functions.

## Performance Expectations

**At the conclusion of this unit, students will be able to:**

**HS-LS1-2.** Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.

**HS-LS1-3.** Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis.

**HS-LS1-4.** Use a model to illustrate the role of cellular division (mitosis) and differentiation in producing and maintaining complex organisms.

**HS-LS1-5.** Use a model to illustrate how photosynthesis transforms light energy into stored chemical energy.

**HS-LS1-6.** Construct and revise an explanation based on evidence for how carbon, hydrogen, and oxygen from sugar molecules may combine with other elements to form amino acids and/or other large carbon-based molecules.

**HS-LS1-7.** Use a model to illustrate that cellular respiration is a chemical process whereby the bonds of food molecules and oxygen molecules are broken and the bonds in new compounds are formed resulting in a net transfer of energy.

## Unit Essential Questions

- How do organisms use matter and energy found in their environment to sustain life processes?
- What mechanisms do organisms use to grow, develop and maintain homeostasis?

## Crosscutting Concepts

### Systems and System Models

- Models (e.g., physical, mathematical, computer models) can be used to simulate systems and interactions— including energy, matter, and information flows—within and between systems at different scales. (HS-LS1-2), (HS-LS1-4)

### Energy and Matter

- Changes of energy and matter in a system can be described in terms of energy and matter flows into, out of, and within that system. (HS-LS1-5), (HS-LS1-6)
- Energy cannot be created or destroyed—it only moves between one place and another place, between objects and/or fields, or between systems.(HS-LS1-7),(HS-LS2-4)

### Structure and Function

- Investigating or designing new systems or structures requires a detailed examination of the properties of different materials, the structures of different components, and connections of components to reveal its function and/or solve a problem. (HS-LS1-1)

### Stability and Change

Feedback (negative or positive) can stabilize or destabilize a system. (HS- LS1-3)

## NGSS Unit Standards

### **DISCIPLINARY CORE IDEAS (DCI):**

#### **LS1.A: Structure and Function**

- Systems of specialized cells within organisms help them perform the essential functions of life. (HS-LS1-1)
- All cells contain genetic information in the form of DNA molecules. Genes are regions in the DNA that contain the instructions that code for the formation of proteins, which carry out most of the work of cells. (HS-LS1-1) (Note: This Disciplinary Core Idea is also addressed by HS-LS3-1.)
- Multicellular organisms have a hierarchical structural organization, in which any one system is made up of numerous parts and is itself a component of the next level. (HS-LS1-2)
- Feedback mechanisms maintain a living system's internal conditions within certain limits and mediate behaviors, allowing it to remain alive and functional even as external conditions change within some range. Feedback mechanisms can encourage (through positive feedback) or discourage (negative feedback) what is going on inside the living system. (HS-LS1-3)

#### **LS1.B: Growth and Development of Organisms**

- In multicellular organisms individual cells grow and then divide via a process called mitosis, thereby allowing the organism to grow. Cellular division and differentiation produce and maintain a complex organism, composed of systems of tissues and organs that work together to meet the needs of the whole organism. (Note: This Disciplinary Core Idea has been divided between unit 2 and 3)

#### **LS1.C: Organization for Matter and Energy Flow in Organisms**

- The process of photosynthesis converts light energy to stored chemical energy by converting carbon dioxide plus water into sugars plus released oxygen. (HS-LS1-5)
- The sugar molecules thus formed contain carbon, hydrogen, and oxygen: their hydrocarbon backbones are used to make amino acids and other carbon-based molecules that can be assembled into larger molecules (such as proteins or DNA), used for example to form new cells. (HS-LS1-6)
- As matter and energy flow through different organizational levels of living systems, chemical elements are recombined in different ways to form different products. (HS-LS1-6),(HS-LS1-7)
- As a result of these chemical reactions, energy is transferred from one system of interacting molecules to another. Cellular respiration is a chemical process in which the bonds of food molecules and oxygen molecules are broken and new compounds are formed that can transport energy to muscles. Cellular respiration also releases the energy needed to maintain body temperature despite ongoing energy transfer to the surrounding environment. (HS-LS1-7)

**SCIENCE AND ENGINEERING PRACTICES (SEP):**

**Developing and Using Models**

- Develop and use a model based on evidence to illustrate the relationships between systems or between components of a system. (HS-LS1-2)

