Environmental Science: High School

Content Area: **Science**
Course(s): **Environmental Science (s)**
Time Period:
Length: **Full-Year**
Status: **Not Published**

Course Overview

The purpose of this course is to provide students with a foundational understanding of the interdisciplinary field of Environmental Science. Through the exploration of key concepts, real-world examples, inquiry-based learning, critical analysis, and hands-on investigations, students will examine the complex interactions between human societies and the natural world, and the challenges arising from this relationship. The course emphasizes the fundamental principles of environmental science, sustainability, and ecological responsibility.

The course begins by establishing a framework for understanding environmental issues, introducing core ecological principles, the impact of human populations, and the scientific methods used to study the environment. Students will also examine ethical considerations in environmental decision-making and explore concepts like the tragedy of the commons. Next, students will investigate the influence of economic principles on environmental policy, focusing on supply and demand, cost-benefit analysis, and the impact of governmental and international environmental policies, analyzing historical and modern approaches through real-world case studies. A study of Earth's environmental systems follows, covering Earth's spheres, biogeochemical cycles (such as carbon, nitrogen, phosphorus, and water), and the interactions between matter and the environment, highlighting their role in maintaining ecological balance.

Students will then examine the critical importance of biodiversity, the benefits it provides, and the threats it faces due to human activity. This section emphasizes conservation efforts, legal protection measures, and approaches to preserving ecosystems and species diversity. A focus on human population dynamics and its impact on the environment includes analyzing historical and modern population trends, demographic transitions, and the social and environmental implications of human expansion, resource consumption, and technological advancements. The relationship between human health and environmental factors is explored through the study of various types of hazards, epidemiology, toxicology, and risk assessment, including the impact of natural disasters.

A portion of the course is dedicated to understanding climate systems, the causes and consequences of climate change, and the impact of human activities on global temperatures and ecosystems. Students will also explore efforts to mitigate climate change through energy conservation, alternative energy sources, and international cooperation. The course concludes with an exploration of the environmental impact of energy use, studying fossil fuels, nuclear energy, and the benefits and limitations of renewable energy sources, emphasizing sustainable energy solutions and the role of technology.

Throughout the course, students will engage in hands-on experiments, case studies, and discussions to develop critical thinking skills and an appreciation for environmental stewardship. By the end of the course, students will gain a broad and deep understanding of the key environmental issues facing our planet and the knowledge necessary to engage with these challenges in an informed and responsible manner, promoting a sustainable future.

Course Name, Length, Date of Revision and Curriculum Writer

Environmental Science

Full-Year

Spring 2025

Mr. Edward Mish Jr and Ms. Emily Koester

Table of Contents

Unit 1: Introduction to Environmental Science

Content Area: **Science**
Course(s): **Environmental Science (s)**
Time Period: **1st Marking Period**
Length: **4-5 weeks**
Status: Submitted

Summary of the Unit

Unit 1 introduces students to the principles of environmental science by exploring how humans interact with the environment. The unit begins with an investigative phenomenon: "Can we reduce the ozone hole?" This guiding question encourages students to think critically about atmospheric issues and human impact. To explore this topic, students participate in the Whirligig Engineering Challenge, a hands-on activity where they apply problem-solving and design skills to model possible environmental solutions.

As the unit progresses, students learn about Earth's atmosphere, including its layers and the important role the ozone layer plays in protecting life. They explore how human actions, such as pollution and industrial growth, can harm these natural systems. Students are introduced to the concept of ecological footprints, which encourages them to reflect on how their personal choices and consumption affect the environment.

The unit also covers the concept of the tragedy of the commons, which explains the challenges of managing shared resources when personal interests conflict with the common good. This idea serves as a foundation for discussions about sustainability and the importance of cooperation in protecting the environment. Students examine both the causes of environmental problems and possible solutions that involve shared responsibility and long-term thinking.

The unit concludes with a closer look at the nature of science, helping students understand what science is, how it works, and how scientific knowledge develops through observation, experimentation, and peer review. The role of ethics in science is also discussed, encouraging students to think about the values and responsibilities involved in making environmental decisions. By the end of the unit, students will have a solid understanding of environmental science and a deeper awareness of their role in shaping a sustainable future.

Enduring Understandings

- Understanding the complex relationship between human societies and the natural world is essential to addressing environmental challenges.
- The scientific process is crucial for studying environmental issues.
- Ethical considerations are essential in environmental decision-making.
- Population growth and resource consumption place pressure on the environment.

Essential Questions

- How have humans influenced the environment throughout history, and what are the major environmental challenges we face today?
- What is the structure of the Earth's atmosphere, and what factors contribute to the depletion and potential recovery of the ozone layer?
- How does human population growth impact the availability of natural resources and the health of ecosystems?
- What is an ecological footprint, and how can it be used to assess individual and societal environmental impact?
- How does science help us understand environmental issues?
- Why are ethics important in environmental decisions?
- What role does ethics play in environmental decision-making and the pursuit of sustainable solutions?
- How can engineering help solve environmental problems?

Summative Assessment and/or Summative Criteria

Assessments can include, but are not limited to the following:

- Research/Presentations Projects
- Group Projects
- Posters
- Labs
- Unit Assessments
- Section Quizzes
- Quarterly Exam

Resources

Board approved textbook(s) and accompanying resources

Digital textbook access resources

Teacher generated/created resources

Student generated resources

OnCourse Classroom materials

Other supplemental materials mentioned in Unit Plans

Digital media and simulations including but not limited to the following:

- YouTube Video: National Geographic "Our Atmosphere Earth Science" https://www.youtube.com/watch?v=5Tz8oyuT4E0&list=PLXZAD5CEPE-vkd8GpvOpVakZJK2F-v8nN
- https://www.youtube.com/watch?v=5Tz8oyuT4E0&t=320s
- How Big is the Atmosphere? https://www.youtube.com/watch?v=VVIesvLJjHE
- World Record Free Fall From Stratosphere Highlights https://www.youtube.com/watch?v=dOoHArAzdug
  Space Jump POV https://www.youtube.com/watch?v=raiFrxbHxV0&list=PLnuf8iyXggLFKnC1bJVA1YO8e-eP-ntHd

Unit Plan

Topic/Selection & Timeframe	General Objectives	Instructional Activities	Benchmarks/ Assessments
Engineering Challenge and the Scientific Method 8-9 days	• Construct a Whirligig, in order to analyze the specifications of the "flight" behavior. • Revise the design of the original Whirligig with specific variables, in order to create a model that reduces descent time within operational constraints. • Optimize best design solution that meets the operational constraints, in order to compete with the other groups for best redesigned model. • Define the steps of the scientific method and explain how to apply them	• Construct a whirligig and observe, collect data and analyze the specifications of the flight behavior • Collaboratively discuss variables that influence a system • Choose an independent variable to test and the materials to create a new model/revised Whirligig. • Choose a second independent variable to test and the materials to create a new	• Data & Observation questions. • Data & Observation Sheets • Best design solution Competition • Scientific Experimental Maps

		model/revise d Whirligig. • Improve best prototype to compete with the other groups for best redesigned model. • Analyze several videos of experiments and map out the scientific method for each one	
Earth's Atmosphere 6-7 days	• Analyze the vertical structure of Earth's atmosphere, to account for the global, regional, and local variations of these characteristics and their impact on life. • Create a poster, in order to model the ozone hole when first identified and at some intervals since. • Classify the layers of the atmosphere based on their altitude and other characteristics. Observ e images and available information (data displayed, units of measure, range of values, etc.), in order to explain how the atmosphere was formed and create an Atmosphere Fold-able Graphic Organizer.	• Central Case Study: "Fixing a Hole in the Sky" • Research & Create a poster, to model the ozone hole when first identified and compared to another time frame. • Create a graphic organizer of the layers with atmospheric data	• Central Case Study Analysis Questions • Poster Project • Graphic Organizer • Section Quiz

