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Marking Period 1 (MP1)	**Science Curriculum Pacing Guide Grade HS MOLECULAR BIO**
MP1 **Standards for Science Content**	HS-PS1-1. Use the periodic table as a model to predict the relative properties of elements based on the patterns of electrons in the outermost energy level of atoms. HS-PS1-3. Plan and investigate to gather evidence to compare the structure of substances at the bulk scale to infer the strength of electrical forces between particles. HS-PS1-5. Apply scientific principles and evidence to explain the effects of changing temperature or concentration of the reacting particles on the rate at which a reaction occurs. HS-PS3-1. Create a computational model to calculate the change in the energy of one component in a system when the change in energy of the other component(s) and energy flows in and out of the system are known. 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 investigate to provide evidence that feedback mechanisms maintain homeostasis.
	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.
MP1 **Topics**	Nature of Life Cell Structure and Function
MP1 **Skills/Concepts**	The process of evolution drives the diversity and unity of life. Biological systems utilize free energy and molecular building blocks to grow, to reproduce and to maintain dynamic homeostasis. Living systems store, retrieve, transmit and respond to information essential to life processes. Biological systems interact, and these systems and their interactions possess complex properties. 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. Systems of specialized cells within organisms help them perform the essential functions of life 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. Conservation of energy means that the total change of energy in any system is always equal to the total energy transferred into or out of the system. As matter and energy flow through different organizational levels of living systems, chemical elements are recombined in different ways to form different products. 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.
MP1 **Core Materials**	Savvas Realize - Miller and Levine

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Marking Period 2 (MP2)	Science Curriculum Pacing Guide Grade HS MOLECULAR BIO
MP2 **Standards for Science Content**	HS-LS1-5. Use a model to illustrate how photosynthesis transforms light energy into stored chemical energy. 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. 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 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.
MP2 **Topics**	Unit 2 – Ecology Unit 3 - Cells
MP2 **Skills/Concepts**	Energy Utilization: Biological systems require energy and molecular building blocks to grow, reproduce, and maintain dynamic homeostasis. This involves processes like cellular respiration and photosynthesis, which convert energy from the environment into forms usable by living organisms. Biological Interactions: All biological systems interact, and their interactions result in emergent properties that are unique to life. This in-cludes interactions at various levels, from molecular to ecological, which contribute to the complexity of biological systems.
MP2 **Core Materials**	Savvas Realize - Miller and Levine

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Marking Period 3 (MP3)	Science Curriculum Pacing Guide Grade HS MOLECULAR BIO
MP3 **Standards for Science Content**	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-LS1-4 Use a model to illustrate the role of cellular division (mitosis) and differentiation in producing and maintaining complex organisms 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.
MP3 **Topics**	Unit 3 - Cells Unit 4 - Genetics
MP3 **Skills/Concepts**	The continuity of life is based on heritable information in the form of DNA. DNA sequences can act as “tape measures of evolution.” Most cell divisions result in genetically identical daughter cells. The eukaryotic cell cycle is regulated by a molecular control system Many species can reproduce either asexually or sexually Genetic variation produced in sexual life cycles contributes to evolution. In sexually reproducing species each individual inherits DNA from both parent organisms Meiosis followed by fertilization ensures genetic diversity in sexually reproducing organisms. The meticulous work of Mendel and others provided evidence for the mechanism of evolution. Mutations in protein coding genes and regulatory DNA contribute to evolution. Anatomical and molecular features often fit a similar nested pattern. Changes to an organism's physical environment are likely to result in evolutionary change.
MP3 **Core Materials**	Savvas Realize - Miller and Levine

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Marking Period 4(MP4)	Science Curriculum Pacing Guide Grade HS MOLECULAR BIO
MP4 **Standards for Science Content**	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. 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.
MP4 **Topics**	Unit 4- Genetics Unit 5- Evolution
MP4 **Skills/Concepts**	The continuity of life is based on heritable information in the form of DNA. DNA sequences can act as “tape measures of evolution.” Most cell divisions result in genetically identical daughter cells. The eukaryotic cell cycle is regulated by a molecular control system Many species can reproduce either asexually or sexually Genetic variation produced in sexual life cycles contributes to evolution. In sexually reproducing species each individual inherits DNA from both parent organisms Meiosis followed by fertilization ensures genetic diversity in sexually reproducing organisms. The meticulous work of Mendel and others provided evidence for the mechanism of evolution. Mutations in protein coding genes and regulatory DNA contribute to evolution. Anatomical and molecular features often fit a similar nested pattern. Changes to an organism's physical environment are likely to result in evolutionary change. The process of evolution is revealed by the imperfections of living organisms. • Molecular and cellular events lead to emergent properties at individual and population levels of biological organization.
MP4 **Core Materials**	Savvas Realize - Miller and Levine