

Springdale Public Schools  
Curriculum At-A-Glance  
Pre-AP Biology-Integrated



Semester 1: Topics 1 & 2

Topic 1

Cycling of Matter and Energy

Unit 1: The Chemistry of Life

**ABI-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.

[Full Standard](#)   [Evidence Statement](#)

**ABI-ESS2-5** Plan and conduct an investigation of the properties of water and its effects on Earth materials and surface processes.

[Full Standard](#)   [Evidence Statement](#)

Unit 2: Photosynthesis & Cellular Respiration

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

[Full Standard](#)   [Evidence Statement](#)

**ABI-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.

[Full Standard](#)   [Evidence Statement](#)

Topic 2

Structure and Function

Unit 3: Cells: Form & Function

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

[Full Standard](#)   [Evidence Statement](#)

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

[Full Standard](#)   [Evidence Statement](#)

**ABI-LS2-1AR** Develop and use a model to explain a negative feedback loop.

[Full Standard](#)   ~~Evidence Statement~~   AR designed

**ABI-LS2-2AR** Develop and use a model to demonstrate the mechanism of cell signaling as a basis of control for cell activities.

[Full Standard](#) ~~Evidence Statement~~ AR designed

**ABI-LS2-3AR** Plan and conduct an investigation to determine the relationship between the structure of a plasma membrane and its function.

[Full Standard](#) ~~Evidence Statement~~ AR designed

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

[Full Standard](#) [Evidence Statement](#)

Topic 3

## Genetic Variations in Organisms

### Unit 4: [Meiosis and Chromosomal Basis of Inheritance](#)

**ABI-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.

[Full Standard](#) [Evidence Statement](#)

**ABI-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.

[Full Standard](#) [Evidence Statement](#)

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

[Full Standard](#) [Evidence Statement](#)

### Unit 5: [DNA to Proteins](#)

**ABI-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.

[Full Standard](#) [Evidence Statement](#)

**ABI-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.

[Full Standard](#) [Evidence Statement](#)

**ABI-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.

[Full Standard](#) [Evidence Statement](#)

**ABI-LS4-8AR** Evaluate evidence to support the claim that viruses are subject to mutations and may have positive, negative, or neutral impact on a species, including humans.

[Full Standard](#) ~~Evidence Statement~~ AR designed

## Semester 2: Topics 4-5

Topic 4

### Evolution by Natural Selection

#### Unit 6: Evolution in Populations

**ABI-LS4-1** Communicate scientific information that common ancestry and biological evolution are supported by multiple lines of empirical evidence.

[Full Standard](#)   [Evidence Statement](#)

**ABI-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.

[Full Standard](#)   [Evidence Statement](#)

**ABI-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.

[Full Standard](#)   [Evidence Statement](#)

**ABI-LS4-7AR** Obtain, evaluate, and communicate the claim that eukaryotic cells evolved from prokaryotic cells.

[Full Standard](#)   ~~Evidence Statement~~   AR designed

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

[Full Standard](#)   [Evidence Statement](#)

#### Unit 7: Biodiversity & Modern Classification from History

**ABI-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.

[Full Standard](#)   [Evidence Statement](#)

**ABI-ESS2-7** Construct an argument based on evidence about the simultaneous coevolution of Earth's systems and life on Earth.

[Full Standard](#)   [Evidence Statement](#)

**ABI-ESS2-2** Analyze geoscience data to make the claim that one change to Earth's surface can create feedbacks that cause changes to other Earth systems.

[Full Standard](#)   [Evidence Statement](#)

Topic 5

### Biodiversity and Population Dynamics

#### Unit 8: Ecosystems

**ABI-LS2-2 Use mathematical representations to support and revise explanations based on evidence factors affecting biodiversity and populations in ecosystems of different scales.**

[Full Standard](#)   [Evidence Statement](#)

**ABI-ESS2-4 Use a model to describe how variations in the flow of energy into and out of Earth's systems result in changes in climate.**

[Full Standard](#)   [Evidence Statement](#)

**ABI-LS2-3 Construct and revise an explanation based on evidence for the cycling of matter and flow of energy in aerobic and anaerobic conditions.**

[Full Standard](#)   [Evidence Statement](#)

**ABI-LS2-4 Use mathematical representations to support claims for the cycling of matter and flow of energy among organisms in an ecosystem.**

[Full Standard](#)   [Evidence Statement](#)

**ABI-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.**

[Full Standard](#)   [Evidence Statement](#)

**ABI-ESS2-6 Develop a quantitative model to describe the cycling of carbon among the hydrosphere, atmosphere, geosphere, and biosphere.**

[Full Standard](#)   [Evidence Statement](#)

### **Unit 9: [Populations, Communities, & Ecosystem Dynamics](#)**

**ABI-LS2-1 Use mathematical and/or computational representations to support explanations of factors that affect carrying capacity of ecosystems at different scales.**

[Full Standard](#)   [Evidence Statement](#)

**ABI-LS2-2 Use mathematical representations to support and revise explanations based on evidence factors affecting biodiversity and populations in ecosystems of different scales.**

[Full Standard](#)   [Evidence Statement](#)

**ABI-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.**

[Full Standard](#)   [Evidence Statement](#)

**Topic 6**

## **Life and Earth's Systems**

### **Unit 10: [Global Change](#)**

**ABI-ESS3-4 Evaluate or refine a technological solution that reduces impacts of human activities on natural systems\***

[Full Standard](#)   [Evidence Statement](#)

**ABI-ESS3-5** Analyze geoscience data and the results from global climate models to make an evidence-based forecast of the current rate of global or regional climate change and associated future impacts to Earth systems.

[Full Standard](#)   [Evidence Statement](#)

**ABI-ESS3-6** Use a computational representation to illustrate the relationships among Earth systems and how those relationships are being modified due to human activity.

[Full Standard](#)   [Evidence Statement](#)

**ABI-ESS3-1** Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and changes in climate have influenced human activity.

[Full Standard](#)   [Evidence Statement](#)

Topic 7

## Human Impacts on Earth's Systems

### Unit 11: [Humans and Sustainability](#)

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

[Full Standard](#)   [Evidence Statement](#)

**ABI-LS4-6** Create or revise a simulation to test a solution to mitigate adverse impacts of human activity on biodiversity.

[Full Standard](#)   [Evidence Statement](#)

**ABI-ESS3-3** Create a computational simulation to illustrate the relationships among management of natural resources, the sustainability of human populations, and biodiversity.

[Full Standard](#)   [Evidence Statement](#)

**ABI-ESS3-2** Evaluate competing design solutions for developing, managing, and utilizing energy and mineral resources based on cost-benefit ratios\*

[Full Standard](#)   [Evidence Statement](#)

## All Engineering Statements used throughout the Units.

**HS-ETS1-1 Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants.**

[Full Standard](#)   [Evidence Statement](#)

**HS-ETS1-2 Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering.**

[Full Standard](#)   [Evidence Statement](#)

**HS-ETS1-3 Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics as well as possible social, cultural, and environmental impacts.**

[Full Standard](#)   [Evidence Statement](#)

**HS-ETS1-4 Use a computer simulation to model the impact of proposed solutions to a complex real-world problem with numerous criteria and constraints on interactions within and between systems relevant to the problem.**

[Full Standard](#)   [Evidence Statement](#)