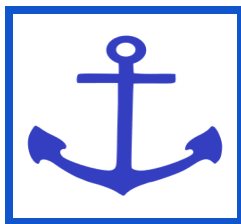


Ocean Academy Charter High School
(Biology) Curriculum Guide
Grades 9-12



Original Adoption:	August 2024
Created by:	Stephen Nichol & Amy LaBarca

Ocean Academy Charter High School Biology Curriculum	
Content Area: Science	
Course Title: Biology	Grade Level: 9
Unit 1: From Molecules to Organisms: Structure, Function, Matter and Energy Climate Change	MP1 45 Days
Unit 2: Heredity: Inheritance and Variation of Traits	MP2 25 Days
Unit 3: Biological Evolution: Unity and Diversity	MP2 10 Days
Unit 4: Ecosystems: Interactions, Energy and Dynamics	MP2 10 Days

Ocean Academy Charter High School
(Biology) Curriculum Guide
Grades 9-12

Philosophy

Biology is the study of life and living organisms, and in this course, students will explore a wide range of topics that help explain how life functions and interacts with its environment. The curriculum covers various essential areas of biology, including ecology, genetics, cellular structure and function, evolutionary changes in genes and species over time, physiology, botany, and zoology. Throughout the course, students will engage with scientific practices, developing their skills in argumentation and explanation of scientific concepts through the **Claim, Evidence, Reasoning (CER)** framework.

The biology curriculum is designed to meet the requirements of the Next Generation Science Standards, ensuring students gain a deep understanding of the concepts and skills necessary for success in both science and real-world applications. By incorporating higher-order thinking and problem-solving, this course prepares students not only to meet the expectations outlined by the NJDOE state assessments but to exceed them through a comprehensive understanding of biology. Students will build the foundation for future scientific study by learning to apply their knowledge to real-world biological issues and research.

Honors Biology Course Description:

The goal of the Honors Biology course is to offer students an in-depth, comprehensive introduction to the field of biology, equivalent to a first-year college-level biology course. This rigorous program covers the core themes of biology, with a primary focus on data analysis, safety protocols, the structure and function of cells, biotic and abiotic systems, and the development of experiments. Students will also learn to use the Claim, Evidence, Reasoning (CER) framework to analyze data, make informed claims, and explain scientific concepts in a logical and structured way.

A significant emphasis is placed on the laboratory component of the course, where students will engage in hands-on experiments to apply the concepts they learn in the classroom. This practical experience allows students to develop critical thinking and problem-solving skills, as well as an understanding of the scientific method. By the end of the course, students will have gained a strong foundation in biology and be well-prepared to tackle more advanced topics in science.

Ocean Academy Charter High School Unit 1 Overview

Content Area: Biology

Target Course/Grade Levels: 9

Unit Title: Unit 1: From Molecules to Organisms: Structure and Function and Matter and Energy

Duration: 45 Days

Introduction/Unit 1 Focus

Summary

Students in this course will explore the structure and function of cells, recognizing them as the basic units of life and examining how organisms are organized into hierarchical systems. They will investigate the role of specialized cells in maintaining homeostasis and supporting growth. Understanding will be demonstrated through critical reading, model creation, and hands-on investigations.

In addition, students will apply mathematical concepts to analyze the interactions between photosynthesis and cellular respiration, using evidence to support their explanations. They will develop models to communicate their findings and insights about these crucial biological processes.

The unit also focuses on key crosscutting concepts, such as structure and function, matter and energy, and system models, as they relate to organisms. The LS1 Disciplinary Core Idea is explored through three main sub-ideas: 1) Structure and Function, 2) Growth and Development of Organisms, and 3) Organization of Matter and Energy Flow in Organisms. These concepts guide students in understanding how cells, organisms, and biological systems work together to sustain life.

Standard 9.1 Personal Financial Literacy

This standard outlines the important fiscal knowledge, habits, and skills that must be mastered in order for students to make informed decisions about personal finance. Financial literacy is an integral component of a student's college and career readiness, enabling students to achieve fulfilling, financially-secure, and successful careers.

Standard 9.2 Career Awareness, Exploration, Preparation and Training

This standard outlines the importance of being knowledgeable about one's interests and talents, and being well informed about postsecondary and career options, career planning, and career requirements.

Standard 9.4 Life Literacies and Key Skills

This standard outline key literacies and technical skills such as critical thinking, global and cultural awareness, and technology literacy* that are critical for students to develop to live and work in an interconnected global economy.

Standard 8.1 Computer Science

Computer Science outlines a comprehensive set of concepts and skills, such as data and analysis, algorithms and programming, and computing systems.

Standard 8.2 Design Thinking

Technology, outlines the technological design concepts and skills essential for technological and engineering literacy. The framework design includes Engineering Design, Ethics and Culture, and the Effects of Technology on the Natural world among the disciplinary concepts

Amistad Law: N.J.S.A. 18A 52:16A-88 Every board of education shall incorporate the information

regarding the contributions of African-Americans to our country in an appropriate place in the curriculum of elementary and secondary school students.

Holocaust Law: N.J.S.A. 18A:35-28 Every board of education shall include instruction on the Holocaust and genocide in an appropriate place in the curriculum of all elementary and secondary school pupils. The instruction shall further emphasize the personal responsibility that each citizen bears to fight racism and hatred whenever and wherever it happens.

LGBT and Disabilities Law: N.J.S.A. 18A:35-4.35 A board of education shall include instruction on the political, economic, and social contributions of persons with disabilities and lesbian, gay, bisexual, and transgender people, in an appropriate place in the curriculum of middle school and high school students as part of the district's implementation of the New Jersey Student Learning Standards (N.J.S.A.18A:35-4.36) A board of education shall have policies and procedures in place pertaining to the selection of instructional materials to implement the requirements of N.J.S.A. 18A:35-4.35.

Diversity and Inclusion C.18A:35-4.36a Curriculum to include instruction on diversity and inclusion.

The instruction shall:

- (1) highlight and promote diversity, including economic diversity, equity, inclusion, tolerance, and belonging in connection with gender and sexual orientation, race and ethnicity, disabilities, and religious tolerance;
- (2) examine the impact that unconscious bias and economic disparities have at both an individual level and on society as a whole; and
- (3) encourage safe, welcoming, and inclusive environments for all students regardless of race or ethnicity, sexual and gender identities, mental and physical disabilities, and religious beliefs.

Asian Americans and Pacific Islanders (AAPI)

Ensures that the contributions, history, and heritage of Asian Americans and Pacific Islanders (AAPI) are included in the New Jersey Student Learning Standards (NJSLS) for Social Studies in kindergarten through Grade 12 (P.L.2021, c.416).

21st Century Themes and Skills

“Twenty-first century themes and skills” means themes such as global awareness; financial, economic, business, and entrepreneurial literacy; civic literacy; health literacy; learning and innovation skills, including creativity and innovation, critical thinking and problem solving, and communication and collaboration; information, media, and technology skills; and life and career skills, including flexibility. Career readiness, life literacies, and key skills education provides students with the necessary skills to make informed career and financial decisions, engage as responsible community members in a digital society, and to successfully meet the challenges and opportunities in an interconnected global economy.”

Focus Standards Unit 1 (Major Standards)
<https://www.nj.gov/education/cccs/2020/NJSLS-Science.pdf>

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 multi-cellular 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-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-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.

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Developing and Using Models ➤ Develop and use a model based on evidence to illustrate the relationships between systems or between components of a system. (HS-LS1-2) Planning and Carrying Out Investigations ➤ Plan and conduct an investigation individually and collaboratively to produce	LS1.A: Structure and Function ➤ Systems of specialized cells within organisms help them perform the essential functions of life. (HS-LS1-1) ➤ All cells contain genetic information in the form of DNA molecules. Genes are regions in the DNA that contain the instructions that code for the formation of proteins, which carry out most of the work of cells.	Systems and System Models ➤ Models (e.g., physical, mathematical, computer models) can be used to simulate systems and interactions—including energy, matter, and information flows—within and between systems at different scales. (HS-LS1-2) Structure and Function ➤ Investigating or designing new systems or

data to serve as the basis for evidence, and in the design: decide on types, how much, and accuracy of data needed to produce reliable measurements and consider limitations on the precision of the data (e.g., number of trials, cost, risk, time), and refine the design accordingly. **(HS-LS1-3)**

Constructing Explanations and Designing Solutions

➤ Construct an explanation based on valid and reliable evidence obtained from a variety of sources (including students' own investigations, models, theories, simulations, peer review) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future. **(HS-LS1-1)**

Connections to Nature of Science

Scientific Investigations Use a Variety of Methods

➤ Scientific inquiry is characterized by a common set of values that include: logical thinking, precision, open-mindedness, objectivity, skepticism, replicability of results, and honest and ethical reporting of findings. **(HS-LS1-3)**

(HS-LS1-1) (Note: This Disciplinary Core Idea is also addressed by **HS-LS3-1**.)

➤ 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. **(HS-LS1-2)**

➤ 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. **(HS-LS1-3)**

LS1.C: Organization for Matter and Energy Flow in Organisms

➤ 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. **(HS-LS1-6)**

➤ As matter and energy flow through different organizational levels of living systems, chemical elements are recombined in different ways to form different

structures requires a detailed examination of the properties of different materials, the structures of different components, and connections of components to reveal its function and/or solve a problem. **(HS-LS1-1)**

Stability and Change

➤ Changes of energy and matter in a system can be described in terms of energy and matter flows into, out of, and within that system. **(HS-LS1-5), (HS-LS1-6)**

➤ Energy cannot be created or destroyed—it only moves between one place and another place, between objects and/or fields, or between systems. **(HS-LS1-7)**

Ocean Academy Charter High School
(Biology) Curriculum Guide
Grades 9-12

	products. (HS-LS1-6),(HS-LS1-7) ➤ As a result of these chemical reactions, energy is transferred from one system of interacting molecules to another. Cellular respiration is a chemical process in which the bonds of food molecules and oxygen molecules are broken and new compounds are formed that can transport energy to muscles. Cellular respiration also releases the energy needed to maintain body temperature despite ongoing energy transfer to the surrounding environment. (HS-LS1-7)	
--	---	--

Unit 1 Supporting and Additional Standards/Interdisciplinary Connections
 Grade 11 - 12 2023 ELA Standards and Practices

ELA/Literacy

RI.CR.11-12.1. Accurately cite a range of thorough textual evidence and make relevant connections to strongly support a comprehensive analysis of multiple aspects of what an informational text says explicitly and inferentially, as well as interpretations of the text.

W.IW.11-12.2. Write informative/explanatory texts (including the narration of historical events, scientific procedures/ experiments, or technical processes) to examine and convey complex ideas, concepts, and information clearly and accurately through the effective selection, organization, and analysis of content.

- Introduce a topic; organize complex ideas, concepts, and information so that each new element
- builds on that which precedes it to create a unified whole; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension.
- Develop the topic thoroughly by selecting the most significant and relevant facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience's knowledge of the topic.
- Use appropriate and varied transitions and syntax to link the major sections of the text, create cohesion, and clarify the relationships among complex ideas and concepts.
- Use precise language, domain-specific vocabulary, and techniques such as metaphor, simile,

- and analogy to manage the complexity of the topic.
- Establish and maintain a style and tone appropriate to the audience and purpose (e.g., formal and objective for academic writing) while attending to the norms and conventions of the discipline in which they are writing.
 - Provide a concluding paragraph or section that supports the argument presented (e.g., articulating implications or the significance of the topic).

W.WR.11-12.5. Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.

W.SE.11-12.6. Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation (MLA or APA Style Manuals).

SL.II.11-12.2. Integrate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, orally) in order to make informed decisions and solve problems, evaluating the credibility and accuracy of each source and noting any discrepancies among the data.

**Unit 1 New Jersey Student Learning Standards Connections:
Career Readiness, Life Literacies, and Key Skills**

Disciplinary Concepts

Career Awareness and Planning (9.2), Creativity and Innovation (9.4), Critical Thinking and Problem-solving (9.4), Digital Citizenship (9.4), Global and Cultural Awareness (9.4), Information and Media Literacy (9.4)

Core Ideas	Performance Expectations (Identified with Standard Number and Statement)
There are strategies to improve one's professional value and marketability.	9.2.12.CAP.3: Investigate how continuing education contributes to one's career and personal growth.
With a growth mindset, failure is an important part of success.	9.4.12.CI.1: Demonstrate the ability to reflect, analyze, and use creative skills and ideas (e.g., 1.1.12prof.CR3a).
Collaboration with individuals with diverse experiences can aid in the problem-solving process, particularly for global issues where diverse solutions are needed.	9.4.12.CT.2: Explain the potential benefits of collaborating to enhance critical thinking and problem solving (e.g., 1.3E.12profCR3.a).

