

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



Original Adoption:	August 2025
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Ocean Academy Charter High School Environmental Science Curriculum	
Content Area: Science	
Course Title: Environmental Science	Grade Level: 10-12
Unit 1: Introduction to Environmental Science Climate Change	18 Days
Unit 2: Ecology Climate Change	17 Days
Unit 3: Populations Climate Change	11 Days
Unit 4: Energy Resources and Consumptions Climate Change	17 Days
Unit 5: Water, Air and Land Climate Change	16 Days
Unit 6: Sustainable Future Climate Change	11 Days

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Philosophy

This course focuses on understanding the complex relationships between living organisms and their nonliving environment. Students will explore planetary, atmospheric, and ecological systems, studying both their historical development and current state. Throughout the year, students will engage in a variety of activities, including laboratory experiments, research projects, and traditional classroom learning, all aimed at deepening their understanding of environmental science.

The curriculum for Environmental Science aligns with the Next Generation Science Standards, ensuring students develop the necessary skills and knowledge to meet and exceed the expectations of the NJDOE state assessments. By applying higher-order thinking and problem-solving techniques, students will gain a comprehensive understanding of environmental systems and processes. This approach encourages not only theoretical learning but also practical application, preparing students for real-world challenges related to environmental issues.

Ocean Academy Charter High School
Unit 1 Overview

Content Area: Environmental Science

Target Course/Grade Levels: 10-12

Unit Title: Unit 1: Introduction to Environmental Science

Duration: 18 Days

Introduction/Unit 1 Focus

Unit Summary

Unit 1 serves as an introduction to environmental science, providing students with a broad overview of the field and the historical relationship between humans and the environment. Students will explore how human activities have impacted the natural world, and how these impacts have shaped current environmental issues. The unit also examines the role of social and economic factors in environmental science, helping students understand the complex interplay between science, society, and economics in addressing environmental challenges.

In addition to identifying the root causes of environmental problems, students will be tasked with proposing viable solutions to contemporary issues. The focus of this unit is on developing the "tools of the mind"—the mental and conceptual tools that scientists use to investigate and understand the environment. This includes an introduction to key scientific practices, such as gathering data, analyzing information, and formulating conclusions.

Students will learn how statistics are applied in environmental science to make sense of complex data sets and identify patterns. The unit will emphasize the importance of different types of models—physical, graphical, conceptual, and mathematical—used by scientists to represent and analyze environmental processes and systems. By the end of the unit, students will have a deeper

understanding of how these models help scientists predict and solve environmental problems.

Students will also engage with science and engineering practices, which will allow them to apply their knowledge in practical, real-world scenarios. They will be expected to demonstrate proficiency with the core ideas of environmental science and apply the skills they have learned to assess and address current environmental issues.

This unit is based on HS-ESS3-1, HS-ESS2-7, HS-ESS3-4, HS-ESS3-6, HS-ETS1-1, HS-ETS1-2, HS-ETS1-3 & HS-ETS1-4.

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)

HS-ESS3-1 Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and climate change have influenced human activity.

[Clarification Statement: Examples of key natural resources include access to fresh water (such as rivers, lakes, and groundwater), regions of fertile soils such as river deltas, and high concentrations of minerals and fossil fuels. Examples of natural hazards can be from interior processes (such as volcanic eruptions and earthquakes), surface processes (such as tsunamis, mass wasting and soil erosion), and severe weather (such as hurricanes, floods, and droughts). Examples of the results of

changes in climate that can affect populations or drive mass migrations include changes to sea level, regional patterns of temperature and precipitation, and the types of crops and livestock that can be raised.]

HS-ESS3-2 Evaluate competing design solutions for developing, managing, and utilizing energy and mineral resources based on cost-benefit ratios.

[Clarification Statement: Emphasis is on the conservation, recycling, and reuse of resources (such as minerals and metals) where possible, and on minimizing impacts where it is not. Examples include developing best practices for agricultural soil use, mining (for coal, tar sands, and oil shales), and pumping (for petroleum and natural gas). Science knowledge indicates what can happen in natural systems—not what should happen.]

HS-ESS3-4 Evaluate or refine a technological solution that reduces impacts of human activities on climate change and other natural systems.

[Clarification Statement: Examples of data on the impacts of human activities could include the quantities and types of pollutants released, changes to biomass and species diversity, or areal changes in land surface use (such as for urban development, agriculture and livestock, or surface mining). Examples for limiting future impacts could range from local efforts (such as reducing, reusing, and recycling resources) to large-scale geoengineering design solutions (such as altering global temperatures by making large changes to the atmosphere or ocean).]

HS-ESS3-6 Use a computational representation to illustrate the relationships among Earth systems and how those relationships are being modified due to human activity (i.e., climate change).

[Clarification Statement: Examples of Earth systems to be considered are the hydrosphere, atmosphere, cryosphere, geosphere, and/or biosphere. An example of the far-reaching impacts from human activity is how an increase in atmospheric carbon dioxide results in an increase in photosynthetic biomass on land and an increase in ocean acidification, with resulting impacts on sea organism health and marine populations.] [Assessment Boundary: Assessment does not include running computational representations but is limited to using the published results of scientific computational models.]

HS-ETS1-1: Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants.

HS-ETS1-2: Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering.

HS-ETS1-3: Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics, as well as possible social, cultural, and environmental impacts.

HS-ETS1-4: Use a computer simulation to model the impact of proposed solutions to a complex real-world problem with numerous criteria and constraints on interactions within and between systems relevant to the problem.

Science and Engineering

Disciplinary Core Ideas

Crosscutting Concepts

Practices		
Using Mathematics and Computational Thinking ➤ Use a computational representation of phenomena or design solutions to describe and/or support claims and/or explanations. (HS-ESS3-6) 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-ESS3-1) ➤ Design or refine a solution to a complex real-world problem, based on scientific knowledge, student-generated sources of evidence, prioritized criteria, and tradeoff considerations. (HS-ESS3-4) Engaging in Argument from Evidence ➤ Evaluate competing	ESS2.D: Weather and Climate ➤ Current models predict that, although future regional climate changes will be complex and varied, average global temperatures will continue to rise. The outcomes predicted by global climate models strongly depend on the amounts of human-generated greenhouse gases added to the atmosphere each year and by the ways in which these gases are absorbed by the ocean and biosphere. (secondary to HS-ESS3-6) ESS3.A: Natural Resources ➤ Resource availability has guided the development of human society. (HS-ESS3-1) ➤ All forms of energy production and other resource extraction have associated economic, social, environmental, and geopolitical costs and risks as well as benefits. New technologies and social regulations can change the balance of these factors. (HS-ESS3-2) ESS3.B: Natural Hazards	Cause and Effect ➤ Empirical evidence is required to differentiate between cause and correlation and make claims about specific causes and effects. (HS-ESS3-1) Systems and System Models ➤ When investigating or describing a system, the boundaries and initial conditions of the system need to be defined and their inputs and outputs analyzed and described using models. (HS-ESS3-6) Stability and Change ➤ Feedback (negative or positive) can stabilize or destabilize a system. (HS-ESS3-4) <i>Connections to Engineering, Technology, and Applications of Science</i> Influence of Science, Engineering, and Technology on Society and the Natural World ➤ Modern civilization depends on major technological systems. (HS-ESS3-1) ➤ Engineers continuously modify these technological systems by applying scientific knowledge and engineering design practices to increase benefits while

design solutions to a real-world problem based on scientific ideas and principles, empirical evidence, and logical arguments regarding relevant factors (e.g. economic, societal, environmental, ethical considerations). (HS-ESS3-2)	➤ Natural hazards and other geologic events have shaped the course of human history; [they] have significantly altered the sizes of human populations and have driven human migrations. (HS-ESS3-1) ESS3.C: Human Impacts on Earth Systems ➤ Scientists and engineers can make major contributions by developing technologies that produce less pollution and waste and that preclude ecosystem degradation. (HS-ESS3-4) ESS3.D: Global Climate Change ➤ Through computer simulations and other studies, important discoveries are still being made about how the ocean, the atmosphere, and the biosphere interact and are modified in response to human activities. (HS-ESS3-6) 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	decreasing costs and risks. (HS-ESS3-2), (HS-ESS3-4) ➤ Analysis of costs and benefits is a critical aspect of decisions about technology. (HS-ESS3-2) <i>Connections to Nature of Science</i> Science Addresses Questions About the Natural and Material World ➤ Science and technology may raise ethical issues for which science, by itself, does not provide answers and solutions. (HS-ESS3-2) ➤ Science knowledge indicates what can happen in natural systems—not what should happen. The latter involves ethics, values, and human decisions about the use of knowledge. (HS-ESS3-2) ➤ Many decisions are not made using science alone, but rely on social and cultural contexts to resolve issues. (HS-ESS3-2)
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	consider social, cultural, and environmental impacts. (secondary to HS-ESS3-2), (secondary HS-ESS3-4)	
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Unit 1 Supporting and Additional Standards/Interdisciplinary Connections

ELA/Literacy

RI.CR.9-10.1. Cite a range and thorough textual evidence and make clear and relevant connections, to strongly support an analysis of multiple aspects of what an informational text says explicitly and inferentially, as well as interpretations of the text. (HS-ESS3-1), (HS-ESS3-2), (HS-ESS3-4)

RI.AA.9-10.7. Describe and evaluate the argument and specific claims in an informational text, assessing whether the reasoning is valid and the evidence is relevant and sufficient; identify false statements and reasoning.. (HS-ESS3-2), (HS-ESS3-4)

W.IW.9-10.2. 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 to make important connections and distinctions; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aid in comprehension.
- Develop the topic with well-chosen, relevant, and sufficient 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 to link the major sections of the text, create cohesion, and clarify the relationships among complex ideas and concepts.
- Use precise language and domain-specific vocabulary 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 information or explanation presented (e.g., articulating implications or the significance of the topic). (HS-ESS3-1)

Mathematics

MP.2 Reason abstractly and quantitatively. (HS-ESS3-1), (HS-ESS3-2), (HS-ESS3-4), (HS-ESS3-6)

MP.4 Model with mathematics. (HS-ESS3-6)

HSN.Q.A.1 Use units as a way to understand problems and to guide the solution of

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multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.

(HS-ESS3-1),(HS-ESS3-4),(HS-ESS3-6)

HSN.Q.A.2 Define appropriate quantities for the purpose of descriptive modeling.

(HS-ESS3-1),(HS-ESS3-4),(HS-ESS3-6)

HSN.Q.A.3 Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. (HS-ESS3-1),(HS-ESS3-4),(HS-ESS3-6)

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

Disciplinary Concepts

Creativity and Innovation (9.4),
Critical Thinking and Problem Solving (9.4),
Global and Cultural Awareness (9.4),
Information and Reading Literacy (9.4),
Technology Literacy (9.4)

Core Ideas	Performance Expectations (Identified with Standard Number and Statement)
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.1: Identify problem-solving strategies used in the development of an innovative product or practice (e.g., 1.1.12acc.C1b, 2.2.12.PF.3). 9.4.12.CT.2: Explain the potential benefits of collaborating to enhance critical thinking and problem solving (e.g., 1.3E.12profCR3.a). 9.4.12.CT.3: Enlist input from a variety of stakeholders (e.g., community members, experts in the field) to design a service learning activity that addresses a local or global issue (e.g., environmental justice).
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,

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	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).
In order for members of our society to participate productively, information needs to be shared accurately and ethically.	9.4.12.IML.5: Evaluate, synthesize, and apply information on climate change from various sources appropriately (e.g., 2.1.12.CHSS.6, S.IC.B.4, S.IC.B.6, 8.1.12.DA.1, 6.1.12.GeoHE.14.a, 7.1.AL.PRSNT.2). 9.4.12.IML.6: Use various types of media to produce and store information on climate change for different purposes and audiences with sensitivity to cultural, gender, and age diversity (e.g., NJSLSA.SL5).
Accurate information may help in making valuable and ethical choices.	9.4.12.IML.7: Develop an argument to support a claim regarding a current workplace or societal/ethical issue such as climate change (e.g., NJSLSA.W1, 7.1.AL.PRSNT.4).
Digital tools differ in features, capacities, and styles. Knowledge of different digital tools is helpful in selecting the best tool for a given task.	9.4.12.TL.1: Assess digital tools based on features such as accessibility options, capacities, and utility for accomplishing a specified task (e.g., W.11-12.6.). • 9.4.12.TL.2: Generate data using formula-based calculations in a spreadsheet and draw conclusions about the data.

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Collaborative digital tools can be used to access, record and share different viewpoints and to collect and tabulate the views of groups of people.	9.4.12.TL.3: Analyze the effectiveness of the process and quality of collaborative environments. 9.4.12.TL.4: Collaborate in online learning communities or social networks or virtual worlds to analyze and propose a resolution to a real-world problem (e.g., 7.1.AL.IPERS.6).
Unit 1 New Jersey Student Learning Standards: Computer Science and Design Thinking	
Disciplinary Concepts Data Analysis (8.1), Interaction of Technology and Humans (8.2), Effects of Technology on the Natural World (8.2)	
Core Ideas	
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.
Human needs and desires determine which new tools are developed.	8.2.2.ITH.1: Identify products that are designed to meet human wants or needs. 8.2.2.ITH.2: Explain the purpose of a product and its value.
Technology has changed the way people live and work. Various tools can improve daily tasks and quality of life.	8.2.2.ITH.3: Identify how technology impacts or improves life. 8.2.2.ITH.4: Identify how various tools reduce work and improve daily tasks. 8.2.2.ITH.5: Design a solution to a problem affecting the community in a collaborative team and explain the intended impact of the solution.
The use of technology developed for the human designed world can affect the environment, including land, water, air, plants, and animals.	8.2.2.ETW.1: Classify products as resulting from nature or produced as a result of technology.