Humans Influences on the Environment 3-4 days	• Apprise the focus of environmental science • Evaluate the recent trends in human population and resource consumption. • Explain the phenomena of The Tragedy of the Commons. • Compare over time the impact of human activity on the cycling of matter and energy through ecosystems • Formulate the percentage by which people in the world are "overshooting" available • Resources.	• Complete guided reading citing evidence from the text. • Lecture • Finite Resources, Modeling activity. • Using real data, calculate & compare the ecological footprint of different countries	• Guided Reading and whole class discussion • Finite Resources Activity Analysis Questions • Section Quiz • Ecological Footprint Worksheet
Science Concepts & Environmental Ethics 2-3 Day	• Explore environmental ethics to apprise how environmental science interacts with, and is guided by a society's morals and principles • Explore the major roles of the scientific community in the process of science	• Discussion centering around 3 important ethical standards in environmental ethics • Lecture • Everyday phenomenon : In investigate what happens to a scientific study after data have been gathered and the results are analyzed.	• Student responses to discussions. • Unit 1 assessment

Standards

SCI.HS-ESS2-5	Plan and conduct an investigation of the properties of water and its effects on Earth materials and surface processes.
SCI.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.
SCI.HS-ESS3-3	Create a computational simulation to illustrate the relationships among management of natural resources, the sustainability of human populations, and biodiversity.
SCI.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).
SCI.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. Analyze complex real-world problems by specifying criteria and constraints for successful solutions.
SCI.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. Constructing explanations and designing solutions 9–12 builds on K – experiences and progresses to explanations and designs that are supported by multiple and independent student-generated sources of evidence consistent with scientific ideas, principles and theories.

Suggested Modifications for Students with Disabilties, Multilingual Learners, At Risk Students and Gifted Students

*Consistent with individual plans, when appropriate.

Special Education*:

- Modifications for any individual student's IEP plan must be met
- Collaboration between Content Education and Special Education teachers
- Modified tests, quizzes, worksheets, and written assignments
- Allow for extended time on assessments and assignments
- Access to a quiet testing environment
- Allow wait time for processing before calling on student for response
- Organizational and time management support (checklists, graphic organizers, structured timelines)
- Preferential seating to minimize distractions
- Breaks as needed to support focus and processing
- Repetition of directions and refocus activities

504-Eligible Students*:

- Collaboration between teachers and support staff to ensure accommodation is met
- Modified tests, quizzes, worksheets, and written assignments
- Allow for extended time on assessments and assignments
- Access to a quiet testing environment
- Allow wait time for processing before calling on student for response
- Organizational and time management support (checklists, graphic organizers, structured timelines)
- Preferential seating to minimize distractions
- Breaks as needed to support focus and processing
- Access to printed and highlighted notes
- Use of assistive technology (speech-to-text, audiobooks, screen readers)

Multilingual Language Learners (MLL):

- Collaboration between Content Education and ESL teachers
- Use of audio recordings when applicable
- Use of translation dictionaries when applicable
- Provide opportunities for oral responses and assessments
- Allow use of computer or other technological devices for assignments
- Highlight important notes and key concepts
- Use of graphic organizers to support comprehension
- Assign a peer liaison for additional support
- Incorporation of visual aids and real-world examples to reinforce concepts
- Modified assignments to focus on essential content
- Additional scaffolding such as sentence starters and guided practice

At-Risk Students:

- Small group instruction or one-on-one support when possible

- Clear, step-by-step instructions and modeling of tasks
- Use of engaging, real-world connections to make content more relevant
- Frequent feedback and progress monitoring
- Additional scaffolding (sentence starters, guided practice, visual supports)
- Peer mentoring and collaborative learning opportunities
- Encouragement of active participation through hands-on and interactive learning
- Flexible deadlines and opportunities for revision and reassessment
- Regular check-ins with teacher or counselor for academic and emotional support
- Positive reinforcement and goal-setting strategies to encourage motivation and engagement

Gifted Students:

- Provide more elaborate, complex, and in-depth study of major ideas and themes that integrate knowledge within and across the curriculum
- Incorporate outside sources (media, content, community resources) for further study that are thematic in nature
- Promote self-directed and self-initiated learning opportunities
- Allow for the development of productive thinking skills to encourage students to generate new knowledge
- Provide opportunities for leadership roles in collaborative projects
- Offer independent research projects and inquiry-based assignments
- Encourage critical analysis of multiple perspectives and interpretations of historical events

Suggested Technological Innovations/Computer Sci Design Thinking

CS.9-12.8.1.12.DA.5	Create data visualizations from large data sets to summarize, communicate, and support different interpretations of real-world phenomena.
CS.9-12.8.1.12.DA.6	Create and refine computational models to better represent the relationships among different elements of data collected from a phenomenon or process.
CS.9-12.8.2.12.ED.1	Use research to design and create a product or system that addresses a problem and make modifications based on input from potential consumers.
CS.9-12.8.2.12.ED.6	Analyze the effects of changing resources when designing a specific product or system (e.g., materials, energy, tools, capital, labor).

Cross Curricular/Career Readiness, Life Literacies and Key Skills Practice

WRK.K-12.P.1	Act as a responsible and contributing community members and employee.
WRK.K-12.P.3	Consider the environmental, social and economic impacts of decisions.
WRK.K-12.P.4	Demonstrate creativity and innovation.
TECH.9.4.12.CI	Creativity and Innovation
TECH.9.4.12.CI.1	Demonstrate the ability to reflect, analyze, and use creative skills and ideas (e.g., 1.1.12prof.CR3a).
TECH.9.4.12.CT	Critical Thinking and Problem-solving
TECH.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).
TECH.9.4.12.CT.2	Explain the potential benefits of collaborating to enhance critical thinking and problem solving (e.g., 1.3E.12profCR3.a).
TECH.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.).
TECH.9.4.12.TL.3	Analyze the effectiveness of the process and quality of collaborative environments.

Unit 2: Economics and Environmental Policy

Content Area: **Science**
Course(s): **Environmental Science (s)**
Time Period: **1st Marking Period**
Length: **2-3 weeks**
Status: **Not Published**

Summary of the Unit

This unit explores the interconnectedness of economic systems and environmental protection, helping students understand how economic decisions shape—and are shaped by—environmental realities. Students will investigate how concepts such as supply and demand, cost-benefit analysis, and externalities are applied in real-world scenarios, particularly in environmental contexts. They will evaluate how societies assign value to natural resources and ecosystem services, and how this affects governmental policy-making.

Through historical and modern perspectives on U.S. environmental policy, students will trace the evolution of environmental regulation, from early conservation efforts to contemporary climate and pollution challenges. International policy frameworks will also be explored, emphasizing how global cooperation and differing economic priorities influence environmental outcomes.

