College Bound Environmental Science Curriculum

This curricula and accompanying instructional materials have been developed to align with the NJSLS and in accordance with the NJ Department of Education's guidelines to include: Curriculum designed to meet grade level expectations, integrated accommodations and modifications for students with IEPs, 504s, ELLs, and gifted and talented students, assessments including benchmarks, formative, summative, and alternative assessments, a list of core instructional and supplemental materials, pacing guide, interdisciplinary connections, integration of 21st century skills, integration of technology, and integration of 21st Century Life and Career standards.

About the Standards

In 1996, the New Jersey State Board of Education adopted the state's first set of academic standards called the Core Curriculum Content Standards. The standards described what students should know and be able to do upon completion of a thirteen-year public school education. Over the last twenty years, New Jersey's academic standards have laid the foundation for local district curricula that is used by teachers in their daily lesson plans.

Revised every five years, the standards provide local school districts with clear and specific benchmarks for student achievement in nine content areas. Developed and reviewed by panels of teachers, administrators, parents, students, and representatives from higher education, business, and the community, the standards are influenced by national standards, research-based practice, and student needs. The standards define a "Thorough and Efficient Education" as guaranteed in 1875 by the New Jersey Constitution. Currently the standards are designed to prepare our students for college and careers by emphasizing high-level skills needed for tomorrow's world.

The New Jersey Student Learning Standards include Preschool Teaching and Learning Standards, as well as nine K-12 standards for the following content areas: **21st Century Life and Careers, Comprehensive Health and Physical Education, English Language Arts, Mathematics, Science, Social Studies, Technology, Visual and Performing Arts, World Languages**

The most recent review and revision of the standards occurred in 2014. However, the standards in language arts and math underwent an additional review in 2015 with adoption by the New Jersey State Board of Education in May 2016.

Lower Cape May Regional School District Environmental Science Curriculum	
Content Area: SCIENCE	
Course Title: College Bound Environmental Science	**Grade level: 11th and 12th**

UNIT	DATES
Unit 1: Introduction to Environmental Science	**September 3 through 25**
Unit 2: Physical Properties of Matter	**September 26 through October 15**
Unit 3: Ecology	**October 15 through November 28**
Unit 4: Human Society and the Environment	**December 1 through 23**
Unit 5: Meteorology	**January 2 through 25**
Unit 6: Water Cycle and Human Water Use	**January 26 through February 21**
Unit 7: Soil and Mineral Resources	**February 21 – March 7**
Unit 8: Energy	**March 7 through April 7**
Unit 9: Solid Waste	**April 8 through 30**
Unit 10: Human Communities (agriculture and land use planning	**May 1 – June 15**
Date Created: September 20, 2019	**Board Approved On: 11/21/19**

Lower Cape May Regional School District Environmental Science Curriculum
Unit 1 Overview

Content Area: Environmental Science

Unit Title: Introduction to Environmental Science

Target Course/Grade Level: 11th and 12th

Unit Summary:
This unit will cover the scope of environmental science, including how the environment works and the impacts of human actions on the environment. It will also include a refresher on how scientists acquire new information.
Topics include:

- Parts of the environment (ecosystems, natural resources, etc.)
- How human society relies on the environment
- How environmental science includes physical and biological science
- That the increasing human population taxes environmental resources
- The scientific method
- Major threats to the environment from human activity
- The idea that all human use of natural resources should be sustainable

Interdisciplinary Connections:
SOCIAL STUDIES: human society has impacts on the environment

21st Century Themes, Skills, and Standards:

- CRP1: students will be introduced to the ways humans impact the environment in positive and negative ways
- CRP7: Students will research a topic, develop and implement an experiment, make a conclusion and write up their results
- CRP8: Students will evaluate online information and make decisions about its value for use as a reference
- CRP12: students will work in groups of varied backgrounds to identify possible solutions to environmental problems

NGSS 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.
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
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).
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.

Learning Targets

CPI #	Cumulative Progress Indicators (CPI) for Unit
1	Students will be able to develop a method based on individual research
2	Students will be able to communicate the results of their lab activities through a lab report
3	Students will be able to work in small groups and freely offer their viewpoint

Unit Enduring Questions:

- How does human society affect the environment?
- How do newly developed technologies impact the environment?
- How can the scientific method be used to understand how something affects the environment?
- How do the scientific disciplines that are part of environmental science apply to a particular issue?

Unit Enduring Understandings:

- All resources used by human society come from the environment.
- Modern human society has the technical ability to deplete resources.
- The scientific method is a tool used by scientists to eliminate bias when answering questions in science.