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Technologies that use natural sources can have negative effects on the environment, its quality, and inhabitants. Reusing and recycling materials can save money while preserving natural resources and avoiding damage to the environment.	8.2.2.ETW.2: Identify the natural resources needed to create a product. 8.2.2.ETW.3: Describe or model the system used for recycling technology. 8.2.2.ETW.4: Explain how the disposal of or reusing a product affects the local and global environment.
New Jersey Student Learning Standards: Climate Change Mandate	
Core Ideas	Performance Expectations (Identified with Standard Number and Statement)
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.	HS-ETS1-3: Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability and aesthetics as well as possible social, cultural and environmental impacts.
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.	HS-ETS1-4: Use a computer simulation to model the impact of proposed solutions to a complex real-world problem with numerous criteria and constraints on interactions within and between systems relevant to the problem.
Unit 1 Evidence of Student Learning	
Performance Tasks/Use of Technology: Use technology throughout the course to collect data, analyze it and make graphs, share information with others etc. Lab Safety video and activity Gizmos -various HHMI resources and labs (click-and learns, data analysis etc)	Assessments Formative ➤ Observation ➤ Homework ➤ Class participation ➤ Graphic Organizers ➤ Projects ➤ Student Response Systems (ex.Clickers) ➤ Do-Now/Exit Cards ➤ Laboratories/Lab Reports ➤ Notebook ➤ Writing Assignments ➤ Graphs, Models, and Tables Summative

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	➤ Chapter/Unit Test ➤ Writing Assignments ➤ Presentations ➤ Laboratory Reports/Practical ➤ Unit Projects Benchmark ➤ Common Assessments ➤ Final Exams ➤ Performance Assessment ➤ Link-it assessments Alternative ➤ Quizz ➤ Blooket ➤ Kahoot ➤ CER (claim, evidence, reasoning)
Unit 1 Essential Questions	
➤ What life-sustaining systems does Earth provide, and how do humans rely on them? ➤ In what ways is environmental science a multidisciplinary field of study? ➤ How are human activities impacting the availability and distribution of natural resources? ➤ How do humans interact with and influence the environment? ➤ What major environmental challenges arise from human-environment interactions? ➤ What is sustainability, and why is it a core concept in environmental science? ➤ What does an ecological footprint measure, and what does it reveal about our resource use?	
Unit 1 Knowledge and Skills	
Enduring Understandings	Learning Targets
<i>Students will know...</i> ➤ Earth functions as an interconnected system made up of multiple interacting components. ➤ Understanding and managing the	<i>Students will be able to...</i> ➤ Identify the essential elements necessary to sustain life. ➤ Differentiate between renewable and nonrenewable resources.

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environment requires knowledge from various scientific fields. ➤ Human activities are contributing to the depletion and degradation of Earth's natural resources. ➤ Throughout history, humans have significantly impacted and altered Earth's environment in multiple ways.	➤ Develop evidence-based explanations of how natural resource availability and natural hazards are influenced by human activities. ➤ Create computational models to represent interactions among Earth's systems and demonstrate how these interactions are affected by human actions. ➤ Explain how feedback mechanisms within Earth's interconnected systems impact other environmental processes.
Unit 1 Instructional Plan	
Suggested Activities	Resources
➤ Lab Safety ➤ Tragedy of the Commons activity ➤ Values and decision making ➤ Tools environmental scientists use ➤ Scientific method activity/lab ➤ Dendrochronology activity (gathering and graphing data etc) ➤ Ecological footprint -use online tool to estimate student impact ➤ Developed vs developing nations compare and contrast	➤ Gizmos ➤ Textbook ➤ Lab materials
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 1 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

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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 Unit 2 Overview	
Content Area: Environmental Science	Target Course/Grade Levels: 10-12
Unit Title: Unit 2: Ecology	Duration: 17 Days
Unit 2 Introduction/ Focus	
Summary This unit introduces students to the concept that all elements in nature are interconnected, forming a complex web of interactions between living (biotic) and non-living (abiotic) components. The focus will be on how these interactions shape ecosystems and contribute to the delicate balance of nature. A key part of the unit is the exploration of evolution, particularly how species adapt over time through the process of natural selection. Students will learn to identify and classify organisms using the six-kingdom classification system, which will help them understand the diversity of life and the unique characteristics that define different groups of organisms. As part of this exploration, students will study how energy flows through ecosystems, the cycling of materials (such as nutrients and water), and the process of ecological succession. These concepts are crucial for understanding how ecosystems function and how they can change over time. A core principle of ecology is that organisms rely on a constant supply of energy to survive, with the sun serving as the ultimate source of all energy in ecosystems. Without energy from the sun, ecosystems	

could not maintain their processes or support life.

The cycling of materials, such as carbon, nitrogen, and water, is another vital aspect of ecosystem function. These cycles ensure that essential nutrients and energy are continually replenished, supporting the diverse life forms within an ecosystem. However, human activities can disrupt these natural cycles, leading to imbalances that can harm ecosystems. Through the process of ecological succession, ecosystems gradually change over time, often as a result of both natural and human-induced factors.

In addition to exploring energy flow and material cycling, the unit will introduce students to the concept of biomes—large-scale ecosystems that cover vast areas of the Earth. These biomes can be broadly categorized into terrestrial (land-based) and aquatic (water-based) biomes. Students will investigate various biomes, including forests, deserts, grasslands, oceans, and freshwater ecosystems, learning how each is characterized by unique environmental conditions and the organisms that inhabit them. They will also examine the threats facing these habitats, such as climate change, deforestation, pollution, and invasive species, and discuss the corrective actions needed to mitigate these threats and restore balance to ecosystems.

Throughout the unit, students will be encouraged to use science and engineering practices to demonstrate their understanding of the core ideas. This includes engaging in hands-on activities, conducting research, and analyzing data to develop solutions for protecting and maintaining healthy ecosystems. By the end of the unit, students will have a comprehensive understanding of how ecosystems work, the importance of biodiversity, and the role humans play in either supporting or damaging the delicate balance of nature.

This unit is based on HS-LS2-3, HS-LS2-4, HS-LS2-5, HS-LS2-6, HS-LS2-7, HS-ETS1-1, HS-ETS1-2, HS-ETS1-3, & HS-ETS1-4.

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.

1. 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 2 Focus Standards (Major Standards)

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.

[Clarification Statement: Emphasis is on conceptual understanding of the role of aerobic and anaerobic respiration in different environments.] [Assessment Boundary: Assessment does not include the specific chemical processes of either aerobic or anaerobic respiration.]

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

[Clarification Statement: Emphasis is on using a mathematical model of stored energy in biomass to describe the transfer of energy from one trophic level to another and that matter and energy are conserved as matter cycles and energy flows through ecosystems. Emphasis is on atoms and molecules such as carbon, oxygen, hydrogen and nitrogen being conserved as they move through an ecosystem.] [Assessment Boundary: Assessment is limited to proportional reasoning to describe the cycling of matter and flow of energy.]

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

[Clarification Statement: Examples of models could include simulations and mathematical models.] [Assessment Boundary: Assessment does not include the specific chemical steps of photosynthesis and respiration.]

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.

[Clarification Statement: Examples of changes in ecosystem conditions could include modest biological or physical changes, such as moderate hunting or a seasonal flood; and extreme changes, such as volcanic eruption or sea level rise.]

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

[Clarification Statement: Examples of human activities can include urbanization, building dams, and dissemination of invasive species.]

HS-ETS1-1: Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants.

HS-ETS1-2: Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering.

HS-ETS1-3: Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics, as well as possible social, cultural, and environmental impacts.

HS-ETS1-4: Use a computer simulation to model the impact of proposed solutions to a complex real-world problem with numerous criteria and constraints on interactions within and between systems relevant to the problem.

HS-ESS3-3: Create a computational simulation to illustrate the relationships among management of natural resources, the sustainability of human populations and biodiversity.

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 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	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 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	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 another objects and/or fields, or between systems. (HS-LS2-4) ➤ Energy drives the cycling of matter within and between systems. (HS-LS2-3)

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) ➤ 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 ➤ Evaluate the claims, evidence, and reasoning behind currently accepted explanations or solutions to determine the merits of arguments. (HS-LS2-6) <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-LS2-3) ➤ Scientific argumentation is a mode of logical discourse used to clarify	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 conditions. If a modest biological or physical disturbance to an ecosystem occurs, it	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)
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the strength of relationships between ideas and evidence that may result in revision of an explanation. (HS-LS2-6)	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-LS2-6) ➤ 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) 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	
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	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) (Note: This Disciplinary Core Idea is also addressed by 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,	
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	cultural and environmental impacts. (secondary to HS-LS2-7)	
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Unit 2 Supporting and Additional Standards/ Interdisciplinary Connections

ELA/Literacy

RI.AA.9-10.7. Describe and evaluate the argument and specific claims in an informational text, assessing whether the reasoning is valid and the evidence is relevant and sufficient; identify false statements and reasoning. (HS-LS2-6),(HS-LS2-7)

RI.CR.9-10.1. Cite a range and thorough textual evidence and make clear and relevant connections, to strongly support an analysis of multiple aspects of what an informational text says explicitly and inferentially, as well as interpretations of the text. (HS-LS2-3),(HS-LS2-6)

RI.MF.9-10.6. Analyze, integrate, and evaluate multiple interpretations (e.g., charts, graphs, diagrams, videos) of a single text or text/s presented in different formats (visually, quantitatively) as well as in words in order to address a question or solve a problem. (HS-LS2-6),(HS-LS2-7)

W.IW.9-10.2. 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 to make important connections and distinctions; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aid in comprehension.
- Develop the topic with well-chosen, relevant, and sufficient 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 to link the major sections of the text, create cohesion, and clarify the relationships among complex ideas and concepts.
- Use precise language and domain-specific vocabulary 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 information or explanation presented (e.g., articulating implications or the significance of the topic). (HS-LS2-3)

W.WP.9-10.4. Develop and strengthen writing as needed by planning, revising, editing, rewriting, trying a new approach; sustaining effort to complete complex writing tasks; seeking out feedback and reflecting on personal writing progress; 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.9-10.5. 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-LS2-4),(HS-LS2-6),(HS-LS2-7)

MP.4 Model with mathematics. (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-LS2-4),(HS-LS2-7)

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

HSN.Q.A.3 Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. (HS-LS2-4),(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 2 New Jersey Student Learning Standards Connections: Career Readiness, Life Literacies, and Key Skills

Disciplinary Concepts

Creativity and Innovation (9.4),

Critical Thinking and Problem Solving (9.4)

Global and Cultural Awareness (9.4),

Information and Reading Literacy (9.4), Technology Literacy (9.4)

Core Ideas

Performance Expectations

(Identified with Standard Number and Statement)

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.1: Identify problem-solving strategies used in the development of an innovative product or practice (e.g., 1.1.12acc.C1b, 2.2.12.PF.3).

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

9.4.12.CT.3: Enlist input from a variety of stakeholders (e.g., community members, experts in the field) to design a

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	service learning activity that addresses a local or global issue (e.g., environmental justice).
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, 7.1.1H.IPERS.6, 7.1.1L.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).
In order for members of our society to participate productively, information needs to be shared accurately and ethically.	9.4.12.IML.5: Evaluate, synthesize, and apply information on climate change from various sources appropriately (e.g., 2.1.12.CHSS.6, S.IC.B.4, S.IC.B.6, 8.1.12.DA.1, 6.1.12.GeoHE.14.a, 7.1.1AL.PRSNT.2). 9.4.12.IML.6: Use various types of media to produce and store information on climate change for different purposes and audiences with sensitivity to cultural, gender, and age diversity (e.g., NJSLSA.SL5).
Accurate information may help in making valuable and ethical choices.	9.4.12.IML.7: Develop an argument to support a claim regarding a current workplace or societal/ethical issue such as climate change (e.g., NJSLSA.W1, 7.1.1AL.PRSNT.4).
Digital tools differ in features, capacities, and styles. Knowledge of different digital tools is helpful in selecting the best tool for a given task.	9.4.12.TL.1: Assess digital tools based on features such as accessibility options, capacities, and utility for accomplishing a specific task (e.g., W.11-12.6.). • 9.4.12.TL.2: Generate data using formula-based calculations in a spreadsheet and draw conclusions about the data.
Collaborative digital tools can be used to access, record and share different viewpoints and to collect and tabulate the views of groups of people.	9.4.12.TL.3: Analyze the effectiveness of the process and quality of collaborative environments. 9.4.12.TL.4: Collaborate in online learning communities or social networks or virtual worlds to analyze and propose a resolution to a real-world problem (e.g., 7.1.1AL.IPERS.6).

Unit 2 New Jersey Student Learning Standards: [Computer Science and Design Thinking](#)

Disciplinary Concepts

Data Analysis (8.1),
Interaction of Technology and Humans (8.2),
Effects of Technology on the Natural World (8.2)

Core Ideas

Performance Expectations

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.

Human needs and desires determine which new tools are developed.

8.2.2.ITH.1: Identify products that are designed to meet human wants or needs.
8.2.2.ITH.2: Explain the purpose of a product and its value.

Technology has changed the way people live and work.

Various tools can improve daily tasks and quality of life.

8.2.2.ITH.3: Identify how technology impacts or improves life.

8.2.2.ITH.4: Identify how various tools reduce work and improve daily tasks.

8.2.2.ITH.5: Design a solution to a problem affecting the community in a collaborative team and explain the intended impact of the solution.

The use of technology developed for the human designed world can affect the environment, including land, water, air, plants, and animals.

Technologies that use natural sources can have negative effects on the environment, its quality, and inhabitants.

8.2.2.ETW.1: Classify products as resulting from nature or produced as a result of technology. •

8.2.2.ETW.2: Identify the natural resources needed to create a product. •

8.2.2.ETW.3: Describe or model the system used for recycling technology. •

8.2.2.ETW.4: Explain how the disposal of or reusing a product affects the local and global environment.

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Reusing and recycling materials can save money while preserving natural resources and avoiding damage to the environment.	
New Jersey Student Learning Standards: Climate Change Mandate	
Core Ideas	Performance Expectations (Identified with Standard Number and Statement)
Criteria and constraints also include satisfying any requirements set by society, such as taking issues of risk mitigation into account, and they should be quantified to the extent possible and stated in such a way that one can tell if a given design meets them. Humanity faces major global challenges today, such as the need for supplies of clean water and food or for energy sources that minimize pollution, which can be addressed through engineering. These global challenges also may have manifestations in local communities.	HS-ETS1-1: Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants.
The sustainability of human societies and the biodiversity that supports them requires responsible management of natural resources.	HS-ESS3-3: Create a computational simulation to illustrate the relationships among management of natural resources, the sustainability of human populations and biodiversity.
Unit 2 Evidence of Student Learning	
Performance Tasks/Use of Technology: Use technology throughout the course to collect data, analyze	Assessments Formative ➤ Observation ➤ Homework ➤ Class participation

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it and make graphs, share information with others etc. Gizmos - various iNaturalist app project (Palmieri) HHMI resources and labs (click-and learns, data analysis etc) Collect data from the deer cameras at BASF using Google Sheets to analyze and graph the results Ecological footprint activity using online tools Dendrochronology lab	➤ Graphic Organizers ➤ Projects ➤ Student Response Systems (ex.Clickers) ➤ Do-Now/Exit Cards ➤ Laboratories/Lab Reports ➤ 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 assessments Alternative ➤ Quizz ➤ Blooket ➤ Kahoot ➤ CER (claim, evidence, reasoning)
Unit 2 Essential Questions	
➤ What defines an ecosystem? ➤ How do biotic and abiotic factors differ within an environment? ➤ What are the essential components that make up an ecosystem? ➤ Why is an organism's habitat critical to its survival? ➤ In what ways is natural selection connected to the process of evolution? ➤ How do adaptations increase an organism's chances of survival? ➤ What distinguishes artificial selection from natural selection? ➤ In what ways have human activities influenced the evolution of certain species?	