The unit culminates in analyzing real-world cases, including plastic pollution and cross-border pollution at the San Diego–Tijuana region, encouraging students to think critically about the roles of economics, politics, and public advocacy in shaping a sustainable future.

Enduring Understandings

By the end of the unit, students will understand that:

- Economic systems impact environmental decision-making—the principles of supply, demand, and cost-benefit analysis influence how resources are used and conserved.
- Environmental policies reflect societal values and priorities, which evolve over time and vary across regions and nations.
- Governmental and economic tools (e.g., taxes, regulations, incentives) can be used to protect the environment, but they must balance economic, social, and ecological needs.
- International cooperation is essential to address global environmental challenges, especially when environmental issues cross political boundaries.
- Complex environmental problems require interdisciplinary solutions, drawing on science, economics, ethics, and political will.

Essential Questions

- How do economic systems affect environmental decision-making and policy development?
- What roles do supply and demand, cost-benefit analysis, and externalities play in environmental economics?

- How has U.S. environmental policy evolved over time, and what factors have influenced these changes?
- What strategies do governments and international organizations use to protect the environment, and how effective are they?
- How can societies balance economic growth with environmental protection?
- What economic and political challenges arise when dealing with cross-border environmental issues, such as the San Diego–Tijuana water crisis?
- How can policies reduce the environmental impact of consumer goods like plastics?

Summative Assessment and/or Summative Criteria

Assessments can include, but are not limited to the following:

- Research/Presentations Projects
- Group Projects
- Posters
- Labs
- Unit Assessments
- Section Quizzes
- Quarterly Exam

Resources

Board approved textbook(s) and accompanying resources

Digital textbook access resources

Teacher resource binder

Student generated resources

OnCourse Classroom materials

Web based resources

Other supplemental materials mentioned in Unit Plans

Unit Plan

Topic/Selection & Timeframe	General Objectives	Instructional Activities	Benchmarks/ Assessments
Economics 2-3 days	• Explain the purpose	• Cleaning the Tides of San Diego and Tijuana Central Case Study • Class Discussion	• Central Case Study

	and give examples of environmental policy. • Explore environmental economics, in order to apprise how environmental economics influences human interactions and decisions with the environment.	• Lecture	Analysis Questions • Section Quiz • Unit Test • Quarterly Assessment
United States Environmental Policy 3-6 days	• Research and identify an environmental issue in order to create a google slide presentation of an environmental policy/law that addresses this issue. • Effectively deliver a presentation conveying research, analysis,	• Google Slides Presentation • Class Discussion • Lecture	• Google Slides Presentation Graphic Organizer • Section Quiz

	and insight on an environmental policy.		
International environmental policy and approaches 1 day	• Explore international environmental policy and approaches. • Using real data, calculate & compare the ecological footprint of different countries	• Class Discussion • Lecture	• Section Quiz • Unit Test • Quarterly Assessment
Plastics 3 days	• Visualize the severity of our plastic problem by watching a documentary and answering comprehension questions. • Describe different types of plastics,	• Plastic Lab Stations • Lecture • Class Discussion	• Student responses to discussions • Lab Questions • Unit Test • Quarterly Assessment

	their uses, and their effect on the environment.		

Standards

SCI.HS-ESS3-2	Evaluate competing design solutions for developing, managing, and utilizing energy and mineral resources based on cost-benefit ratios.
SCI.HS.ESS3.A	Natural Resources
SCI.HS-ESS3-4	Evaluate or refine a technological solution that reduces impacts of human activities on climate change and other natural systems.
SCI.HS.ESS3.C	Human Impacts on Earth Systems
SCI.HS-ETS1	Engineering Design
SCI.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.

Suggested Modifications for Students with Disabilties, Multilingual Learners, At Risk Students and Gifted Students

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CS.9-12.8.2.12.ED.1	Use research to design and create a product or system that addresses a problem and make modifications based on input from potential consumers.
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TECH.9.4.12.CI.1	Demonstrate the ability to reflect, analyze, and use creative skills and ideas (e.g., 1.1.12prof.CR3a).
TECH.9.4.12.CT	Critical Thinking and Problem-solving
TECH.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).
TECH.9.4.12.CT.2	Explain the potential benefits of collaborating to enhance critical thinking and problem solving (e.g., 1.3E.12profCR3.a).
TECH.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.).
TECH.9.4.12.TL.3	Analyze the effectiveness of the process and quality of collaborative environments.

Unit 3: Earth's Environmental Systems

Content Area: **Science**
Course(s): **Environmental Science (s)**
Time Period: **2nd Marking Period**
Length: **7 weeks**
Status: **Not Published**

Summary of the Unit

In this unit, students will explore how Earth functions as a system made up of interacting spheres—the geosphere, hydrosphere, atmosphere, and biosphere—and how matter cycles through these spheres. Centered around the real-world phenomenon of dead zones, particularly in the Gulf of Mexico, students will investigate how nutrient pollution disrupts natural cycles like the nitrogen and phosphorus cycles, leading to oxygen-depleted waters that harm aquatic life.

Students will begin with the basics of chemistry and matter, then dive into the properties of water, systems thinking, and the movement of nutrients through Earth's spheres. They will study the biogeochemical cycles in depth, learning how human activities can unbalance these cycles. By the end of the unit, students will understand how interconnected Earth's systems are and how human actions can cause environmental issues—and also help solve them. A final project will challenge them to explain how dead zones form using the concepts they've learned.

Enduring Understandings

- Earth is a complex system of interconnected spheres (geosphere, atmosphere, hydrosphere, biosphere) that continuously interact and influence one another.
- Matter cycles through the environment in biogeochemical cycles, and disruptions to these cycles can lead to environmental issues such as dead zones.
- Human activity can alter natural cycles and systems, often with unintended consequences for ecosystems and biodiversity.
- Understanding Earth's systems and the science of matter is essential to addressing and mitigating environmental challenges.

Essential Questions

How do the Earth's spheres interact, and what happens when one system is disrupted?

What role do biogeochemical cycles play in sustaining life on Earth?

How do human activities contribute to the formation of dead zones like the one in the Gulf of Mexico?

In what ways can scientific understanding of environmental systems help us prevent or reduce ecological damage?

Summative Assessment and/or Summative Criteria

Assessments can include, but are not limited to the following:

- Research/Presentations Projects
- Group Projects
- Posters
- Labs
- Unit Assessments
- Section Quizzes
- Quarterly Exam

Resources

Board approved textbook(s) and accompanying resources

Digital textbook access resources

Teacher resource binder

Student generated resources

OnCourse Classroom materials

Other supplemental materials mentioned in Unit Plans

Digital media and simulations including but not limited to the following:

- Water Liquid Awesome Crash Course Scishow https://youtu.be/HVT3Y3_gHGg
- Jesus Christ Lizard national Geographic https://www.youtube.com/watch?v=CW0TijmAUqY

- Water Lab Part A

  https://www.youtube.com/watch?v=xGSF_y-tcOY

- Lab Parts B & C

  https://www.youtube.com/watch?v=LrJfueQLrSk

  https://www.youtube.com/watch?v=rCU9E-dbRhk

- Lab Parts D & E
  https://www.youtube.com/watch?v=RAXymmaptHw
  https://www.youtube.com/watch?v=CW0TijmAUqY
  https://www.youtube.com/watch?v=sV0SxwaVKN8

  https://www.youtube.com/watch?v=Z50jEi1igNQ

  https://www.youtube.com/watch?v=iGiL9Nm5DiI

- How Big is the Atmosphere?
  https://www.youtube.com/watch?v=VVIesvLJjHE

- World Record Free Fall From Stratosphere Highlights
  https://www.youtube.com/watch?v=dOoHArAzdug