**Constructing Explanations and Designing Solutions**

- Construct an explanation based on valid and reliable evidence obtained from a variety of sources (including students' own investigations, models, theories, simulations, peer review) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future. (HS-LS1-1)

**Planning and Carrying out Investigations**

- Plan and conduct an investigation individually and collaboratively to produce data to serve as the basis for evidence, and in the design: decide on types, how much, and accuracy of data needed to produce reliable measurements and consider limitations on the precision of the data (e.g., number of trials, cost, risk, time), and refine the design accordingly. (HS-LS1-3)

**Corresponding CT Core Standards:**

**ELA/Literacy** – RST.11-12.1, RST.11-12.8, WHST.9-12.2

**Mathematics** – MP.2, HSN-Q.A.1, HSN-Q.A.2, HSN-Q.A.3

# Unit 4 Ecosystems: Interactions, Energy, and Dynamics

## Overview

The Earth is an ever changing system. Many factors within the system affect biodiversity and populations of species. Populations are influenced by available energy, cycling of nutrients, populations of other species, and human activities. The biodiversity of ecosystems is dependent upon various organisms ability to adapt and survive changes in the environment.

## Unit Content Objectives

**At the conclusion of this unit, students will be able to:**

**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 and revise an explanation based on evidence for the cycling of matter and flow of energy in aerobic and anaerobic conditions.

**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 interactions in ecosystems maintain relatively consistent numbers and types of organisms in stable conditions, but changing conditions may result in a new ecosystem.

**HS-LS2-7.** Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.

**HS-LS2-8.** Evaluate the evidence for the role of group behavior on individual and species' chances to survive and reproduce.

### Unit Essential Questions

- How do organisms cycle matter and energy?
- How do stable and changing environmental conditions affect species populations?

### Crosscutting Concepts

#### Scale, Proportion, and Quantity

- The significance of a phenomenon is dependent on the scale, proportion, and quantity at which it occurs. (HS-LS2-1)
- Using the concept of orders of magnitude allows one to understand how a model at one scale relates to a model at another scale. (HS-LS2-2)

#### Energy and Matter

- Energy cannot be created or destroyed—it only moves between one place and another place, between objects and/or fields, or between systems.(HS-LS1-7),(HS-LS2-4)
- Energy drives the cycling of matter within and between systems. (HS-LS2- 3)

#### Systems and System Models

- Models (e.g., physical, mathematical, computer models) can be used to simulate systems and interactions— including energy, matter, and information flows—within and between systems at different scales. (HS-LS2-5)

#### Stability and Change

- Much of science deals with constructing explanations of how things change and how they remain stable. (HS-LS2-6),(HSL2-7)

#### Cause and Effect

- Empirical evidence is required to differentiate between cause and correlation and make claims about specific causes and effects. (HS-LS2-8), (HS-LS4-6)

## NGSS Unit Standards

### **DISCIPLINARY CORE IDEAS (DCI):**

#### **LS2.A: Interdependent Relationships in Ecosystems**

- Ecosystems have carrying capacities, which are limits to the numbers of organisms and populations they can support. These limits result from such factors as the availability of living and nonliving resources and from such challenges such as predation, competition, and disease. Organisms would have the capacity to produce populations of great size were it not for the fact that environments and resources are finite. This fundamental tension affects the abundance (number of individuals) of species in any given ecosystem. (HS-LS2-1),(HS-LS2-2)

#### **LS2.B: Cycles of Matter and Energy Transfer in Ecosystems**

- Photosynthesis and cellular respiration (including anaerobic processes) provide most of the energy for life processes. (HS-LS2-3)
- Plants or algae form the lowest level of the food web. At each link upward in a food web, only a small fraction of the matter consumed at the lower level is transferred upward, to produce growth and release energy in cellular respiration at the higher level. Given this inefficiency, there are generally fewer organisms at higher levels of a food web. Some matter reacts to release energy for life functions, some matter is stored in newly made structures, and much is discarded. The chemical elements that make up the molecules of organisms pass through food webs and into and out of the atmosphere and soil, and they are combined and recombined in different ways. At each link in an ecosystem, matter and energy are conserved. (HS-LS2-4)
- Photosynthesis and cellular respiration are important components of the carbon cycle, in which carbon is exchanged among the biosphere, atmosphere, oceans, and geosphere through chemical, physical, geological, and biological processes. (HS-LS2-5)