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- How has human use of pesticides and antibiotics contributed to increased resistance in pests and bacteria?
- What methods are used to classify living organisms?
- How and why do organisms interact with their environment, and what are the outcomes of these interactions?
- In what ways are bacteria and fungi alike, and how do they differ?
- How do angiosperms rely on animals, and how do animals depend on angiosperms?
- What role do protists play in marine ecosystems?
- How are animals grouped and classified within biological taxonomy?
- How do environmental changes affect ecosystems?
- What is the difference between primary and secondary succession?
- What role do pioneer species play during primary succession?
- How are ecosystems and biomes interconnected?
- Why does temperature determine which plants can survive in a given biome?
- How do latitude and altitude influence the distribution of organisms in a biome?
- What are the distinct layers of a tropical rainforest?
- What major threats are facing biomes around the world?

Unit 2 Knowledge and Skills

Enduring Understandings

Learning Targets

Students Will Know:

- Ecosystems consist of many interconnected components that often interact in complex and dynamic ways.
- An ecosystem includes

Students Will Be Able To:

- Explain how scientific investigations use evidence to develop explanations of natural events and to make predictions based on those explanations.
- Identify and describe the main components of an ecosystem.
- Describe the relationship between natural selection and the

all the living organisms in an area along with the physical environment. Within ecosystems, organisms exist as populations of a single species and as part of larger communities with other species, each occupying specific habitats. ➤ Charles Darwin introduced the concept of natural selection to explain how certain traits improve an organism's ability to survive and reproduce. ➤ Natural selection drives the process of evolution over time. ➤ Humans influence evolution through artificial selection, intentionally breeding organisms for desired traits. ➤ Human activity has also unintentionally led to the development of pesticide-resistant pests and antibiotic-resistant bacteria. ➤ All organisms can be classified into six kingdoms, each defined by distinct characteristics such as cell structure and method of obtaining energy.	process of evolution. ➤ Explain how humans have influenced the traits of species through artificial selection. ➤ Distinguish between primary succession and secondary succession as ecological processes following environmental disturbances. ➤ Describe the function and importance of pioneer species in ecological succession. ➤ Explain how a climax community forms and represents the final stage of ecological succession. ➤ Identify human activities that impact the biosphere, suggest ways to reduce these impacts, and evaluate whether ecosystems are capable of recovery. ➤ Explain how vegetation characterizes and defines different biomes. ➤ Describe how climate conditions such as temperature and precipitation influence the types of vegetation in a region. ➤ Explain how latitude and altitude affect climate patterns and, in turn, determine the types of vegetation that can grow. ➤ Describe how the types of vegetation in a biome influence the animal species that can survive there. ➤ Identify various human impacts on biomes and describe their consequences.
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- **Bacteria and fungi** play vital roles in ecosystems by recycling nutrients.
- Following a disturbance, ecosystems undergo **ecological succession**, a natural progression of biological change over time.
- **Primary succession** begins in areas where no ecosystem previously existed, while **secondary succession** takes place where an ecosystem was disturbed but remnants remain.
- A **climax community** is a stable group of species that persists in an ecosystem until another disturbance occurs.
- Scientists group ecosystems into broad categories called **biomes**, based largely on dominant vegetation types.
- Each **biome's vegetation** is shaped by specific climate conditions, which in turn influence the types of organisms that can thrive there.
- **Climate**, including factors like **latitude** and **altitude**, determines which plant species are able to grow in a given region.

- **Tropical rainforests** receive high amounts of rainfall and have warm temperatures year-round, supporting the greatest biodiversity of any biome.
- **Temperate forests** experience seasonal changes and support plant life adapted to varying temperatures and precipitation levels.
- **Deforestation** poses a significant threat to forest biomes.
- **Savannas**, located just outside tropical rainforests, have distinct wet and dry seasons and are home to grasses and scattered trees.
- **Temperate grasslands** receive limited rainfall, which restricts tree growth and supports grasses and flowering plants.
- **Deserts** are the driest biomes and are characterized by low precipitation and extreme temperature variations.
- All plants and animals have adaptations that allow them to survive and thrive in the specific conditions of

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their respective biomes.	
Unit 2 Instructional Plan	
Suggested Activities	Resources
➤ Create food chains and food webs ➤ Energy transfer, 10% rule ➤ Biomes project ➤ Biodiversity ➤ Symbiosis ➤ Keystone species video ➤ Lion king with appropriate questions and discussion ➤ Books that could be read - "Last flight of the scarlet macaw", "The world without fish", "Seedfolks", "A Long walk to water" ➤ Fire ecology - NJ has a lot of resources on this, also read about the wildfires in the western US and Australia ➤ Succession - read articles about real life examples ➤ Natural selection ➤ Set up ecocolumns	➤ Gizmos ➤ Savvas Textbook ➤ Lab materials
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

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- 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

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Unit 3 Overview

Content Area:
Environmental
Science

Target Course/Grade Levels: 10-12

Unit Title: Unit 3 :
Populations

Duration: 11 Days

Unit 3 Introduction/ Focus

Summary

This unit is designed to provide students with a comprehensive understanding of populations, focusing on both plant and animal groups within ecosystems. Students will explore how populations fluctuate in size and how various species interact with one another in their environments. A significant portion of the unit will concentrate on human populations, examining trends and demographic changes over time and their broader impact on the planet.

A key element of the unit will be the discussion of biodiversity across all biological kingdoms. Students will study the intricate web of life, including the various species that contribute to the richness of ecosystems, and will consider how biodiversity directly influences human life. Emphasis will be placed on understanding how the loss of biodiversity, particularly through habitat destruction, climate change, and human activity, leads to the extinction of species around the world. Students will analyze the causes of species extinction and the broader ecological consequences that arise from these losses.

In addition to exploring the interactions between species and changes in population dynamics, the unit will highlight how human activities have altered natural population trends, including how urbanization, resource consumption, and agricultural practices impact both local and global populations. By investigating human population growth, students will learn about the pressures on

natural resources, and potential long-term environmental effects.

Throughout the unit, students will engage in hands-on learning activities, research projects, and data analysis to explore these concepts in-depth. The unit will also emphasize the importance of using the science and engineering practices to investigate the real-world implications of population changes and biodiversity. By the end of the unit, students will gain a clear understanding of the vital relationship between population dynamics, biodiversity, and human activity, and how these factors collectively shape the health of ecosystems on Earth.

This unit is based on HS-LS2-3, HS-LS2-4, HS-LS2-5, HS-LS2-6, HS-LS2-7, HS-ETS1-1, HS-ETS1-2, HS-ETS1-3, & HS-ETS1-4.

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-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.

[Clarification Statement: Examples of changes in ecosystem conditions could include modest biological or physical changes, such as moderate hunting or a seasonal flood; and extreme changes,

such as volcanic eruption or sea level rise.]

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

[Clarification Statement: Examples of human activities can include urbanization, building dams, and dissemination of invasive species.]

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

[Clarification Statement: Emphasis is on: (1) distinguishing between group and individual behavior, (2) identifying evidence supporting the outcomes of group behavior, and (3) developing logical and reasonable arguments based on evidence. Examples of group behaviors could include flocking, schooling, herding, and cooperative behaviors such as hunting, migrating, and swarming.]

HS-LS3-3 Apply concepts of statistics and probability to explain the variation and distribution of expressed traits in a population.

[Clarification Statement: Emphasis is on the use of mathematics to describe the probability of traits as it relates to genetic and environmental factors in the expression of traits.] [Assessment Boundary: Assessment does not include Hardy-Weinberg calculations.]

HS-ESS3-4. Evaluate or refine a technological solution that reduces impacts of human activities on natural systems.*

[Clarification Statement: Examples of data on the impacts of human activities could include the quantities and types of pollutants released, changes to biomass and species diversity, or areal changes in land surface use (such as for urban development, agriculture and livestock, or surface mining). Examples for limiting future impacts could range from local efforts (such as reducing, reusing, and recycling resources) to large-scale geoengineering design solutions (such as altering global temperatures by making large changes to the atmosphere or ocean).]

HS-ESS3-6. Use a computational representation to illustrate the relationships among Earth systems and how those relationships are being modified due to human activity.

[Clarification Statement: Examples of Earth systems to be considered are the hydrosphere, atmosphere, cryosphere, geosphere, and/or biosphere. An example of the far-reaching impacts from human activity is how an increase in atmospheric carbon dioxide results in an increase in photosynthetic biomass on land and an increase in ocean acidification, with resulting impacts on sea organism health and marine populations.] [Assessment Boundary: Assessment does not include running computational representations but is limited to using the published results of scientific computational models.]

HS-ETS1-1: Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants.

HS-ETS1-2: Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering.

HS-ETS1-3: Evaluate a solution to a complex real-world problem based on prioritized criteria and

trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics, as well as possible social, cultural, and environmental impacts.

HS-ETS1-4: Use a computer simulation to model the impact of proposed solutions to a complex real-world problem with numerous criteria and constraints on interactions within and between systems relevant to the problem.

HS-ESS3-3: Create a computational simulation to illustrate the relationships among management of natural resources, the sustainability of human populations and biodiversity.

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Constructing Explanations and Designing Solutions ➤ 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) ➤ Design or refine a solution to a complex real-world problem, based on scientific knowledge, student-generated sources of evidence, prioritized criteria, and tradeoff considerations. (HS-ESS3-4) Engaging in Argument from Evidence ➤ Evaluate the claims, evidence, and reasoning behind currently accepted explanations or solutions to determine the merits of arguments. (HS-LS2-6) ➤ Evaluate the evidence	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 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-LS2-6) ➤ Moreover, anthropogenic changes (induced by human activity) in the environment—including	Cause and Effect ➤ Empirical evidence is required to differentiate between cause and correlation and make claims about specific causes and effects. (HS-LS2-8) 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) Systems and System Models ➤ When investigating or describing a system, the boundaries and initial conditions of the system need to be defined and their inputs and outputs analyzed and described using models. (HS-ESS3-6) Stability and Change ➤ Change and rates of change can be

behind currently accepted explanations to determine the merits of arguments. (HS-LS2-8) Using Mathematics and Computational Thinking ➤ Create a computational model or simulation of a phenomenon, designed device, process, or system. (HS-ESS3-3) ➤ Use a computational representation of phenomena or design solutions to describe and/or support claims and/or explanations. (HS-ESS3-6) <i>Connections to Nature of Science</i> Scientific Knowledge is Open to Revision in Light of New Evidence ➤ 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)	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) 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	quantified and modeled over very short or very long periods of time. Some system changes are irreversible. (HS-ESS3-3) ➤ Feedback (negative or positive) can stabilize or destabilize a system. (HS-ESS3-4) <i>Connections to Engineering, Technology, and Applications of Science</i> Influence of Science, Engineering, and Technology on Society and the Natural World ➤ Modern civilization depends on major technological systems. (HS-ESS3-3) ➤ Engineers continuously modify these technological systems by applying scientific knowledge and engineering design practices to increase benefits while decreasing costs and risks. (HS-ESS3-4) ➤ New technologies can have deep impacts on society and the environment, including some that were not anticipated. (HS-ESS3-3) <i>Connections to Nature of Science</i>
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	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) (Note: This Disciplinary Core Idea is also addressed by HS-LS4-6.) 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-LS2-7) ESS2.D: Weather and Climate ➤ Current models predict that, although future regional climate changes will be complex and varied, average global temperatures will continue to rise. The outcomes predicted by global climate models strongly depend on the amounts of human-generated greenhouse gases added	Science is a Human Endeavor ➤ Science is a result of human endeavors, imagination, and creativity. (HS-ESS3-3)
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	to the atmosphere each year and by the ways in which these gases are absorbed by the ocean and biosphere. (secondary to HS-ESS3-6) ESS3.C: Human Impacts on Earth Systems ➤ The sustainability of human societies and the biodiversity that supports them requires responsible management of natural resources. (HS-ESS3-3) ➤ Scientists and engineers can make major contributions by developing technologies that produce less pollution and waste and that preclude ecosystem degradation. (HS-ESS3-4) ESS3.D: Global Climate Change ➤ Through computer simulations and other studies, important discoveries are still being made about how the ocean, the atmosphere, and the biosphere interact and are modified in response to human activities. (HS-ESS3-6) ETS1.B: Developing Possible Solutions	
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	➤ 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-ESS3-2), (secondary HS-ESS3-4)	
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Articulation of DCIs across grade-bands:
MS.LS3.A ; MS.LS3.B

Unit 3 Supporting and Additional Standards/Interdisciplinary Connections

ELA/Literacy

RI.CR.9-10.1. Cite a range and thorough textual evidence and make clear and relevant connections, to strongly support an analysis of multiple aspects of what an informational text says explicitly and inferentially, as well as interpretations of the text. (HS-LS2-6), (HS-LS2-8), (HS-ESS3-4)

RI.MF.9-10.6. Analyze, integrate, and evaluate multiple interpretations (e.g., charts, graphs, diagrams, videos) of a single text or text/s presented in different formats (visually, quantitatively) as well as in words in order to address a question or solve a problem. (HS-LS2-6), (HS-LS2-7), (HS-LS2-8)

RI.AA.9-10.7. Describe and evaluate the argument and specific claims in an informational text, assessing whether the reasoning is valid and the evidence is relevant and sufficient; identify false statements and reasoning (HS-LS2-6), (HS-LS2-7), (HS-LS2-8), (HS-ESS3-4)

W.WR.9-10.5. 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-LS2-6), (HS-LS2-7), (HS-ESS3-6)

MP.4 Model with mathematics. (HS-ESS3-3), (HS-ESS3-6)

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-LS2-7), (HS-ESS3-4), (HS-ESS3-6)

HSN.Q.A.2 Define appropriate quantities for the purpose of descriptive modeling. (HS-LS2-7), (HS-ESS3-4), (HS-ESS3-6)

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HSN.Q.A.3 Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. (HS-LS2-7),(HS-ESS3-4),(HS-ESS3-6)
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 3 New Jersey Student Learning Standards Connections:
Career Readiness, Life Literacies, and Key Skills**

Disciplinary Concepts

Creativity and Innovation (9.4),
Critical Thinking and Problem Solving (9.4),
Global and Cultural Awareness (9.4),
Information and Reading Literacy (9.4),
Technology Literacy (9.4)