Unit Objectives:

- Students will know that humans depend on natural resources for survival
- Students will know that environmental science is interdisciplinary, including physical and biologic science

Unit Objectives:

- Students will be able to list and describe the different types of natural resource.
- Students will be able to describe the interdisciplinary nature of environmental science
- Students will be able to state that the growing human population could overuse natural resources

• Students will know that the increasing human population taxes environmental resources • Students will know the scientific method for discovering new information • Students will know human activity can damage environmental systems • Students will know environmental science strives to develop sustainable solutions to environmental problems	• Students will be able to use the scientific method to answer a question • Students will be able to state that sustainable solutions are a goal of environmental science

Lower Cape May Regional School District Environmental Science Curriculum
Unit 2 Overview

Content Area: Physical Science

Unit Title: Physical Properties of Matter

Target Course/Grade Level: 11th and 12th

Unit Summary:
This unit is a refresher, bringing students back up to speed on how matter behaves. This material is necessary for comprehending ideas presented in most parts of the course and are placed first. Topics include:

- Atomic Structure
- Ionic and Covalent Bonding
- Phases of Matter
- Temperature
- Density
- Specific and Latent Heat
- Absorption and Reflection of Radiant Energy

Interdisciplinary Connections:
This unit has no interdisciplinary connections that are covered within the unit. The interdisciplinary connections will be covered in later units when the concepts are applied to real world situations

21st Century Themes, Skills, and Standards:

- CRP2: students will apply their knowledge of how to measure and observe during the Physical Properties of Matter Lab
- CRP8: students will use their knowledge of the structure and behavior of matter to explain the results of the Physical Properties of Matter Lab

Learning Targets

CPI #	Cumulative Progress Indicators (CPI) for Unit

NGSS STANDARDS

HS-PS1-1.	**Use the periodic table as a model to predict the relative properties of elements based on the patterns of electrons in the outermost energy level of atoms.** [Clarification Statement: Examples of properties that could be predicted from patterns could include reactivity of metals, types of bonds formed, numbers of bonds formed, and reactions with oxygen.] [Assessment Boundary: Assessment is limited
HS-PS1-2.	**Construct and revise an explanation for the outcome of a simple chemical reaction based on the outermost electron states of atoms, trends in the periodic table, and knowledge of the patterns of chemical properties.** [Clarification Statement: Examples of chemical reactions could include the reaction of sodium and chlorine, of carbon and oxygen, or of carbon and

	hydrogen.] [Assessment Boundary: Assessment is limited to chemical reactions involving main group elements and combustion reactions.]
HS-PS1-5.	**Apply scientific principles and evidence to provide an explanation about the effects of changing the temperature or concentration of the reacting particles on the rate at which a reaction occurs.** [Clarification Statement: Emphasis is on student reasoning that focuses on the number and energy of collisions between molecules.] [Assessment Boundary: Assessment is limited to simple reactions in which there are only two reactants; evidence from temperature, concentration, and rate data; and qualitative relationships between rate and temperature.]
HS-PS1-7.	**Use mathematical representations to support the claim that atoms, and therefore mass, are conserved during a chemical reaction.** [Clarification Statement: Emphasis is on using mathematical ideas to communicate the proportional relationships between masses of atoms in the reactants and the products, and the translation of these relationships to the macroscopic scale using the mole as the conversion from the atomic to the macroscopic scale. Emphasis is on assessing students' use of mathematical thinking and not on memorization and rote application of problem- solving techniques.]
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 Enduring Questions: ● How can the physical properties of matter be used to develop solutions to problems?	**Unit Enduring Understandings:** • Matter is made up of atoms • Atoms are made of protons, neutrons and electrons • The density of matter is affected by temperature • Matter occurs in 3 phases: solid, liquid and gas • Temperature is a measure of how much energy is in matter • Different substances change temperature at different rates when the same amount of energy is absorbed • Matter absorbs energy while not changing temperature when transitioning from solid to liquid or liquid to gas (the opposite occurs when changing from gas to liquid or liquid to solid) • When radiant energy strikes an object, some fraction is absorbed and the rest is reflected • Absorbed energy is converted to heat
Unit Objectives: ● Student will know that matter is made of atoms and that atoms are made of protons, neutrons and electrons**.** ● Student will know that atoms bond together to form molecules and that the 2 types of bond that occur in molecules are ionic and covalent	**Unit Objectives:** ● Students will be able to diagram what happens during covalent and ionic bonding ● Students will be able to predict what will happen to the density of an object as temperature changes ● Students will be able to predict what will happen when 2 fluids of different densities are mixed ● Students will be able to compare the change in

● Student will know that matter occurs in solid, liquid and gas phases ● Student will know that temperature is a measure of how much energy is in a substance ● Student will know that density decreases as temperature decreases (and the opposite) ● Student will know that specific heat is the amount of energy needed to raise 1g of a substance 1 degree Celsius ● Student will know that latent heat is the energy absorbed or released during a phase change ● Student will know that energy striking an object is either absorbed or reflected	temperature that occurs when a light colored object and a dark object are put under a strong light source

Lower Cape May Regional School District Environmental Science Curriculum
Unit 3 Overview

Content Area: Biology and Earth Science

Unit Title: Ecology

Target Course/Grade Level: 11th and 12th

Unit Summary:
The natural world is the support system for all organisms. This unit will provide students with a strong background in the structure of ecosystems and how matter and energy move through these systems. Additionally, the unit will include study of interactions between species, ecosystem diversity, stability and change over time. Topics include:

- ecosystem structure
- energy flow
- ecosystem diversity
- changes over time
- biogeochemical cycles
- population biology (carrying capacity, reproductive strategies, survivorship), including the human population
- ecosystem services
- world biomes, biome distribution, effects of human changes to biomes such as deforestation both terrestrial and aquatic/marine

Interdisciplinary Connections:

- MATH: math is required when measuring biodiversity or estimating population size
- SOCIAL STUDIES: human society depends on ecosystem services; human actions affect ecosystems
- ENGLISH: good writing skills are needed to effectively communicate observations

21st Century Themes, Skills, and Standards:

- CRP1: an understanding of ecological principles will allow students to act as responsible citizens, making decisions that have the minimal impact on the environment throughout their lives
- CRP2: apply math skills when calculating biodiversity or estimating population size
- CRP4: effective communicate their observations made during various lab activities
- CRP5: apply their knowledge of ecology to environmental, social and economic decisions
- CRP7: use recognized techniques to estimate population size
- CRP8: use critical thinking to brainstorm possible solutions to environmental problems

Learning Targets

CPI #	Cumulative Progress Indicators (CPI) for Unit

NGSS STANDARDS

HS-LS2-1.	**Use mathematical and/or computational representations to support explanations of factors that affect carrying capacity of ecosystems at different scales.** [Clarification Statement: Emphasis is on quantitative analysis and comparison of the relationships among interdependent factors including boundaries, resources, climate, and competition. Examples of mathematical comparisons could include graphs, charts, histograms, and population changes gathered from simulations or historical data sets.] [Assessment Boundary: Assessment does not include deriving mathematical equations to make comparisons.]
HS-LS2-2.	**Use mathematical representations to support and revise explanations based on evidence about factors affecting biodiversity and populations in ecosystems of different scales.** [Clarification Statement: Examples of mathematical representations include finding the average, determining trends, and using graphical comparisons of multiple sets of data.] [Assessment Boundary: Assessment is limited to provided data.]
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-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,
HS-ES-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.
HS-ES-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).

HS-ES-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).
HS-ES-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: An example of the far-reaching impacts from a 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.
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.

Unit Enduring Questions: While examining a specific ecosystem: • How will is change over time? • How might a specific human action affect an ecosystem? In general: • How would a specific human action affect a particular biogeochemical cycle? • How might the carrying capacity of an ecosystem be affected by a change in the ecosystem? • How might the worldwide distribution of biomes change as the world's climate changes?	**Unit Enduring Understandings:** • All ecosystems contain producers, consumers and decomposers • Matter is recycled in the biosphere through biogeochemical cycles • The sun is the energy source for most of earth's ecosystems and energy makes a one way trip through ecosystems • All ecosystems change over time • All ecosystems have a specific number of organisms they can support • Ecosystems provide water and oxygen to the planet through the recycling of matter • There are many biomes found on the planet; the specific biome found in a place depends on the physical conditions found there such as temperature, rainfall and soil pH
Unit Objectives: • Student will know that all ecosystems have the same components • Student will know that energy makes a one way trip through ecosystems while matter is recycled • Student will know that carrying capacity is the number of organisms an ecosystem can support • Student will know that biodiversity is a measure of the number of different types of organism an ecosystem supports and the relative abundance of the different types of organism	**Unit Objectives:** • Students will be able to list and describe the components of all ecosystems • Students will be able to describe how matter and energy move through ecosystems • Students will be able to be able to describe carrying capacity and predict how changes in climate or other alterations of the physical conditions of an ecosystem would affect carrying capacity • Students will be able to calculate a biodiversity index • Students will be able to predict changes in the distribution of world biomes given a specific

• Student will know that the distribution of world biomes is dictated by physical conditions	physical change

Lower Cape May Regional School District (Insert Subject/Content Area) Curriculum
Unit 4 Overview

Content Area: Physical Science, Life Science, Social Studies

Unit Title: Human Society and the Environment

Target Course/Grade Level: 11th and 12th

Unit Summary:
Humans are part of the environment, depend on the environment for the resources needed for survival and have an impact on the environment. This unit looks at the structure of human society, historical and current views of the responsibility of human society to the environment and the development of environmental ethics.

- The development of human society from hunter gatherer times to the current age of technology
- The impact of the rapidly growing human population on the environment and availability of resources
- The different ways ethics are applied to human interactions with the environment
- The relationships between environmental ethics, economics and sustainable environmental practices

Interdisciplinary Connections:
- SOCIAL STUDIES: students will consider the way the government works when considering environmental issues
- ENGLISH: students will be able to effectively communicate their knowledge of
- BUSINESS: students will consider the short and long term economics of environmental decisions

21st Century Themes, Skills, and Standards:
- CRP1: acquire knowledge that will allow a student to make responsible environmental decisions
- CRP5: be able to determine the environmental social and environmental consequences of decisions
- CRP8: apply critical thinking to apply knowledge of environmental issues to solving problems
- CRP9: Consider moral and ethical aspects when making environmental decisions

Learning Targets

CPI #	Cumulative Progress Indicators (CPI) for Unit
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.]
The human aspect of these standards is covered in this unit. The scientific aspects are covered in different units	
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. [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 the 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 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's 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. [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 a 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.]
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.

