

HCPS Biology Course

Unit & Title	MSDE/NGSS Science Standards	Lesson Topic	
Unit 1 – Biological Systems <i>11 Class Periods</i>	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.	Experience 1.1	Characteristics of Life
		Experience 1.2	Body Systems and Interactions
		Experience 1.3	Homeostasis and Feedback

Unit & Title	MSDE/NGSS Science Standards	Lesson Topic	
Unit 2 – Cellular Processes <i>10 Class Periods</i>	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	Experience 2.1	Cellular Respiration
		Experience 2.2	Aerobic and Anaerobic Pathways

<p>oxygen molecules are broken and the bonds in new compounds are formed resulting in a net transfer of energy.</p> <p>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.</p> <p>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.</p> <p>HS-ESS2-6: Develop a quantitative model to describe the cycling of carbon among the hydrosphere, atmosphere, geosphere, and biosphere.</p>	Experience 2.3	Photosynthesis
	Experience 2.4	Carbon Cycle
	Experience 2.5	Biosynthesis

Unit & Title	MSDE/NGSS Science Standards	Lesson Topic	
<p>Unit 3 – Genetics 12 Class Periods</p>	<p>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.</p> <p>HS-LS1-4: Use a model to illustrate the role of cellular division (mitosis) and differentiation in producing and maintaining complex organisms.</p>	Experience 3.1	DNA Structure and Organization
		Experience 3.2	Role of Cellular Division

	<p>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.</p> <p>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.</p>	Experience 3.3	Central Dogma and Gene Expression
--	--	----------------	-----------------------------------

Unit & Title	MSDE/NGSS Science Standards	Lesson Topic	
Unit 4 – Evolution <i>12 Class Periods</i>	<p>HS-LS2-8: Evaluate the evidence for the role of group behavior on individual and species' chances to survive and reproduce.</p> <p>HS-LS4-1: Communicate scientific information that common ancestry and biological evolution are supported by multiple lines of empirical evidence.</p>	Experience 4.1	Earth's History and Change Over Time
	<p>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</p>	Experience 4.2	Common Ancestry and Evidence for Evolution

	<p>able to survive and reproduce in the environment.</p> <p>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.</p> <p>HS-LS4-4: Construct an explanation based on evidence for how natural selection leads to adaptation of populations.</p> <p>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.</p> <p>HS-ESS1-5: Evaluate evidence of the past and current movements of continental and oceanic crust and the theory of plate tectonics to explain the ages of crustal rocks.</p>	Experience 4.3	Natural Selection and Adaptations
		Experience 4.4	Group Behavior

Unit & Title	MSDE/NGSS Science Standards	Lesson Topic	
<p>Unit 5 – Ecosystems <i>12 Class Periods</i></p>	<p>HS-LS2-1: Use mathematical and/or computational representations to support explanations of factors that affect carrying capacity of ecosystems at different scales.</p>	Experience 5.1	Factors Affecting Carrying Capacity

<p>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.</p> <p>HS-LS2-4: Use mathematical representations to support claims for the cycling of matter and flow of energy among organisms in an ecosystem.</p> <p>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.</p>	Experience 5.2	Biodiversity and Populations in Ecosystems
	Experience 5.3	Cycling of Matter
	Experience 5.4	Climate Stability and Change

Unit & Title	MSDE/NGSS Science Standards	Lesson Topic	
<p>Unit 6 – Biodiversity and Human Impact 6 Class Periods</p>	<p>HS-LS2-7: Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.</p> <p>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.</p> <p>HS-LS4-6: Create or revise a simulation to test a solution to mitigate adverse impacts of human activity on biodiversity.</p>	Experience 6.1	Human Impact on Ecosystems
	Experience 6.2	Stability and Change of Ecosystems	

	<p>HS-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.</p>	Experience 6.3	Natural Resource Impact on Human Activity
	<p>HS-ESS3-3: Create a computational simulation to illustrate the relationships among management of natural resources, the sustainability of human populations, and biodiversity.</p> <p>HS-ESS3-4: Evaluate or refine a technological solution that reduces impacts of human activities on natural systems.</p>	Experience 6.4	Reducing Human Impacts on the Environment