**WCSD High School Biology Unit Overview**

|  |  |
| --- | --- |
| **Semester 1** | |
| **Unit Title:**  **Interdependent Relationships in Ecosystems**  **Guiding Question:**  How do organisms interact with the living and non-living environment to obtain matter and energy? | **Unit Title:**  **Matter and Energy in Organisms and Ecosystems**  **Guiding Questions:**  How do organisms obtain and use energy they need to live and grow?  How do matter and energy move through ecosystems? |
| **Standards**  **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-LS2-6** Evaluate the claims, evidence, and reasoning that the complex interactions in ecosystems maintain relatively consistent in 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  **HS-LS2-8** Evaluate the evidence for the role of group behavior on individual and species’ chances to survive and reproduce.  **HS-LS4-6** \* Create or revise a simulation to test a simulation to test a solution to mitigate adverse impacts of human activity on biodiversity.  **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.  **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.  **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.  **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. | **Standards**  **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 oxygen molecules are broken and the bonds in new compounds are formed resulting in a net transfer of energy.  **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. |

|  |  |  |
| --- | --- | --- |
| **Semester 2** | | |
| **Unit Title:**  **Structure and Function**  **Guiding Question:**  How do the structures of organisms enable life’s functions? | **Unit Title:**  **Inheritance and Variation of Traits**  **Guiding Question:**  How are the characteristics from one generation related to the previous generation? | **Unit Title:**  **Natural Selection and Evolution**  **Guiding Questions:**  How can there be so many similarities among organisms yet so many different plants, animals, and microorganisms? How does biodiversity affect humans? |
| **Standards**  **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-LS1-2** 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 | **Standards**  **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. | **Standards**  **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.  **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. |