- Space Jump POV
  https://www.youtube.com/watch?v=raiFrxbHxV0&list=PLnuf8iyXggLFKnC1bJVA1YO8e-eP-ntHd

- Why Does The Earth Have Layers?
  https://www.youtube.com/watch?v=WwiiOjyfvAU&feature=youtu.be

  https://www.youtube.com/watch?v=pVeZYgUHU7g
  https://www.youtube.com/watch?v=3FoSAHk7DMA

- YouTube Video: National Geographic "Our Atmosphere Earth Science"
  https://www.youtube.com/watch?v=5Tz8oyuT4E0&list=PLXZAD5CEPE-vkd8GpvOpVakZJK2F-v8nN

  https://www.youtube.com/watch?v=5Tz8oyuT4E0&t=320s

- Video demonstration of the Plate Tectonics Lab:

  https://www.youtube.com/watch?v=WEBn0YMRbLI

- Rock Types and Rock Cycle Video:
  https://www.youtube.com/watch?v=6bkyXvYP4jM

Unit Plan

Topic/Selection & Timeframe	General Objectives	Instructional Activities	Benchmarks/ Assessments
Building Blocks of Chemistry 2 Weeks	• Evaluate the nonliving parts of Earth's systems, in order to analyze how it provides the essential material to support life. • Discuss how various macromolecules are essential to life	• The Gulf of Mexico's Dead Zone Central Case • Study • Analysis Questions • Pre-test • Lecture • Water Lab • Crossword Puzzle Study Guide • Water Properties and Vocab Quiz	• Central Case Study Analysis Questions • Water Lab Questions • Guided Reading Questions • Section Test • Unit Test • Quarterly Assessment

	• Differentiate among an atom, an element, a molecule, and a compound. • Differentiate the unique properties of water while analyzing the background information of the Properties of Water Lab.		
Systems in Environmental Science 1-2 days	• Access Earth's environmental systems while participating in a whole class discussion.	• Lecture • Class Discussion	• Central Case Study Analysis Questions • Graphic Organizer • Section Quiz • Poster Project • Quarterly Assessment
Earth's Spheres 3-4 Weeks	• Illustrate the compositional layers of the Earth's interior by creating a scale model. • Access the compositional layers of the Earth's interior • Apprise their prior knowledge of plate tectonic theory by completing a pre-assessment. • Differentiate between	• Scaled Model Layers of the Earth • Pre-assessment • Lecture • Graphic Organizer • Plate Movement Lab • Web Quest • Starburst Rock Cycle Lab • Study Guide • Kahoot Review Game	• Starburst Rock Cycle Lab Questions • Unit Test • Quarterly Assessment

	different types of plate boundaries by completing a graphic organizer. • Simulate the different types of plate boundaries • Make deductions about plate tectonic mechanisms • Review different types of rocks and their properties		
Biogeochemical Cycles 1 Week	• Develop 21st century research and collaborative skills	• Lecture • Biogeochemical Cycles Project	• Biogeochemical Cycles Project • Quarterly Assessment

Standards

SCI.HS-LS2	Ecosystems: Interactions, Energy, and Dynamics
SCI.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.
SCI.HS-ESS2	Earth's Systems
SCI.HS-ESS2-6	Develop a quantitative model to describe the cycling of carbon among the hydrosphere, atmosphere, geosphere, and biosphere.

Suggested Modifications for Special Education

*Consistent with individual plans, when appropriate.

Special Education*:

- Modifications for any individual student's IEP plan must be met

- Collaboration between Content Education and Special Education teachers
- Modified tests, quizzes, worksheets, and written assignments
- Allow for extended time on assessments and assignments
- Access to a quiet testing environment
- Allow wait time for processing before calling on student for response
- Organizational and time management support (checklists, graphic organizers, structured timelines)
- Preferential seating to minimize distractions
- Breaks as needed to support focus and processing
- Repetition of directions and refocus activities

504-Eligible Students*:

- Collaboration between teachers and support staff to ensure accommodations are met
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- Allow for extended time on assessments and assignments
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- Allow wait time for processing before calling on student for response
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- Preferential seating to minimize distractions
- Breaks as needed to support focus and processing
- Access to printed and highlighted notes
- Use of assistive technology (speech-to-text, audiobooks, screen readers)

Multilingual Language Learners (MLL):

- Collaboration between Content Education and ESL teachers
- Use of audio recordings when applicable
- Use of translation dictionaries when applicable

- Provide opportunities for oral responses and assessments
- Allow use of computer or other technological devices for assignments
- Highlight important notes and key concepts
- Use of graphic organizers to support comprehension
- Assign a peer liaison for additional support
- Incorporation of visual aids and real-world examples to reinforce concepts
- Modified assignments to focus on essential content
- Additional scaffolding such as sentence starters and guided practice

At-Risk Students:

- Small group instruction or one-on-one support when possible
- Clear, step-by-step instructions and modeling of tasks
- Use of engaging, real-world connections to make content more relevant
- Frequent feedback and progress monitoring
- Additional scaffolding (sentence starters, guided practice, visual supports)
- Peer mentoring and collaborative learning opportunities
- Encouragement of active participation through hands-on and interactive learning
- Flexible deadlines and opportunities for revision and reassessment
- Regular check-ins with teacher or counselor for academic and emotional support
- Positive reinforcement and goal-setting strategies to encourage motivation and engagement

Gifted Students:

- Provide more elaborate, complex, and in-depth study of major ideas and themes that integrate knowledge within and across the curriculum
- Incorporate outside sources (media, content, community resources) for further study that are thematic in nature
- Promote self-directed and self-initiated learning opportunities

- Allow for the development of productive thinking skills to encourage students to generate new knowledge
- Provide opportunities for leadership roles in collaborative projects
- Offer independent research projects and inquiry-based assignments
- Encourage critical analysis of multiple perspectives and interpretations of historical events

Suggested Technological Innovations/Computer Sci Design Thinking

CS.9-12.8.1.12.DA.5	Create data visualizations from large data sets to summarize, communicate, and support different interpretations of real-world phenomena.
CS.9-12.8.1.12.DA.6	Create and refine computational models to better represent the relationships among different elements of data collected from a phenomenon or process.
CS.9-12.8.2.12.ED.1	Use research to design and create a product or system that addresses a problem and make modifications based on input from potential consumers.
CS.9-12.8.2.12.ED.6	Analyze the effects of changing resources when designing a specific product or system (e.g., materials, energy, tools, capital, labor).

Cross Curricular/Career Readiness, Life Literacies and Key Skills Practice

WRK.K-12.P.1	Act as a responsible and contributing community members and employee.
WRK.K-12.P.3	Consider the environmental, social and economic impacts of decisions.
WRK.K-12.P.4	Demonstrate creativity and innovation.
TECH.9.4.12.CI	Creativity and Innovation
TECH.9.4.12.CI.1	Demonstrate the ability to reflect, analyze, and use creative skills and ideas (e.g., 1.1.12prof.CR3a).
TECH.9.4.12.CT	Critical Thinking and Problem-solving
TECH.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).
TECH.9.4.12.CT.2	Explain the potential benefits of collaborating to enhance critical thinking and problem solving (e.g., 1.3E.12profCR3.a).
TECH.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.).
TECH.9.4.12.TL.3	Analyze the effectiveness of the process and quality of collaborative environments.