Core Ideas	Performance Expectations (Identified with Standard Number and Statement)
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.1: Identify problem-solving strategies used in the development of an innovative product or practice (e.g., 1.1.12acc.C1b, 2.2.12.PF.3). 9.4.12.CT.2: Explain the potential benefits of collaborating to enhance critical thinking and problem solving (e.g., 1.3E.12profCR3.a). 9.4.12.CT.3: Enlist input from a variety of stakeholders (e.g., community members, experts in the field) to design a service learning activity that addresses a local or global issue (e.g., environmental justice).
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	9.4.12.IML.1: Compare search browsers and recognize features that allow for filtering of information. •

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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.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).
In order for members of our society to participate productively, information needs to be shared accurately and ethically.	9.4.12.IML.5: Evaluate, synthesize, and apply information on climate change from various sources appropriately (e.g., 2.1.12.CHSS.6, S.IC.B.4, S.IC.B.6, 8.1.12.DA.1, 6.1.12.GeoHE.14.a, 7.1.AL.PRSENT.2). 9.4.12.IML.6: Use various types of media to produce and store information on climate change for different purposes and audiences with sensitivity to cultural, gender, and age diversity (e.g., NJSLSA.SL5).
Accurate information may help in making valuable and ethical choices.	9.4.12.IML.7: Develop an argument to support a claim regarding a current workplace or societal/ethical issue such as climate change (e.g., NJSLSA.W1, 7.1.AL.PRSENT.4).
Digital tools differ in features, capacities, and styles. Knowledge of different digital tools is helpful in selecting the best tool for a given task.	9.4.12.TL.1: Assess digital tools based on features such as accessibility options, capacities, and utility for accomplishing a specified task (e.g., W.11-12.6.). • 9.4.12.TL.2: Generate data using formula-based calculations in a spreadsheet and draw conclusions about the data.
Collaborative digital tools can be used to access, record and share different viewpoints and to collect and tabulate the views of groups of people.	9.4.12.TL.3: Analyze the effectiveness of the process and quality of collaborative environments. 9.4.12.TL.4: Collaborate in online learning communities or social networks or virtual worlds to analyze and propose a resolution to a real-world problem (e.g., 7.1.AL.IPERS.6).
Unit 3 New Jersey Student Learning Standards: Computer Science and Design Thinking	
Disciplinary Concepts Data Analysis (8.1), Interaction of Technology and Humans (8.2), Effects of Technology on the Natural World (8.2)	
Core Ideas	Performance Expectations (Identified with Standard Number and Statement)

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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.
Human needs and desires determine which new tools are developed.	8.2.2.ITH.1: Identify products that are designed to meet human wants or needs. 8.2.2.ITH.2: Explain the purpose of a product and its value.
Technology has changed the way people live and work. Various tools can improve daily tasks and quality of life.	8.2.2.ITH.3: Identify how technology impacts or improves life. 8.2.2.ITH.4: Identify how various tools reduce work and improve daily tasks. 8.2.2.ITH.5: Design a solution to a problem affecting the community in a collaborative team and explain the intended impact of the solution.
The use of technology developed for the human designed world can affect the environment, including land, water, air, plants, and animals. Technologies that use natural sources can have negative effects on the environment, its quality, and inhabitants. Reusing and recycling materials can save money while preserving natural resources and avoiding damage to the environment.	8.2.2.ETW.1: Classify products as resulting from nature or produced as a result of technology. 8.2.2.ETW.2: Identify the natural resources needed to create a product. 8.2.2.ETW.3: Describe or model the system used for recycling technology. 8.2.2.ETW.4: Explain how the disposal of or reusing a product affects the local and global environment.
New Jersey Student Learning Standards: Climate Change Mandate	
Core Ideas	Performance Expectations (Identified with Standard Number and Statement)

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The sustainability of human societies and the biodiversity that supports them requires responsible management of natural resources.	HS-ESS3-3: Create a computational simulation to illustrate the relationships among management of natural resources, the sustainability of human populations and biodiversity.
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Unit 3 Evidence of Student Learning

Performance Tasks/Use of Technology:	Assessments
Use technology throughout the course to collect data, analyze it and make graphs, share information with others etc. Gizmos - various HHMI resources and labs (click-and learns, data analysis etc)	Formative ➤ Observation ➤ Homework ➤ Class participation ➤ Graphic Organizers ➤ Projects ➤ Student Response Systems (ex.Clickers) ➤ Do-Now/Exit Cards ➤ Laboratories/Lab Reports ➤ 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 assessments Alternative ➤ Quizz ➤ Blooket ➤ Kahoot ➤ CER (claim, evidence, reasoning)

Unit 3 Essential Questions

- What are the key characteristics of a population, and how do these factors influence

population dynamics?

- What are the five primary types of species interactions, and how do they impact population size and community structure?
- What is carrying capacity, and how can it fluctuate in response to changes in environmental conditions?
- In what ways does rapid human population growth impact the environment?
- How do the challenges associated with population growth differ between more-developed and less-developed countries?
- Why is biodiversity essential to the stability and health of ecosystems and the organisms they support?
- What is the role of a keystone species, and how does it influence ecosystem balance?
- What are the most significant threats to global biodiversity today?
- What is the Endangered Species Act, and how has it contributed to the protection of species in the U.S. and internationally?

Unit 3 Knowledge and Skills

Enduring Understandings

Students will understand that...

- Populations exhibit varying growth rates depending on environmental conditions and biological factors.
- Population growth is naturally limited by resource availability and environmental constraints.
- Organisms within ecosystems interact in both cooperative and

Learning Targets

Students will be able to...

- Explain the factors that regulate population size, including access to food, light, space, predation, competition, and disease.
- Research and present findings on variables influencing human population growth and its rate of change.
- Analyze how reproductive strategies and behaviors impact population growth.
- Demonstrate how interspecific competition can result in either competitive exclusion or resource partitioning.
- Describe the four phases of demographic transition and their implications for population trends.
- Interpret global population projections and evaluate their

competitive ways, forming complex relationships. ➤ Rapid human population growth places significant stress on Earth's natural systems and resources. ➤ Maintaining a balance between population size and the carrying capacity of ecosystems is essential for environmental sustainability. ➤ Nations progress through different stages of demographic transition, each with unique population dynamics. ➤ Declining biodiversity undermines ecosystem resilience and contributes to greater environmental instability. ➤ Preserving entire ecosystems is often more effective for protecting biodiversity than focusing solely on individual species. ➤ A decline in biodiversity reduces ecosystem stability and increases environmental stress.	potential impact through the next century. ➤ Define and provide examples of endangered and threatened species, including causes and conservation efforts.
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➤ Conserving entire ecosystems is often more effective than focusing solely on individual species protection. ➤ Habitat destruction caused by human activities is currently the leading driver of species extinction. ➤ Efforts to preserve biodiversity can sometimes conflict with economic or developmental goals.	
Unit 3 Instructional Plan	
Suggested Activities	Resources
➤ Carrying capacity activity ➤ Exponential growth and logistic growth graphs ➤ Population pyramids ➤ Human population growth - look at the world population website to see growth patterns ➤ People Paradox video ➤ Women and fertility ➤ Population management ➤ Mark return recapture	➤ Gizmos ➤ Savvas Textbook ➤ Lab materials
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

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- 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: Environmental Science	Target Course/Grade Levels: 10-12
Unit Title: Unit 4: Energy Resources and Consumptions	Duration: 17 days
Unit 4 Introduction/ Focus	
Summary This unit aims to help students explain the role of energy in the cycling of matter within ecosystems, while also understanding how scientific explanations can evolve as new evidence is discovered. Students will explore how organisms interact with each other and their environment, learning how they obtain resources, change their surroundings, and how these changes affect both	

the organisms and the ecosystems they inhabit.

Students will delve into how energy flows through ecosystems, from producers to consumers, and how the cycling of nutrients supports life. Students will also learn about the interconnectedness of all living organisms and how they depend on energy and matter to survive. By studying the dynamics of ecosystems, students will gain insight into how organisms interact with their environment and how these interactions impact the balance of the ecosystem.

In addition to understanding energy flow, students will investigate the role of biodiversity in ecosystems. They will learn about how different species contribute to ecosystem stability and how changes in biodiversity can affect the health of the environment. Students will also explore how animal behaviors, such as migration or foraging, impact survival and the continuation of species within ecosystems.

Students will use models, conduct investigations, and apply mathematical comparisons to understand the processes within ecosystems. By linking evidence with scientific reasoning, students will be able to explain how changes in one part of an ecosystem can influence the entire system. Throughout the unit, they will also develop their ability to engage with science and engineering practices to demonstrate their understanding of the core ideas related to ecosystem dynamics.

This unit is based on HS-PS3-1, HS-PS3-3, HS-PS3-4, HS-LS2-3, HS-LS2-4, HS-LS2-7, HS-ESS3-4 & HS-ESS3-6.

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-PS3-1 Create a computational model to calculate the change in the energy of one component in a system when the change in energy of the other component(s) and energy flows in and out of the system are known.

[Clarification Statement: Emphasis is on explaining the meaning of mathematical expressions used in the model.] [Assessment Boundary: Assessment is limited to basic algebraic expressions or computations; to systems of two or three components; and to thermal energy, kinetic energy, and/or the energies in gravitational, magnetic, or electric fields.]

HS-PS3-3 Design, build, and refine a device that works within given constraints to convert one form of energy into another form of energy.

[Clarification Statement: Emphasis is on both qualitative and quantitative evaluations of devices. Examples of devices could include Rube Goldberg devices, wind turbines, solar cells, solar ovens, and generators. Examples of constraints could include use of renewable energy forms and efficiency.] [Assessment Boundary: Assessment for quantitative evaluations is limited to total output for a given input. Assessment is limited to devices constructed with materials provided to students.]

HS-PS3-4 Plan and conduct an investigation to provide evidence that the transfer of thermal energy when two components of different temperature are combined within a closed system results in a more uniform energy distribution among the components in the system (second law of thermodynamics).

[Clarification Statement: Emphasis is on analyzing data from student investigations and using mathematical thinking to describe the energy changes both quantitatively and conceptually. Examples of investigations could include mixing liquids at different initial temperatures or adding objects at different temperatures to water.] [Assessment Boundary: Assessment is limited to investigations based on materials and tools provided to students.]

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.

[Clarification Statement: Emphasis is on conceptual understanding of the role of aerobic and anaerobic respiration in different environments.] [Assessment Boundary: Assessment does not include the specific chemical processes of either aerobic or anaerobic respiration.]

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

[Clarification Statement: Emphasis is on using a mathematical model of stored energy in biomass to describe the transfer of energy from one trophic level to another and that matter and energy are conserved as matter cycles and energy flows through ecosystems. Emphasis is on atoms and molecules such as carbon, oxygen, hydrogen and nitrogen being conserved as they move through an ecosystem.] [Assessment Boundary: Assessment is limited to proportional reasoning to describe the cycling of matter and flow of energy.]

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

[Clarification Statement: Examples of human activities can include urbanization, building dams, and dissemination of invasive species.]

HS-ESS2-4: Use a model to describe how variations in the flow of energy into and out of Earth's systems result in changes in climate.

HS-ESS3-4 Evaluate or refine a technological solution that reduces impacts of human activities on climate change and other natural systems.

[Clarification Statement: Examples of data on the impacts of human activities could include the quantities and types of pollutants released, changes to biomass and species diversity, or areal changes in land surface use (such as for urban development, agriculture and livestock, or surface mining). Examples for limiting future impacts could range from local efforts (such as reducing, reusing, and recycling resources) to large-scale geoengineering design solutions (such as altering global temperatures by making large changes to the atmosphere or ocean).]

HS-ESS3-6 Use a computational representation to illustrate the relationships among Earth systems and how those relationships are being modified due to human activity (i.e., climate change).

[Clarification Statement: Examples of Earth systems to be considered are the hydrosphere, atmosphere, cryosphere, geosphere, and/or biosphere. An example of the far-reaching impacts from human activity is how an increase in atmospheric carbon dioxide results in an increase in photosynthetic biomass on land and an increase in ocean acidification, with resulting impacts on sea organism health and marine populations.] [Assessment Boundary: Assessment does not include running computational representations but is limited to using the published results of scientific computational models.]

HS-ETS1-1: Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants.

HS-ETS1-2: Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering.

HS-ETS1-3: Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics, as well as possible social, cultural, and environmental impacts.

HS-ETS1-4: Use a computer simulation to model the impact of proposed solutions to a complex real-world problem with numerous criteria and constraints on interactions within and between systems relevant to the problem.

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Using Mathematics and Computational Thinking ➤ Use a computational representation of phenomena or design solutions to describe and/or support claims and/or explanations. (HS-ESS3-6) Constructing Explanations and Designing Solutions ➤ Design or refine a solution to a complex real-world problem, based on scientific knowledge, student-generated sources of evidence, prioritized criteria, and tradeoff considerations. (HS-ESS3-4) Planning and Carrying Out Investigations ➤ Plan and conduct an investigation individually and collaboratively to produce 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	PS3.A: Definitions of Energy ➤ Energy is a quantitative property of a system that depends on the motion and interactions of matter and radiation within that system. That there is a single quantity called energy is due to the fact that a system's total energy is conserved, even as, within the system, energy is continually transferred from one object to another and between its various possible forms. (HS-PS3-1) ➤ At the macroscopic scale, energy manifests itself in multiple ways, such as in motion, sound, light, and thermal energy. (HS-PS3-3) PS3.B: Conservation of Energy and Energy Transfer ➤ Conservation of energy means that the total change of energy in any system is always equal to the total energy transferred into or out of the system. (HS-PS3-1) ➤ Energy cannot be	Systems and System Models ➤ When investigating or describing a system, the boundaries and initial conditions of the system need to be defined and their inputs and outputs analyzed and described using models. (HS-ESS3-6), (HS-PS3-4) ➤ Models can be used to predict the behavior of a system, but these predictions have limited precision and reliability due to the assumptions and approximations inherent in models. (HS-PS3-1) Energy and Matter ➤ 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-PS3-3) ➤ Energy cannot be created or destroyed—it only moves between one place and another place, between objects and/or fields, or between systems. (HS-LS2-4) ➤ Energy drives the cycling of matter within and between systems.