Unit Enduring Questions: ● How will future changes in human society affect the environment? ● How should society handle the growing human population? ● How will this action affect human society?	**Unit Enduring Understandings:** ● Human society is constantly evolving**.** ● Humans, today, have the ability to drastically change the environment, affecting other organisms ● Environmental ethics considers the morality of human actions that affect the environment. ● Sustainable practices consider human quality of life and economics as well as ecological impacts.
Unit Objectives: ***Students will know….*** ● That human society is always changing ● That modern technology and human actions can cause ecosystem change. ● That environmental sustainability considers human and ecological factors. ● That environmental ethics considers the morality of human actions	**Unit Objectives:** ***Students will be able to…...*** ● Evaluate the impacts of human actions on the environment ● Consider the impacts of their decisions on the environment ● Consider sustainability and morality when making decisions

Lower Cape May Regional School District Environmental Science Curriculum
Unit 5: Overview

Content Area: Earth Science

Unit Title: Meteorology

Target Course/Grade Level: 11th and 12th grages

Unit Summary:
Meteorology is the effect of incoming solar radiation on the earth's atmosphere. This unit addresses the structure of the earth's atmosphere, how incoming radiation affects both the gasses in the atmosphere and the earth's surface and how those effects cause weather. Topics include:

- Composition of the atmosphere
- Absorption, Reflection and Scattering of electromagnetic radiation
- Climate, seasons and latitude
- Convection and Coriolis effect
- Local and global winds
- Humidity (specific and relative)
- Cloud formation and types of cloud
- Air masses, fronts and weather maps
- The pollutants that are added to the atmosphere
- Changes in weather patterns due to climate change
- The impact of legislation on air quality

Interdisciplinary Connections:

- BIOLOGY – climate and weather affects ecosystems in both the short and the long term
- SOCIAL STUDIES – climate and weather affect agriculture and human living conditions

21st Century Themes, Skills, and Standards:
CRP1. Act as a responsible and contributing citizen and employee.
CRP2. Apply appropriate academic and technical skills.
CRP4. Communicate clearly and effectively and with reason.
CRP5. Consider the environmental, social and economic impacts of decisions.
CRP7. Employ valid and reliable research strategies.
CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.
CRP10. Plan education and career paths aligned to personal goals.
CRP11. Use technology to enhance productivity.
CRP12. Work productively in teams while using cultural global competence.

Learning Targets

CPI #	Cumulative Progress Indicators (CPI) for Unit
HS-ESS2-4.	**Use a model to describe how variations in the flow of energy into and out of Earth systems result in changes in climate**. [Clarification Statement: Examples of the causes of climate change differ by timescale, over 1-10 years: large volcanic eruption, ocean circulation; 10-100s of years: changes in human activity, ocean circulation, solar output; 10-100s of thousands of years: changes to Earth's orbit and the orientation of its axis; and 10-100s of millions of years: long-term changes in atmospheric composition.]
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.
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)
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.

Unit Enduring Questions: ● How do human actions affect climate and weather? ● .How does the sun's energy cause wind? ● How does the Coriolis Effect cause global wind patterns? ● How does air temperature affect relative humidity?	**Unit Enduring Understandings:** ● The angle of inclination for solar radiation is the major cause of the temperature gradient between the equator and the poles ● Global wind cells are the major cause of wet and dry regions around the planet ● The Coriolis Force causes hurricanes to spin, the trade winds and westerlies ● Human CO_2 emissions are the cause of accelerated climate change
Unit Objectives: ***Students will know….*** ● That warm air rises and cooler air sinks ● That the earth's rotation causes the Coriolis effect ● That incoming solar radiation is absorbed, reflected or scattered as it enters the atmosphere and hits gas molecules	**Unit Objectives:** ***Students will be able to…...*** ● Read weather map ● Identify areas of high and low air pressure based on wind direction ● Predict the flow of air around areas of high and low air pressure ● Predict changes in world weather caused by climate change

Lower Cape May Regional School District Environmental Science Curriculum
Unit 6 Overview

Content Area: Earth Science and Biology

Unit Title: Water Cycle and Human Water Use

Target Course/Grade Level: 11th and 12th grade

Unit Summary:
Surface and ground water are important parts of the total water cycle that are stressed during this unit. Generally speaking, incoming students are well versed in the evaporation/condensation/precipitation part of the water cycle. This unit introduces both surface and ground water, flow of both and storage times. Human water use and sustainability are addressed in this unit. Topics include:

- condensation, evaporation and precipitation
- surface water and watersheds
- aquifers and relationship with surface water
- treatment of drinking water
- treatment of wastewater
- environmental impacts of wastewater recharge
- relationship between withdrawal and recharge of aquifers
- saltwater intrusion

Interdisciplinary Connections:

- SOCIAL STUDIES – water is critical for industry, human health, ecotourism and other human endeavors

21st Century Themes, Skills, and Standards:
CRP1. Act as a responsible and contributing citizen and employee.
CRP2. Apply appropriate academic and technical skills.
CRP4. Communicate clearly and effectively and with reason.
CRP5. Consider the environmental, social and economic impacts of decisions.
CRP6. Demonstrate creativity and innovation.
CRP7. Employ valid and reliable research strategies.
CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.
CRP9. Model integrity, ethical leadership and effective management.
CRP10. Plan education and career paths aligned to personal goals.
CRP11. Use technology to enhance productivity.
CRP12. Work productively in teams while using cultural global competence.