Unit 4: Biodiversity and Conservation

Content Area: **Science**
Course(s): **Environmental Science (s)**
Time Period: **3rd Marking Period**
Length: **4-5 weeks**
Status: **Awaiting Review**

Summary of the Unit

This unit explores the concept and significance of biodiversity, emphasizing its critical role in sustaining healthy ecosystems and supporting human well-being. Students begin by defining biodiversity and examining the variety of life at the genetic, species, and ecosystem levels. They investigate how biodiversity is unevenly distributed across the planet and explore the many benefits it provides—from regulating climate and supporting food webs to contributing to medicine, agriculture, economic development, and cultural traditions.

The unit also examines the threats facing biodiversity today. Students will research the primary causes of biodiversity loss, including habitat destruction, climate change, pollution, the spread of invasive species, and the overexploitation of natural resources. Through real-world examples, students gain and develop an understanding of how human activities have accelerated the extinction of species and disrupted ecosystems around the world. Deepening understanding of the fragile balance within ecosystems and the urgent need to protect them.

To address these growing concerns, students evaluate a range of conservation strategies designed to protect and restore biodiversity. These include legal efforts such as environmental protection laws and international agreements, as well as conservation programs and initiatives that focus on individual species or entire ecosystems. By the end of the unit, students will have a comprehensive understanding of biodiversity's value, the challenges it faces, and the practical steps individuals, communities, and governments can take to conserve the natural world for future generations.

Enduring Understandings

- Biodiversity is essential for the stability and health of ecosystems and human survival.
- The variety of life at genetic, species, and ecosystem levels supports critical ecosystem functions and services.
- Biodiversity is unevenly distributed around the world and is influenced by both natural and human factors.
- Biodiversity provides numerous benefits to humans, including regulating climate, supporting food webs, and contributing to medicine, agriculture, economic development, and cultural traditions.
- Human activities, such as habitat destruction, climate change, pollution, invasive species spread, and overexploitation, are the primary drivers of biodiversity loss.
- Biodiversity loss threatens the stability of ecosystems, accelerates species extinction, and disrupts the delicate balance of the natural world.

- Different strategies, from protecting individual species to preserving entire habitats, can help mitigate biodiversity loss.
- Individuals, communities, and governments all play a vital role in conserving biodiversity and ensuring a sustainable future for generations to come.

Essential Questions

- What is biodiversity, and why is it important to both ecosystems and human well-being?
- How is biodiversity distributed across the Earth, and what factors contribute to its uneven distribution?
- In what ways does biodiversity benefit humans, and how do these benefits support our societies and economies?
- What are the main threats to biodiversity today, and how do human activities contribute to the loss of species and the disruption of ecosystems?
- What are the consequences of biodiversity loss, and how does it impact the stability of ecosystems and the services they provide?
- What strategies can be implemented to effectively protect and restore biodiversity, and what are the strengths and limitations of each approach?
- What role can individuals, communities, and governments play in conserving biodiversity, and what actions can they take to ensure a sustainable future?
- Why is it important to balance human development and environmental conservation?
- How can we balance human needs with the need to protect biodiversity?
- What are the ethical considerations surrounding biodiversity loss?

Summative Assessment and/or Summative Criteria

Assessments can include, but are not limited to the following:

- Research/Presentations Projects
- Group Projects
- Posters
- Labs
- Unit Assessments
- Section Quizzes
- Quarterly Exam

Resources

Board approved textbook(s) and accompanying resources

Digital textbook access resources

Teacher resource binder

Student generated resources

OnCourse Classroom materials

Other supplemental materials mentioned in Unit Plans

Digital media and simulations including but not limited to the following:

- Earth From Above - Biodiversity https://www.youtube.com/watch?v=ob-BqDBlTNU https://www.youtube.com/watch?v=ob-BqDBlTNU
- YouTube Video: Lion vs tiger-who will win in a fight? https://www.youtube.com/watch?v=rMs06PfdJlU
- NJ State Department of Natural Resources https://www.nj.gov/dep/infofinder/topics/natural.htm
- Golden Lion Tamarin https://www.youtube.com/watch?v=K2DogPzYipo
- Kahoot website

Unit Plan

Topic/Selection & Timeframe	General Objectives	Instructional Activities	Benchmarks/ Assessments
Components of Biodiversity 5-6 days	• Assess the central case study, in order to develop a logical argument why it is important to protect biodiversity. • Differentiate the components of biodiversity, while engaging in the guided reading assignment.	• Central Case Study; Saving the Siberian Tiger • Guided Reading citing evidence from the text. • Lecture Google Slides Presentation • Analyze the video documentary Earth from	• Analysis Questions • Guided Reading Assignment • Whole class discussion • Construct a list citing evidence of three specific ways that biodiversity has provided either a product or service that improves lives.

	• Explain two ways in which biodiversity varies across groups or geography, while engaging in class discussion of Google Slides presentation. • Develop a logical argument why it is important to protect biodiversity. • Connect how biodiverse ecosystems provide economically valuable services and products, while viewing the video documentary Earth From Above - Biodiversity, in order to construct a list, citing evidence of three specific ways that biodiversity has provided either a product or service that improves lives. • Connect how biodiverse ecosystems provide	Above – Biodiversity.	• Quiz on the components of biodiversity.

	economically valuable services and products.		
Biodiversity Loss & Conservation 15-16 days	• Explain the major causes of biodiversity loss, while engaging in class discussion of Google Slide presentation. • Investigate one of the major causes of biodiversity loss, while researching an extinct , endangered or threatened plant/animal species that lived in New Jersey. • Connect a major cause of biodiversity loss with the extinction,	• Lecture Google Slides Presentation • Develop 21st century research & collaborative skills. In groups, Research an extinct or endangered plant/animal species that lived in New Jersey. • Students will present research findings to the class. • In groups, analyze the Real Data questions and the	• Whole class discussion • Loss of Biodiversity Presentations Rubric • Golden Lion Tamarin Math Activity • Hotspot Poster • Review responses • Biodiversity and conservation assessment.

	endangerment or threatening of a plant/animal species that lived in New Jersey, while presenting research findings. • Evaluate three strategies for managing whole ecosystems and habitats, while engaging in class discussion of Google Slide presentation. • Explore a biodiversity hotspot, in order to create a poster showing its biome, its common species, its endemic species, and reasons why it is losing biodiversity. • Evaluate individual knowledge of Biodiversity and conservation, while competing in a Kahoot review game.	Golden Lion Tamarin Math Activity worksheet. • Create a poster showing its biome, its common species, its endemic species, and reasons why it is losing biodiversity. • Engage in a Kahoot review • Formulate responses to the biodiversity and conservation assessment.	

	• Apply concepts of Biodiversity and conservation, while engaging in the Biodiversity and conservation assessment.		

Standards

SCI.HS-LS2	Ecosystems: Interactions, Energy, and Dynamics
SCI.HS-LS2-7	Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.
SCI.HS-LS4	Biological Evolution: Unity and Diversity
SCI.HS-LS4-6	Create or revise a simulation to test a solution to mitigate adverse impacts of human activity on biodiversity.
SCI.HS-ESS3	Earth and Human Activity
SCI.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.
SCI.HS-ESS3-4	Evaluate or refine a technological solution that reduces impacts of human activities on climate change and other natural systems.