trials, cost, risk, time), and refine the design accordingly. (HS-PS3-4) Using Mathematics and Computational Thinking ➤ Create a computational model or simulation of a phenomenon, designed device, process, or system. (HS-PS3-1) ➤ Use mathematical representations of phenomena or design solutions to support claims. (HS-LS2-4) Constructing Explanations and Designing Solutions ➤ Design, evaluate, and/or refine a solution to a complex real-world problem, based on scientific knowledge, student-generated sources of evidence, prioritized criteria, and tradeoff considerations. (HS-PS3-3), (HS-LS2-7) ➤ 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)	created or destroyed, but it can be transported from one place to another and transferred between systems. (HS-PS3-1), (HS-PS3-4) ➤ Mathematical expressions, which quantify how the stored energy in a system depends on its configuration (e.g. relative positions of charged particles, compression of a spring) and how kinetic energy depends on mass and speed, allow the concept of conservation of energy to be used to predict and describe system behavior. (HS-PS3-1) ➤ The availability of energy limits what can occur in any system. (HS-PS3-1) ➤ Uncontrolled systems always evolve toward more stable states—that is, toward more uniform energy distribution (e.g., water flows downhill, objects hotter than their surrounding environment cool down). (HS-PS3-4) PS3.D: Energy in Chemical Processes ➤ Although energy cannot be destroyed, it can be	(HS-LS2-3) Stability and Change ➤ Feedback (negative or positive) can stabilize or destabilize a system. (HS-ESS3-4) ➤ Much of science deals with constructing explanations of how things change and how they remain stable. (HS-LS2-7) <i>Connections to Engineering, Technology, and Applications of Science</i> Influence of Science, Engineering, and Technology on Society and the Natural World ➤ Engineers continuously modify these technological systems by applying scientific knowledge and engineering design practices to increase benefits while decreasing costs and risks. (HS-ESS3-4) ➤ Modern civilization depends on major technological systems. Engineers continuously modify these technological systems by applying scientific knowledge and engineering design practices to increase benefits while decreasing costs and risks. (HS-PS3-3)
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<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-LS2-3)	converted to less useful forms—for example, to thermal energy in the surrounding environment. (HS-PS3-3), (HS-PS3-4) ETS1.A: Defining and Delimiting an Engineering Problem ➤ Criteria and constraints also include satisfying any requirements set by society, such as taking issues of risk mitigation into account, and they should be quantified to the extent possible and stated in such a way that one can tell if a given design meets them. (secondary to HS-PS3-3) 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-LS2-7) ESS2.D: Weather and Climate ➤ Current models predict that, although future regional climate changes will be complex	<i>Connections to Nature of Science</i> Scientific Knowledge Assumes an Order and Consistency in Natural Systems ➤ Science assumes the universe is a vast single system in which basic laws are consistent. (HS-PS3-1)
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	and varied, average global temperatures will continue to rise. The outcomes predicted by global climate models strongly depend on the amounts of human-generated greenhouse gases added to the atmosphere each year and by the ways in which these gases are absorbed by the ocean and biosphere. (secondary to HS-ESS3-6) ESS3.C: Human Impacts on Earth Systems ➤ The sustainability of human societies and the biodiversity that supports them requires responsible management of natural resources. (HS-ESS3-3) ESS3.D: Global Climate Change ➤ Through computer simulations and other studies, important discoveries are still being made about how the ocean, the atmosphere, and the biosphere interact and are modified in response to human activities. (HS-ESS3-6) LS2.B: Cycles of Matter and Energy Transfer in Ecosystems	
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	➤ 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 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) LS2.C: Ecosystem Dynamics, Functioning, and Resilience	
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	➤ 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) 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	
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	enhancing life on Earth. Sustaining biodiversity also aids humanity by preserving landscapes of recreational or inspirational value. (secondary to HS-LS2-7) (Note: This Disciplinary Core Idea is also addressed by HS-LS4-6.)	
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Unit 4 Supporting and Additional Standards/Interdisciplinary Connections

ELA/Literacy

RI.CR.9-10.1. Cite a range and thorough textual evidence and make clear and relevant connections, to strongly support an analysis of multiple aspects of what an informational text says explicitly and inferentially, as well as interpretations of the text. (HS-ESS3-4), (HS-PS3-4), (HS-LS2-3)

RI.MF.9-10.6. Analyze, integrate, and evaluate multiple interpretations (e.g., charts, graphs, diagrams, videos) of a single text or text/s presented in different formats (visually, quantitatively) as well as in words in order to address a question or solve a problem. (HS-LS2-7)

RI.AA.9-10.7. Describe and evaluate the argument and specific claims in an informational text, assessing whether the reasoning is valid and the evidence is relevant and sufficient; identify false statements and reasoning. (HS-ESS3-4), (HS-LS2-7)

W.IW.9-10.2. 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 to make important connections and distinctions; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aid in comprehension.
- Develop the topic with well-chosen, relevant, and sufficient 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 to link the major sections of the text, create cohesion, and clarify the relationships among complex ideas and concepts.
- Use precise language and domain-specific vocabulary 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 information or explanation presented (e.g., articulating implications or the significance of the topic). (HS-LS2-3)

W.WP.9-10.4. Develop and strengthen writing as needed by planning, revising, editing, rewriting, trying a new approach; sustaining effort to complete complex writing tasks; seeking out feedback and reflecting on personal writing progress; 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.9-10.5. 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-PS3-3),(HS-PS3-4),(HS-LS2-7)

W.SE.9-10.6. Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation (MLA or APA Style Manuals). (HS-PS3-4)

SL.UM.9-10.5. Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance findings, reasoning, and evidence and to add interest. (HS-PS3-1)

Mathematics

MP.2 Reason abstractly and quantitatively. (HS-ESS3-4),(HS-ESS3-6), (HS-PS3-1),(HS-PS3-3),(HS-PS3-4),(HS-LS2-4),(HS-LS2-7)

MP.4 Model with mathematics. (HS-ESS3-6),(HS-PS3-1),(HS-PS3-3),(HS-PS3-4),(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-ESS3-4),(HS-ESS3-6),(HS-PS3-1),(HS-PS3-3),(HS-LS2-4),(HS-LS2-7)

HSN.Q.A.2 Define appropriate quantities for the purpose of descriptive modeling. (HS-ESS3-4),(HS-ESS3-6),(HS-PS3-1),(HS-PS3-3),(HS-LS2-4),(HS-LS2-7)

HSN.Q.A.3 Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. (HS-ESS3-4),(HS-ESS3-6),(HS-PS3-1),(HS-PS3-3),(HS-LS2-4),(HS-LS2-7)

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

Disciplinary Concepts

Creativity and Innovation (9.4),
Critical Thinking and Problem Solving (9.4),
Global and Cultural Awareness (9.4),
Information and Reading Literacy (9.4),

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Technology Literacy (9.4)	
Core Ideas	Performance Expectations (Identified with Standard Number and Statement)
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.1: Identify problem-solving strategies used in the development of an innovative product or practice (e.g., 1.1.12acc.C1b, 2.2.12.PF.3). 9.4.12.CT.2: Explain the potential benefits of collaborating to enhance critical thinking and problem solving (e.g., 1.3E.12profCR3.a). 9.4.12.CT.3: Enlist input from a variety of stakeholders (e.g., community members, experts in the field) to design a service learning activity that addresses a local or global issue (e.g., environmental justice).
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).
In order for members of our society to participate productively, information needs to be shared accurately and ethically.	9.4.12.IML.5: Evaluate, synthesize, and apply information on climate change from various sources appropriately (e.g., 2.1.12.CHSS.6, S.IC.B.4, S.IC.B.6, 8.1.12.DA.1, 6.1.12.GeoHE.14.a, 7.1.AL.PRSNT.2). 9.4.12.IML.6: Use various types of media to produce and store information on climate change for different purposes and audiences with sensitivity to cultural, gender, and age diversity (e.g., NJSLSA.SL5).

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Accurate information may help in making valuable and ethical choices.	9.4.12.IML.7: Develop an argument to support a claim regarding a current workplace or societal/ethical issue such as climate change (e.g., NJSLSA.W1, 7.1.AL.PRSNT.4).
Digital tools differ in features, capacities, and styles. Knowledge of different digital tools is helpful in selecting the best tool for a given task.	9.4.12.TL.1: Assess digital tools based on features such as accessibility options, capacities, and utility for accomplishing a specified task (e.g., W.11-12.6.). • 9.4.12.TL.2: Generate data using formula-based calculations in a spreadsheet and draw conclusions about the data.
Collaborative digital tools can be used to access, record and share different viewpoints and to collect and tabulate the views of groups of people.	9.4.12.TL.3: Analyze the effectiveness of the process and quality of collaborative environments. 9.4.12.TL.4: Collaborate in online learning communities or social networks or virtual worlds to analyze and propose a resolution to a real-world problem (e.g., 7.1.AL.IPERS.6).
Unit 4 New Jersey Student Learning Standards: Computer Science and Design Thinking	
Disciplinary Concepts Data Analysis (8.1), Interaction of Technology and Humans (8.2), Effects of Technology on the Natural World (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.
Human needs and desires determine which new tools are developed.	8.2.2.ITH.1: Identify products that are designed to meet human wants or needs. 8.2.2.ITH.2: Explain the purpose of a product and its value.

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Technology has changed the way people live and work. Various tools can improve daily tasks and quality of life.	8.2.2.ITH.3: Identify how technology impacts or improves life. 8.2.2.ITH.4: Identify how various tools reduce work and improve daily tasks. 8.2.2.ITH.5: Design a solution to a problem affecting the community in a collaborative team and explain the intended impact of the solution.
The use of technology developed for the human designed world can affect the environment, including land, water, air, plants, and animals. Technologies that use natural sources can have negative effects on the environment, its quality, and inhabitants. Reusing and recycling materials can save money while preserving natural resources and avoiding damage to the environment.	8.2.2.ETW.1: Classify products as resulting from nature or produced as a result of technology. 8.2.2.ETW.2: Identify the natural resources needed to create a product. 8.2.2.ETW.3: Describe or model the system used for recycling technology. 8.2.2.ETW.4: Explain how the disposal of or reusing a product affects the local and global environment.
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	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.

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human activity have increased carbon dioxide concentrations and thus affect climate.	
All forms of energy production and other resource extraction have associated economic, social, environmental and geopolitical costs and risks as well as benefits. New technologies and social regulations can change the balance of these factors. 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.	HS-ESS3-2: Evaluate competing design solutions for developing, managing and utilizing energy and mineral resources based on cost-benefit ratios.

Unit 4 Evidence of Student Learning

Performance Tasks/Use of Technology:	Assessments
Use technology throughout the course to collect data, analyze it and make graphs, share information with others etc. Gizmos - various HHMI resources and labs (click-and-learns, data analysis etc)	Formative ➤ Observation ➤ Homework ➤ Class participation ➤ Graphic Organizers ➤ Projects ➤ Student Response Systems (ex.Clickers) ➤ Do-Now/Exit Cards ➤ Laboratories/Lab Reports ➤ Notebook ➤ Writing Assignments

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Use school solar panel data to analyze usage and production	➤ 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 assessments Alternative ➤ Quizz ➤ Blooket ➤ Kahoot ➤ CER (claim, evidence, reasoning)
Unit 4 Essential Questions	
➤ In what ways do organisms interact with their environment, and what are the consequences of these interactions? ➤ How do living things engage with both biotic and abiotic components of their environment to acquire matter and energy? ➤ How do group interactions among organisms enhance individual survival and success? ➤ Engaging in Argument from Evidence: Develop and support a scientific claim about the natural world using both established scientific knowledge and evidence gathered through investigation.	
Unit 4 Knowledge and Skills	
Enduring Understandings	Learning Targets
<i>Students will know...</i> ➤ Photosynthesis transforms light energy into stored chemical energy by	<i>Students will be able to...</i> ➤ Describe how energy flows from the sun to producers and subsequently to consumers.

converting carbon dioxide and water into glucose and releasing oxygen. ➤ During chemical reactions, energy is transferred between interacting molecules. In cellular respiration, the bonds in food and oxygen molecules are broken and rearranged to form new compounds that deliver energy to cells, especially muscles. ➤ Cellular respiration generates the energy required for maintaining body temperature, even as energy is continuously lost to the environment. ➤ Photosynthesis and cellular respiration—including anaerobic processes—supply most of the energy required for life functions. Some matter is used to release energy, some is stored in newly formed cellular structures, and some is eliminated as waste. ➤ The atoms that make up biological molecules circulate through food webs and are exchanged between the atmosphere, soil, and living organisms, undergoing continual recombination. ➤ Both photosynthesis and cellular respiration play critical roles in the carbon cycle, which moves carbon among the biosphere, atmosphere, oceans, and	➤ Explain the dependence of consumers on producers for energy. ➤ Identify and differentiate among various types of consumers within an ecosystem. ➤ Analyze why energy transfer within a food web is more complex than in a simple food chain. ➤ Interpret the structure of an energy pyramid and its relationship to trophic levels. ➤ Explain the connection between solar energy, the process of photosynthesis, and how living organisms meet their energy requirements.
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geosphere through various physical, chemical, geological, and biological processes. ➤ Photosynthesis is the primary mechanism by which solar energy is captured and stored on Earth.	
Unit 4 Instructional Plan	
Suggested Activities	Resources
➤ Energy types poster -renewable vs. nonrenewable ➤ Nuclear energy pros and cons - discuss oyster creek closing/ Chernobyl debate ➤ Landfill field trip ➤ Plastics breakdown lab ➤ Waste Management video ➤ Hazardous waste	➤ Gizmos ➤ Textbook - ➤ Lab materials
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 an 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

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- 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 5 Overview	
Content Area: Environmental Science	Target Course/Grade Levels: 10-12
Unit Title: Unit 5: Water, Air and Land	Duration: 16 days
Unit 5 Introduction/ Focus	
Summary This unit introduces students to the key concepts surrounding water, air, the atmosphere, and climate change. It begins with a focus on water resources, delving into the water cycle and examining both surface and groundwater. Students will explore the sources and types of water pollution, as well as its impact on ecosystems and human health. Topics also covered are acid precipitation, discussing its causes and how it negatively affects soil, plants, and animals. A section will be dedicated to the ozone shield, including the chemicals responsible for its depletion and the consequences for life on Earth. A significant portion of the unit addresses the issue of global warming, exploring its causes and effects. Students will investigate the potential consequences of a warmer planet, including rising sea levels, changes in global weather patterns, and shifts in flora and fauna. The implications of these changes will be thoroughly examined through research and discussion. Throughout the unit, students will engage with science and engineering practices, using these skills to demonstrate their understanding of the core concepts. The unit aims to provide students with the tools to critically analyze and understand environmental issues related to water, air, and	

climate.

This unit is based on HS-LS2-3, HS-LS2-4, HS-LS2-6, HS-LS2-7, HS-LS2-8, HS-ESS3-1, HS-ESS3-2, HS-ESS3-3, HS-ESS3-4, HS-ESS3-5 & HS-ESS3-6.

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 5 Focus Standards (Major Standards)

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.

[Clarification Statement: Emphasis is on conceptual understanding of the role of aerobic and anaerobic respiration in different environments.] [Assessment Boundary: Assessment does not include the specific chemical processes of either aerobic or anaerobic respiration.]