#### **PS3.D: Energy in Chemical Processes**

- The main way that solar energy is captured and stored on Earth is through the complex chemical process known as photosynthesis. (secondary to HS-LS2-5)

#### **LS2.C: Ecosystem Dynamics, Functioning, and Resilience**

- A complex set of interactions within an ecosystem can keep its numbers and types of organisms relatively constant over long periods of time under stable conditions. If a modest biological or physical disturbance to an ecosystem occurs, it may return to its more or less original status (i.e., the ecosystem is resilient), as opposed to becoming a very different ecosystem. Extreme fluctuations in conditions or the size of any population, however, can challenge the functioning of ecosystems in terms of resources and habitat availability.(HS-LS2-2),(HS-LS2-6)
- Moreover, anthropogenic changes (induced by human activity) in the environment—including habitat destruction, pollution, introduction of invasive species, overexploitation, and climate change—can disrupt an ecosystem and threaten the survival of some species. (HS-LS2-7)

#### **LS2.D: Social Interactions and Group Behavior**

- Group behavior has evolved because membership can increase the chances of survival for individuals and their genetic relatives. (HS-LS2-8)

#### **LS4.D: Biodiversity and Humans**

- Humans depend on the living world for the resources and other benefits provided by biodiversity. But human activity is also having adverse impacts on biodiversity through overpopulation, overexploitation, habitat destruction, pollution, introduction of invasive species, and climate change. Thus sustaining biodiversity so that ecosystem functioning and productivity are maintained is essential to supporting and enhancing life on Earth. Sustaining biodiversity also aids humanity by preserving landscapes of recreational or inspirational value. (HS-LS4-6) (Note: This Disciplinary Core Idea is also addressed by HS-LS2-7.)
- Humans depend on the living world for the resources and other benefits provided by biodiversity. But human activity is also having adverse impacts on biodiversity through overpopulation, overexploitation, habitat destruction, pollution, introduction of invasive species, and climate change. Thus sustaining biodiversity so that ecosystem functioning and productivity are maintained is essential to supporting and enhancing life on Earth. Sustaining biodiversity also aids humanity by preserving landscapes of recreational or inspirational value. (secondary to HS-LS2-7) (Note: This Disciplinary Core Idea is also addressed by HS-LS4-6.)

#### **SCIENCE AND ENGINEERING PRACTICES (SEP):**

##### **Engaging in Argument from Evidence**

- Evaluate the claims, evidence, and reasoning behind currently accepted explanations or solutions to determine the merits of arguments. (HS-LS2-6)
- Evaluate the evidence behind currently accepted explanations or solutions to determine the merits of arguments. (HS-LS2-8)

##### **Constructing Explanations and Designing Solutions**

- Evaluate the claims, evidence, and reasoning behind currently accepted explanations or solutions to determine the merits of arguments. (HS-LS2-6)
- Evaluate the evidence behind currently accepted explanations or solutions to determine the merits of arguments. (HS-LS2-8)

##### **Scientific Knowledge is Open to Revision in Light of New Evidence**

- Most scientific knowledge is quite durable, but is, in principle, subject to change based on new evidence and/or reinterpretation of existing evidence. (HS-LS2-2)
- Scientific argumentation is a mode of logical discourse used to clarify the strength of relationships between ideas and evidence that may result in revision of an explanation. (HS-LS2-6), (HS-LS2-8)

##### **Using Mathematical and Computational Thinking**

- Use mathematical and/or computational representations of phenomena or design solutions to support explanations. (HS-LS2-1)
- Use mathematical representations of phenomena or design solutions to support and revise explanations. (HS-LS2-2)

- Create or revise a simulation of a phenomenon, designed device, process, or system. (HS-LS4-6)

**Developing and Using Models**

- Develop a model based on evidence to illustrate the relationships between systems or components of a system. (HS-LS2-5)

**Corresponding CT Core Standards:**

**ELA/Literacy** – RST.11-12.1, RST.11-12.8

**Mathematics** – MP.2, HSN-Q.A.1, HSN-Q.A.2, HSN-Q.A.3