Suggested Modifications for Students with Disabilties, Multilingual Learners, At Risk Students and Gifted Students

*Consistent with individual plans, when appropriate.

Special Education*:

- Modifications for any individual student's IEP plan must be met
- Collaboration between Content Education and Special Education teachers

- Modified tests, quizzes, worksheets, and written assignments
- Allow for extended time on assessments and assignments
- Access to a quiet testing environment
- Allow wait time for processing before calling on student for response
- Organizational and time management support (checklists, graphic organizers, structured timelines)
- Preferential seating to minimize distractions
- Breaks as needed to support focus and processing
- Repetition of directions and refocus activities

504-Eligible Students*:

- Collaboration between teachers and support staff to ensure accommodations are met
- Modified tests, quizzes, worksheets, and written assignments
- Allow for extended time on assessments and assignments
- Access to a quiet testing environment
- Allow wait time for processing before calling on student for response
- Organizational and time management support (checklists, graphic organizers, structured timelines)
- Preferential seating to minimize distractions
- Breaks as needed to support focus and processing
- Access to printed and highlighted notes
- Use of assistive technology (speech-to-text, audiobooks, screen readers)

Multilingual Language Learners (MLL):

- Collaboration between Content Education and ESL teachers
- Use of audio recordings when applicable
- Use of translation dictionaries when applicable
- Provide opportunities for oral responses and assessments
- Allow use of computer or other technological devices for assignments

- Highlight important notes and key concepts
- Use of graphic organizers to support comprehension
- Assign a peer liaison for additional support
- Incorporation of visual aids and real-world examples to reinforce concepts
- Modified assignments to focus on essential content
- Additional scaffolding such as sentence starters and guided practice

At-Risk Students:

- Small group instruction or one-on-one support when possible
- Clear, step-by-step instructions and modeling of tasks
- Use of engaging, real-world connections to make content more relevant
- Frequent feedback and progress monitoring
- Additional scaffolding (sentence starters, guided practice, visual supports)
- Peer mentoring and collaborative learning opportunities
- Encouragement of active participation through hands-on and interactive learning
- Flexible deadlines and opportunities for revision and reassessment
- Regular check-ins with teacher or counselor for academic and emotional support
- Positive reinforcement and goal-setting strategies to encourage motivation and engagement

Gifted Students:

- Provide more elaborate, complex, and in-depth study of major ideas and themes that integrate knowledge within and across the curriculum
- Incorporate outside sources (media, content, community resources) for further study that are thematic in nature
- Promote self-directed and self-initiated learning opportunities
- Allow for the development of productive thinking skills to encourage students to generate new knowledge
- Provide opportunities for leadership roles in collaborative projects
- Offer independent research projects and inquiry-based assignments

- Encourage critical analysis of multiple perspectives and interpretations of historical events

Suggested Technological Innovations/Computer Sci Design Thinking

CS.9-12.8.1.12.DA.5	Create data visualizations from large data sets to summarize, communicate, and support different interpretations of real-world phenomena.
CS.9-12.8.1.12.DA.6	Create and refine computational models to better represent the relationships among different elements of data collected from a phenomenon or process.
CS.9-12.8.2.12.ED.1	Use research to design and create a product or system that addresses a problem and make modifications based on input from potential consumers.
CS.9-12.8.2.12.ED.6	Analyze the effects of changing resources when designing a specific product or system (e.g., materials, energy, tools, capital, labor).

Cross Curricular/Career Readiness, Life Literacies and Key Skills Practice

WRK.K-12.P.1	Act as a responsible and contributing community members and employee.
WRK.K-12.P.3	Consider the environmental, social and economic impacts of decisions.
WRK.K-12.P.4	Demonstrate creativity and innovation.
TECH.9.4.12.CI	Creativity and Innovation
TECH.9.4.12.CI.1	Demonstrate the ability to reflect, analyze, and use creative skills and ideas (e.g., 1.1.12prof.CR3a).
TECH.9.4.12.CT	Critical Thinking and Problem-solving
TECH.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).
TECH.9.4.12.CT.2	Explain the potential benefits of collaborating to enhance critical thinking and problem solving (e.g., 1.3E.12profCR3.a).
TECH.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.).
TECH.9.4.12.TL.3	Analyze the effectiveness of the process and quality of collaborative environments.

Unit 5: Human Population

Content Area: **Science**
Course(s): **Environmental Science (s)**
Time Period: **3rd Marking Period**
Length: **2 weeks**
Status: **Not Published**

Summary of the Unit

In this unit, students will explore how human population growth affects the environment. They'll examine the history of population growth, including the impact of industrialization and technological advances, and analyze recent global trends. Using demographic tools like fertility rate, age structure, and population pyramids, students will learn to describe and predict population change.

A case study on China will highlight the social, political, and environmental consequences of population policies. Students will also investigate the Demographic Transition Model and how social factors such as education, healthcare, and women's rights influence growth.

Finally, students will connect population trends to environmental impacts like resource use, pollution, and land change. They'll also consider how technology can both help and harm the environment. By the end of the unit, students will better understand the complex relationship between population and sustainability.

Enduring Understandings

- Human population dynamics are influenced by biological, social, economic, and political factors.
- Population growth has significant and complex impacts on natural resources and environmental systems.
- Technological developments can both alleviate and intensify environmental impacts of population growth.
- Understanding population trends and demographic data is essential for addressing sustainability challenges.

Essential Questions

- How has the human population changed over time, and what factors influence these changes?
- What are the consequences of rapid population growth for societies and ecosystems?
- How do social and cultural factors shape population trends and fertility rates?
- What role does technology play in mitigating or exacerbating the environmental impacts of population?
- How can understanding population data help societies plan for a sustainable future?

Summative Assessment and/or Summative Criteria

Assessments can include, but are not limited to the following:

- Research/Presentations Projects
- Group Projects
- Posters
- Labs
- Unit Assessments
- Section Quizzes
- Quarterly Exam

Resources

Board approved textbook(s) and accompanying resources
Digital textbook access resources
Teacher resource binder
Student generated resources
OnCourse Classroom materials
Other supplemental materials mentioned in Unit Plans
Digital media and simulations including but not limited to the following:

- The Science of Overpopulation https://www.youtube.com/watch?v=dD-yN2G5BY0
- populationpyramid.net https://www.populationpyramid.net/
- Life After People Video https://www.youtube.com/watch?v=3o_ArhmvyCc

Unit Plan

Topic/Selection & Timeframe	General Objectives	Instructional Activities	Benchmarks/ Assessments
Trends in Human Population Growth 2-3 days	• Explore an introduction of population growth and the resources needed to keep cultures sustainable. • Review and interpret concepts of human population by creating an Age	• Central Case Study China's Changing Population Needs • Population Growth Video • Pre/pop quiz on population • Lecture	• Central Case Study Analysis Questions • Age Structure Diagram • Unit Test • Quarterly Exam

	Structure Diagram	• Age Structure Diagram of New Jersey and Sayreville • Study Guide	
Predicting Population Growth 3-5 days	• Explore Earth without humans, our impact on Earth, and Earth's recovery process.	• Life After People Video • Analysis Questions • Class Discussion	• Unit Test • Quarterly Exam
People and Their Environments 1-2 days	• Describe how humans impact their environments • Discuss the negative and positive impacts of technology.	• Lecture • Analysis Questions • Class Discussion	• Unit Test • Quarterly Exam