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

[Clarification Statement: Emphasis is on using a mathematical model of stored energy in biomass to describe the transfer of energy from one trophic level to another and that matter and energy are conserved as matter cycles and energy flows through ecosystems. Emphasis is on atoms and molecules such as carbon, oxygen, hydrogen and nitrogen being conserved as they move through an ecosystem.] [Assessment Boundary: Assessment is limited to proportional reasoning to describe the cycling of matter and flow of energy.]

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.

[Clarification Statement: Examples of changes in ecosystem conditions could include modest biological or physical changes, such as moderate hunting or a seasonal flood; and extreme changes, such as volcanic eruption or sea level rise.]

HS-LS2-7

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

[Clarification Statement: Examples of human activities can include urbanization, building dams, and dissemination of invasive species.]

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

[Clarification Statement: Emphasis is on: (1) distinguishing between group and individual behavior, (2) identifying evidence supporting the outcomes of group behavior, and (3) developing logical and reasonable arguments based on evidence. Examples of group behaviors could include flocking, schooling, herding, and cooperative behaviors such as hunting, migrating, and swarming.]

HS-ESS2-2: Analyze geoscience data to make the claim that one change to Earth's surface can create feedback that causes changes to other Earth systems.

HS-ESS3-1 Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and climate change have influenced human activity.

[Clarification Statement: Examples of key natural resources include access to fresh water (such as rivers, lakes, and groundwater), regions of fertile soils such as river deltas, and high concentrations of minerals and fossil fuels. Examples of natural hazards can be from interior processes (such as volcanic eruptions and earthquakes), surface processes (such as tsunamis, mass wasting and soil erosion), and severe weather (such as hurricanes, floods, and droughts). Examples of the results of changes in climate that can affect populations or drive mass migrations include changes to sea level, regional patterns of temperature and precipitation, and the types of crops and livestock that can be raised.]

HS-ESS3-2 Evaluate competing design solutions for developing, managing, and utilizing energy and mineral resources based on cost-benefit ratios.

[Clarification Statement: Emphasis is on the conservation, recycling, and reuse of resources (such as minerals and metals) where possible, and on minimizing impacts where it is not. Examples include developing best practices for agricultural soil use, mining (for coal, tar sands, and oil shales), and pumping (for petroleum and natural gas). Science knowledge indicates what can

happen in natural systems—not what should happen.]

HS-ESS3-3 Create a computational simulation to illustrate the relationships among management of natural resources, the sustainability of human populations, and biodiversity.

[Clarification Statement: Examples of factors that affect the management of natural resources include costs of resource extraction and waste management, per-capita consumption, and the development of new technologies. Examples of factors that affect human sustainability include agricultural efficiency, levels of conservation, and urban planning.] [Assessment Boundary: Assessment for computational simulations is limited to using provided multi-parameter programs or constructing simplified spreadsheet calculations.]

HS-ESS3-4 Evaluate or refine a technological solution that reduces impacts of human activities on climate change and other natural systems.

[Clarification Statement: Examples of data on the impacts of human activities could include the quantities and types of pollutants released, changes to biomass and species diversity, or areal changes in land surface use (such as for urban development, agriculture and livestock, or surface mining). Examples for limiting future impacts could range from local efforts (such as reducing, reusing, and recycling resources) to large-scale geoengineering design solutions (such as altering global temperatures by making large changes to the atmosphere or ocean).]

HS-ESS3-5 Analyze geoscience data and the results from global climate models to make an evidence-based forecast of the current rate of global or regional climate change and associated future impacts to Earth systems.

[Clarification Statement: Examples of evidence, for both data and climate model outputs, are for climate changes (such as precipitation and temperature) and their associated impacts (such as on sea level, glacial ice volumes, or atmosphere and ocean composition).] [Assessment Boundary: Assessment is limited to one example of a climate change and its associated impacts.]

HS-ESS3-6 Use a computational representation to illustrate the relationships among Earth systems and how those relationships are being modified due to human activity (i.e., climate change).

[Clarification Statement: Examples of Earth systems to be considered are the hydrosphere, atmosphere, cryosphere, geosphere, and/or biosphere. An example of the far-reaching impacts from human activity is how an increase in atmospheric carbon dioxide results in an increase in photosynthetic biomass on land and an increase in ocean acidification, with resulting impacts on sea organism health and marine populations.] [Assessment Boundary: Assessment does not include running computational representations but is limited to using the published results of scientific computational models.]

HS-ETS1-1: Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants.

HS-ETS1-2: Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering.

HS-ETS1-3: Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics, as well as possible social, cultural, and environmental impacts.

HS-ETS1-4: Use a computer simulation to model the impact of proposed solutions to a complex real-world problem with numerous criteria and constraints on interactions within and between systems relevant to the problem.

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
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) ➤ Design, evaluate, and refine a solution to a complex real-world problem, based on scientific knowledge, student-generated sources of evidence, prioritized criteria, and trade off considerations. (HS-LS2-7) ➤ Construct an explanation based on valid and reliable evidence obtained from a variety of sources (including students' own investigations,	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 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	Energy and Matter ➤ Energy drives the cycling of matter within and between systems. (HS-LS2-3) ➤ Energy cannot be created or destroyed—it only moves between one place and another place, between objects and/or fields, or between systems. (HS-LS2-4) 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) ➤ Change and rates of change can be quantified and modeled over very short or very long periods of time. Some system changes are irreversible. (HS-ESS3-3), (HS-ESS3-5) ➤ Feedback (negative or positive) can stabilize or destabilize a system. (HS-ESS3-4) Cause and Effect ➤ Empirical evidence is

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-ESS3-1) ➤ Design or refine a solution to a complex real-world problem, based on scientific knowledge, student-generated sources of evidence, prioritized criteria, and tradeoff considerations. (HS-ESS3-4) Using Mathematics and Computational Thinking ➤ Use mathematical representations of phenomena or design solutions to support claims. ➤ Create a computational model or simulation of a phenomenon, designed device, process, or system. (HS-ESS3-3) ➤ Use a computational representation of phenomena or design solutions to describe and/or support claims and/or explanations. (HS-ESS3-6)	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) 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 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-LS2-6) ➤ Moreover, anthropogenic changes (induced by human activity) in the environment—including habitat destruction, pollution, introduction of invasive species,	required to differentiate between cause and correlation and make claims about specific causes and effects. (HS-LS2-8), (HS-ESS3-1) Systems and System Models ➤ When investigating or describing a system, the boundaries and initial conditions of the system need to be defined and their inputs and outputs analyzed and described using models. (HS-ESS3-6) <i>Connections to Engineering, Technology, and Applications of Science</i> Influence of Science, Engineering, and Technology on Society and the Natural World ➤ Modern civilization depends on major technological systems. (HS-ESS3-1), (HS-ESS3-3) ➤ Engineers continuously modify these technological systems by applying scientific knowledge and engineering design practices to increase benefits while decreasing costs and risks. (HS-ESS3-2), (HS-ESS3-4) ➤ New technologies can have deep impacts on
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Engaging in Argument from Evidence ➤ 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 explanations to determine the merits of arguments. (HS-LS2-8) ➤ Evaluate competing design solutions to a real-world problem based on scientific ideas and principles, empirical evidence, and logical arguments regarding relevant factors (e.g. economic, societal, environmental, ethical considerations). (HS-ESS3-2) Analyzing and Interpreting Data ➤ Analyze data using computational models in order to make valid and reliable scientific claims. (HS-ESS3-5) <i>Connections to Nature of Science</i> Scientific Knowledge is Open	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. LS4.D: Biodiversity and Humans ➤ Biodiversity is increased by the formation of new species (speciation) and decreased by the loss of species (extinction). (secondary) (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	society and the environment, including some that were not anticipated. (HS-ESS3-3) ➤ Analysis of costs and benefits is a critical aspect of decisions about technology. (HS-ESS3-2) <i>Connections to Nature of Science</i> Science is a Human Endeavor ➤ Science is a result of human endeavors, imagination, and creativity. (HS-ESS3-3) Science Addresses Questions About the Natural and Material World ➤ Science and technology may raise ethical issues for which science, by itself, does not provide answers and solutions. (HS-ESS3-2) ➤ Science knowledge indicates what can happen in natural systems—not what should happen. The latter involves ethics, values, and human decisions about the use of knowledge. (HS-ESS3-2) ➤ Many decisions are not made using science alone, but rely on social and cultural contexts to resolve issues. (HS-ESS3-2)
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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-LS2-3)
- 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)

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) (Note: This Disciplinary Core Idea is also addressed by HS-LS4-6.) (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) (HS-LS2-7)

ESS2.D: Weather and Climate

- Current models predict that, although future regional climate changes will be complex and varied, average global temperatures will continue to rise. The outcomes predicted by global climate models strongly depend on the amounts of

	human-generated greenhouse gases added to the atmosphere each year and by the ways in which these gases are absorbed by the ocean and biosphere. (secondary to HS-ESS3-6) ESS3.A: Natural Resources ➤ Resource availability has guided the development of human society. (HS-ESS3-1) ➤ All forms of energy production and other resource extraction have associated economic, social, environmental, and geopolitical costs and risks as well as benefits. New technologies and social regulations can change the balance of these factors. (HS-ESS3-2) ESS3.B: Natural Hazards ➤ Natural hazards and other geologic events have shaped the course of human history; [they] have significantly altered the sizes of human populations and have driven human migrations. (HS-ESS3-1) ESS3.C: Human Impacts on	
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	Earth Systems ➤ The sustainability of human societies and the biodiversity that supports them requires responsible management of natural resources. (HS-ESS3-3) ➤ Scientists and engineers can make major contributions by developing technologies that produce less pollution and waste and that preclude ecosystem degradation. (HS-ESS3-4) ESS3.D: Global Climate Change ➤ Though the magnitudes of human impacts are greater than they have ever been, so too are human abilities to model, predict, and manage current and future impacts. (HS-ESS3-5) ➤ Through computer simulations and other studies, important discoveries are still being made about how the ocean, the atmosphere, and the biosphere interact and are modified in response to human activities. (HS-ESS3-6) ETS1.B: Developing Possible	
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	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-ESS3-2), (secondary HS-ESS3-4)	
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Articulation of DCIs across grade-bands:
MS.LS3.A ; MS.LS3.B

Unit 5 Supporting and Additional Standards/Interdisciplinary Connections

ELA/Literacy

RI.CR.9-10.1. Cite a range and thorough textual evidence and make clear and relevant connections, to strongly support an analysis of multiple aspects of what an informational text says explicitly and inferentially, as well as interpretations of the text. (HS-LS2-3), (HS-LS2-6), (HS-LS2-8), (HS-ESS3-1), (HS-ESS3-2), (HS-ESS3-4), (HS-ESS3-5)

RI.CI.9-10.2. Determine one or more central ideas of an informational text and analyze how it is developed and refined over the course of a text, including how it emerges and is shaped by specific details; provide an objective summary of the text. (HS-ESS3-5)

RI.MF.9-10.6. Analyze, integrate, and evaluate multiple interpretations (e.g., charts, graphs, diagrams, videos) of a single text or text/s presented in different formats (visually, quantitatively) as well as in words in order to address a question or solve a problem. (HS-LS2-6), (HS-LS2-7), (HS-LS2-8), (HS-ESS3-5)

RI.AA.9-10.7. Describe and evaluate the argument and specific claims in an informational text, assessing whether the reasoning is valid and the evidence is relevant and sufficient; identify false statements and reasoning. (HS-LS2-6), (HS-LS2-7), (HS-LS2-8), (HS-ESS3-5)

W.IW.9-10.2. 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 to make important connections and distinctions; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aid in

comprehension.

- Develop the topic with well-chosen, relevant, and sufficient 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 to link the major sections of the text, create cohesion, and clarify the relationships among complex ideas and concepts.
- Use precise language and domain-specific vocabulary 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 information or explanation presented (e.g., articulating implications or the significance of the topic). (HS-ESS3-1)

W.WP.9-10.4. Develop and strengthen writing as needed by planning, revising, editing, rewriting, trying a new approach; sustaining effort to complete complex writing tasks; seeking out feedback and reflecting on personal writing progress; 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.9-10.5. 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-LS2-4), (HS-LS2-6), (HS-ESS3-1), (HS-ESS3-2), (HS-ESS3-3), (HS-ESS3-4), (HS-ESS3-5), (HS-ESS3-6)

MP.4 Model with mathematics. (HS-LS2-4), (HS-ESS3-3), (HS-ESS3-6)

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-LS2-4), (HS-LS2-7), (HS-ESS3-1), (HS-ESS3-4), (HS-ESS3-5), (HS-ESS3-6)

HSN.Q.A.2 Define appropriate quantities for the purpose of descriptive modeling.

(HS-LS2-4), (HS-LS2-7), (HS-ESS3-1), (HS-ESS3-4), (HS-ESS3-5), (HS-ESS3-6)

HSN.Q.A.3 Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.

(HS-LS2-4), (HS-LS2-7), (HS-ESS3-1), (HS-ESS3-4), (HS-ESS3-5), (HS-ESS3-6)

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 5 New Jersey Student Learning Standards Connections:

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Career Readiness, Life Literacies, and Key Skills	
Disciplinary Concepts Creativity and Innovation (9.4), Critical Thinking and Problem Solving (9.4), Global and Cultural Awareness (9.4), Information and Reading Literacy (9.4), Technology Literacy (9.4)	
Core Ideas	Performance Expectations (Identified with Standard Number and Statement)
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.1: Identify problem-solving strategies used in the development of an innovative product or practice (e.g., 1.1.12acc.C1b, 2.2.12.PF.3). 9.4.12.CT.2: Explain the potential benefits of collaborating to enhance critical thinking and problem solving (e.g., 1.3E.12profCR3.a). 9.4.12.CT.3: Enlist input from a variety of stakeholders (e.g., community members, experts in the field) to design a service learning activity that addresses a local or global issue (e.g., environmental justice).
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.