Ocean Academy Charter High School
(Biology) Curriculum Guide
Grades 9-12

Network connectivity and computing capability extended to objects, sensors and everyday items not normally considered computers allows these devices to generate, exchange, and consume data with minimal human intervention. Technologies such as Artificial Intelligence (AI) and blockchain can help minimize the effect of climate change.	9.4.12.DC.8: Explain how increased network connectivity and computing capabilities of everyday objects allow for innovative technological approaches to climate protection.
Solutions to the problems faced by a global society require the contribution of individuals with different points of view and experiences.	9.4.12.GCA.1: Collaborate with individuals to analyze a variety of potential solutions to climate change effects and determine why some solutions (e.g., political, economic, cultural) may work better than others (e.g., SL.11-12.1., HS-ETS1-1, HS-ETS1-2, HS-ETS1-4, 6.3.12.GeoGI.1, 7.1.IH.IPERS.6, 7.1.IL.IPERS.7, 8.2.12.ETW.3).
Advanced search techniques can be used with digital and media resources to locate information and to check the credibility and the expertise of sources to answer questions, solve problems, and inform decision-making.	9.4.12.IML.1: Compare search browsers and recognize features that allow for filtering of information. 9.4.12.IML.2: Evaluate digital sources for timeliness, accuracy, perspective, credibility of the source, and relevance of information, in media, data, or other resources (e.g., NJSLSA.W8, Social Studies Practice: Gathering and Evaluating Sources.
Unit 1 New Jersey Student Learning Standards: Computer Science and Design Thinking	
Disciplinary Concepts Data and Analysis (8.1), Engineering Design (8.2), Nature of Technology (8.2), Ethics and Culture (8.2)	
Core Ideas	Performance Expectations (Identified with Standard Number and Statement)

Ocean Academy Charter High School
(Biology) Curriculum Guide
Grades 9-12

Individuals select digital tools and design automated processes to collect, transform, generalize, simplify, and present large data sets in different ways to influence how other people interpret and understand the underlying information.	8.1.12.DA.1: Create interactive data visualizations using software tools to help others better understand real world phenomena, including climate change.
Engineering design is a complex process in which creativity, content knowledge, research, and analysis are used to address local and global problems.	8.2.12.ED.1: Use research to design and create a product or system that addresses a problem and make modifications based on input from potential consumers. 8.2.12.ED.3: Evaluate several models of the same type of product and make recommendations for a new design based on a cost benefit analysis. 8.2.12.ED.4: Design a product or system that addresses a global problem and document decisions made based on research, constraints, trade-offs, and aesthetic and ethical considerations and share this information with an appropriate audience.
Engineers use science, mathematics, and other disciplines to improve technology. Increased collaboration among engineers, scientists, and mathematicians can improve their work and designs. Technology, product, or system redesign can be more difficult than the original design.	8.2.12.NT.1: Explain how different groups can contribute to the overall design of a product. 8.2.12.NT.2: Redesign an existing product to improve form or function.
The ability to ethically integrate new technologies requires deciding whether to introduce a technology, taking into consideration local resources and the role of culture in acceptance.	8.2.12.EC.1: Analyze controversial technological issues and determine the degree to which individuals, businesses, and governments have an ethical role in decisions that are made. 8.2.12.EC.2: Assess the positive and negative impacts of emerging technologies on developing countries and evaluate how individuals,

Ocean Academy Charter High School
(Biology) Curriculum Guide
Grades 9-12

	non-profit organizations, and governments have responded.
New Jersey Student Learning Standards: Climate Change Mandate	
Core Ideas	Performance Expectations (Identified with Standard Number and Statement)
The foundation for Earth's global climate systems is the electromagnetic radiation from the sun, as well as its reflection, absorption, storage, and redistribution among the atmosphere, ocean, and land systems, and this energy's re-radiation into space. Changes in the atmosphere due to human activity have increased carbon dioxide concentrations and thus affect climate.	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.
Unit 1 Evidence of Student Learning	
Performance Tasks/Use of Technology: ➤ Lab Safety Station Activity ➤ Flinn Safety Video ➤ Use technology throughout the course to collect data, analyze it and make graphs, share information with others etc. Explore Learning ➤ Paramecium Gizmo ➤ Cellular Respiration Gizmo ➤ Photosynthesis Gizmo Virtual Lab ➤ Factors that affect enzyme activity ➤ collect data from a simulation to draw conclusions about the impact that various changes have on on enzyme function Microscope ➤ ID cell types and cellular structures	Assessments Formative ➤ Observation ➤ Homework ➤ Class participation ➤ Graphic Organizers ➤ Projects ➤ Student Response Systems ➤ Do-Now/Exit Cards ➤ Laboratories/Lab Reports ➤ Maintaining a Notebook ➤ Writing Assignments ➤ Graphs, Models, and Tables Summative ➤ Chapter/Unit Test ➤ Writing Assignments ➤ Presentations ➤ Laboratory Reports/Practical ➤ Unit Projects Benchmark ➤ Common Assessments ➤ Final Exams

Ocean Academy Charter High School
(Biology) Curriculum Guide
Grades 9-12

	➤ Performance Assessment ➤ Link-it assessment Alternative ➤ Quizz ➤ Blooket ➤ Kahoot ➤ CER (claim, evidence, reasoning) - Duco Cement Demo to introduce concept of CER, follow-up would be to show a living organism and have students write their own CER to answer Is it Living? (differentiate picture based on students ie. Plant vs. bacteria vs. dog
Unit 1 Essential Questions	
➤ How do the structures within organisms support their vital life functions? ➤ What mechanisms allow organisms to grow, develop, and sustain life? ➤ How do organisms acquire and use matter and energy for survival and growth? ➤ How do organisms sense, interpret, and respond to environmental information?	
Unit 1 Knowledge and Skills	
Enduring Understandings	Learning Targets
<i>Students will know...</i> ➤ All living organisms are composed of cells, the basic units of life. ➤ The structure of cells is directly related to their specific functions. ➤ Passive transport is the movement of substances across cell membranes without the use of energy. ➤ Active transport requires energy to move substances across the cell membrane against a concentration	<i>Students will be able to...</i> ➤ Identify and explain the characteristics that define living things. <i>(Connects to all year-long standards; LS1-3: Homeostasis)</i> ➤ Describe how water's polarity contributes to its unique properties. <i>(Builds toward LS1-3)</i>

gradient. ➤ Single-celled organisms maintain internal balance through various processes. ➤ In multicellular organisms, cells work collaboratively to maintain homeostasis at the organism level.	➤ Explain the structure and function of the four main macromolecule groups: carbohydrates, lipids, proteins, and nucleic acids. <i>(LS1-1, LS1-6)</i> ➤ Compare and contrast the structure and function of cell organelles and relate these to larger biological structures (tissues, organs, and organisms). <i>(Use NGSS Lee & Steudler activity; LS1-2)</i> ➤ Analyze how the structures of chloroplasts and mitochondria support the processes of photosynthesis and cellular respiration, respectively. <i>(LS1-2)</i> ➤ Predict the movement of water across membranes using concepts like osmosis and tonicity. <i>(LS1-3)</i> ➤ Explain how molecular transport across membranes contributes to homeostasis in cells. <i>(LS1-3)</i> ➤ Evaluate cell responses in various environmental conditions (hypotonic, hypertonic, isotonic). <i>(LS1-3)</i> ➤ Design and conduct investigations that provide evidence of feedback mechanisms maintaining homeostasis. <i>(LS1-3)</i> ➤ Explore real-life examples of organisms maintaining homeostasis (e.g., freshwater vs. saltwater fish, Galapagos
--	--

	marine iguanas). (LS1-3) ➤ Explain how the surface-area-to-volume ratio affects cellular size and the ability to maintain homeostasis. (LS1-3) ➤ Construct models to demonstrate how photosynthesis transforms light energy into chemical energy. Compare and evaluate different models for accuracy and clarity. (LS1-5) ➤ Identify and describe the other molecules synthesized from sugars produced during photosynthesis. (LS1-6) ➤ Describe how mitosis enables growth and development in organisms. (LS1-4) ➤ Explain the process of cell differentiation and how it results in complex multicellular systems working together. (LS1-4) ➤ Create a model to illustrate how cellular respiration breaks down organic molecules to release energy. (LS1-7) ➤ Describe the role of ATP as the primary energy currency in cellular activities. (LS1-7) ➤ Interpret and generate tables and graphs to analyze and communicate scientific data effectively.
Unit 1 Instructional Plan	

Ocean Academy Charter High School
(Biology) Curriculum Guide
Grades 9-12

Suggested Activities	Resources
➤ Videos - Amoeba Sisters ➤ Posters - Characteristics of Life (analogy) ➤ Water (polarity) paper model ➤ Macromolecules paper models ➤ Polar Acrostic Poetry ➤ Microscope Labs ➤ Cell Types ➤ Mitosis ➤ Diffusion and Osmosis Lab Activities ➤ Egg lab ➤ Dialysis tubing lab ➤ Mitosis modeling (pipe cleaners, beads etc.) ➤ Chromatography ➤ Yeast balloon demo ➤ Yeast and food source cellular respiration lab ➤ Measure cellular respiration before and after running (bromothymol blue)	➤ Gizmos ➤ Textbook - Savvas - <i>Miller & Levine Biology</i> ➤ Section worksheets ➤ Lab materials ➤ POGIL
Differentiation & Inclusive Support Strategies:	
Multilingual Learners: - Provide guided reading and writing in small groups - Use visuals, labeled classroom materials, and cognates - Pre-teach academic vocabulary using sentence and speaking frames - Integrate WIDA Can Do Descriptors into lesson scaffolding - Use screen readers, audio tools, and visual glossaries - Offer extended time and oral/dictated responses - Integrate culturally relevant texts and technology tools Students with IEPs or 504 Plans: - Follow all IEP/504 accommodations and modifications - Use audio books, large print, or Braille/digital formats	

- Provide peer tutoring, scribes, and augmentative communication tools
- Allow oral responses and extended time
- Offer modified assignments, assessments, and guided notes
- Utilize leveled texts and differentiated materials
- Use flexible seating and small group instruction

Students At Risk of Academic Failure:

- Scaffold instruction using visuals, chants, and songs
- Offer modified tasks and flexible grouping
- Use technology to support organization and engagement
- Provide structured routines and clear expectations
- Assign peer mentors and provide goal-setting checklists
- Include culturally relevant content to boost connection
- Embed mini-lessons and tiered intervention strategies

Gifted and Talented Learners:

- Provide open-ended and inquiry-based tasks
- Incorporate Bloom's Taxonomy (analyzing, evaluating, creating)
- Offer choices in content, process, and product
- Use advanced reading lists and tiered assignments
- Encourage discovery and student-designed projects
- Offer enrichment centers and flexible grouping
- Facilitate problem-solving simulations and debriefing

Diversity and Inclusion:

- Celebrate cultural identity through inclusive texts
- Provide alternative formats for assignments and assessments

- Collaborate with ESL staff and use closed captions when available
- Offer wait time and avoid idioms or slang
- Create a nurturing classroom with visual routines and structured expectations
- Encourage family engagement and home language maintenance
- Use word walls and accessible academic vocabulary tools

Core Instructional and Supplemental Materials / Resources

Instructional Materials

- Textbook
- Textbook resources
- Laboratory manuals and equipment
- Translation apps (Google etc)

Supplemental Materials

- School databases
- Multimedia Resources
- Printers and Computers
- Online Resources and videos
- Interactive Projector
- Rubrics
- POGIL
- Science Websites:
 - ACS Chemistry for Life
 - Periodic table
 - PBS Learning Media
 - Khan Academy
 - Bozeman Science
 - Science Magazine
 - US National Science Foundation
 - Newsela
 - Next Generation Science Standards
 - Chem Spider
 - Amoeba Sisters
 - HHMI
 - Gizmos
 - Edpuzzle

Intervention Materials

- Anchor activities: Anchor activities provide meaningful options for students when they are not actively engaged in classroom activities (e.g., when they finish early,

are waiting for further directions, are stumped, first enter class, or when the teacher is working with other students). Anchors should be directly related to the current learning goals.

- Choices of review activities: Different review or extension activities are made available to students during a specific section of the class (such as at the beginning or end of the period).
- Homework options: Students are provided with choices about the assignments they complete as homework. Or, students are directed to specific homework based on student needs.
- Student-teacher goal setting: The teacher and student work together to develop individual learning goals for the student.
- Flexible grouping: Students might be instructed as a whole group, in small groups of various permutations (homogeneous or heterogeneous by skill or interest), in pairs or individuals. Any small groups or pairs change over time based on assessment data.
- Varied computer programs: The computer is used as an additional center in the classroom, and students are directed to specific websites or software that allows them to work on skills at their level.
- Varying scaffolding of same organizer: Provide graphic organizers that require students to complete various amounts of information. Some will be more filled out (by the teacher) than others.
- Think-Pair-Share by readiness, interest, and/or learning profile: Students are placed in pre-determined pairs, asked to think about a question for a specific amount of time, then are asked to share their answers first with their partner and then with the whole group.
- Games to practice mastery of information and skill: Use games as a way to review and reinforce concepts. Include questions and tasks that are on a variety of cognitive levels.
- Multiple levels of questions: Teachers vary the sorts of questions posed to different students based on their ability to handle them. Varying questions is an excellent way to build the confidence (and motivation) of students who are reluctant to contribute to class discourse. Note: Most teachers would probably admit that without even thinking about it they tend to address particular types of questions to particular students. In some cases, such tendencies may need to be corrected. (For example, a teacher may be unknowingly addressing all of the more challenging questions to one student, thereby inhibiting other students' learning and fostering class resentment of that student.)
- Stations/ Learning Centers: A station (or simply a collection of materials) that students might use independently to explore topics or practice skills. Centers allow individuals or groups of students to work at their own pace. Students are constantly

reassessed to determine which centers are appropriate for students at a particular time, and to plan activities at those centers to build the most pressing skills.

Social and Emotional Learning New Jersey SEL

Competencies and Sub-Competencies Social and emotional learning (SEL) involves the process through which children and adults acquire and apply the knowledge, attitudes and skills necessary to understand and manage emotions, set and achieve positive goals, feel and show empathy for others, establish and maintain positive relationships, and make responsible decisions. The purpose of the SEL competencies is to provide schools with guidelines for integrating SEL across grades and subject areas.

