SCIENCE SCOPE AND SEQUENCE
BIOLOGY AND ADVANCE BIOLOGY
AY 24-25

STRAND	STANDARDS/SKILLS (Common Core)	9th	10th	11th/12th
From Molecules to Organisms: Structures and Processes	**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.	Students will learn that regions of DNA called genes determine the structure of proteins, which carry out the essential functions of life through systems of specialized cells.		
	HS-LS1-2. Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.	Students develop a model to help identify and describe the relevant parts (e.g., organ system, organs, and their component tissues) and processes (e.g., transport of fluids, motion) of body systems in multicellular organisms. They will describe the relationships between components. Ex: Skeletal and Muscular system. Students will look at how all body systems are interacting and connected together.		
	HS-LS1-3. Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis.	Students learn what homeostasis is and learn how the body uses feedback mechanisms to respond to internal/external stimuli. This can also be applied when the Immune system responds to invasions of bacteria or viruses and how it responds to return to homeostasis.		
	HS-LS1-4. Use a model to illustrate the role of cellular division (mitosis) and differentiation in producing and maintaining complex organisms.	Students use a model based on evidence to illustrate the relationship between mitosis and organism growth.		
	HS-LS1-5. Use a model to illustrate how photosynthesis transforms light energy into stored chemical energy.	Students will learn that photosynthesis transforms light energy into stored chemical energy by converting carbon dioxide plus water into sugars plus released		

		oxygen. This allows for the understanding that transfer of matter and flow of energy between the organism and its environment happens during photosynthesis.		
	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.	Student will learn that carbon, hydrogen, and oxygen atoms from sugar molecules formed in or ingested by an organism and those same atoms found in amino acids and other large carbon-based molecules. Students will learn that all organisms take in matter (allowing growth and maintenance) and rearrange the atoms in chemical reactions		
	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.	Students will identify and describe matter in the form of food molecules, oxygen, and the products of their reaction (e.g., water and CO2) and the breaking and formation of chemical bonds where carbon dioxide and water are produced from sugar and oxygen by the process of cellular respiration which release energy		
Ecosystems: Interactions, Energy, and Dynamics	**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.	Students identify and describe the components in the given mathematical representations (which include trends, averages, and graphs of the number of organisms per unit of area in a stable system) that are relevant to supporting and revising the given explanations about factors affecting biodiversity and ecosystems		
	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.	Students identify and describe evidence to construct an explanation for the cycling of matter.		
	HS-LS2-4. Use mathematical representations to support claims for the cycling of matter and flow of energy among organisms in an ecosystem.	Students use a mathematical model of stored energy in biomass to describe the transfer of energy from one trophic level to another and that matter and energy are conserved as matter cycles and energy flows through ecosystems.		

	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.	Students will create a model in which they identify and describe the relationship between the exchange of carbon (through carbon-containing compounds) between organisms and the environment and the role of storing carbon in organisms (in the form of carbon-containing compounds) as part of the carbon cycle.		
	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.	Students are exposed to many theories of ecosystem interactions (such as predation, symbiosis, etc.) and must discuss the principle that they all lead to one conclusion: 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.	Students design a solution that involves reducing the negative effects of human activities on the environment and biodiversity, and that relies on scientific knowledge of the factors affecting changes and stability in biodiversity.		
Heredity: Inheritance and Variation of Traits	**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.	Students learn that DNA codes for proteins which are shown as traits that are visibly 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.	Students learn genetic mutations can occur due to errors during replication of DNA (such as during mitosis) or from environmental factors, like smoking. Students will learn how to read a karyogram and identify genetic disorders from that arise due to meiosis leading to variation.		
	HS-LS3-3. Apply concepts of statistics and probability to explain the variation and distribution of expressed traits in a population.	Students learn to apply mathematics to describe the probability of traits, using a Punnett square.		

Biological Evolution: Unity and Diversity	**HS-LS4-1.** Communicate scientific information that common ancestry and biological evolution are supported by multiple lines of empirical evidence.	Students learn that modifying or making changes to DNA can be possible, by either fixing mutations/diseases or introducing new traits that help an organism survive. This with time results in evolution.		
	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.	Students evaluate the degree to which the given empirical evidence can be used to construct logical arguments that identify causal links between environmental changes and changes in the number of individuals or species based on environmental factors that can determine the ability of individuals in a species to survive and reproduce.		