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In order for members of our society to participate productively, information needs to be shared accurately and ethically.	9.4.12.IML.5: Evaluate, synthesize, and apply information on climate change from various sources appropriately (e.g., 2.1.12.CHSS.6, S.IC.B.4, S.IC.B.6, 8.1.12.DA.1, 6.1.12.GeoHE.14.a, 7.1.AL.PRSNT.2). 9.4.12.IML.6: Use various types of media to produce and store information on climate change for different purposes and audiences with sensitivity to cultural, gender, and age diversity (e.g., NJSLSA.SL5).
Accurate information may help in making valuable and ethical choices.	9.4.12.IML.7: Develop an argument to support a claim regarding a current workplace or societal/ethical issue such as climate change (e.g., NJSLSA.W1, 7.1.AL.PRSNT.4).
Digital tools differ in features, capacities, and styles. Knowledge of different digital tools is helpful in selecting the best tool for a given task.	9.4.12.TL.1: Assess digital tools based on features such as accessibility options, capacities, and utility for accomplishing a specified task (e.g., W.11-12.6.). • 9.4.12.TL.2: Generate data using formula-based calculations in a spreadsheet and draw conclusions about the data.
Collaborative digital tools can be used to access, record and share different viewpoints and to collect and tabulate the views of groups of people.	9.4.12.TL.3: Analyze the effectiveness of the process and quality of collaborative environments. 9.4.12.TL.4: Collaborate in online learning communities or social networks or virtual worlds to analyze and propose a resolution to a real-world problem (e.g., 7.1.AL.IPERS.6).
Unit 5 New Jersey Student Learning Standards: Computer Science and Design Thinking	
Disciplinary Concepts Data Analysis (8.1), Interaction of Technology and Humans (8.2), Effects of Technology on the Natural World (8.2)	
Core Ideas	Performance Expectations (Identified with Standard Number and Statement)
Individuals select digital tools and design automated processes to collect, transform, generalize,	8.1.12.DA.1: Create interactive data visualizations using software tools to help others better

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simplify, and present large data sets in different ways to influence how other people interpret and understand the underlying information.	understand real world phenomena, including climate change.
Human needs and desires determine which new tools are developed.	8.2.2.ITH.1: Identify products that are designed to meet human wants or needs. 8.2.2.ITH.2: Explain the purpose of a product and its value.
Technology has changed the way people live and work. Various tools can improve daily tasks and quality of life.	8.2.2.ITH.3: Identify how technology impacts or improves life. 8.2.2.ITH.4: Identify how various tools reduce work and improve daily tasks. 8.2.2.ITH.5: Design a solution to a problem affecting the community in a collaborative team and explain the intended impact of the solution.
The use of technology developed for the human designed world can affect the environment, including land, water, air, plants, and animals. Technologies that use natural sources can have negative effects on the environment, its quality, and inhabitants. Reusing and recycling materials can save money while preserving natural resources and avoiding damage to the environment.	8.2.2.ETW.1: Classify products as resulting from nature or produced as a result of technology. 8.2.2.ETW.2: Identify the natural resources needed to create a product. 8.2.2.ETW.3: Describe or model the system used for recycling technology. 8.2.2.ETW.4: Explain how the disposal of or reusing a product affects the local and global environment.
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	HS-ESS2-2: Analyze geoscience data to make the claim that one change to Earth's surface can create feedback that causes changes to other Earth systems.

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among the atmosphere, ocean, and land systems, and this energy's re-radiation into space.	
Resource availability has guided the development of human society.	HS-ESS3-1: Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards and changes in climate have influenced human activity.
The sustainability of human societies and the biodiversity that supports them requires responsible management of natural resources.	HS-ESS3-3: Create a computational simulation to illustrate the relationships among management of natural resources, the sustainability of human populations and biodiversity
Criteria and constraints also include satisfying any requirements set by society, such as taking issues of risk mitigation into account, and they should be quantified to the extent possible and stated in such a way that one can tell if a given design meets them. Humanity faces major global challenges today, such as the need for supplies of clean water and food or for energy sources that minimize pollution, which can be addressed through engineering. These global challenges also may have manifestations in local communities.	HS-ETS1-1: Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants.

Unit 5 Evidence of Student Learning

Performance Tasks/Use of Technology:	Assessments
Use technology throughout the course to collect data, analyze it and make graphs, share information with others etc. Gizmos - various	Formative ➤ Observation ➤ Homework ➤ Class participation ➤ Graphic Organizers ➤ Projects ➤ Student Response Systems (ex.Clickers) ➤ Do-Now/Exit Cards

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HHMI resources and labs (click-and-learns, data analysis etc) Water quality testing at local streams - collect and analyze data	➤ Laboratories/Lab Reports ➤ 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 assessments Alternative ➤ Quizz ➤ Blooket ➤ Kahoot ➤ CER (claim, evidence, reasoning)
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Unit 5 Essential Questions

- Why is freshwater considered a limited natural resource?
- What are the two primary sources of freshwater?
- How are river systems connected to the surrounding watershed?
- How is groundwater created?
- What is the significance of aquifers?
- How can pollution in a watershed impact the river systems it feeds?
- How does industrial water usage compare to agricultural water usage?
- What strategies are used to conserve water in industry?
- What are the advantages and disadvantages of dams and water diversion projects?
- What actions can be taken to help conserve the global water supply?

- Why is point-source pollution easier to manage than nonpoint-source pollution?
- Why is groundwater pollution difficult to remediate?
- What is the primary source of ocean pollution?
- What are the main contributors to air pollution?
- What are the sources of primary air pollutants?
- In what ways does smog affect human health?
- How does a temperature inversion trap air pollutants near the Earth's surface?
- What are the short-term and long-term health impacts of air pollution?
- What are two methods for preventing indoor air pollution?
- What health problems can be caused by noise pollution?
- How does the pH of pure water compare to that of acid rain?
- What are the causes of acid precipitation?
- What effects does acid rain have on soil, aquatic life, humans, and vegetation?
- How is climate defined?
- What factors influence a region's climate?
- What causes the change in seasons on Earth?
- What is the ozone layer and what function does it serve?
- Which chemicals contribute to the depletion of the ozone layer?
- What harmful effects can result from increased UV exposure due to ozone thinning?
- What is a greenhouse gas?
- How do rising levels of greenhouse gases contribute to global warming?
- What are the environmental and societal consequences of a warming planet?
- What is the goal of the Kyoto Protocol?

- What challenges do scientists face when developing accurate models for predicting global warming?
- How do ecosystem services link rural environments with urban areas?
- In what ways do humans utilize land resources?
- What strategies are used to address challenges associated with urbanization?
- In what ways do open spaces contribute to environmental health in urban settings?
- Why is the preservation of farmland important, and what environmental impacts result from deforestation?
- What practices support the sustainable management of rangelands?

Unit 5 Knowledge and Skills

Enduring Understandings	Learning Targets
<i>Students will understand that...</i> ➤ Freshwater makes up only a small portion of Earth's total water supply. ➤ Surface water and groundwater are the primary sources of freshwater. ➤ River systems collect and channel water from the land within a watershed. ➤ Groundwater collects in underground reservoirs known as aquifers. ➤ The level of the water table influences both human and animal access to groundwater. ➤ Water usage can be categorized into residential,	<i>Students will be able to...</i> ➤ Describe how Earth's water resources are distributed across the planet. ➤ Explain why freshwater is a limited and valuable natural resource. ➤ Distinguish between surface water and groundwater within a watershed system. ➤ Analyze global patterns of water use. ➤ Explain the steps involved in treating water for safe human consumption. ➤ Identify how water is utilized in homes, industry, and agriculture. ➤ Describe how dams and water diversion systems help manage freshwater supplies. ➤ List and explain five methods for conserving water. ➤ Differentiate between point-source and

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industrial, and agricultural sectors. ➤ Dams and water diversion systems are used to manage surface water resources. ➤ Water conservation is essential for sustaining a reliable supply of freshwater. ➤ Water pollution can result from chemical, physical, and biological contaminants. ➤ Groundwater contamination is particularly difficult to remediate. ➤ Ocean pollution is largely driven by nonpoint source runoff from coastal areas. ➤ Human activity introduces primary air pollutants, while chemical reactions create secondary pollutants. ➤ Vehicles and industrial processes are major contributors to air pollution. ➤ Smog is a form of urban air pollution caused by these emissions. ➤ Temperature inversions can trap pollutants near Earth's surface, worsening air quality. ➤ Air pollution can lead to serious health issues. ➤ Indoor air pollution can often be more hazardous than outdoor pollution.	nonpoint-source pollution. ➤ Explain why groundwater contamination is particularly difficult to remediate. ➤ Identify major sources of ocean pollution and describe their impacts on marine ecosystems. ➤ List five primary air pollutants and identify their sources. ➤ Describe the two major contributors to air pollution in urban environments. ➤ Explain how smog forms and affects air quality. ➤ Describe how thermal inversions trap air pollutants close to the ground. ➤ Identify both short-term and long-term health effects of air pollution. ➤ Describe common causes of indoor air pollution and ways to prevent it. ➤ Explain how air pollution contributes to various human health issues. ➤ Identify the causes of acid precipitation. ➤ Describe the effects of acid precipitation on people and the environment. ➤ Distinguish between weather and climate. ➤ Identify four key factors that influence climate. ➤ Explain why climate varies in different parts of the world. ➤ Describe how Earth's tilt and orbit cause seasonal changes. ➤ Explain how the ozone layer protects Earth from harmful ultraviolet (UV) radiation. ➤ Describe how chlorofluorocarbons (CFCs) damage the
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➤ Noise pollution negatively impacts human health and overall quality of life. ➤ Acid precipitation, including rain, sleet, and snow, results from atmospheric pollutants. ➤ Acid shock—a sudden drop in pH—can harm aquatic ecosystems. ➤ Airborne pollutants can travel great distances before settling to the ground. ➤ Climate refers to the long-term average weather conditions of a region. ➤ Multiple factors influence climate, including latitude, elevation, and ocean currents. ➤ Seasonal changes are caused by variations in the angle of solar radiation reaching Earth. ➤ The ozone layer protects life on Earth by absorbing most of the sun’s ultraviolet radiation. ➤ Chlorofluorocarbons (CFCs) contribute to the depletion of the ozone layer. ➤ Ozone thinning is particularly evident over the polar regions. ➤ A thinner ozone layer increases the amount of harmful UV radiation	ozone layer. ➤ Explain how the ozone hole forms and why it matters. ➤ Discuss the harmful effects of increased UV radiation exposure. ➤ Explain why the ozone layer remains at risk despite global efforts to reduce damage. ➤ Describe how Earth’s atmosphere functions like a greenhouse to retain heat. ➤ Explain why atmospheric carbon dioxide levels are rising. ➤ Analyze the causes and consequences of global temperature increases. ➤ Differentiate between urban and rural land uses. ➤ Describe various ways humans use land for development and agriculture. ➤ Define ecosystems and explain their importance in land use planning. ➤ Describe the urban crisis and current efforts to address it. ➤ Explain how urban sprawl impacts the environment. ➤ Identify the environmental benefits of preserving open spaces in urban areas. ➤ Discuss the importance of protecting farmland and the benefits of its preservation. ➤ Describe two strategies for managing rangeland sustainably. ➤ Explain the environmental consequences of deforestation. ➤ Describe the purpose and ecological value of parks and wilderness areas.
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reaching Earth. ➤ Greenhouse gases trap and re-radiate heat in the atmosphere, contributing to global warming.	
Unit 5 Instructional Plan	
Suggested Activities	Resources
➤ Layers of the Earth ➤ Plate tectonics, Pangea ➤ Earthquake Plotting ➤ Volcanoes and Tsunami (video, plot volcanoes for ring of fire) ➤ Land use project ➤ Let them Eat Cake demo ➤ Soil Testing ➤ Particulate matter collectors ➤ Graph the layers of the atmosphere ➤ Convection Lab ➤ pH lab ➤ Sand and light bulbs lab ➤ Global warming, ozone videos ➤ <i>Day after tomorrow</i> - watch ➤ Water cycle drawings ➤ Water treatment lab ➤ Water treatment plant field trip ➤ Water testing ➤ Plot currents (lab) ➤ Oil spill pollution lab	➤ Gizmos ➤ Textbook ➤ Lab materials
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 5 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

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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
Unit 6 Overview

Content Area: Environmental Science

Target Course/Grade Levels: 10-12

Unit Title: Unit 6: Sustainable Future

Duration: 11 days

Unit 6 Introduction/ Focus

Summary

Unit 6 focuses on integrating concepts from science, social studies, and health to critically assess both the positive and negative impacts of natural events and human activities on human health and the environment. They will explore how diseases in humans are often linked to specific pathogens and vectors, investigating how these factors contribute to the spread of illness and affect public

health globally.

Students will also examine the interconnectedness of environmental health and human well-being by investigating the various ways in which human activities can either harm or benefit ecosystems. A significant focus will be placed on understanding the role of individuals, communities, and governments in addressing environmental issues. Students will analyze the impact of policies and practices implemented at the local, state, national, and global levels to tackle pressing environmental challenges such as pollution, deforestation, and climate change, with an emphasis on fostering sustainable practices.

Throughout the unit, students will be encouraged to think critically about how decisions made at all levels can influence the environment and society. They will also use scientific and engineering practices to gather and analyze data, interpret findings, and develop solutions to real-world issues related to health and the environment, ultimately demonstrating proficiency with core scientific concepts and practices.

This unit is based on HS-LS2-3, HS-LS2-4, HS-LS2-6, HS-LS2-7, HS-LS28, HS-ESS3-3, HS-ESS3-4 & HS-ESS3-6 .

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 6 Focus Standards (Major Standards)

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.

[Clarification Statement: Emphasis is on conceptual understanding of the role of aerobic and anaerobic respiration in different environments.] [Assessment Boundary: Assessment does not include the specific chemical processes of either aerobic or anaerobic respiration.]

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

[Clarification Statement: Emphasis is on using a mathematical model of stored energy in biomass to describe the transfer of energy from one trophic level to another and that matter and energy are conserved as matter cycles and energy flows through ecosystems. Emphasis is on atoms and molecules such as carbon, oxygen, hydrogen and nitrogen being conserved as they move through an ecosystem.] [Assessment Boundary: Assessment is limited to proportional reasoning to describe the cycling of matter and flow of energy.]

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.

[Clarification Statement: Examples of changes in ecosystem conditions could include modest biological or physical changes, such as moderate hunting or a seasonal flood; and extreme changes, such as volcanic eruption or sea level rise.]

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

[Clarification Statement: Examples of human activities can include urbanization, building dams, and dissemination of invasive species.]

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

[Clarification Statement: Emphasis is on: (1) distinguishing between group and individual behavior, (2) identifying evidence supporting the outcomes of group behavior, and (3) developing logical and reasonable arguments based on evidence. Examples of group behaviors could include flocking, schooling, herding, and cooperative behaviors such as hunting, migrating, and swarming.]

HS-ESS3-1 Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards and changes in climate have influenced human activity.

HS-ESS3-2 Evaluate competing design solutions for developing, managing and utilizing energy and mineral resources based on cost-benefit ratios.

HS-ESS3-3 Create a computational simulation to illustrate the relationships among management of natural resources, the sustainability of human populations, and biodiversity.

[Clarification Statement: Examples of factors that affect the management of natural resources include costs of resource extraction and waste management, per-capita consumption, and the development of new technologies. Examples of factors that affect human sustainability include agricultural efficiency, levels of conservation, and urban planning.] [Assessment Boundary: Assessment for computational simulations is limited to using provided multi-parameter programs or constructing simplified spreadsheet calculations.]