Learning Targets

CPI #	Cumulative Progress Indicators (CPI) for Unit
HS-ESS2-4.	**Use a model to describe how variations in the flow of energy into and out of Earth systems result in changes in climate.** [Clarification Statement: Examples of the causes of climate change differ by timescale, over 1-10 years: large volcanic eruption, ocean circulation; 10-100s of years: changes in human activity, ocean circulation, solar output; 10-100s of thousands of years: changes to Earth's orbit and the orientation of its axis; and 10-100s of millions of years: long-term changes in atmospheric composition.] [Assessment Boundary: Assessment of the results of changes in climate is limited to changes in surface temperatures, precipitation patterns, glacial ice volumes, sea levels, and biosphere distribution.]
HS-ESS2-5.	**Plan and conduct an investigation of the properties of water and its effects on Earth materials and surface processes.** [Clarification Statement: Emphasis is on mechanical and chemical investigations with water and a variety of solid materials to provide the evidence for connections between the hydrologic cycle and system interactions commonly known as the rock cycle. Examples of mechanical investigations include stream transportation and deposition using a stream table, erosion using variations in soil moisture content, or frost wedging by the expansion of water as it freezes. Examples of chemical investigations include chemical weathering and recrystallization (by testing the solubility of different materials) or melt generation (by examining how water lowers the melting temperature of most solids).]
HS-ESS2-6.	**Develop a quantitative model to describe the cycling of carbon among the hydrosphere, atmosphere, geosphere, and biosphere.** [Clarification Statement: Emphasis is on modeling biogeochemical cycles that include the cycling of carbon through the ocean, atmosphere, soil, and biosphere (including humans), providing the foundation for living organisms.]
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 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-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-ESS2-4.	**Use a model to describe how variations in the flow of energy into and out of Earth systems result in changes in climate.** [Clarification Statement: Examples of the causes of climate change differ by timescale, over 1-10 years: large volcanic eruption, ocean circulation; 10-100s of years: changes in human activity, ocean circulation, solar output; 10-100s of thousands of years: changes to Earth's orbit and the orientation of its axis; and 10-100s of millions of years: long-term changes in atmospheric composition.] [Assessment Boundary: Assessment of the results of changes in climate is limited to changes in surface temperatures, precipitation patterns, glacial ice volumes, sea levels, and biosphere distribution.]
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).]
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.
Unit Enduring Questions: ● How will various human actions affect the availability of water for both the environment and human society?	**Unit Enduring Understandings:** ● The amount of water on the planet is finite ● Only a tiny part of earth's water is fresh ● Most of earth's freshwater is frozen or underground ● Water moves between various storage types ● Humans must purify water before distributing it for use ● Human and environmental health depends on treatment of wastewater
Unit Objectives: ***Students will know….*** ● That the sun's energy drives the water cycle ● That water constantly moves around the planet ● That human activities can pollute water to the point that it is not usable to humans ● That technologies to purify drinking and waste water exist, how they work and that the costs of the technologies must be factored into the cost of running a community	**Unit Objectives:** ***Students will be able to…...*** ● Weigh the costs and benefits of different human activities on water quality ● Describe the effects of over pumping on coastal aquifers ● Describe the processes of drinking water treatment and wastewater treatment

Lower Cape May Regional School District Environmental Science Curriculum
Unit 7 Overview

Content Area: Earth Science

Unit Title: Soil and Mineral Resouces

Target Course/Grade Level: 11th and 12th grade

Unit Summary:
This unit focuses on the substances humans extract from the earth for energy and manufacturing purposes. The environmental impacts of extraction on human and natural communities are a focus. Topics include:

- types of resource
  - renewable/non-renewable
- methods of extraction
  - wells
  - mines (tunnel and strip)
- environmental impacts of extraction

Interdisciplinary Connections:

- SOCIAL STUDIES – natural resources are needed for the running of society

21st Century Themes, Skills, and Standards:
CRP1. Act as a responsible and contributing citizen and employee.
CRP2. Apply appropriate academic and technical skills.
CRP5. Consider the environmental, social and economic impacts of decisions.
CRP6. Demonstrate creativity and innovation.
CRP7. Employ valid and reliable research strategies.
CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.
CRP9. Model integrity, ethical leadership and effective management.
CRP11. Use technology to enhance productivity.
CRP12. Work productively in teams while using cultural global competence.

Learning Targets

CPI #	Cumulative Progress Indicators (CPI) for Unit
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.** [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 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 a 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.]

