Union County Educational Services Commission
High School Course Syllabus

Title: Biology

Timeline: Full Year; 5 Credits

Course Description:
Biology is the study of life. What is it? How do you stay alive? Students will learn what it takes to truly be alive through a unique blending of field and lab studies. Young scientists will implement interactive notebooks and digital portfolios to document their observations, predictions, and revelations. Graduates will have practical lab experience and digital dissection training upon the completion of this course.

Scope and Sequence:

I. From Molecules to Organisms: Structures and Processes
II. Heredity: Inheritance and Variation of Traits
III. Biological Evolution: Unity and Diversity
IV. Ecosystems: Interactions, Energy, and Dynamics

Refer to the attached curriculum map for a detailed outline of course objectives.

Curriculum Alignment:
New Jersey Student Learning Standards/Next Generation Science Standards - Life Sciences

Grading Procedures:

Do Now	10%
Participation	20%
Class Assignments	50%
Assessments	20%

Adoption Date:

Union County Educational Services Commission
Curriculum Mapping Format: Biology

Unit	Unit 1	Unit 2	Unit 3	Unit 4
Length of Unit	10 Weeks	10 Weeks	10 Weeks	10 Weeks
Topic	From Molecules to Organisms: Structures and Processes	Heredity: Inheritance and Variation of Traits	Biological Evolution: Unity and Diversity	Ecosystems: Interactions, Energy, and Dynamics
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. **HS-LS1-4** - Use a model to illustrate the role of cellular division (mitosis) and differentiation in producing and maintaining complex organisms. **HS-LS1-5** - Use a model to illustrate how photosynthesis transforms light energy into stored chemical energy.	**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.	**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	**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

	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.		(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. **HS-LS4-6 -** Create or revise a simulation to test a solution to mitigate adverse impacts of human activity on biodiversity.	geosphere. **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. **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 evidence for the role of group behavior on individual and species' chances to survive and reproduce.
Content/ Disciplinary Core Ideas	Structure and Function Growth and Development of Organisms Organization for Matter and Energy Flow in Organisms	Structure and Function Inheritance of Traits Variation of Traits	Evidence of Common Ancestry and Diversity Natural Selection Adaptation Biodiversity and Humans Developing Possible Solutions	Interdependent Relationships in Ecosystems Ecosystems Dynamics, Functioning, and Resilience Cycles of Matter and Energy Transfer in Ecosystems Energy in Chemical Processes Biodiversity and Humans Developing Possible Solutions Social Interactions and Group Behavior
Skills/ Science and Engineering Principles	Constructing Explanations and Designing Solutions Developing and Using Models Planning and Carrying Out Investigations	Asking Questions and Defining Problems Analyzing and Interpreting Data Engaging in Argument from Evidence	Obtaining, Evaluating, and Communicating Information Constructing Explanations and Designing Solutions Analyzing and Interpreting Data Engaging in Argument from Evidence Using Mathematics and Computational Thinking	Using Mathematics and Computational Thinking Constructing Explanations and Designing Solutions Developing and Using Models Engaging in Argument from Evidence

Crosscutting Concepts	Structure and Function Systems and System Models Stability and Change Energy and Matter	Cause and Effect Scale, Proportion, and Quantity	Patterns Cause and Effect	Scale, Proportion, and Quantity Energy and Matter Stability and Change Systems and System Models Cause and Effect