Self-Awareness

- Recognize one's feelings and thoughts
- Recognize the impact of one's feelings and thoughts on one's own behavior
- Recognize one's personal traits, strengths and limitations
- Recognize the importance of self-confidence in handling daily tasks and challenges

Self-Management

- Understand and practice strategies for managing one's own emotions, thoughts and behaviors
- Recognize the skills needed to establish and achieve personal and educational goals
- Identify and apply ways to persevere or overcome barriers through alternative methods to achieve one's goals

Social Awareness

- Recognize and identify the thoughts, feelings and perspectives of others
- Demonstrate awareness of the differences among individuals, groups and others' cultural backgrounds
- Demonstrate an understanding of the need for mutual respect when viewpoints differ
- Demonstrate an awareness of the expectations for social interactions in a variety of settings

Responsible Decision-Making

- Develop, implement and model effective problem solving and critical thinking skills
- Identify the consequences associated with one's actions in order to make constructive choices
- Evaluate personal, ethical, safety and civic impact of decisions

Relationship Skills

- Establish and maintain healthy relationships
- Utilize positive communication and social skills to interact effectively with others
- Identify ways to resist inappropriate social pressure

Ocean Academy Charter High School
(Biology) Curriculum Guide
Grades 9-12

- Demonstrate the ability to prevent and resolve interpersonal conflicts in constructive ways
- Identify who, when, where, or how to seek help for oneself or others when needed

Ocean Academy Charter High School
Unit 2 Overview

Content Area: Biology

Target Course/Grade Levels: 9

Unit Title: Unit 2:
Heredity: Inheritance
and Variation of Traits

Duration: 25 Days

Introduction/Unit 2 Focus

Summary

The topic of Inheritance and Variation of Traits helps students explore the question: "How are characteristics passed from one generation to the next?" In this unit, high school students will examine the relationship between DNA, chromosomes, and cellular division, which allows traits to be inherited. Through this study, students will develop an understanding of why individuals within the same species can vary in appearance, function, and behavior.

As they continue their learning, students will construct conceptual models to explain the role of DNA in the unity of life on Earth. They will also use statistical models to understand how genetic variation within populations contributes to the survival and evolution of species. Ethical issues surrounding genetic modification and its broader implications will also be addressed.

By the end of the unit, students will be able to describe the mechanisms of genetic inheritance, explaining how genes are passed down and how traits are expressed. They will also examine the environmental and genetic factors that cause gene mutations and how these mutations can affect gene expression, influencing an organism's traits. This unit will lay the groundwork for a deeper understanding of genetics, evolution, and heredity.

Standard 9.1 Personal Financial Literacy

This standard outlines the important fiscal knowledge, habits, and skills that must be mastered in order for students to make informed decisions about personal finance. Financial literacy is an integral component of a student's college and career readiness, enabling students to achieve fulfilling, financially-secure, and successful careers.

Standard 9.2 Career Awareness, Exploration, Preparation and Training

This standard outlines the importance of being knowledgeable about one's interests and talents, and being well informed about postsecondary and career options, career planning, and career requirements.

Standard 9.4 Life Literacies and Key Skills

This standard outline key literacies and technical skills such as critical thinking, global and cultural awareness, and technology literacy* that are critical for students to develop to live and work in an interconnected global economy.

Standard 8.1 Computer Science

Computer Science outlines a comprehensive set of concepts and skills, such as data and analysis, algorithms and programming, and computing systems.

Standard 8.2 Design Thinking

Technology, outlines the technological design concepts and skills essential for technological and engineering literacy. The framework design includes Engineering Design, Ethics and Culture, and the Effects of Technology on the Natural world among the disciplinary concepts

Amistad Law: N.J.S.A. 18A 52:16A-88 Every board of education shall incorporate the information regarding the contributions of African-Americans to our country in an appropriate place in the curriculum of elementary and secondary school students.

Holocaust Law: N.J.S.A. 18A:35-28 Every board of education shall include instruction on the Holocaust and genocide in an appropriate place in the curriculum of all elementary and secondary school pupils. The instruction shall further emphasize the personal responsibility that each citizen bears to fight racism and hatred whenever and wherever it happens.

LGBT and Disabilities Law: N.J.S.A. 18A:35-4.35 A board of education shall include instruction on the political, economic, and social contributions of persons with disabilities and lesbian, gay, bisexual, and transgender people, in an appropriate place in the curriculum of middle school and high school students as part of the district's implementation of the New Jersey Student Learning Standards (N.J.S.A.18A:35-4.36) A board of education shall have policies and procedures in place pertaining to the selection of instructional materials to implement the requirements of N.J.S.A. 18A:35-4.35.

Diversity and Inclusion C.18A:35-4.36a Curriculum to include instruction on diversity and inclusion. The instruction shall:

- (1) highlight and promote diversity, including economic diversity, equity, inclusion, tolerance, and belonging in connection with gender and sexual orientation, race and ethnicity, disabilities, and religious tolerance;
- (2) examine the impact that unconscious bias and economic disparities have at both an individual level and on society as a whole; and
- (3) encourage safe, welcoming, and inclusive environments for all students regardless of race or ethnicity, sexual and gender identities, mental and physical disabilities, and religious beliefs.

Asian Americans and Pacific Islanders (AAPI)

Ensures that the contributions, history, and heritage of Asian Americans and Pacific Islanders (AAPI) are included in the New Jersey Student Learning Standards (NJSLS) for Social Studies in kindergarten through Grade 12 (P.L.2021, c.416).

21st Century Themes and Skills

“Twenty-first century themes and skills” means themes such as global awareness; financial, economic, business, and entrepreneurial literacy; civic literacy; health literacy; learning and innovation skills, including creativity and innovation, critical thinking and problem solving, and communication and collaboration; information, media, and technology skills; and life and career skills, including flexibility. Career readiness, life literacies, and key skills education provides students with the necessary skills to make informed career and financial decisions, engage as responsible community members in a digital society, and to successfully meet the challenges and opportunities in an interconnected global economy.”

Focus Standards Unit 2 (Major Standards)

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.

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Asking Questions and Defining Problems ➤ Ask questions that arise from examining models or a theory to clarify relationships. (HS-LS3-1) Analyzing and Interpreting Data ➤ Apply concepts of statistics and probability (including determining function fits to data, slope, intercept, and correlation coefficient for linear fits) to scientific and engineering	LS1.B: Growth and Development of Organisms ➤ In multicellular organisms individual cells grow and then divide via a process called mitosis, thereby allowing the organism to grow. The organism begins as a single cell (fertilized egg) that divides successively to produce many cells, with each parent cell passing identical genetic material (two variants of each chromosome pair) to both	Systems and System Models ➤ Models (e.g., physical, mathematical, computer models) can be used to simulate systems and interactions—including energy, matter, and information flows—within and between systems at different scales. (HS-LS1-2), (HS-LS1-4) Energy and Matter ➤ Changes of energy and matter in a system can be described in terms of energy and matter flows into, out of,

questions and problems, using digital tools when feasible. (HS-LS3-3) Engaging in Argument from Evidence ➤ Make and defend a claim based on evidence about the natural world that reflects scientific knowledge, and student-generated evidence. (HS-LS3-2)	daughter cells. Cellular division and differentiation produce and maintain a complex organism, composed of systems of tissues and organs that work together to meet the needs of the whole organism. (HS-LS1-4) LS1.A: Structure and Function ➤ All cells contain genetic information in the form of DNA molecules. Genes are regions in the DNA that contain the instructions that code for the formation of proteins. (secondary to HS-LS3-1) (Note: This Disciplinary Core Idea is also addressed by HS-LS1-1.) LS3.A: Inheritance of Traits ➤ Each chromosome consists of a single very long DNA molecule, and each gene on the chromosome is a particular segment of that DNA. The instructions for forming species' characteristics are carried in DNA. All cells in an organism have the same genetic content, but the genes used (expressed) by the cell may be regulated in different ways. Not all DNA codes for a protein; some segments of DNA are involved in regulatory or structural functions, and some have no as-yet known function. (HS-LS3-1)	and within that system. (HS-LS1-5), (HS-LS1-6) ➤ Energy cannot be created or destroyed—it only moves between one place and another place, between objects and/or fields, or between systems. (HS-LS1-7) Structure and Function ➤ Investigating or designing new systems or structures requires a detailed examination of the properties of different materials, the structures of different components, and connections of components to reveal its function and/or solve a problem. (HS-LS1-1) Stability and Change ➤ Feedback (negative or positive) can stabilize or destabilize a system. (HS-LS1-3)
--	--	---

LS3.B: Variation of Traits

- In sexual reproduction, chromosomes can sometimes swap sections during the process of meiosis (cell division), thereby creating new genetic combinations and thus more genetic variation. Although DNA replication is tightly regulated and remarkably accurate, errors do occur and result in mutations, which are also a source of genetic variation. Environmental factors can also cause mutations in genes, and viable mutations are inherited. (HS-LS3-2)
- Environmental factors also affect expression of traits, and hence affect the probability of occurrences of traits in a population. Thus the variation and distribution of traits observed depends on both genetic and environmental factors. (HS-LS3-2), (HS-LS3-3)

Unit 2 Supporting and Additional Standards/ Interdisciplinary Connection
 Grade 11 - 12 2023 ELA Standards and Practices

ELA/Literacy

RI.CI.11-12.2. Determine two or more central ideas of an informational text and analyze how they are developed and refined over the course of a text, including how they interact and build on one another to provide a complex account or analysis; provide an objective summary of the text

RI.MF.11-12.6. Synthesize complex information across multiple sources and formats to develop ideas, resolve conflicting information, or develop an interpretation that goes beyond explicit text information (e.g., express a personal point of view, new interpretation of the concept).

W.AW.11-12.1. Write arguments to support claims in an analysis of substantive topics or texts, using

valid reasoning and relevant and sufficient evidence.

- Introduce precise, knowledgeable claim(s), establish the significance of the claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that logically sequences claim(s), counterclaims, reasons, and evidence.
- Develop claim(s) and counterclaims avoiding common logical fallacies and using sound reasoning and thoroughly, supplying the most relevant evidence for each while pointing out the strengths and limitations of both in a manner that anticipates the audience's knowledge level, concerns, values, and possible biases.
- Use transitions (e.g., words, phrases, clauses) to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims.
- Establish and maintain a style and tone appropriate to the audience and purpose (e.g., formal and objective for academic writing) while attending to the norms and conventions of the discipline in which they are writing.
- Provide a concluding paragraph or section that supports the argument presented (e.g., articulating implications or the significance of the topic).

Mathematics

MP.2	Reason abstractly and quantitatively. (HS-LS3-2),(HS-LS3-3)
MP.4	Model with mathematics. (HS-LS1-4)
HSF-IF.C.7	Graph functions expressed symbolically and show key features of the graph, by hand, in simple cases and using technology for more complicated cases. (HS-LS1-4)
HSF-BF.A.1	Write a function that describes a relationship between two quantities. (HS-LS1-4)

Unit 2 New Jersey Student Learning Standards Connections: Career Readiness, Life Literacies, and Key Skills

Disciplinary Concepts

Career Awareness and Planning (9.2), Creativity and Innovation (9.4), Critical Thinking and Problem-solving(9.4), Digital Citizenship(9.4), Global and Cultural Awareness(9.4), Information and Media Literacy(9.4)

Core Ideas	Performance Expectations (Identified with Standard Number and Statement)
There are strategies to improve one's professional value and marketability.	9.2.12.CAP.3: Investigate how continuing education contributes to one's career and personal growth.
With a growth mindset, failure is an important part of success.	9.4.12.CI.1: Demonstrate the ability to reflect, analyze, and use creative skills and ideas (e.g., 1.1.12 prof.CR3a).
Collaboration with individuals with diverse experiences can aid in the problem-solving process, particularly	9.4.12.CT.2: Explain the potential benefits of collaborating to enhance critical thinking and problem solving (e.g., 1.3E.12profCR3.a).

Ocean Academy Charter High School
(Biology) Curriculum Guide
Grades 9-12

for global issues where diverse solutions are needed.	
Network connectivity and computing capability extended to objects, sensors and everyday items not normally considered computers allows these devices to generate, exchange, and consume data with minimal human intervention. Technologies such as Artificial Intelligence (AI) and blockchain can help minimize the effect of climate change.	9.4.12.DC.8: Explain how increased network connectivity and computing capabilities of everyday objects allow for innovative technological approaches to climate protection.
Solutions to the problems faced by a global society require the contribution of individuals with different points of view and experiences.	9.4.12.GCA.1: Collaborate with individuals to analyze a variety of potential solutions to climate change effects and determine why some solutions (e.g., political, economic, cultural) may work better than others (e.g., SL.11-12.1., HS-ETS1-1, HS-ETS1-2, HS-ETS1-4, 6.3.12.GeoGI.1, 7.1.IH.IPERS.6, 7.1.IL.IPERS.7, 8.2.12.ETW.3).
Advanced search techniques can be used with digital and media resources to locate information and to check the credibility and the expertise of sources to answer questions, solve problems, and inform the decision-making.	9.4.12.IML.1: Compare search browsers and recognize features that allow for filtering of information. 9.4.12.IML.2: Evaluate digital sources for timeliness, accuracy, perspective, credibility of the source, and relevance of information, in media, data, or other resources (e.g., NJSLA.W8, Social Studies Practice: Gathering and Evaluating Sources).
Unit 2 New Jersey Student Learning Standards: <u>Computer Science and Design Thinking</u>	
Disciplinary Concepts Data and Analysis (8.1), Engineering Design (8.2), Nature of Technology (8.2), Ethics and Culture (8.2)	
Core Ideas	Performance Expectations (Identified with Standard Number and Statement)
Individuals select digital tools and design automated processes to collect, transform, generalize, simplify, and present large data sets in different ways	8.1.12.DA.1: Create interactive data visualizations using software tools to help others better understand real world phenomena, including climate change.