Unit Enduring Questions: ● What are the environmental impacts of different resources? ● What are the environmental impacts of acquiring different resources? ● What are possible substitutes for different resources and are the substitutes a better option?	**Unit Enduring Understandings:** • All resources used by humans have an impact on the environment • The acquisition of resources has an impact on the environment • Sustainable practices will require intensive evaluation of how resources are used and the development of new resources
Unit Objectives: ***Students will know….*** ● The difference between a renewable and a non-renewable resource ● How different methods of resource extraction impact the environment	**Unit Objectives:** ***Students will be able to…...*** • Evaluate the resources they use every day and make decisions based on the environmental impacts of the resources

Lower Cape May Regional School District Environmental Science Curriculum
Unit 8 Overview

Content Area: Earth Science

Unit Title: Energy

Target Course/Grade Level: 11th and 12th grade

Unit Summary:
This unit has students examining how people all over the world use energy and how it impacts the environment. Environmental impacts are a large part of the topic. Here the focus is on sustainability. Topics include:

- energy sources
  - fossil fuels
  - water
  - nuclear
  - wind
  - solar
  - geothermal
  - hydrogen
  - biomass
- environmental impacts of all sources of energy
- sustainability of all sources of energy
- socio/political aspects of energy

Interdisciplinary Connections:

- SOCIAL STUDIES – energy is required to power all aspects of modern society
- BIOLOGY - use of energy has impacts on ecosystems

21st Century Themes, Skills, and Standards:
CRP1. Act as a responsible and contributing citizen and employee.
CRP2. Apply appropriate academic and technical skills.
CRP4. Communicate clearly and effectively and with reason.
CRP5. Consider the environmental, social and economic impacts of decisions.
CRP6. Demonstrate creativity and innovation.
CRP7. Employ valid and reliable research strategies.
CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.
CRP9. Model integrity, ethical leadership and effective management.
CRP10. Plan education and career paths aligned to personal goals.
CRP11. Use technology to enhance productivity.
CRP12. Work productively in teams while using cultural global competence.

Learning Targets

CPI #	Cumulative Progress Indicators (CPI) for Unit
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-PS2-5.	**Plan and conduct an investigation to provide evidence that an electric current can produce a magnetic field and that a changing magnetic field can produce an electric current.** [Assessment Boundary: Assessment is limited to designing and conducting investigations with provided materials and tools.]
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.** [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 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-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.**

Unit Enduring Questions: ● What technologies can be applied to minimize the environmental impacts of different forms of energy ●	**Unit Enduring Understandings:** ● All forms of energy have environmental impacts, which can be positive or negative ● Modern society requires energy to run ● Human energy sources can have significant environmental impacts ● Sustainable development requires consideration of the environmental costs of energy
Unit Objectives: ***Students will know….*** ● How each of the sources of energy listed	**Unit Objectives:** ***Students will be able to…...*** ● Describe different sources of energy and their

above are used by humans and the positive and negative environmental impacts of the sources	environmental impacts ● Evaluate their position on human use of energy and the environmental impacts of energy ● Critically evaluate their energy choices

Lower Cape May Regional School District (Insert Subject/Content Area) Curriculum
Unit 9 Overview

Content Area:

Unit Title: Solid Waste

Target Course/Grade Level: 11th and 12th Grade

Unit Summary:
People living in the United States generate more solid waste per capita than citizens of any other county in today's world. This unit will cover how that waste is currently handled and the types of technologies that are being developed to reduce the amount of waste. Topics include:

- types of waste
- how the waste is collected
- recycling programs and markets for recyclables
- landfill design

Interdisciplinary Connections:

- SOCIAL STUDIES: human society must manage the waste it generates
- ECONOMICS: the costs of managing wastes must be incorporated into municipal operations

21st Century Themes, Skills, and Standards:
CRP1. Act as a responsible and contributing citizen and employee.
CRP2. Apply appropriate academic and technical skills.
CRP4. Communicate clearly and effectively and with reason.
CRP5. Consider the environmental, social and economic impacts of decisions.
CRP6. Demonstrate creativity and innovation.
CRP7. Employ valid and reliable research strategies.
CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.
CRP9. Model integrity, ethical leadership and effective management.
CRP10. Plan education and career paths aligned to personal goals.
CRP11. Use technology to enhance productivity.
CRP12. Work productively in teams while using cultural global competence

Learning Targets

CPI #	Cumulative Progress Indicators (CPI) for Unit
HS-ESS3-4.	Evaluate or refine a technological solution that reduces impacts of human activities on natural systems
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.

Unit Enduring Questions: ● How can societal wastes be minimized? ● How can the environmental impact of waste disposal be minimized	**Unit Enduring Understandings:** • Wastes produced by society have the potential to damage the environment • In many places a clean environment is essential to a healthy economy • The costs and benefits of waste disposal must be constantly evaluated
Unit Objectives: ***Students will know….*** ● That currently citizens of the US generate more solid waste than citizens of any other country in the world ● That much of the waste stream is not biodegradable ● That well-constructed landfills keep substances from entering groundwater	**Unit Objectives:** ***Students will be able to…...*** ● Evaluate their lifestyle choices with respect to how much solid waste is produced ● Evaluate different solid waste disposal options with respect to their impacts on the environment ● Evaluate new technologies for handling solid waste

Lower Cape May Regional School District Environmental Science Curriculum
Unit 10 Overview

