

Grade BIOLOGY

Science CCRS STANDARDS and ALABAMA COS

CCRS Standard	Standard ID	Disciplinary Core Idea	Teacher Vocabulary	Knowledge	Skills	Understanding	ALEX Resources
1. Use models to compare and contrast how the structural characteristics of carbohydrates, nucleic acids, proteins, and lipids define their function in organisms.	HS.BIO.1	From Molecules to Organisms: Structures and Processes					
2. Obtain, evaluate, and communicate information to describe the function and diversity of organelles and structures in various types of cells (e.g., muscle cells having a large amount of mitochondria, plasmids in bacteria, chloroplasts in plant cells).	HS.BIO.2	From Molecules to Organisms: Structures and Processes					
<p>3. Formulate an evidence-based explanation regarding how the composition of deoxyribonucleic acid (DNA) determines the structural organization of proteins.</p> <ul style="list-style-type: none"> a. Obtain and evaluate experiments of major scientists and communicate their contributions to the development of the structure of DNA and to the development of the central dogma of molecular biology. b. Obtain, evaluate, and communicate information that explains how advancements in genetic technology (e.g., Human Genome Project, Encyclopedia of DNA Elements [ENCODE] project, 1000 Genomes Project) have contributed to the understanding as to how a genetic change at the DNA level may affect proteins and, in turn, influence the appearance of traits. c. Obtain information to identify errors that occur during DNA replication (e.g., deletion, insertion, translocation, substitution, inversion, frame-shift, point mutations). 	HS.BIO.3	From Molecules to Organisms: Structures and Processes					
4. Develop and use models to explain the role of the cell cycle during growth and maintenance in multicellular organisms (e.g., normal growth and/or uncontrolled growth resulting in tumors).	HS.BIO.4	From Molecules to Organisms: Structures and Processes					
<p>5. Plan and carry out investigations to explain feedback mechanisms (e.g., sweating and shivering) and cellular processes (e.g., active and passive transport) that maintain homeostasis.</p> <ul style="list-style-type: none"> a. Plan and carry out investigations to explain how the unique properties of water (e.g., polarity, cohesion, adhesion) are vital to maintaining homeostasis in organisms. 	HS.BIO.5	From Molecules to Organisms: Structures and Processes					

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<p>6. Analyze and interpret data from investigations to explain the role of products and reactants of photosynthesis and cellular respiration in the cycling of matter and the flow of energy.</p> <p>a. Plan and carry out investigations to explain the interactions among pigments, absorption of light, and reflection of light.</p>	HS.BIO.6	From Molecules to Organisms: Structures and Processes					
7. Develop and use models to illustrate examples of ecological hierarchy levels, including biosphere, biome, ecosystem, community, population, and organism.	HS.BIO.7	Ecosystems: Interactions, Energy, and Dynamics					
8. Develop and use models to describe the cycling of matter (e.g., carbon, nitrogen, water) and flow of energy (e.g., food chains, food webs, biomass pyramids, ten percent law) between abiotic and biotic factors in ecosystems.	HS.BIO.8	Ecosystems: Interactions, Energy, and Dynamics					
9. Use mathematical comparisons and visual representations to support or refute explanations of factors that affect population growth (e.g., exponential, linear, logistic).	HS.BIO.9	Ecosystems: Interactions, Energy, and Dynamics					
10. Construct an explanation and design a real-world solution to address changing conditions and ecological succession caused by density-dependent and/or density-independent factors.*	HS.BIO.10	Ecosystems: Interactions, Energy, and Dynamics					
<p>11. Analyze and interpret data collected from probability calculations to explain the variation of expressed traits within a population.</p> <p>a. Use mathematics and computation to predict phenotypic and genotypic ratios and percentages by constructing Punnett squares, including using both homozygous and heterozygous allele pairs.</p> <p>b. Develop and use models to demonstrate codominance, incomplete dominance, and Mendel's laws of segregation and independent assortment.</p> <p>c. Analyze and interpret data (e.g., pedigree charts, family and population studies) regarding Mendelian and complex genetic disorders (e.g., sickle-cell anemia, cystic fibrosis, type 2 diabetes) to determine patterns of genetic</p>	HS.BIO.11	Heredity: Inheritance and Variation of Traits					

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inheritance and disease risks from both genetic and environmental factors.							
<p>12. Develop and use a model to analyze the structure of chromosomes and how new genetic combinations occur through the process of meiosis.</p> <p>a. Analyze data to draw conclusions about genetic disorders caused by errors in meiosis (e.g., Down syndrome, Turner syndrome).</p>	HS.BIO.12	Heredity: Inheritance and Variation of Traits					
<p>13. Obtain, evaluate, and communicate information to explain how organisms are classified by physical characteristics, organized into levels of taxonomy, and identified by binomial nomenclature (e.g., taxonomic classification, dichotomous keys).</p> <p>a. Engage in argument to justify the grouping of viruses in a category separate from living things.</p>	HS.BIO.13	Unity and Diversity					
<p>14. Analyze and interpret data to evaluate adaptations resulting from natural and artificial selection that may cause changes in populations over time (e.g., antibiotic-resistant bacteria, beak types, peppered moths, pest-resistant crops).</p>	HS.BIO.14	Unity and Diversity					
<p>15. Engage in argument from evidence (e.g., mathematical models such as distribution graphs) to explain how the diversity of organisms is affected by overpopulation of species, variation due to genetic mutations, and competition for limited resources.</p>	HS.BIO.15	Unity and Diversity					
<p>16. Analyze scientific evidence (e.g., DNA, fossil records, cladograms, biogeography) to support hypotheses of common ancestry and biological evolution.</p>	HS.BIO.16	Unity and Diversity					