Ocean Academy Charter High School
(Biology) Curriculum Guide
Grades 9-12

to influence how other people interpret and understand the underlying information.	
Engineering design is a complex process in which creativity, content knowledge, research, and analysis are used to address local and global problems.	8.2.12.ED.1: Use research to design and create a product or system that addresses a problem and make modifications based on input from potential consumers. 8.2.12.ED.3: Evaluate several models of the same type of product and make recommendations for a new design based on a cost benefit analysis. 8.2.12.ED.4: Design a product or system that addresses a global problem and document decisions made based on research, constraints, trade-offs, and aesthetic and ethical considerations and share this information with an appropriate audience.
Engineers use science, mathematics, and other disciplines to improve technology. Increased collaboration among engineers, scientists, and mathematicians can improve their work and designs. Technology, product, or system redesign can be more difficult than the original design.	8.2.12.NT.1: Explain how different groups can contribute to the overall design of a product. 8.2.12.NT.2: Redesign an existing product to improve form or function.
The ability to ethically integrate new technologies requires deciding whether to introduce a technology, taking into consideration local resources and the role of culture in acceptance.	8.2.12.EC.1: Analyze controversial technological issues and determine the degree to which individuals, businesses, and governments have an ethical role in decisions that are made. 8.2.12.EC.2: Assess the positive and negative impacts of emerging technologies on developing countries and evaluate how individuals, non-profit organizations, and governments have responded.
New Jersey Student Learning Standards: Climate Change Mandate	
Core Ideas	Performance Expectations (Identified with Standard Number and Statement)
Individuals select digital tools and design automated processes to collect, transform, generalize, simplify, and present large data sets in different ways to influence how other people interpret	8.1.12.DA.1: Create interactive data visualizations using software tools to help others better understand real world phenomena, including climate change.

Ocean Academy Charter High School
(Biology) Curriculum Guide
Grades 9-12

and understand the underlying information.	
Unit 2 Evidence of Student Learning	
Performance Tasks/Use of Technology: Microscope - ID cells in various phases of cell division, calculate time spent in each phase, calculate percent of time per phase Explore Learning Building DNA Gizmo Heredity and Traits STEM case Karyotyping Create genetics questions and solve them (have other students solve student generated questions) Use technology throughout the unit to collect data, analyze it and make graphs, share information with others etc.	Assessments Formative ➤ Observation ➤ Homework ➤ Class participation ➤ Graphic Organizers ➤ Projects ➤ Student Response Systems ➤ Do-Now/Exit Cards ➤ Laboratories/Lab Reports ➤ Maintaining a Notebook ➤ Writing Assignments ➤ Graphs, Models, and Tables Summative ➤ Chapter/Unit Test ➤ Writing Assignments ➤ Presentations ➤ Laboratory Reports/Practical ➤ Unit Projects Benchmark ➤ Common Assessments ➤ Final Exams ➤ Performance Assessment ➤ Link-it assessment Alternative ➤ Quizz ➤ Blooket ➤ Kahoot ➤ CER (claim, evidence, reasoning)
Unit 2 Essential Questions	
➤ What processes enable organisms to grow and develop over time? ➤ How are traits inherited from one generation to the next?	

- Why do individuals of the same species, including siblings, display differences in their characteristics?

Unit 2 Knowledge and Skills

Enduring Understandings	Learning Targets
<i>Students will understand that...</i> ➤ DNA serves as the fundamental blueprint for all living organisms. ➤ The central dogma of biology describes the flow of genetic information from DNA to RNA to protein, with some exceptions such as certain viruses. ➤ Sexual reproduction promotes genetic variation within a population. ➤ Genetic traits are passed from parent(s) to offspring through inherited genes.	<i>Students will be able to...</i> ➤ Construct models to represent the structure and function of DNA molecules. (LS1-1, LS3-1) ➤ Illustrate the process of DNA replication and explain its biological importance. (LS1-4) ➤ Explain the necessity of maintaining a consistent chromosome number in individuals. (LS1-4) ➤ Compare and contrast the structures and functions of DNA and RNA. (LS1-1) ➤ Model or simulate the processes of transcription, translation, and protein synthesis. (Part of LS3-1) ➤ Identify and describe chromosomal events occurring during meiosis. (LS3-2) ➤ Explain how genetic variation arises through DNA replication errors, environmental factors, and meiotic processes such as crossing over and nondisjunction. (LS3-2) ➤ Analyze the role of sexual reproduction in promoting genetic diversity. (LS3-2) ➤ Detect mutations within DNA sequences and demonstrate their potential effects. (LS3-2) ➤ Use probability and statistical reasoning to predict outcomes of genetic crosses. (LS3-3) ➤ Apply basic probability formulas to simplify mono-, di-, and tri-hybrid cross predictions. ➤ Predict outcomes of genetic crosses involving multiple alleles, sex-linked traits, autosomal

Ocean Academy Charter High School
(Biology) Curriculum Guide
Grades 9-12

	dominant and recessive traits, and codominance.
Unit 2 Instructional Plan	
Suggested Activities	Resources
➤ Videos - Amoeba Sisters ➤ Dragon or Monster genetics activity ➤ Pedigree case study (see Steudler) ➤ Transcription and translation sentence activity ➤ Karyotype analysis ➤ Meiosis modeling ➤ DNA model ➤ Read and annotate DNA structure article from Nature 1953 by Watson and Crick	➤ Gizmos ➤ Textbook - Savvas Miller & Levine Biology ○ Chapter mysteries ○ Section worksheets ➤ Lab materials ➤ POGIL
Differentiation & Inclusive Support Strategies:	
Multilingual Learners: - Provide guided reading and writing in small groups - Use visuals, labeled classroom materials, and cognates - Pre-teach academic vocabulary using sentence and speaking frames - Integrate WIDA Can Do Descriptors into lesson scaffolding - Use screen readers, audio tools, and visual glossaries - Offer extended time and oral/dictated responses - Integrate culturally relevant texts and technology tools Students with IEPs or 504 Plans: - Follow all IEP/504 accommodations and modifications - Use audio books, large print, or Braille/digital formats - Provide peer tutoring, scribes, and augmentative communication tools - Allow oral responses and extended time	

- Offer modified assignments, assessments, and guided notes
- Utilize leveled texts and differentiated materials
- Use flexible seating and small group instruction

Students At Risk of Academic Failure:

- Scaffold instruction using visuals, chants, and songs
- Offer modified tasks and flexible grouping
- Use technology to support organization and engagement
- Provide structured routines and clear expectations
- Assign peer mentors and provide goal-setting checklists
- Include culturally relevant content to boost connection
- Embed mini-lessons and tiered intervention strategies

Gifted and Talented Learners:

- Provide open-ended and inquiry-based tasks
- Incorporate Bloom's Taxonomy (analyzing, evaluating, creating)
- Offer choices in content, process, and product
- Use advanced reading lists and tiered assignments
- Encourage discovery and student-designed projects
- Offer enrichment centers and flexible grouping
- Facilitate problem-solving simulations and debriefing

Diversity and Inclusion:

- Celebrate cultural identity through inclusive texts
- Provide alternative formats for assignments and assessments
- Collaborate with ESL staff and use closed captions when available
- Offer wait time and avoid idioms or slang

- Create a nurturing classroom with visual routines and structured expectations
- Encourage family engagement and home language maintenance
- Use word walls and accessible academic vocabulary tools

Unit 2 Core Instructional and Supplemental Materials and Additional Resources

Instructional Materials

- Textbook
- Textbook resources
- Laboratory manuals and equipment
- Translation apps (Google etc)

Supplemental Materials

- School databases
- Multimedia Resources
- Printers and Computers
- Online Resources and videos
- Interactive Projector
- Rubrics
- POGIL
- Science Websites:
 - ACS Chemistry for Life
 - Periodic table
 - PBS Learning Media
 - Khan Academy
 - Bozeman Science
 - Science Magazine
 - US National Science Foundation
 - Newsela
 - Next Generation Science Standards
 - Chem Spider
 - Amoeba Sisters
 - HHMI
 - Gizmos
 - Edpuzzle

Intervention Materials

- Anchor activities: Anchor activities provide meaningful options for students when they are not actively engaged in classroom activities (e.g., when they finish early, are waiting for further directions, are stumped, first enter class, or when the teacher is working with other students). Anchors should be directly related to the current learning goals.

- Choices of review activities: Different review or extension activities are made available to students during a specific section of the class (such as at the beginning or end of the period).
- Homework options: Students are provided with choices about the assignments they complete as homework. Or, students are directed to specific homework based on student needs.
- Student-teacher goal setting: The teacher and student work together to develop individual learning goals for the student.
- Flexible grouping: Students might be instructed as a whole group, in small groups of various permutations (homogeneous or heterogeneous by skill or interest), in pairs or individuals. Any small groups or pairs change over time based on assessment data.
- Varied computer programs: The computer is used as an additional center in the classroom, and students are directed to specific websites or software that allows them to work on skills at their level.
- Varying scaffolding of same organizer: Provide graphic organizers that require students to complete various amounts of information. Some will be more filled out (by the teacher) than others.
- Think-Pair-Share by readiness, interest, and/or learning profile: Students are placed in pre-determined pairs, asked to think about a question for a specific amount of time, then are asked to share their answers first with their partner and then with the whole group.
- Games to practice mastery of information and skill: Use games as a way to review and reinforce concepts. Include questions and tasks that are on a variety of cognitive levels.
- Multiple levels of questions: Teachers vary the sorts of questions posed to different students based on their ability to handle them. Varying questions is an excellent way to build the confidence (and motivation) of students who are reluctant to contribute to class discourse. Note: Most teachers would probably admit that without even thinking about it they tend to address particular types of questions to particular students. In some cases, such tendencies may need to be corrected. (For example, a teacher may be unknowingly addressing all of the more challenging questions to one student, thereby inhibiting other students' learning and fostering class resentment of that student.)
- Stations/ Learning Centers: A station (or simply a collection of materials) that students might use independently to explore topics or practice skills. Centers allow individuals or groups of students to work at their own pace. Students are constantly reassessed to determine which centers are appropriate for students at a particular time, and to plan activities at those centers to build the most pressing skills.

Social and Emotional Learning New Jersey SEL

Competencies and Sub-Competencies Social and emotional learning (SEL) involves the process through which children and adults acquire and apply the knowledge, attitudes and

skills necessary to understand and manage emotions, set and achieve positive goals, feel and show empathy for others, establish and maintain positive relationships, and make responsible decisions. The purpose of the SEL competencies is to provide schools with guidelines for integrating SEL across grades and subject areas.

Self-Awareness

- Recognize one's feelings and thoughts
- Recognize the impact of one's feelings and thoughts on one's own behavior
- Recognize one's personal traits, strengths and limitations
- Recognize the importance of self-confidence in handling daily tasks and challenges

Self-Management

- Understand and practice strategies for managing one's own emotions, thoughts and behaviors
- Recognize the skills needed to establish and achieve personal and educational goals
- Identify and apply ways to persevere or overcome barriers through alternative methods to achieve one's goals

Social Awareness

- Recognize and identify the thoughts, feelings and perspectives of others
- Demonstrate awareness of the differences among individuals, groups and others' cultural backgrounds
- Demonstrate an understanding of the need for mutual respect when viewpoints differ
- Demonstrate an awareness of the expectations for social interactions in a variety of settings

Responsible Decision-Making

- Develop, implement and model effective problem solving and critical thinking skills
- Identify the consequences associated with one's actions in order to make constructive choices
- Evaluate personal, ethical, safety and civic impact of decisions

Relationship Skills

- Establish and maintain healthy relationships
- Utilize positive communication and social skills to interact effectively with others
- Identify ways to resist inappropriate social pressure
- Demonstrate the ability to prevent and resolve interpersonal conflicts in constructive ways
- Identify who, when, where, or how to seek help for oneself or others when needed

Ocean Academy Charter High School
(Biology) Curriculum Guide
Grades 9-12

<u>Ocean Academy Charter High School</u> Unit 3 Overview	
Content Area: Biology	Target Course/Grade Levels: 9th
Unit Title: Unit 3: Biological Evolution: Unity and Diversity	Duration: 10 days
Unit 3 Introduction/ Focus	
Summary The topic of Natural Selection and Evolution helps students explore key questions such as: “How can there be so many similarities among organisms yet so many different plants, animals, and microorganisms?” and “How does biodiversity impact humans?” Through this unit, high school students will investigate the patterns that link the environment to the process of natural selection. They will examine how natural selection drives the evolution of species over time and explore the factors that contribute to these evolutionary changes. Students will gain a deeper understanding of how multiple lines of scientific evidence, such as the fossil record and genetic relationships among species, strengthen the theories of natural selection and evolution. They will explore how changes in the environment influence the distribution of traits in a population, leading to evolutionary shifts. Through this process, students will learn how to apply scientific reasoning and analysis to support the theory of biological evolution. As part of their investigations, students will use models and statistical tools to analyze data and draw conclusions about evolution. They will also develop skills in communicating their findings effectively, presenting data and insights through scientific writing and presentations. By the end of the unit, students will have a comprehensive understanding of how natural selection shapes the diversity of life on Earth and how scientific evidence supports the theory of evolution. This knowledge will also help them understand the role of biodiversity in ecosystems and its significance for human society. Standard 9.1 Personal Financial Literacy This standard outlines the important fiscal knowledge, habits, and skills that must be mastered in order for students to make informed decisions about personal finance. Financial literacy is an integral component of a student’s college and career readiness, enabling students to achieve fulfilling, financially-secure, and successful careers. Standard 9.2 Career Awareness, Exploration, Preparation and Training	

This standard outlines the importance of being knowledgeable about one's interests and talents, and being well informed about postsecondary and career options, career planning, and career requirements.

Standard 9.4 Life Literacies and Key Skills

This standard outline key literacies and technical skills such as critical thinking, global and cultural awareness, and technology literacy* that are critical for students to develop to live and work in an interconnected global economy.

Standard 8.1 Computer Science

Computer Science outlines a comprehensive set of concepts and skills, such as data and analysis, algorithms and programming, and computing systems.

Standard 8.2 Design Thinking

Technology, outlines the technological design concepts and skills essential for technological and engineering literacy. The framework design includes Engineering Design, Ethics and Culture, and the Effects of Technology on the Natural world among the disciplinary concepts

Amistad Law: N.J.S.A. 18A 52:16A-88 Every board of education shall incorporate the information regarding the contributions of African-Americans to our country in an appropriate place in the curriculum of elementary and secondary school students.

