Union County Educational Services Commission
High School Course Syllabus

Title: Marine Biology

Timeline: Full Year; 5 Credits

Course Description:
This course is designed for students with an interest in marine biology and oceanography and will provide excellent background for further study of the oceans and the organisms that inhabit it. Major concepts include the study of: the interrelationship of marine and terrestrial environments, the geology of the oceans, marine organisms, and the ecology of coral reefs. Students will learn about the physical structure and chemistry of the ocean, the diversity of ocean life, marine ecology, and the scope and impact of human interactions with the oceans. Laboratory activities reinforce concepts and principles presented. Laboratory activities, including the examination of marine specimens are utilized throughout this course to build upon student knowledge.

Scope and Sequence:

I. Ocean Environment
II. Marine Organisms
III. Marine Ecosystems
IV. Humans and the Seas

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 Science

Grading Procedures:

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

Adoption Date:
June 2024

Union County Educational Services Commission
Curriculum Mapping - Marine Biology

	Unit 1	**Unit 2**	**Unit 3**	**Unit 4**
Number of Weeks	9 weeks	11 weeks	11 weeks	9 weeks
Topics	Ocean Environment	Marine Organisms	Marine Ecosystems	Humans and the Seas
Standards	HS-PS1-5 - Apply scientific principles and evidence to provide an explanation about the effects of changing the temperature or concentration of the reacting particles on the rate at which a reaction occurs. 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	HS-PS1-4 - Develop a model to illustrate that the release or absorption of energy from a chemical reaction system depends upon the changes in total bond energy. HS-LS1-5 - Use a model to illustrate how photosynthesis transforms light energy into stored chemical energy. HS-LS 1-6 - 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	HS-PS3-4 - Plan and conduct an investigation to provide evidence that the transfer of thermal energy when two components of different temperature are combined within a closed system results in a more uniform energy distribution among the components in the system (second law of thermodynamics). 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-PS3-3 - Design, build, and refine a device that works within given constraints to convert one form of energy into another form of energy. HS-LS 1-2- Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms. HS-LS3-3 - Apply concepts of statistics and probability to explain the variation and distribution of expressed traits in a population. HS-LS2-4 - Communicate scientific information that common ancestry

	compounds are formed resulting in a net transfer of energy. HS-LS2-4 - Use mathematical representations to support claims for the cycling of matter and flow of energy among organisms in an ecosystem. HS-ESS2-4 - Use a model to describe how variations in the flow of energy into and out of Earth's systems result in changes in climate. HS-ESS2-5 - Plan and conduct an investigation of the properties of water and its effects on Earth materials and surface processes.	and/or other large carbon-based molecules. HS-LS 3-2 - 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-ESS1-5 - Evaluate evidence of the past and current movements of continental and oceanic crust and the theory of plate tectonics to explain the ages of crustal rocks.	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-LS1-2 HS-ESS1-2 - Construct an explanation of the Big Bang theory based on astronomical evidence of light spectra, motion of distant galaxies, and composition of matter in the universe. HS-ESS2-2 - Analyze geoscience data to make the claim that one change to Earth's surface can create feedbacks that cause changes to other Earth systems. HS-ESS2-3 - Develop a model based on evidence of Earth's interior to describe the cycling of matter by thermal convection.	and biological evolution are supported by multiple lines of empirical evidence. HS-ESS1-2 - Construct an explanation of the Big Bang theory based on astronomical evidence of light spectra, motion of distant galaxies, and composition of matter in the universe. HS-ESS3-2 - Evaluate competing design solutions for developing, managing, and utilizing energy and mineral resources based on cost-benefit ratios HS-ESS2-3 - Develop a model based on evidence of Earth's interior to describe the cycling of matter by thermal convection.

Content/ Disciplinary Core Ideas	Science & Marine Biology Fundamentals of Ecology Geology of the Oceans Water Waves and Tides Organization for Matter and Energy Flow in Organisms Cycles of Matter and Energy Transfer in Ecosystems Weather and Climate Earth Materials and Systems The Roles of Water in Earth's Surface Processes Chemical Reactions	Biological Concepts Marine Fish Marine Reptiles Marine Mammals Shark Week Chemical Reactions Structure and Properties of Matter Organization for Matter and Energy Flow in Organisms Variation of Traits The History of Planet Earth	Intertidal Communities Estuaries Coral Reef Communities Continental Shelves & Netic zone Electromagnetic Radiation The Universe & Its Stars Earth Material and Systems Weather and Climate Plate Tectonics and Large-Scale System Interactions Wave Properties Conservation of Energy and Energy Transfer Energy in Chemical Processes Cycles of Matter and Energy Transfer in Ecosystems Ecosystem Dynamics, Functioning, and Resilience	Harvesting the Oceans Oceans in Jeopardy Variation of Traits Evidence of Common Ancestry and Diversity Structure and Function Definitions of Energy Energy and Chemical Processes The Universe and Its Stars Electromagnetic Radiation Natural Resources Developing Possible Solutions Human Impacts on Earth Systems
Skills/ Science and Engineering Principles	Developing and Using Models Using Mathematics and Computational Thinking Planning and Carrying Out Investigations Constructing Explanations and Designing Solutions	Developing and Using Models Constructing Explanations and Designing Solutions Engaging in Argument from Evidence	Constructing Explanations and Designing Solutions Analyzing and Interpreting Data Developing and Using Models Planning and Carrying Out Investigations	Analyzing and Interpreting Data Obtaining, Evaluating, and Communicating Information Developing and Using Models Constructing Explanations and Designing Solutions

			Engaging in Argument from Evidence	Engaging in Argument from Evidence
Crosscutting Concepts	Energy and Matter Cause and Effect Structure and Function Patterns	Energy and Matter Cause and Effect Patterns	Energy and Matter Stability and Change Systems and System Models	Scale, Proportion, and Quantity Systems and System Models Energy and Matter Using Mathematics and Computational Thinking Stability and Change