Content Area: Life Science

Unit Title: Human Communities (Agriculture and Land Use Planning)

Target Course/Grade Level: 11th and 12th

Unit Summary:
The types of human communities around the world will be covered as well as how agriculture feeds those communities. Land use planning will provide students with the opportunity to think about what they value in a place to live and how to achieve it. Topics include:

- agriculture
  - history
  - modern
  - industrial/organic/I.P.M
  - environmental impacts
- land use planning
  - farm to table versus food miles
  - types of community
    - urban
    - suburban
    - rural
    - environmental impacts of each type of community
  - sprawl versus walkable communities
  - planning for environmental hazards
  - sustainable use of resources

Interdisciplinary Connections:

- SOCIAL STUDIES: land use and urban planning take human needs into account as well as environmental considerations

21st Century Themes, Skills, and Standards:
CRP1. Act as a responsible and contributing citizen and employee.
CRP2. Apply appropriate academic and technical skills.
CRP4. Communicate clearly and effectively and with reason.
. Consider the environmental, social and economic impacts of decisions.
CRP6. Demonstrate creativity and innovation.
CRP7. Employ valid and reliable research strategies.
CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.
CRP9. Model integrity, ethical leadership and effective management.
CRP10. Plan education and career paths aligned to personal goals.
CRP11. Use technology to enhance productivity.
CRP12. Work productively in teams while using cultural global competence

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

Unit Enduring Questions: ● How can human communities and health ecosystems co-exist? ● How can human communities minimize the impacts of natural hazards? ● How can all citizens of community have access to natural areas and open space?	**Unit Enduring Understandings:** • Well-designed human communities enhance the quality of life for all residents • Well-designed human communities minimize impacts on the environment • Locally produced food is part of a sustainable food supply
Unit Objectives: ***Students will know….*** ● That all human activity impacts the environment (either positively or negatively) ● That a variety of techniques, such as retention basins, rain gardens and permeable paving are available to help communities manage storm water ● That organic agriculture and integrated pest management practices can minimize non-target impacts of agriculture ● That natural hazards are everywhere and that planning is needed to minimize the impact of hazards on human communities	**Unit Objectives:** ***Students will be able to…...*** • Evaluate personal food and land use choices in the future • Make informed choices regarding societal decisions such as referendums regarding infrastructure during elections

Lower Cape May Regional School District (Insert Subject/Content Area) Curriculum
Evidence of Learning

Specific Formative Assessments Utilized in Daily Lessons:

- Exit ticket and warm up activities posted in Google Classroom will be used to gauge student comprehension at the end of a lesson and what they remember at the start of the next class period
- Regular quizzes administered in Google Classroom will provide the instructor with feedback on student progress toward mastery, plus provide students with immediate feedback on their progress.
- Subsequent quizzes will provide students with an opportunity to improve both their mastery and score
- Lab and other classroom activities will require students to build models, collect and graph data
- Students will be able to practice using vocabulary and test their mastery of the terms for different units with vocabulary sets posted on Quizlet

Summative Assessment Utilized throughout Units:

- Unit test at the end of each unit
- Semester cumulative test at the end of each semester
- Benchmark lab activities will require students to apply concepts

Modifications for ELL's, Special Education, 504, and Gifted and Talented Students:

- Teacher tutoring
- Peer tutoring
- Cooperative Learning Groups
- Modified Assignments
- Differentiated Instruction
- Response to Intervention (www.help4teachers.com)
- Follow all IEP and 504 modifications

Teacher Notes:

- As required by the NJ Department of Education, teachers in all content areas will integrate the 21st Century Life and Careers Standards. As the NJDOE indicates, "Providing New Jersey students with the life and career skills needed to function optimally within this dynamic context is a critical focus and organizing principle of K-12 public education. New Jersey has both an obligation to prepare its young people to thrive in this environment, and a vested economic interest in grooming an engaged citizenry made up of productive members of a global workforce that rewards innovation, creativity, and adaptation to change." The links below indicate the CPIs for grade ranges and need to be addressed throughout the units of study:
  Life and Career Standards
- As indicated in the NJSLS, standards and interdisciplinary connections will be integrated throughout content area curriculum. Links to relevant content standards can be found below:

Project-based Learning Tasks:

- Sow Bug Experimental Design Lab

- Pond Study
- Sustainable Water Project
- Growing Aquatic Plants project
- Wind Turbine Project
- Cape May County Land Use Planning Capstone Project

Vocabulary:

- Vocabulary sets will be posted on Quizlet for student practice
- Students will be required to use vocabulary when answering lab and test questions

The Research Process:

- Students will be required to evaluate the reliability of all sources used in various activities and complete a website evaluation form for each project. Student scores on projects requiring research will include an evaluation of the quality of the resources
- Most units will include activities requiring students to find their own information. Examples include:
  - Leaf Project: students research the life history of plant species
  - Sustainable Water Project: students research the aquifer recharge and withdrawals in Southern NJ and technologies for purifying water. The information is used to develop a sustainable plan for the region
  - Wind Turbine Project: students research wind turbine design and blade design and apply the information to the building of a wind turbine
  - Capstone Land Use Plan: students must research sustainable development and apply everything learned during the year to develop a sustainable land use plan for Lower Township