Holocaust Law: N.J.S.A. 18A:35-28 Every board of education shall include instruction on the Holocaust and genocide in an appropriate place in the curriculum of all elementary and secondary school pupils. The instruction shall further emphasize the personal responsibility that each citizen bears to fight racism and hatred whenever and wherever it happens.

LGBT and Disabilities Law: N.J.S.A. 18A:35-4.35 A board of education shall include instruction on the political, economic, and social contributions of persons with disabilities and lesbian, gay, bisexual, and transgender people, in an appropriate place in the curriculum of middle school and high school students as part of the district's implementation of the New Jersey Student Learning Standards (N.J.S.A.18A:35-4.36) A board of education shall have policies and procedures in place pertaining to the selection of instructional materials to implement the requirements of N.J.S.A. 18A:35-4.35.

Diversity and Inclusion C.18A:35-4.36a Curriculum to include instruction on diversity and inclusion. The instruction shall:

- (1) highlight and promote diversity, including economic diversity, equity, inclusion, tolerance, and belonging in connection with gender and sexual orientation, race and ethnicity, disabilities, and religious tolerance;
- (2) examine the impact that unconscious bias and economic disparities have at both an individual level and on society as a whole; and
- (3) encourage safe, welcoming, and inclusive environments for all students regardless of race or ethnicity, sexual and gender identities, mental and physical disabilities, and religious beliefs.

Asian Americans and Pacific Islanders (AAPI)

Ensures that the contributions, history, and heritage of Asian Americans and Pacific Islanders (AAPI) are included in the New Jersey Student Learning Standards (NJSLS) for Social Studies in kindergarten through Grade 12 (P.L.2021, c.416).

21st Century Themes and Skills

“Twenty-first century themes and skills” means themes such as global awareness; financial, economic, business, and entrepreneurial literacy; civic literacy; health literacy; learning and innovation skills, including creativity and innovation, critical thinking and problem solving, and communication and collaboration; information, media, and technology skills; and life and career skills, including flexibility. Career readiness, life literacies, and key skills education provides students with the necessary skills to make informed career and financial decisions, engage as responsible community members in a digital society, and to successfully meet the challenges and opportunities in an interconnected global economy.”

Unit 3 Focus Standards (Major 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 traits 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
- (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.

HS-ESS 1-6 Apply scientific reasoning and evidence from ancient Earth materials, meteorites, and other planetary surfaces to construct an account of Earth’s formation and early history.

HS-ESS 2-7 Construct an argument based on evidence about the simultaneous coevolution of Earth’s systems and life on Earth.

HS-ET1-3 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.

S-ET1-4 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.

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Analyzing and Interpreting Data ➤ Analyzing data in 9-12 builds on K-8 experiences and progresses to introducing more detailed statistical analysis, the comparison of data sets for consistency, and the use of models to generate and analyze data. Apply concepts of statistics and probability (including determining function fits to data, slope, intercept, and correlation coefficient for linear fits) to scientific and engineering questions and problems, using digital tools when feasible. (HS-LS4-3) Using Mathematics and Computational Thinking	LS4.A: Evidence of Common Ancestry and Diversity ➤ Genetic information provides evidence of evolution. DNA sequences vary among species, but there are many overlaps; in fact, the ongoing branching that produces multiple lines of descent can be inferred by comparing the DNA sequences of different organisms. Such information is also derivable from the similarities and differences in amino acid sequences and from anatomical and embryological evidence. (HS-LS4-1) LS4.B: Natural Selection ➤ Natural selection occurs only if there is both (1) variation in the genetic information between organisms in a population and	Patterns ➤ Different patterns may be observed at each of the scales at which a system is studied and can provide evidence for causality in explanations of phenomena. (HS-LS4-1), (HS-LS4-3) Cause and Effect ➤ Empirical evidence is required to differentiate between cause and correlation and make claims about specific causes and effects. (HSL S4-2), (HS-LS4-4), (HS-LS4-5), (HS-LS4-6) Systems and System Models ➤ Models (e.g. physical, mathematical, computer models) can be used to simulate systems and interactions - including energy, matter, and information flows- within

- Create or revise a simulation of a phenomenon, designed device, process, or system. (HS-LS4-6)
- Use mathematical models/and/or computer simulations to predict the effects of a design solution on systems and/or the interactions between systems. (HS-ETS1-4)

Constructing Explanations and Designing Solutions

- Construct an explanation based on valid and reliable evidence obtained from a variety of sources (including students' own investigations, models, theories, simulations, peer review) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future. (HS-LS4-2), (HS-LS4-4)
- Evaluate a solution to a complex real-world problem, based on scientific knowledge, student-generated sources of evidence, prioritized criteria, and tradeoff considerations.

Engaging in Argument from Evidence

- Evaluate the evidence behind currently accepted explanations or solutions to determine the merits of arguments. (HS-LS4-5)

- (2) variation in the expression of that genetic information—that is, trait variation—that leads to differences in performance among individuals. (HS-LS4-2), (HS-LS4-3)
- The traits that positively affect survival are more likely to be reproduced, and thus are more common in the population. (HS-LS4-3)

LS4.C: Adaptation

- Evolution is a consequence of the interaction of four factors:
 - (1) the potential for a species to increase in number,
 - 2) the genetic variation of individuals in a species due to mutation and sexual reproduction,
 - (3) competition for an environment's limited supply of the resources that individuals need in order to survive and reproduce, and
 - (4) the ensuing proliferation of those organisms that are better able to survive and reproduce in that environment. (HS-LS4-2)
- Natural selection leads to adaptation, that is, to a population dominated by organisms that are anatomically, behaviorally, and physiologically well suited to survive and reproduce in a specific environment. That is, the differential survival and reproduction of organisms in a population that have an advantageous heritable

and between systems at different scales (HS-ETS1-4)

Obtaining, Evaluating, and Communicating Information
Obtaining, evaluating, and communicating information

- Communicate scientific information (e.g., about phenomena and/or the process of development and the design and performance of a proposed process or system) in multiple formats (including orally, graphically, textually, and mathematically). (HS-LS4-1)

Connections to Nature of Science

Science Models, Laws, Mechanisms, and Theories
Explain Natural Phenomena

- A scientific theory is a substantiated explanation of some aspect of the natural world, based on a body of facts that have been repeatedly confirmed through observation and experiment and the science community validates each theory before it is accepted. If new evidence is discovered that the theory does not accommodate, the theory is generally modified in light of this new evidence. (HS-LS4-1)

trait leads to an increase in the proportion of individuals in future generations that have the trait and to a decrease in the proportion of individuals that do not. (HS-LS4-3), (HS-LS4-4)

-Adaptation also means that the distribution of traits in a population can change when conditions change. (HS-LS4-3)

- Changes in the physical environment, whether naturally occurring or human induced, have thus contributed to the expansion of some species, the emergence of new distinct species as populations diverge under different conditions, and the decline-and sometimes the extinction-of some species. (HS-LS4-5), (HS-LS4-6) -Species become extinct because they can no longer survive and reproduce in their altered environment. If members cannot adjust to change that is too fast or drastic, the opportunity for the species' evolution is lost. (HS-LS4-5)

LS4.D: Biodiversity and Humans

- Humans depend on the living world for the resources and other benefits provided by biodiversity. But human activity is also having adverse impacts on

biodiversity through overpopulation, overexploitation, habitat destruction, pollution, introduction of invasive species, and climate change. Thus, sustaining biodiversity so that ecosystem functioning and productivity are maintained is essential to supporting and enhancing life on Earth. Sustaining biodiversity also aids humanity by preserving landscapes of recreational or inspirational value. (HS-LS4-6) (Note: This Disciplinary Core Idea is also addressed by HS-LS2-7.)

ETS1.B: Developing Possible Solutions

- When evaluating solutions, it is important to take into account a range of constraints, including cost, safety, reliability, and aesthetics, and to consider social, cultural, and environmental impacts. (secondary to HS-LS4-6)
- Both physical models and computers can be used in various ways to aid in the engineering design process. Computers are useful for a variety of purposes, such as running simulations to test different ways of solving a problem or to see which one is most efficient or economical; and in making a persuasive presentation to a client about how a

	given design will meet his or her needs. (secondary to HS-LS4-6)	
--	--	--

Articulation of DCIs across grade-bands:
MS.LS3.A ; MS.LS3.B

Unit 3 Supporting and Additional Standards /Interdisciplinary Connections
Grade 11 - 12 2023 ELA Standards and Practices

ELA/Literacy

RI.CR.11-12.1. Accurately cite a range of thorough textual evidence and make relevant connections to strongly support a comprehensive analysis of multiple aspects of what an informational text says explicitly and inferentially, as well as interpretations of the text.

RI.CT.11-12.8. Analyze and reflect on (e.g., practical knowledge, historical/cultural context, and background knowledge) documents of historical and scientific significance for their purposes, including primary source documents relevant to U.S. and/or global history and texts proposing scientific or technical advancements.

W.IW.11-12.2. Write informative/explanatory texts (including the narration of historical events, scientific procedures/ experiments, or technical processes) to examine and convey complex ideas, concepts, and information clearly and accurately through the effective selection, organization, and analysis of content.

- Introduce a topic; organize complex ideas, concepts, and information so that each new element builds on that which precedes it to create a unified whole; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension.
- Develop the topic thoroughly by selecting the most significant and relevant facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience's knowledge of the topic.
- Use appropriate and varied transitions and syntax to link the major sections of the text, create cohesion, and clarify the relationships among complex ideas and concepts.
- Use precise language, domain-specific vocabulary, and techniques such as metaphor, simile, and analogy to manage the complexity of the topic.
- Establish and maintain a style and tone appropriate to the audience and purpose (e.g., formal and objective for academic writing) while attending to the norms and conventions of the discipline in which they are writing.
- Provide a concluding paragraph or section that supports the argument presented (e.g., articulating implications or the significance of the topic).

W.WP.11-12.4. Develop and strengthen writing as needed by planning, revising, editing, rewriting, trying a new approach; sustaining effort to complete complex writing tasks; tracking and reflecting on personal writing progress (e.g., using portfolios, journals, conferencing); or consulting a style manual (such as MLA or APA Style), focusing on addressing what is most significant for a specific purpose and audience.

W.WR.11-12.5. Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.

SL.PI.11-12.4 Present information, findings and supporting evidence clearly, concisely, and logically. The content, organization, development, and style are appropriate to task, purpose, and audience.

SL.II.11-12.2. Integrate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, orally) in order to make informed decisions and solve problems, evaluating the credibility and accuracy of each source and noting any discrepancies among the data.

RI.MF.11-12.6. Synthesize complex information across multiple sources and formats to develop ideas, resolve conflicting information, or develop an interpretation that goes beyond explicit text information (e.g., express a personal point of view, new interpretation of the concept).

Mathematics

MP.2 Reason abstractly and quantitatively. (HS-LS4-1),(HS-LS4-2),(HS-LS4-3),(HS-LS4-4),(HS-LS4-5
(HS-ETS1-1),(HS-ETS1-3),(HS-ETS1-4)

MP.4 Model with mathematics. (HS-LS4-2),(HS-ETS1-1),(HS-ETS1-2),(HS-ETS1-3),(HS-ETS1-4)

Unit 3 New Jersey Student Learning Standards Connections: Career Readiness, Life Literacies, and Key Skills

Disciplinary Concepts

Career Awareness and Planning, Creativity and Innovation, Critical Thinking and problem-solving, Digital Citizenship, Global and Cultural Awareness, Information and Media Literacy

Core Ideas

Performance Expectations (Identified with Standard Number and Statement)

There are strategies to improve one's professional value and marketability.

9.2.12.CAP.3: Investigate how continuing education contributes to one's career and personal growth.

With a growth mindset, failure is an important part of success.

9.4.12.CI.1: Demonstrate the ability to reflect, analyze, and use creative skills and ideas (e.g., 1.1.12prof.CR3a).

Collaboration with individuals with diverse experiences can aid in the problem-solving process, particularly for global issues where diverse solutions are needed.

9.4.12.CT.2: Explain the potential benefits of collaborating to enhance critical thinking and problem solving (e.g., 1.3E.12profCR3.a).

Network connectivity and computing capability extended to objects, sensors and everyday items not normally considered computers

9.4.12.DC.8: Explain how increased network connectivity and computing capabilities of everyday objects allow for innovative technological approaches to climate protection.

Ocean Academy Charter High School
(Biology) Curriculum Guide
Grades 9-12

allows these devices to generate, exchange, and consume data with minimal human intervention. Technologies such as Artificial Intelligence (AI) and blockchain can help minimize the effect of climate change.	
Solutions to the problems faced by a global society require the contribution of individuals with different points of view and experiences.	9.4.12.GCA.1: Collaborate with individuals to analyze a variety of potential solutions to climate change effects and determine why some solutions (e.g., political, economic, cultural) may work better than others (e.g., SL.11-12.1., HS-ETS1-1, HS-ETS1-2, HS-ETS1-4, 6.3.12.GeoGI.1, 7.1.IH.IPERS.6, 7.1.IL.IPERS.7, 8.2.12.ETW.3).
Advanced search techniques can be used with digital and media resources to locate information and to check the credibility and the expertise of sources to answer questions, solve problems, and inform decision-making.	9.4.12.IML.1: Compare search browsers and recognize features that allow for filtering of information. 9.4.12.IML.2: Evaluate digital sources for timeliness, accuracy, perspective, credibility of the source, and relevance of information, in media, data, or other resources (e.g., NJSLSA.W8, Social Studies Practice: Gathering and Evaluating Sources.