HS-ESS3-4 Evaluate or refine a technological solution that reduces impacts of human activities on climate change and other natural systems.

[Clarification Statement: Examples of data on the impacts of human activities could include the quantities and types of pollutants released, changes to biomass and species diversity, or areal changes in land surface use (such as for urban development, agriculture and livestock, or surface mining). Examples for limiting future impacts could range from local efforts (such as reducing, reusing, and recycling resources) to large-scale geoengineering design solutions (such as altering global temperatures by making large changes to the atmosphere or ocean).]

HS-ESS3-6 Use a computational representation to illustrate the relationships among Earth systems and how those relationships are being modified due to human activity (i.e., climate change).

[Clarification Statement: Examples of Earth systems to be considered are the hydrosphere, atmosphere, cryosphere, geosphere, and/or biosphere. An example of the far-reaching impacts from human activity is how an increase in atmospheric carbon dioxide results in an increase in photosynthetic biomass on land and an increase in ocean acidification, with resulting impacts on sea organism health and marine populations.] [Assessment Boundary: Assessment does not include running computational representations but is limited to using the published results of scientific computational models.]

HS-ETS1-1: Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants.

HS-ETS1-2: Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering.

HS-ETS1-3: Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics, as well as possible social, cultural, and environmental impacts.

HS-ETS1-4: Use a computer simulation to model the impact of proposed solutions to a complex real-world problem with numerous criteria and constraints on interactions within and between systems relevant to the problem.

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Using Mathematics and	LS2.B: Cycles of Matter and	Cause and Effect

Computational Thinking ➤ Use mathematical representations of phenomena or design solutions to support claims. (HS-LS2-4) ➤ Create a computational model or simulation of a phenomenon, designed device, process, or system. (HS-ESS3-3) ➤ Use a computational representation of phenomena or design solutions to describe and/or support claims and/or explanations. (HS-ESS3-6) 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) ➤ Design, evaluate, and refine a solution to a complex real-world problem, based on scientific knowledge, student-generated	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 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)	➤ Empirical evidence is required to differentiate between cause and correlation and make claims about specific causes and effects. (HS-LS2-8) Energy and Matter ➤ Energy cannot be created or destroyed—it only moves between one place and 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) ➤ Change and rates of change can be quantified and modeled over very short or very long periods of time. Some system changes are irreversible. (HS-ESS3-3) ➤ Feedback (negative or positive) can stabilize or destabilize a system. (HS-ESS3-4) Systems and System Models ➤ When investigating or describing a system,
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sources of evidence, prioritized criteria, and trade off considerations. (HS-LS2-7) ➤ Design or refine a solution to a complex real-world problem, based on scientific knowledge, student-generated sources of evidence, prioritized criteria, and tradeoff considerations. (HS-ESS3-4) Engaging in Argument from Evidence ➤ 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 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.	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 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-LS2-6) ➤ 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	the boundaries and initial conditions of the system need to be defined and their inputs and outputs analyzed and described using models. (HS-ESS3-6) <i>Connections to Engineering, Technology, and Applications of Science</i> Influence of Science, Engineering, and Technology on Society and the Natural World ➤ Modern civilization depends on major technological systems. (HS-ESS3-3) ➤ Engineers continuously modify these technological systems by applying scientific knowledge and engineering design practices to increase benefits while decreasing costs and risks. (HS-ESS3-4) ➤ New technologies can have deep impacts on society and the environment, including some that were not anticipated. (HS-ESS3-3) <i>Connections to Nature of Science</i> Science is a Human Endeavor ➤ Science is a result of human endeavors, imagination, and creativity. (HS-ESS3-3)
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(HS-LS2-3) ➤ 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)	Group Behavior ➤ Group behavior has evolved because membership can increase the chances of survival for individuals and their genetic relatives. (HS-LS2-8) 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	
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	inspirational value. (secondary to HS-LS2-7) (Note: This Disciplinary Core Idea is also addressed by HS-LS4-6.) 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-LS2-7) ESS2.D: Weather and Climate ➤ Current models predict that, although future regional climate changes will be complex and varied, average global temperatures will continue to rise. The outcomes predicted by global climate models strongly depend on the amounts of human-generated greenhouse gases added to the atmosphere each year and by the ways in which these gases are absorbed by the ocean and biosphere. (secondary to HS-ESS3-6)	
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	ESS3.C: Human Impacts on Earth Systems ➤ The sustainability of human societies and the biodiversity that supports them requires responsible management of natural resources. (HS-ESS3-3) ➤ Scientists and engineers can make major contributions by developing technologies that produce less pollution and waste and that preclude ecosystem degradation. (HS-ESS3-4) ESS3.D: Global Climate Change ➤ Through computer simulations and other studies, important discoveries are still being made about how the ocean, the atmosphere, and the biosphere interact and are modified in response to human activities. (HS-ESS3-6) 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,	
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	cultural, and environmental impacts. (secondary HS-ESS3-4)	
<i>Articulation of DCIs across grade-bands:</i> MS.LS3.A ; MS.LS3.B		
Unit 6 Supporting and Additional Standards/Interdisciplinary Connections		
ELA/Literacy RI.CR.9-10.1. Cite a range and thorough textual evidence and make clear and relevant connections, to strongly support an analysis of multiple aspects of what an informational text says explicitly and inferentially, as well as interpretations of the text. (HS-LS2-3),(HS-LS2-6),(HS-LS2-8),(HS-ESS3-4) RI.MF.9-10.6. Analyze, integrate, and evaluate multiple interpretations (e.g., charts, graphs, diagrams, videos) of a single text or text/s presented in different formats (visually, quantitatively) as well as in words in order to address a question or solve a problem. (HS-LS2-6),(HS-LS2-7),(HS-LS2-8) RI.AA.9-10.7. Describe and evaluate the argument and specific claims in an informational text, assessing whether the reasoning is valid and the evidence is relevant and sufficient; identify false statements and reasoning (HS-LS2-6),(HS-LS2-7),(HS-LS2-8),(HS-ESS3-4) W.IW.9-10.2. 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 to make important connections and distinctions; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aid in comprehension. ➤ Develop the topic with well-chosen, relevant, and sufficient 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 to link the major sections of the text, create cohesion, and clarify the relationships among complex ideas and concepts. ➤ Use precise language and domain-specific vocabulary 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 information or explanation presented (e.g., articulating implications or the significance of the topic). (HS-LS2-3) W.WP.9-10.4. Develop and strengthen writing as needed by planning, revising, editing,		

rewriting, trying a new approach; sustaining effort to complete complex writing tasks; seeking out feedback and reflecting on personal writing progress; 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.9-10.5. 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-LS2-4), (HS-LS2-6), (HS-LS2-7), (HS-ESS3-3), (HS-ESS3-4), (HS-ESS3-6)

MP.4 Model with mathematics. (HS-LS2-4), (HS-ESS3-3), (HS-ESS3-6)

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-LS2-4), (HS-LS2-7), (HS-ESS3-4), (HS-ESS3-6)

HSN.Q.A.2 Define appropriate quantities for the purpose of descriptive modeling.

(HS-LS2-4), (HS-LS2-7), (HS-ESS3-4), (HS-ESS3-6)

HSN.Q.A.3 Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. (HS-LS2-4), (HS-LS2-7), (HS-ESS3-4), (HS-ESS3-6)

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

Disciplinary Concepts

Creativity and Innovation (9.4),
Critical Thinking and Problem Solving (9.4),
Global and Cultural Awareness (9.4),
Information and Reading Literacy (9.4),
Technology Literacy (9.4)

Core Ideas

Performance Expectations

(Identified with Standard Number and Statement)

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

9.4.12.CT.1: Identify problem-solving strategies used in the development of an innovative

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process, particularly for global issues where diverse solutions are needed	product or practice (e.g., 1.1.12acc.C1b, 2.2.12.PF.3). 9.4.12.CT.2: Explain the potential benefits of collaborating to enhance critical thinking and problem solving (e.g., 1.3E.12profCR3.a). 9.4.12.CT.3: Enlist input from a variety of stakeholders (e.g., community members, experts in the field) to design a service learning activity that addresses a local or global issue (e.g., environmental justice).
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).
In order for members of our society to participate productively, information needs to be shared accurately and ethically.	9.4.12.IML.5: Evaluate, synthesize, and apply information on climate change from various sources appropriately (e.g., 2.1.12.CHSS.6, S.IC.B.4, S.IC.B.6, 8.1.12.DA.1, 6.1.12.GeoHE.14.a, 7.1.AL.PRSENT.2). 9.4.12.IML.6: Use various types of media to produce and store information on climate change for different purposes and audiences with sensitivity to cultural, gender, and age diversity (e.g., NJSLSA.SL5).
Accurate information may help in making valuable and ethical choices.	9.4.12.IML.7: Develop an argument to support a claim regarding a current workplace or

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	societal/ethical issue such as climate change (e.g., NJSLSA.W1, 7.1.AL.PRSNT.4).
Digital tools differ in features, capacities, and styles. Knowledge of different digital tools is helpful in selecting the best tool for a given task.	9.4.12.TL.1: Assess digital tools based on features such as accessibility options, capacities, and utility for accomplishing a specific task (e.g., W.11-12.6.). 9.4.12.TL.2: Generate data using formula-based calculations in a spreadsheet and draw conclusions about the data.
Collaborative digital tools can be used to access, record and share different viewpoints and to collect and tabulate the views of groups of people.	9.4.12.TL.3: Analyze the effectiveness of the process and quality of collaborative environments. 9.4.12.TL.4: Collaborate in online learning communities or social networks or virtual worlds to analyze and propose a resolution to a real-world problem (e.g., 7.1.AL.IPERS.6).
Unit 6 New Jersey Student Learning Standards: Computer Science and Design Thinking	
Disciplinary Concepts Data Analysis (8.1), Interaction of Technology and Humans (8.2), Effects of Technology on the Natural World (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.
Human needs and desires determine which new tools are developed.	8.2.2.ITH.1: Identify products that are designed to meet human wants or needs. 8.2.2.ITH.2: Explain the purpose of a product and its value.
Technology has changed the way people live and work.	8.2.2.ITH.3: Identify how technology impacts or improves life.

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Various tools can improve daily tasks and quality of life.	8.2.2.ITH.4: Identify how various tools reduce work and improve daily tasks. 8.2.2.ITH.5: Design a solution to a problem affecting the community in a collaborative team and explain the intended impact of the solution.
The use of technology developed for the human designed world can affect the environment, including land, water, air, plants, and animals. Technologies that use natural sources can have negative effects on the environment, its quality, and inhabitants. Reusing and recycling materials can save money while preserving natural resources and avoiding damage to the environment.	8.2.2.ETW.1: Classify products as resulting from nature or produced as a result of technology. 8.2.2.ETW.2: Identify the natural resources needed to create a product. 8.2.2.ETW.3: Describe or model the system used for recycling technology. 8.2.2.ETW.4: Explain how the disposal of or reusing a product affects the local and global environment.

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.	HS-ESS2-2: Analyze geoscience data to make the claim that one change to Earth's surface can create feedback that causes changes to other Earth systems.
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	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.

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human activity have increased carbon dioxide concentrations and thus affect climate.	
Resource availability has guided the development of human society.	HS-ESS3-1: Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards and changes in climate have influenced human activity.
All forms of energy production and other resource extraction have associated economic, social, environmental and geopolitical costs and risks as well as benefits. New technologies and social regulations can change the balance of these factors. 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.	HS-ESS3-2: Evaluate competing design solutions for developing, managing and utilizing energy and mineral resources based on cost-benefit ratios.
Scientists and engineers can make major contributions by developing technologies that produce less pollution and waste and that preclude ecosystem degradation. 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.	HS-ESS3-4: Evaluate or refine a technological solution that reduces impacts of human activities on climate change and other natural systems.
When evaluating solutions, it is important to take into account a range of constraints, including cost, safety, reliability, and aesthetics and to consider social,	HS-ETS1-3: Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability and aesthetics as well as possible social, cultural and environmental impacts.

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cultural and environmental impacts.	
Unit 6 Evidence of Student Learning	
Performance Tasks/Use of Technology: Use technology throughout the course to collect data, analyze it and make graphs, share information with others etc. Gizmos - various HHMI resources and labs (click-and learns, data analysis etc) Collect data from the deer cameras at BASF using Google Sheets to analyze and graph the results	Assessments Formative ➤ Observation ➤ Homework ➤ Class participation ➤ Graphic Organizers ➤ Projects ➤ Student Response Systems (ex.Clickers) ➤ Do-Now/Exit Cards ➤ Laboratories/Lab Reports ➤ 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 assessments Alternative ➤ Quizz ➤ Blooket ➤ Kahoot ➤ CER (claim, evidence, reasoning)
Unit 6 Essential Questions	
➤ In what ways can environmental changes—both natural and human-made—affect human health? ➤ How are environmental science and economics connected?	

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- What is sustainability, and why is it essential for the future of our environment?
- How can individuals impact environmental issues through personal choices and civic engagement?

Unit 6 Knowledge and Skills

Enduring Understandings	Learning Targets
<i>Students will know...</i> ➤ Environmental changes can contribute to the spread of infectious diseases. ➤ Sustainability is essential for protecting the future of the environment and the organisms that depend on it. ➤ Pollution can originate from both natural events and human activities. ➤ Many environmentally linked human diseases are caused by pathogens. ➤ Emerging diseases often result from pathogens that spread due to environmental changes and can jump between species. ● Individuals can influence environmental outcomes by promoting awareness, educating others, and taking on leadership roles.	<i>Students will be able to...</i> ➤ Explain how toxicology and epidemiology are used by scientists to study environmental impacts on human health. ➤ Analyze the connections between waste, pollution, and their effects on human health. ➤ Summarize key international conferences and agreements focused on environmental issues. ➤ Identify examples of how individuals, communities, and governments work to solve environmental problems. ➤ Outline significant milestones and events in the history of environmental science.

Unit 6 Instructional Plan

Suggested Activities	Resources
➤ Recycling poster campaign ➤ Reuse project - bring in items and repurpose them into something new	➤ Gizmos ➤ Textbook - ➤ Lab materials

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- Plant a garden
- Composting lab
- Campus trash clean up day
- Read an article on e-waste and design a plan to better recycle these items
- Pollution solutions
- Ted Talks (many exist on sustainability)
- Watch Down to Earth on Netflix with Zach Efron (2 episodes on renewable energy in Iceland, water quality and treatment in France)
- participate in Sustainability Week - coat drive, pollinator garden, visiting a conservation location/protected green space
- Campaign to switch from disposable to reusable containers, or stop using plastic bags
- Ethics and government laws and agencies - research and discuss

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 6 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