Standards

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

Suggested Modifications for Students with Disabilties, Multilingual Learners, At Risk Students and Gifted Students

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Special Education*:

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- Collaboration between Content Education and Special Education teachers
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- Use of translation dictionaries when applicable

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- Encouragement of active participation through hands-on and interactive learning
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Gifted Students:

- Provide more elaborate, complex, and in-depth study of major ideas and themes that integrate knowledge within and across the curriculum
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- Promote self-directed and self-initiated learning opportunities
- Allow for the development of productive thinking skills to encourage students to generate new knowledge

- Provide opportunities for leadership roles in collaborative projects
- Offer independent research projects and inquiry-based assignments
- Encourage critical analysis of multiple perspectives and interpretations of historical events

Suggested Technological Innovations/Computer Sci Design Thinking

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CS.9-12.8.1.12.DA.6	Create and refine computational models to better represent the relationships among different elements of data collected from a phenomenon or process.
CS.9-12.8.2.12.ED.1	Use research to design and create a product or system that addresses a problem and make modifications based on input from potential consumers.
CS.9-12.8.2.12.ED.6	Analyze the effects of changing resources when designing a specific product or system (e.g., materials, energy, tools, capital, labor).

Cross Curricular/Career Readiness, Life Literacies and Key Skills Practice

WRK.K-12.P.1	Act as a responsible and contributing community members and employee.
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TECH.9.4.12.CT	Critical Thinking and Problem-solving
TECH.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).
TECH.9.4.12.CT.2	Explain the potential benefits of collaborating to enhance critical thinking and problem solving (e.g., 1.3E.12profCR3.a).
TECH.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.).
TECH.9.4.12.TL.3	Analyze the effectiveness of the process and quality of collaborative environments.

Unit 6: Environmental Health

Content Area: **Science**
Course(s): **Environmental Science (s)**
Time Period: **3rd Marking Period**
Length: **5 weeks**
Status: **Awaiting Review**

Summary of the Unit

Unit 6: Environmental Health focuses on the important connection between human well-being and the environment, asking how do we balance the relationship between our own health and the health of the environment. The unit begins by introducing environmental health and categorizing hazards into biological threats, like infectious and emerging diseases, and social hazards stemming from human behaviors and societal factors. Recognizing and understanding these different types of hazards is essential to dealing with the many challenges that affect both human and environmental health.

Chemical hazards are another major focus, both indoors and outdoors. Students learn about different types of chemical threats, such as carcinogens, mutagens, teratogens, and neurotoxins. Indoor hazards like mold and carbon monoxide, and outdoor hazards like air and water pollution, demonstrate how environmental toxins can accumulate. The concept of biomagnification is introduced to show how toxins become increasingly concentrated as they move through the food chain, posing greater risks to organisms at higher levels. Knowing how chemical hazards work is essential for finding strategies to reduce exposure and protect both ecosystems and human communities.

The effects of natural disasters on environmental health are another important topic covered in the unit. Events such as earthquakes, volcanic eruptions, storms, and avalanches are explored for their immediate and long-term impacts on both human populations and natural systems. Understanding how these natural phenomena affect health and ecosystems is critical for effective preparedness, disaster response, and recovery planning.

Finally, the unit stresses the role of scientific disciplines like epidemiology and toxicology in assessing environmental health risks. It emphasizes the important role individuals play in protecting the environment and introduces risk assessment as a key tool for identifying and managing dangers. By exploring all of these topics, Unit 6 helps students better understand environmental health and encourages them to take action toward a healthier, more sustainable future for both themselves and the planet.

Enduring Understandings

- Human health and environmental health are interconnected, requiring balance to sustain both.
- Protecting the environment directly contributes to safeguarding human health.
- A sustainable balance between human needs and environmental preservation is necessary.
- Environmental health includes understanding biological hazards like infectious and emerging diseases.
- Social hazards, arising from human behaviors and societal factors, also impact health and ecosystems.
- Biomagnification shows how toxins concentrate through the food chain, threatening higher-level organisms.

- Natural disasters like earthquakes, volcanic eruptions, storms, and avalanches can cause immediate and lasting health and environmental damage.
- Individuals have a powerful role in protecting environmental health and contributing to a healthier, more sustainable future.
- Scientific fields like epidemiology and toxicology provide essential tools for assessing environmental health risks.

Essential Questions

- How are human health and environmental health connected, and why is it important to maintain a balance between them?
- Why is it critical to find a sustainable balance between meeting human needs and preserving the environment?
- What are biological hazards, and how do infectious and emerging diseases impact both people and ecosystems?
- How do social hazards, created by human behaviors and societal factors, affect environmental and human health?
- How do human actions and social issues create risks for the environment and our health?
- What is biomagnification, and how does it increase the risk of toxins for organisms higher up in the food chain?
- How do natural disasters like earthquakes, volcanic eruptions, storms, and avalanches affect both immediate and long-term health and environmental stability?
- In what ways can natural disasters affect human health and the environment, and how can we prepare for and respond to these events?
- What role do individuals play in promoting environmental health and creating a more sustainable future?
- How do scientists use tools like epidemiology and toxicology to study and manage environmental risks?

Summative Assessment and/or Summative Criteria

Assessments can include, but are not limited to the following:

- Research/Presentations Projects
- Group Projects
- Posters
- Labs
- Unit Assessments
- Section Quizzes
- Quarterly Exam

Resources

Board approved textbook(s) and accompanying resources
Digital textbook access resources
Teacher resource binder
Student generated resources
OnCourse Classroom materials
Other supplemental materials mentioned in Unit Plans
Digital media and simulations including but not limited to the following:

- Kahoot website
- "The Rise and Fall of DDT in America" https://www.youtube.com/watch?v=MMSEnIVFBQ0.

- The Story of Cholera https://www.youtube.com/watch?v=jG1VNSCsP5Q
- Intro to infectious diseases: https://www.youtube.com/watch?v=9axOFtPqS0c
- Infectious disease spread: https://youtu.be/2JWku3Kjpq0
- Washing your hands: https://youtu.be/gKiHCKycN1I
- How soap kills viruses | The Straits Times: https://youtu.be/kfbU9Ie9tFc
- Which is better: Soap or hand sanitizer? - Alex Rosenthal and Pall Thordarson https://www.youtube.com/watch?v=x7KKkElpyKQ
- Explainer: How soap destroys COVID-19 coronavirus https://www.youtube.com/watch?v=aetLtiWyqTU
- U.S. Department of Health and Human Services Household Products Database. https://www.whatsinproducts.com/brands/index/1

Unit Plan

Topic/Selection Timeframe	General Objectives	Instructional Activities	Benchmarks/Assessments
Overview of Environmental Health 4-5 days	• Compare the relationship between environmental health and our own health, while investigating DDT. • Explain an overview of environmental health, while discussing a Google Slides presentation	• SW read the central case and complete the central case worksheet questions. • Research DDT and create a T-chart about 4 advantages and 4 disadvantages of using DDT. • Lecture • Google Slides Presentation	• Central Case analysis questions • T-chart about 4 advantages and 4 disadvantages of using DDT. • Whole class discussion and guided notes