Unit 3 New Jersey Student Learning Standards: [Computer Science and Design Thinking](#)

Disciplinary Concepts

Data and Analysis (8.1), Engineering Design (8.2), Nature of Technology (8.2), Ethics and Culture (8.2)

Core Ideas

Performance Expectations

(Identified with Standard Number and Statement)

Individuals select digital tools and design automated processes to collect, transform, generalize, simplify, and present large data sets in different ways to influence how other people interpret and understand the underlying information.	8.1.12.DA.1: Create interactive data visualizations using software tools to help others better understand real world phenomena, including climate change.
Engineering design is a complex process in which creativity, content knowledge, research, and analysis are used to address local and global problems.	8.2.12.ED.1: Use research to design and create a product or system that addresses a problem and make modifications based on input from potential consumers.

Ocean Academy Charter High School
(Biology) Curriculum Guide
Grades 9-12

	8.2.12.ED.3: Evaluate several models of the same type of product and make recommendations for a new design based on a cost benefit analysis. 8.2.12.ED.4: Design a product or system that addresses a global problem and document decisions made based on research, constraints, trade-offs, and aesthetic and ethical considerations and share this information with an appropriate audience.
Engineers use science, mathematics, and other disciplines to improve technology. Increased collaboration among engineers, scientists, and mathematicians can improve their work and designs. Technology, product, or system redesign can be more difficult than the original design.	8.2.12.NT.1: Explain how different groups can contribute to the overall design of a product. • 8.2.12.NT.2: Redesign an existing product to improve form or function.
The ability to ethically integrate new technologies requires deciding whether to introduce a technology, taking into consideration local resources and the role of culture in acceptance.	8.2.12.EC.1: Analyze controversial technological issues and determine the degree to which individuals, businesses, and governments have an ethical role in decisions that are made. 8.2.12.EC.2: Assess the positive and negative impacts of emerging technologies on developing countries and evaluate how individuals, non-profit organizations, and governments have responded.
New Jersey Student Learning Standards: Climate Change Mandate	
Core Ideas	Performance Expectations (Identified with Standard Number and Statement)
Individuals select digital tools and design automated processes to collect, transform, generalize, simplify, and present large data sets in different ways to influence how other people interpret and understand the underlying information.	8.1.12.DA.1: Create interactive data visualizations using software tools to help others better understand real world phenomena, including climate change.
Unit 3 Evidence of Student Learning	

Ocean Academy Charter High School
(Biology) Curriculum Guide
Grades 9-12

Performance Tasks/Use of Technology: Explore Learning Natural Selection Human Evolution Bird Beaks - metric Use technology throughout the unit to collect data, analyze it and make graphs, share information with others etc.	Assessments Formative ➤ Observation ➤ Homework ➤ Class participation ➤ Graphic Organizers ➤ Projects ➤ Student Response Systems ➤ Do-Now/Exit Cards ➤ Laboratories/Lab Reports ➤ Maintaining a Notebook ➤ Writing Assignments ➤ Graphs, Models, and Tables Summative ➤ Chapter/Unit Test ➤ Writing Assignments ➤ Presentations ➤ Laboratory Reports/Practical ➤ Unit Projects Benchmark ➤ Common Assessments ➤ Final Exams ➤ Performance Assessment ➤ Link-it assessment Alternative ➤ Quizz ➤ Blooket ➤ Kahoot ➤ CER (claim, evidence, reasoning)
Unit 3 Essential Questions	
➤ How can organisms share so many characteristics, yet exhibit such a wide diversity across species, including plants, animals, and microorganisms? ➤ What types of evidence support the idea that different species share common ancestry? ➤ In what ways does genetic variation influence an organism's chances of survival and ability to reproduce? ➤ How do environmental factors shape populations of organisms over time?	

- What is biodiversity, how do human activities impact it, and how does it, in turn, influence human life?

Unit 3 Knowledge and Skills

Enduring Understandings

Students will know...

- All living organisms share inherited characteristics that indicate common ancestry.
- The genetic makeup of organisms has evolved over time.
- Populations adapt and change over generations in response to their environmental conditions.

Learning Targets

Students will be able to...

- Synthesize scientific evidence from multiple fields—including geology, comparative anatomy, biochemistry, embryology, and taxonomy—to support the theory of common ancestry among Earth's species. (LS4-1)
- Explain how the diversity of life on Earth today has evolved from a shared ancestral origin. (LS4-1)
- Define natural selection and apply its principles to real-world examples. (LS4-2, LS4-3)
- Explain that evolution refers to changes in the genetic composition of populations over time, not individuals. (LS4-4)
- Describe the process of speciation and identify the necessary conditions for the formation of a new species. (LS4-4, LS4-5)
- Explain how natural selection drives the development of adaptations within populations. (LS4-4, LS4-3)
- Conduct and interpret an online simulation modeling genetic variation in a grasshopper population in response to environmental changes. (LS4-6)
- [Placeholder: Insert objectives for ET1-3 and ET1-4 once they are defined.]

Unit 3 Instructional Plan

Suggested Activities

- Videos - Amoeba Sisters
- Darwin's voyage (w/ stations)
- Facebook conversation between Darwin and his influences (on paper)
- Homologous and analogous structures

Resources

- Gizmos
- Textbook - Savvas Miller & Levine Biology
 - Section worksheets
- Lab materials
- POGIL

Ocean Academy Charter High School
(Biology) Curriculum Guide
Grades 9-12

- DNA/protein comparison
- HHMI Bioresources video on Rock Pocket Mouse or Finches - complete CER template (Steudler)
- Video- Your Inner Fish/Reptile/Monkey - (Steudler, youtube?)
- Evolve Videos (Discovery Channel) - good ones Guts, Venom (Williamson)
- Evolution Series (PBS) - Great Transformations (Williamson)

Differentiation & Inclusive Support Strategies:

Multilingual Learners:

- Provide guided reading and writing in small groups
- Use visuals, labeled classroom materials, and cognates
- Pre-teach academic vocabulary using sentence and speaking frames
- Integrate WIDA Can Do Descriptors into lesson scaffolding
- Use screen readers, audio tools, and visual glossaries
- Offer extended time and oral/dictated responses
- Integrate culturally relevant texts and technology tools

Students with IEPs or 504 Plans:

- Follow all IEP/504 accommodations and modifications
- Use audio books, large print, or Braille/digital formats
- Provide peer tutoring, scribes, and augmentative communication tools
- Allow oral responses and extended time
- Offer modified assignments, assessments, and guided notes
- Utilize leveled texts and differentiated materials
- Use flexible seating and small group instruction

Students At Risk of Academic Failure:

- Scaffold instruction using visuals, chants, and songs
- Offer modified tasks and flexible grouping
- Use technology to support organization and engagement
- Provide structured routines and clear expectations
- Assign peer mentors and provide goal-setting checklists
- Include culturally relevant content to boost connection
- Embed mini-lessons and tiered intervention strategies

Gifted and Talented Learners:

- Provide open-ended and inquiry-based tasks
- Incorporate Bloom's Taxonomy (analyzing, evaluating, creating)
- Offer choices in content, process, and product
- Use advanced reading lists and tiered assignments
- Encourage discovery and student-designed projects
- Offer enrichment centers and flexible grouping
- Facilitate problem-solving simulations and debriefing

Diversity and Inclusion:

- Celebrate cultural identity through inclusive texts
- Provide alternative formats for assignments and assessments
- Collaborate with ESL staff and use closed captions when available
- Offer wait time and avoid idioms or slang
- Create a nurturing classroom with visual routines and structured expectations
- Encourage family engagement and home language maintenance
- Use word walls and accessible academic vocabulary tools

Unit 3 Core Instructional and Supplemental Materials and Additional Resources

Instructional Materials

- Textbook
- Textbook resources
- Laboratory manuals and equipment
- Translation apps (Google etc)

Supplemental Materials

- School databases
- Multimedia Resources
- Printers and Computers
- Online Resources and videos
- Interactive Projector
- Rubrics
- POGIL
- Science Websites:
 - ACS Chemistry for Life
 - Periodic table
 - PBS Learning Media
 - Khan Academy
 - Bozeman Science
 - Science Magazine
 - US National Science Foundation
 - Newsela
 - Next Generation Science Standards
 - Chem Spider
 - Amoeba Sisters
 - HHMI
 - Gizmos
 - Edpuzzle

Intervention Materials

- Anchor activities: Anchor activities provide meaningful options for students when they are not actively engaged in classroom activities (e.g., when they finish early, are waiting for further directions, are stumped, first enter class, or when the teacher is working with other students). Anchors should be directly related to the current learning goals.
- Choices of review activities: Different review or extension activities are made available to students during a specific section of the class (such as at the beginning or end of the period).
- Homework options: Students are provided with choices about the assignments they complete as homework. Or, students are directed to specific homework based on student needs.
- Student-teacher goal setting: The teacher and student work together to develop individual learning goals for the student.

- Flexible grouping: Students might be instructed as a whole group, in small groups of various permutations (homogeneous or heterogeneous by skill or interest), in pairs or individuals. Any small groups or pairs change over time based on assessment data.
- Varied computer programs: The computer is used as an additional center in the classroom, and students are directed to specific websites or software that allows them to work on skills at their level.
- Varying scaffolding of same organizer: Provide graphic organizers that require students to complete various amounts of information. Some will be more filled out (by the teacher) than others.
- Think-Pair-Share by readiness, interest, and/or learning profile: Students are placed in pre-determined pairs, asked to think about a question for a specific amount of time, then are asked to share their answers first with their partner and then with the whole group.
- Games to practice mastery of information and skill: Use games as a way to review and reinforce concepts. Include questions and tasks that are on a variety of cognitive levels.
- Multiple levels of questions: Teachers vary the sorts of questions posed to different students based on their ability to handle them. Varying questions is an excellent way to build the confidence (and motivation) of students who are reluctant to contribute to class discourse. Note: Most teachers would probably admit that without even thinking about it they tend to address particular types of questions to particular students. In some cases, such tendencies may need to be corrected. (For example, a teacher may be unknowingly addressing all of the more challenging questions to one student, thereby inhibiting other students' learning and fostering class resentment of that student.)
- Stations/ Learning Centers: A station (or simply a collection of materials) that students might use independently to explore topics or practice skills. Centers allow individuals or groups of students to work at their own pace. Students are constantly reassessed to determine which centers are appropriate for students at a particular time, and to plan activities at those centers to build the most pressing skills.

Social and Emotional Learning New Jersey SEL

Competencies and Sub-Competencies Social and emotional learning (SEL) involves the process through which children and adults acquire and apply the knowledge, attitudes and skills necessary to understand and manage emotions, set and achieve positive goals, feel and show empathy for others, establish and maintain positive relationships, and make responsible decisions. The purpose of the SEL competencies is to provide schools with guidelines for integrating SEL across grades and subject areas.

Self-Awareness

- Recognize one's feelings and thoughts
- Recognize the impact of one's feelings and thoughts on one's own behavior
- Recognize one's personal traits, strengths and limitations
- Recognize the importance of self-confidence in handling daily tasks and challenges

Self-Management

- Understand and practice strategies for managing one's own emotions, thoughts and behaviors
- Recognize the skills needed to establish and achieve personal and educational goals
- Identify and apply ways to persevere or overcome barriers through alternative methods to achieve one's goals

Social Awareness

- Recognize and identify the thoughts, feelings and perspectives of others
- Demonstrate awareness of the differences among individuals, groups and others' cultural backgrounds
- Demonstrate an understanding of the need for mutual respect when viewpoints differ
- Demonstrate an awareness of the expectations for social interactions in a variety of settings

Responsible Decision-Making

- Develop, implement and model effective problem solving and critical thinking skills
- Identify the consequences associated with one's actions in order to make constructive choices
- Evaluate personal, ethical, safety and civic impact of decisions

Relationship Skills

- Establish and maintain healthy relationships
- Utilize positive communication and social skills to interact effectively with others
- Identify ways to resist inappropriate social pressure
- Demonstrate the ability to prevent and resolve interpersonal conflicts in constructive ways
- Identify who, when, where, or how to seek help for oneself or others when needed

<u>Ocean Academy Charter High School</u> Unit 4 Overview	
Content Area: Biology	Target Course/Grade Levels: 9
Unit Title: Unit 4: Ecosystems: Interactions, Energy and Dynamics	Duration: 10 days
Unit 4 Introduction/ Focus	
Summary Students will explore the role of energy in the cycling of matter within organisms and ecosystems, and will construct explanations about how energy flows through these systems. They will also investigate how the nature of science evolves, with a focus on how scientific explanations can change as new evidence emerges. This understanding will help students grasp the tentative nature of science—an essential concept for recognizing that scientific knowledge is always subject to revision in light of new discoveries.	

In this unit, students will examine how organisms interact with each other and their physical environment. They will study how organisms obtain resources, influence their surroundings, and how these environmental changes, in turn, affect both individual organisms and the broader ecosystem. Students will explore these interactions through real-world examples, analyzing how factors like resource availability, competition, and predation shape ecosystems.

Students will also delve into the critical role of biodiversity in maintaining healthy ecosystems. By investigating how biodiversity supports ecosystem stability, resilience, and function, students will better understand why protecting species diversity is vital for ecosystem health. In addition, students will explore the role of animal behavior in the survival and adaptation of species, examining behaviors like migration, mating, and territoriality, and how these behaviors enhance species survival.

Through mathematical comparisons, investigations, and the use of scientific models, students will develop skills in linking evidence to their explanations. They will apply scientific reasoning to analyze data, draw conclusions, and communicate their findings, fostering a deeper understanding of how ecological interactions drive changes within ecosystems. By the end of the unit, students will be able to demonstrate a comprehensive understanding of the dynamic and interconnected nature of life on Earth and how organisms adapt to and influence their environments.

Standard 9.1 Personal Financial Literacy

This standard outlines the important fiscal knowledge, habits, and skills that must be mastered in order for students to make informed decisions about personal finance. Financial literacy is an integral component of a student's college and career readiness, enabling students to achieve fulfilling, financially-secure, and successful careers.