Technology:

- Students must engage in technology applications integrated throughout the curriculum.
  - Assignments will be posted in Google Classroom with links to selected references
  - Vocabulary sets will be posted in quizlet,
  - Microscopes will allow students to view organisms too small to be seen with the naked eye

Resources:

Differentiation Strategies

Differentiation strategies can require varied amounts of preparation time. High-prep strategies often require a teacher to both create multiple pathways to process information/demonstrate learning and to assign students to those pathways. Hence, more ongoing monitoring and assessment is often required. In contrast, low-prep strategies might require a teacher to strategically create process and product choices for students, but students are allowed to choose which option to pursue given their learning profile or readiness level. Also, a low-prep strategy might be focused on a discrete skill (such as vocabulary words), so there are fewer details to consider. Most teachers find that integration of one to two new low-prep strategies and one high-prep strategy each quarter is a reasonable goal.

Low Prep Strategies (add to list as needed)	
Varied journal prompts, spelling or vocabulary lists	Students are given a choice of different journal prompts, spelling lists or vocabulary lists depending on level of proficiency/assessment results.
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 books	Different textbooks or novels (often at different levels) that students are allowed to choose from for content study or for literature circles.
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 individual. 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.

Multiple Intelligence or Learning Style options	Students select activities or are assigned an activity that is designed for learning a specific area of content through their strong intelligence (verbal-linguistic, interpersonal, musical, etc.)
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 predetermined 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.
Mini workshops to re-teach or extend skills	A short, specific lesson with a student or group of students that focuses on one area of interest or reinforcement of a specific skill.
Orbitals	Students conduct independent investigations generally lasting 3-6 weeks. The investigations "orbit" or revolve around some facet of the curriculum.
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.)
High Prep Strategies (add to list as needed)	
Cubing	Designed to help students think about a topic or idea from many different angles or perspectives. The tasks are placed on the six sides of a cube and use commands that help support thinking (justify, describe, evaluate, connect, etc.). The students complete the task on the side that ends face up, either independently or in homogenous groups.
Tiered assignment/ product	The content and objective are the same, but the process and/or the products that students must create to demonstrate mastery are varied according to the students' readiness level.

Independent studies	Students choose a topic of interest that they are curious about and wants to discover new information on. Research is done from questions developed by the student and/or teacher. The researcher produces a product to share learning with classmates.
4MAT	Teachers plan instruction for each of four learning preferences over the course of several days on a given topic. Some lessons focus on mastery, some on understanding, some on personal involvement, and some on synthesis. Each learner has a chance to approach the topic through preferred modes and to strengthen weaker areas
Jigsaw	Students are grouped based on their reading proficiency and each group is given an appropriate text on a specific aspect of a topic (the economic, political and social impact of the Civil War, for example). Students later get into heterogeneous groups to share their findings with their peers, who have read about different areas of study from source texts on their own reading levels. The jigsaw technique allows you to tackle the same subject with all of your students while discreetly providing them the different tools they need to get there.
Multiple texts	The teacher obtains or creates a variety of texts at different reading levels to assign strategically to students.
Alternative assessments	After completing a learning experience via the same content or process, the student may have a choice of products to show what has been learned. This differentiation creates possibilities for students who excel in different modalities over others (verbal versus visual).
Modified Assessments	Assessments can be modified in a variety of ways – for example by formatting the document differently (e.g. more space between questions) or by using different types of questions (matching vs. open ended) or by asking only the truly essential questions.
Learning contracts or Personal Agendas	A contract is a negotiated agreement between teacher and student that may have a mix of requirements and choice based on skills and understandings considered important by the teacher. A personal agenda could be quite similar, as it would list the tasks the teacher wants each student to accomplish in a given day/lesson/unit. Both Learning contracts and personal agendas will likely vary between students within a classroom.
Compacting	This strategy begins with a student assessment to determine level of knowledge or skill already attained (i.e. pretest). Students who demonstrate proficiency before the unit even begins are given the opportunity to work at a higher level (either independently or in a group).

Literature circles	Flexible grouping of students who engage in different studies of a piece of literature. Groups can be heterogeneous and homogeneous.
Learning Centers	A station (or simply a collection of materials) that students might use independently to explore topics or practice skills. Centers allow individual 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.
Tic-Tac-Toe Choice Board (sometimes called "Think-Tac-Toe"	The tic-tac-toe choice board is a strategy that enables students to choose multiple tasks to practice a skill, or demonstrate and extend understanding of a process or concept. From the board, students choose (or teacher assigns) three adjacent or diagonal. To design a tic-tac-toe board: - Identify the outcomes and instructional focus - Design 9 different tasks - Use assessment data to determine student levels - Arrange the tasks on a tic-tac-toe board either randomly, in rows according to level of difficulty, or you may want to select one critical task to place in the center of the board for all students to complete.
Curriculum development Resources/Instructional Materials:	
https://www.nextgenscience.org/new-jersey	
Board of Education Approved Text(s)	
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