Standard 9.2 Career Awareness, Exploration, Preparation and Training

This standard outlines the importance of being knowledgeable about one's interests and talents, and being well informed about postsecondary and career options, career planning, and career requirements.

Standard 9.4 Life Literacies and Key Skills

This standard outline key literacies and technical skills such as critical thinking, global and cultural awareness, and technology literacy* that are critical for students to develop to live and work in an interconnected global economy.

Standard 8.1 Computer Science

Computer Science outlines a comprehensive set of concepts and skills, such as data and analysis, algorithms and programming, and computing systems.

Standard 8.2 Design Thinking

Technology, outlines the technological design concepts and skills essential for technological and engineering literacy. The framework design includes Engineering Design, Ethics and Culture, and the Effects of Technology on the Natural world among the disciplinary concepts

Amistad Law: N.J.S.A. 18A 52:16A-88 Every board of education shall incorporate the information regarding the contributions of African-Americans to our country in an appropriate place in the curriculum of elementary and secondary school students.

Holocaust Law: N.J.S.A. 18A:35-28 Every board of education shall include instruction on the Holocaust and genocide in an appropriate place in the curriculum of all elementary and secondary school pupils. The instruction shall further emphasize the personal responsibility that each citizen bears to fight racism and hatred whenever and wherever it happens.

LGBT and Disabilities Law: N.J.S.A. 18A:35-4.35 A board of education shall include instruction on the political, economic, and social contributions of persons with disabilities and lesbian, gay, bisexual, and transgender people, in an appropriate place in the curriculum of middle school and high school students as part of the district's implementation of the New Jersey Student Learning Standards (N.J.S.A.18A:35-4.36) A board of education shall have policies and procedures in place pertaining to the selection of instructional materials to implement the requirements of N.J.S.A. 18A:35-4.35.

Diversity and Inclusion C.18A:35-4.36a Curriculum to include instruction on diversity and inclusion. The instruction shall:

- (1) highlight and promote diversity, including economic diversity, equity, inclusion, tolerance, and belonging in connection with gender and sexual orientation, race and ethnicity, disabilities, and religious tolerance;
- (2) examine the impact that unconscious bias and economic disparities have at both an individual level and on society as a whole; and
- (3) encourage safe, welcoming, and inclusive environments for all students regardless of race or ethnicity, sexual and gender identities, mental and physical disabilities, and religious beliefs.

Asian Americans and Pacific Islanders (AAPI)

Ensures that the contributions, history, and heritage of Asian Americans and Pacific Islanders (AAPI) are included in the New Jersey Student Learning Standards (NJSLS) for Social Studies in kindergarten through Grade 12 (P.L.2021, c.416).

21st Century Themes and Skills

“Twenty-first century themes and skills” means themes such as global awareness; financial, economic, business, and entrepreneurial literacy; civic literacy; health literacy; learning and innovation skills, including creativity and innovation, critical thinking and problem solving, and communication and collaboration; information, media, and technology skills; and life and career skills, including flexibility. Career readiness, life literacies, and key skills education provides students with the necessary skills to make informed career and financial decisions, engage as responsible community members in a digital society, and to successfully meet the challenges and opportunities in an interconnected global economy.”

Unit 4 Focus Standards (Major Standards)

HS-LS2-4 Use mathematical representations to support claims for the cycling of matter and flow of energy among organisms in an ecosystem

HS-LS1-5 Use a model to illustrate how photosynthesis transforms light energy into stored chemical energy

HS-LS2-5 Develop a model to illustrate the role of photosynthesis & cellular respiration in the cycling of carbon among the biosphere, atmosphere, hydrosphere & biosphere

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-LS2-7 Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity

HS-LS4-6 Create or revise a simulation to test a solution to mitigate adverse impacts of human activity on biodiversity

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-LS2-8 Evaluate the evidence for the role of group behavior on individual and species' chances to survive and reproduce

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-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-ESS2-5 Plan and conduct an investigation of the properties of water and its effects on Earth materials and surface processes.

HS-ETS-1 Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants.

HS-ETS-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-ETS-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.

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Developing and Using Models ➤ Develop a model based on evidence to illustrate the relationships between systems or components of a system. (HS-LS2-5) Using Mathematics and Computational Thinking ➤ Use mathematical and/or computational representations of phenomena or design solutions to support explanations. (HS-LS2-1) ➤ Use mathematical representations of phenomena or design solutions to support and	LS2.A: Interdependent Relationships in Ecosystems ➤ Ecosystems have carrying capacities, which are limits to the numbers of organisms and populations they can support. These limits result from such factors as the availability of living and nonliving resources and from such challenges such as predation, competition, and disease. Organisms would have the capacity to produce populations of great size were it not for the fact that environments and resources are finite. This fundamental tension affects the abundance (number of individuals) of species in any given ecosystem. (HS-LS2-1), (HS-LS2-2) LS2.B: Cycles of Matter and Energy Transfer in Ecosystems ➤ Photosynthesis and cellular respiration (including anaerobic processes) provide most of the energy for life processes. (HS-LS2-3) ➤ Plants or algae form the lowest level of the food web. At each link upward in	Cause and Effect ➤ Empirical evidence is required to differentiate between cause and correlation and make claims about specific causes and effects. (HS-LS2-8) Scale, Proportion, and Quantity ➤ The significance of a phenomenon is dependent on the scale, proportion, and quantity at which it occurs. (HS-LS2-1) ➤ Using the concept of orders of magnitude allows one to understand how a model at one scale relates to a model at another scale. (HS-LS2-2) Systems and System Models ➤ Models (e.g., physical, mathematical, computer models) can be used to simulate systems and interactions—including energy, matter, and information flows—within and between systems at different scales. (HS-LS2-5) Energy and Matter ➤ Energy cannot be created or destroyed—it only moves between one place and

revise explanations. (HS-LS2-2) ➤ Use mathematical representations of phenomena or design solutions to support claims. (HS-LS2-4) Constructing Explanations and Designing Solutions ➤ Construct and revise an explanation based on valid and reliable evidence obtained from a variety of sources (including students' own investigations, models, theories, simulations, peer review) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future. (HS-LS2-3)	a food web, only a small fraction of the matter consumed at the lower level is transferred upward, to produce growth and release energy in cellular respiration at the higher level. Given this inefficiency, there are generally fewer organisms at higher levels of a food web. Some matter reacts to release energy for life functions, some matter is stored in newly made structures, and much is discarded. The chemical elements that make up the molecules of organisms pass through food webs and into and out of the atmosphere and soil, and they are combined and recombined in different ways. At each link in an ecosystem, matter and energy are conserved. (HS-LS2-4) ➤ Photosynthesis and cellular respiration are important components of the carbon cycle, in which carbon is exchanged among the biosphere, atmosphere, oceans, and geosphere through chemical, physical, geological, and biological processes. (HS-LS2-5) LS2.C: Ecosystem Dynamics, Functioning, and Resilience ➤ A complex set of interactions within an ecosystem can keep its numbers and types of organisms relatively constant over long periods of time under stable	another place, between objects and/or fields, or between systems. (HS-LS2-4) ➤ Energy drives the cycling of matter within and between systems. (HS-LS2-3) Stability and Change ➤ Much of science deals with constructing explanations of how things change and how they remain stable. (HS-LS2-6), (HS-LS2-7)
--	---	--

➤ Design, evaluate, and refine a solution to a complex real-world problem, based on scientific knowledge, student-generated sources of evidence, prioritized criteria, and tradeoff considerations. (HS-LS2-7) Engaging in Argument from Evidence ➤ Arguments may also come from current scientific or historical episodes in science. ➤ Evaluate the claims, evidence, and reasoning behind currently accepted explanations or solutions to determine the merits of arguments. (HS-LS2-6) ➤ Evaluate the evidence behind currently accepted	conditions. If a modest biological or physical disturbance to an ecosystem occurs, it may return to its more or less original status (i.e., the ecosystem is resilient), as opposed to becoming a very different ecosystem. Extreme fluctuations in conditions or the size of any population, however, can challenge the functioning of ecosystems in terms of resources and habitat availability. (HS-LS2-2)(HS-LS2-6) ➤ Moreover, anthropogenic changes (induced by human activity) in the environment—including habitat destruction, pollution, introduction of invasive species, overexploitation, and climate change—can disrupt an ecosystem and threaten the survival of some species. (HS-LS2-7) LS2.D: Social Interactions and Group Behavior ➤ Group behavior has evolved because membership can increase the chances of survival for individuals and their genetic relatives. (HS-LS2-8) ➤ Changes in the physical environment, whether naturally occurring or human induced, have thus contributed to the expansion of some species, the emergence of new distinct species as populations diverge under different	
--	--	--

explanations to determine the merits of arguments. (HS-LS2-8) <i>Connections to Nature of Science</i> Scientific Knowledge is Open to Revision in Light of New Evidence ➤ Most scientific knowledge is quite durable, but is, in principle, subject to change based on new evidence and/or reinterpretation of existing evidence. (HS-LS2-2) ➤ Scientific argumentation is a mode of logical discourse used to clarify the strength of relationships between ideas and evidence that may result in revision of an explanation. (HS-LS2-6), (HS-LS2-8)	conditions, and the decline-and sometimes the extinction-of some species. (HS-LS4-6) LS4.D: Biodiversity and Humans ➤ Biodiversity is increased by the formation of new species (speciation) and decreased by the loss of species (extinction). (secondary to HS-LS2-7) ➤ Humans depend on the living world for the resources and other benefits provided by biodiversity. But human activity is also having adverse impacts on biodiversity through overpopulation, overexploitation, habitat destruction, pollution, introduction of invasive species, and climate change. Thus sustaining biodiversity so that ecosystem functioning and productivity are maintained is essential to supporting and enhancing life on Earth. Sustaining biodiversity also aids humanity by preserving landscapes of recreational or inspirational value. (secondary to HS-LS2-7), (HS-LS4-6) PS3.D Energy in Chemical Processes ➤ The main way that solar energy is captured and stored on Earth is through the complex chemical process known as photosynthesis. (secondary to HS-LS2-5)	
---	--	--

	ETS1.B: Developing Possible Solutions ➤ When evaluating solutions, it is important to take into account a range of constraints, including cost, safety, reliability, and aesthetics, and to consider social, cultural, and environmental impacts. (secondary to HSLS2-7)	
--	--	--

Unit 4 Supporting and Additional Standards / Interdisciplinary Connections
Grade 11 - 12 2023 ELA Standards and Practices

ELA/Literacy

RI.CR.11-12.1. Accurately cite a range of thorough textual evidence and make relevant connections to strongly support a comprehensive analysis of multiple aspects of what an informational text says explicitly and inferentially, as well as interpretations of the text.

RI.MF.11-12.6. Synthesize complex information across multiple sources and formats to develop ideas, resolve conflicting information, or develop an interpretation that goes beyond explicit text information (e.g., express a personal point of view, new interpretation of the concept).

W.IW.11-12.2. Write informative/explanatory texts (including the narration of historical events, scientific procedures/ experiments, or technical processes) to examine and convey complex ideas, concepts, and information clearly and accurately through the effective selection, organization, and analysis of content.

- Introduce a topic; organize complex ideas, concepts, and information so that each new element builds on that which precedes it to create a unified whole; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension.
- Develop the topic thoroughly by selecting the most significant and relevant facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience's knowledge of the topic.
- Use appropriate and varied transitions and syntax to link the major sections of the text, create cohesion, and clarify the relationships among complex ideas and concepts.
- Use precise language, domain-specific vocabulary, and techniques such as metaphor, simile, and analogy to manage the complexity of the topic.
- Establish and maintain a style and tone appropriate to the audience and purpose (e.g., formal and objective for academic writing) while attending to the norms and conventions of the discipline in which they are writing.
- Provide a concluding paragraph or section that supports the argument presented (e.g.,

articulating implications or the significance of the topic). (HS-LS2-1),(HS-LS2-2),(HS-LS2-3)

W.WP.11-12.4. Develop and strengthen writing as needed by planning, revising, editing, rewriting, trying a new approach; sustaining effort to complete complex writing tasks; tracking and reflecting on personal writing progress (e.g., using portfolios, journals, conferencing); or consulting a style manual (such as MLA or APA Style), focusing on addressing what is most significant for a specific purpose and audience. (HS-LS2-3)

W.WR.11-12.5. Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.. (HS-LS2-7)

Mathematics

MP.2 Reason abstractly and quantitatively. (HS-LS2-1),(HS-LS2-2),(HS-LS2-4),(HS-LS2-6),(HS-LS2-7)

MP.4 Model with mathematics. (HS-LS2-1),(HS-LS2-2),(HS-LS2-4)

HSN.Q.A.1 Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. (HS-LS2-1),(HS-LS2-2),(HS-LS2-4),(HS-LS2-7)

HSN.Q.A.2 Define appropriate quantities for the purpose of descriptive modeling. (HS-LS2-1),(HS-LS2-2),(HS-LS2-4),(HS-LS2-7)

HSN.Q.A.3 Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. (HS-LS2-1),(HS-LS2-2),(HS-LS2-4),(HS-LS2-7)

HSS-ID.A.1 Represent data with plots on the real number line. (HS-LS2-6)

HSS-IC.A.1 Understand statistics as a process for making inferences about population parameters based on a random sample from that population. (HS-LS2-6)

HSS-IC.B.6 Evaluate reports based on data. (HS-LS2-6)

Unit 4 New Jersey Student Learning Standards Connections: Career Readiness, Life Literacies, and Key Skills

Disciplinary Concepts

Career Awareness and Planning(9.2), Creativity and Innovation(9.4), Critical Thinking and Problem-solving(9.4), Digital Citizenship(9.4), Global and Cultural Awareness(9.4), Information and Media Literacy(9.4)

Core Ideas

Performance Expectations (Identified with Standard Number and Statement)

Ocean Academy Charter High School
(Biology) Curriculum Guide
Grades 9-12

There are strategies to improve one's professional value and marketability.	9.2.12.CAP.3: Investigate how continuing education contributes to one's career and personal growth.
With a growth mindset, failure is an important part of success.	9.4.12.CI.1: Demonstrate the ability to reflect, analyze, and use creative skills and ideas (e.g., 1.1.12 prof.CR3a).
Collaboration with individuals with diverse experiences can aid in the problem-solving process, particularly for global issues where diverse solutions are needed.	9.4.12.CT.2: Explain the potential benefits of collaborating to enhance critical thinking and problem solving (e.g., 1.3E.12profCR3.a).
Network connectivity and computing capability extended to objects, sensors and everyday items not normally considered computers allows these devices to generate, exchange, and consume data with minimal human intervention. Technologies such as Artificial Intelligence (AI) and blockchain can help minimize the effect of climate change.	9.4.12.DC.8: Explain how increased network connectivity and computing capabilities of everyday objects allow for innovative technological approaches to climate protection.
Solutions to the problems faced by a global society require the contribution of individuals with different points of view and experiences.	9.4.12.GCA.1: Collaborate with individuals to analyze a variety of potential solutions to climate change effects and determine why some solutions (e.g., political. economic, cultural) may work better than others (e.g., SL.11-12.1., HS-ETS1-1, HS-ETS1-2, HS-ETS1-4, 6.3.12.GeoGI.1, 7.1.IH.IPERS.6, 7.1.IL.IPERS.7, 8.2.12.ETW.3).
Advanced search techniques can be used with digital and media resources to locate information and to check the credibility and the expertise of sources to answer questions, solve problems, and inform decision-making.	9.4.12.IML.1: Compare search browsers and recognize features that allow for filtering of information. 9.4.12.IML.2: Evaluate digital sources for timeliness, accuracy, perspective, credibility of the source, and relevance of information, in media, data, or other resources (e.g., NJLSA.W8, Social Studies Practice: Gathering and Evaluating Sources.

Ocean Academy Charter High School
(Biology) Curriculum Guide
Grades 9-12

Unit 4 New Jersey Student Learning Standards: Computer Science and Design Thinking	
Disciplinary Concepts Data and Analysis (8.1), Engineering Design (8.2), Nature of Technology (8.2), Ethics and Culture (8.2)	
Core Ideas	Performance Expectations (Identified with Standard Number and Statement)
Engineering design is a complex process in which creativity, content knowledge, research, and analysis are used to address local and global problems.	8.2.12.ED.1: Use research to design and create a product or system that addresses a problem and make modifications based on input from potential consumers. 8.2.12.ED.3: Evaluate several models of the same type of product and make recommendations for a new design based on a cost benefit analysis. 8.2.12.ED.4: Design a product or system that addresses a global problem and document decisions made based on research, constraints, trade-offs, and aesthetic and ethical considerations and share this information with an appropriate audience.
Engineers use science, mathematics, and other disciplines to improve technology. Increased collaboration among engineers, scientists, and mathematicians can improve their work and designs. Technology, product, or system redesign can be more difficult than the original design.	8.2.12.NT.1: Explain how different groups can contribute to the overall design of a product. • 8.2.12.NT.2: Redesign an existing product to improve form or function.
The ability to ethically integrate new technologies requires deciding whether to introduce a technology, taking into consideration local resources and the role of culture in acceptance.	8.2.12.EC.1: Analyze controversial technological issues and determine the degree to which individuals, businesses, and governments have an ethical role in decisions that are made. • • • 8.2.12.EC.2: Assess the positive and negative impacts of emerging technologies on developing countries and evaluate how individuals, non-profit organizations, and governments have responded.

Ocean Academy Charter High School
(Biology) Curriculum Guide
Grades 9-12

New Jersey Student Learning Standards: Climate Change Mandate	
Core Ideas	Performance Expectations (Identified with Standard Number and Statement)
Individuals select digital tools and design automated processes to collect, transform, generalize, simplify, and present large data sets in different ways to influence how other people interpret and understand the underlying information.	8.1.12.DA.1: Create interactive data visualizations using software tools to help others better understand real world phenomena, including climate change.
Unit 4 Evidence of Student Learning	
Performance Tasks/Use of Technology: Explore Learning Ecosystems STEM case Water Cycle Dichotomous Key Classification Use technology throughout the unit to collect data, analyze it and make graphs, share information with others etc.	Assessments Formative ➤ Observation ➤ Homework ➤ Class participation ➤ Graphic Organizers ➤ Projects ➤ Student Response Systems ➤ Do-Now/Exit Cards ➤ Laboratories/Lab Reports ➤ Maintaining a Notebook ➤ Writing Assignments ➤ Graphs, Models, and Tables Summative ➤ Chapter/Unit Test ➤ Writing Assignments ➤ Presentations ➤ Laboratory Reports/Practical ➤ Unit Projects Benchmark ➤ Common Assessments ➤ Final Exams ➤ Performance Assessment ➤ Link-it assessment

Ocean Academy Charter High School
(Biology) Curriculum Guide
Grades 9-12

	Alternative ➤ Quizz ➤ Blooket ➤ Kahoot ➤ CER (claim, evidence, reasoning) ○ Duco Cement Demo to introduce concept of CER, follow-up would be to show a living organism and have students write their own CER to answer Is it Living? (differentiate picture based on students ie. Plant vs. bacteria vs. dog
Unit 4 Essential Questions	
➤ What drives interactions between organisms and their environment, and what are the resulting effects? ➤ In what ways do organisms engage with living and nonliving components of their environment to acquire matter and energy? ➤ How are matter and energy transferred and transformed within an ecosystem? ➤ What are the consequences of environmental changes on the structure and stability of ecosystems? ➤ How do group behaviors among organisms enhance survival and benefit individuals within populations?	
Unit 4 Knowledge and Skills	
Enduring Understandings	Learning Targets
<i>Students will know...</i> ➤ All organisms are interdependent and connected to both one another and their surrounding environment. ➤ Human activities can have significant and often harmful effects on the Earth's systems.	<i>Students will be able to...</i> ➤ Explain how science seeks to understand natural phenomena through evidence-based explanations and uses these explanations to make informed predictions. ➤ Trace the flow of energy through ecosystems and assess how efficiently energy is transferred between organisms. ➤ Describe how energy availability influences the stability and structure of ecosystems. ➤ Identify and explain the interactions that shape ecological communities and analyze factors that influence population dynamics.

Ocean Academy Charter High School
(Biology) Curriculum Guide
Grades 9-12

➤ Matter cycles continuously through ecosystems, while energy flows in one direction.	➤ Evaluate human impacts on the biosphere, propose strategies to reduce ecological disturbances, and assess ecosystem resilience and recovery. ➤ Investigate and explain the interconnected roles of photosynthesis and cellular respiration in the cycling of matter and the flow of energy. ➤ Analyze how photosynthesis serves as a critical link between solar energy and the energy requirements of living organisms.
---	--

Unit 4 Instructional Plan

Suggested Activities	Resources
➤ Videos - Amoeba Sisters ➤ Draw and interpret cycle diagrams (color, questions) ➤ Create food chains and webs ➤ Predict impacts to ecosystems when an element/component is changed ➤ Use data to create population pyramids	➤ Gizmos ➤ Textbook - Savvas Miller & Levine Biology ○ Section worksheets ➤ Lab materials ➤ POGIL

Differentiation & Inclusive Support Strategies:

Multilingual Learners:

- Provide guided reading and writing in small groups
- Use visuals, labeled classroom materials, and cognates
- Pre-teach academic vocabulary using sentence and speaking frames
- Integrate WIDA Can Do Descriptors into lesson scaffolding
- Use screen readers, audio tools, and visual glossaries
- Offer extended time and oral/dictated responses
- Integrate culturally relevant texts and technology tools

Students with IEPs or 504 Plans:

- Follow all IEP/504 accommodations and modifications
- Use audio books, large print, or Braille/digital formats
- Provide peer tutoring, scribes, and augmentative communication tools
- Allow oral responses and extended time
- Offer modified assignments, assessments, and guided notes
- Utilize leveled texts and differentiated materials
- Use flexible seating and small group instruction

Students At Risk of Academic Failure:

- Scaffold instruction using visuals, chants, and songs
- Offer modified tasks and flexible grouping
- Use technology to support organization and engagement
- Provide structured routines and clear expectations
- Assign peer mentors and provide goal-setting checklists
- Include culturally relevant content to boost connection
- Embed mini-lessons and tiered intervention strategies

Gifted and Talented Learners:

- Provide open-ended and inquiry-based tasks
- Incorporate Bloom's Taxonomy (analyzing, evaluating, creating)
- Offer choices in content, process, and product
- Use advanced reading lists and tiered assignments
- Encourage discovery and student-designed projects
- Offer enrichment centers and flexible grouping
- Facilitate problem-solving simulations and debriefing

Diversity and Inclusion:

- Celebrate cultural identity through inclusive texts
- Provide alternative formats for assignments and assessments
- Collaborate with ESL staff and use closed captions when available
- Offer wait time and avoid idioms or slang
- Create a nurturing classroom with visual routines and structured expectations
- Encourage family engagement and home language maintenance
- Use word walls and accessible academic vocabulary tools

Unit 4 Core Instructional and Supplemental Materials and Additional Resources**Instructional Materials**

- Textbook
- Textbook resources
- Laboratory manuals and equipment
- Translation apps (Google etc)

Supplemental Materials

- School databases
- Multimedia Resources
- Printers and Computers
- Online Resources and videos
- Interactive Projector
- Rubrics
- POGIL
- Science Websites:
 - ACS Chemistry for Life
 - Periodic table
 - PBS Learning Media
 - Khan Academy
 - Bozeman Science
 - Science Magazine
 - US National Science Foundation
 - Newsela
 - Next Generation Science Standards
 - Chem Spider
 - Amoeba Sisters
 - HHMI

- Gizmos
- Edpuzzle

Intervention Materials

- **Anchor activities:** Anchor activities provide meaningful options for students when they are not actively engaged in classroom activities (e.g., when they finish early, are waiting for further directions, are stumped, first enter class, or when the teacher is working with other students). Anchors should be directly related to the current learning goals.
- **Choices of review activities:** Different review or extension activities are made available to students during a specific section of the class (such as at the beginning or end of the period).
- **Homework options:** Students are provided with choices about the assignments they complete as homework. Or, students are directed to specific homework based on student needs.
- **Student-teacher goal setting:** The teacher and student work together to develop individual learning goals for the student.
- **Flexible grouping:** Students might be instructed as a whole group, in small groups of various permutations (homogeneous or heterogeneous by skill or interest), in pairs or individuals. Any small groups or pairs change over time based on assessment data.
- **Varied computer programs:** The computer is used as an additional center in the classroom, and students are directed to specific websites or software that allows them to work on skills at their level.
- **Varying scaffolding of same organizer:** Provide graphic organizers that require students to complete various amounts of information. Some will be more filled out (by the teacher) than others.
- **Think-Pair-Share by readiness, interest, and/or learning profile:** Students are placed in pre-determined pairs, asked to think about a question for a specific amount of time, then are asked to share their answers first with their partner and then with the whole group.
- **Games to practice mastery of information and skill:** Use games as a way to review and reinforce concepts. Include questions and tasks that are on a variety of cognitive levels.
- **Multiple levels of questions:** Teachers vary the sorts of questions posed to different students based on their ability to handle them. Varying questions is an excellent way to build the confidence (and motivation) of students who are reluctant to contribute to class discourse. Note: Most teachers would probably admit that without even thinking about it they tend to address particular types of questions to particular students. In some cases, such tendencies may need to be corrected. (For example, a teacher may be unknowingly addressing all of the more challenging questions to one student, thereby inhibiting other students' learning and fostering class resentment of that student.)
- **Stations/ Learning Centers:** A station (or simply a collection of materials) that students might use independently to explore topics or practice skills. Centers allow individuals or groups of students to work at their own pace. Students are constantly reassessed to

determine which centers are appropriate for students at a particular time, and to plan activities at those centers to build the most pressing skills.

Social and Emotional Learning New Jersey SEL

Competencies and Sub-Competencies Social and emotional learning (SEL) involves the process through which children and adults acquire and apply the knowledge, attitudes and skills necessary to understand and manage emotions, set and achieve positive goals, feel and show empathy for others, establish and maintain positive relationships, and make responsible decisions. The purpose of the SEL competencies is to provide schools with guidelines for integrating SEL across grades and subject areas.

Self-Awareness

- Recognize one's feelings and thoughts
- Recognize the impact of one's feelings and thoughts on one's own behavior
- Recognize one's personal traits, strengths and limitations
- Recognize the importance of self-confidence in handling daily tasks and challenges

Self-Management

- Understand and practice strategies for managing one's own emotions, thoughts and behaviors
- Recognize the skills needed to establish and achieve personal and educational goals
- Identify and apply ways to persevere or overcome barriers through alternative methods to achieve one's goals

Social Awareness

- Recognize and identify the thoughts, feelings and perspectives of others
- Demonstrate awareness of the differences among individuals, groups and others' cultural backgrounds
- Demonstrate an understanding of the need for mutual respect when viewpoints differ
- Demonstrate an awareness of the expectations for social interactions in a variety of settings

Responsible Decision-Making

- Develop, implement and model effective problem solving and critical thinking skills
- Identify the consequences associated with one's actions in order to make constructive choices
- Evaluate personal, ethical, safety and civic impact of decisions

Relationship Skills

- Establish and maintain healthy relationships
- Utilize positive communication and social skills to interact effectively with others
- Identify ways to resist inappropriate social pressure

Ocean Academy Charter High School
(Biology) Curriculum Guide
Grades 9-12

- Demonstrate the ability to prevent and resolve interpersonal conflicts in constructive ways
- Identify who, when, where, or how to seek help for oneself or others when needed