Biological and Social Hazards 9-10 Days	• Analyze how infectious disease spreads, while engaging in Tracking an Outbreak inquiry activity. • Analyze how infectious disease spreads, while determining the effectiveness of their hand-washing technique by using GloGerm lotion and inspecting their work with a UV light. • Explain why emerging diseases are important to monitor and control, while discussing Google Slides presentation • Design a public service announcement , in order to encourage other teens to avoid a lifestyle choice that is considered to be a social hazard.	• Work in pairs while engaging in Tracking an Outbreak inquiry activity. • Pass around and observe objects applied with glo-germ powder. A black light will be used to show how easy it is to pass germs to another person. • Lecture Google Slides Presentation • SW work with a partner to create a poster with a public service announcement , in order to encourage other teens to avoid a lifestyle choice that is considered to be a social hazard.	• Tracking an Outbreak analysis questions • Individual student handwashing technique. • Whole class discussion • Public service announcement Poster • Biological and Social Hazards Quiz
Toxic Substances in the Environment	• Analyze how chemical hazards affect human health,	• Lecture Google Slides Presentation	• Whole class discussion • Home Hazmat Survey Inquiry Activity

9-10 Days	while discussing Google Slides presentation. • Inventory & Analyze household hazardous materials, in order to learn how to use, store and dispose of them safely. • Investigate hazardous chemicals in the environment, while engaging in a biomagnification simulation	• SW Inventory & Analyze their household hazardous materials, using the U.S. Department of Health and Human Services Household Products Database. • SW will go outside to investigate hazardous chemicals in the environment, while engaging in a biomagnification simulation.	• Biomagnification Simulation Questions
Natural Disasters 3 Days	• Analyze how earthquakes affect structures on Earth's surface, while discussing Google Slides presentation.	• Lecture • Google Slides Presentation	• Formal & Informal Questions • Environmental Health Assessment

Standards

SCI.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.
SCI.HS-LS2-7	Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.
SCI.HS-LS4-6	Create or revise a simulation to test a solution to mitigate adverse impacts of human activity on biodiversity.
SCI.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.
SCI.HS-ESS3-3	Create a computational simulation to illustrate the relationships among management of natural resources, the sustainability of human populations, and biodiversity.

SCI.HS-ESS3-4	Evaluate or refine a technological solution that reduces impacts of human activities on climate change and other natural systems.
SCI.HS-ETS1	Engineering Design

Suggested Modifications for Students with Disabilties, Multilingual Learners, At Risk Students and Gifted Students

*Consistent with individual plans, when appropriate.

Special Education*:

- Modifications for any individual student's IEP plan must be met
- Collaboration between Content Education and Special Education teachers
- Modified tests, quizzes, worksheets, and written assignments
- Allow for extended time on assessments and assignments
- Access to a quiet testing environment
- Allow wait time for processing before calling on student for response
- Organizational and time management support (checklists, graphic organizers, structured timelines)
- Preferential seating to minimize distractions
- Breaks as needed to support focus and processing
- Repetition of directions and refocus activities

504-Eligible Students*:

- Collaboration between teachers and support staff to ensure accommodations are met
- Modified tests, quizzes, worksheets, and written assignments
- Allow for extended time on assessments and assignments
- Access to a quiet testing environment
- Allow wait time for processing before calling on student for response
- Organizational and time management support (checklists, graphic organizers, structured timelines)
- Preferential seating to minimize distractions
- Breaks as needed to support focus and processing
- Access to printed and highlighted notes

- Use of assistive technology (speech-to-text, audiobooks, screen readers)

Multilingual Language Learners (MLL):

- Collaboration between Content Education and ESL teachers
- Use of audio recordings when applicable
- Use of translation dictionaries when applicable
- Provide opportunities for oral responses and assessments
- Allow use of computer or other technological devices for assignments
- Highlight important notes and key concepts
- Use of graphic organizers to support comprehension
- Assign a peer liaison for additional support
- Incorporation of visual aids and real-world examples to reinforce concepts
- Modified assignments to focus on essential content
- Additional scaffolding such as sentence starters and guided practice

At-Risk Students:

- Small group instruction or one-on-one support when possible
- Clear, step-by-step instructions and modeling of tasks
- Use of engaging, real-world connections to make content more relevant
- Frequent feedback and progress monitoring
- Additional scaffolding (sentence starters, guided practice, visual supports)
- Peer mentoring and collaborative learning opportunities
- Encouragement of active participation through hands-on and interactive learning
- Flexible deadlines and opportunities for revision and reassessment
- Regular check-ins with teacher or counselor for academic and emotional support
- Positive reinforcement and goal-setting strategies to encourage motivation and engagement

Gifted Students:

- Provide more elaborate, complex, and in-depth study of major ideas and themes that integrate knowledge within and across the curriculum
- Incorporate outside sources (media, content, community resources) for further study that are thematic in nature
- Promote self-directed and self-initiated learning opportunities
- Allow for the development of productive thinking skills to encourage students to generate new knowledge
- Provide opportunities for leadership roles in collaborative projects
- Offer independent research projects and inquiry-based assignments
- Encourage critical analysis of multiple perspectives and interpretations of historical events

Suggested Technological Innovations/Computer Sci Design Thinking

CS.9-12.8.1.12.DA.5	Create data visualizations from large data sets to summarize, communicate, and support different interpretations of real-world phenomena.
CS.9-12.8.1.12.DA.6	Create and refine computational models to better represent the relationships among different elements of data collected from a phenomenon or process.
CS.9-12.8.2.12.ED.1	Use research to design and create a product or system that addresses a problem and make modifications based on input from potential consumers.
CS.9-12.8.2.12.ED.6	Analyze the effects of changing resources when designing a specific product or system (e.g., materials, energy, tools, capital, labor).

Cross Curricular/Career Readiness, Life Literacies and Key Skills Practice

WRK.K-12.P.1	Act as a responsible and contributing community members and employee.
WRK.K-12.P.3	Consider the environmental, social and economic impacts of decisions.
WRK.K-12.P.4	Demonstrate creativity and innovation.
TECH.9.4.12.CI	Creativity and Innovation
TECH.9.4.12.CI.1	Demonstrate the ability to reflect, analyze, and use creative skills and ideas (e.g., 1.1.12prof.CR3a).
TECH.9.4.12.CT	Critical Thinking and Problem-solving
TECH.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).
TECH.9.4.12.CT.2	Explain the potential benefits of collaborating to enhance critical thinking and problem solving (e.g., 1.3E.12profCR3.a).
TECH.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.).
TECH.9.4.12.TL.3	Analyze the effectiveness of the process and quality of collaborative environments.

Unit 7: Global Climate Change

Content Area: **Science**
Course(s): **Environmental Science (s)**
Time Period: **4th Marking Period**
Length: **3-4 weeks**
Status: **Awaiting Review**

Summary of the Unit

Unit 7: Global Climate Change

This unit explores the global issue of climate change, with a specific focus on the threats it poses to low-lying regions such as the Maldive Islands. The unit begins by examining the concept of rising sea levels and how Earth's climate is shaped by natural forces, including energy from the sun, wind patterns, and ocean currents, which play major roles in regulating global temperatures and weather patterns. While climate naturally changes over time, current shifts are occurring at an unusually rapid pace, largely due to human influence.

Scientific evidence of a warming Earth such as increasing global temperatures, shrinking glaciers, and rising sea levels will be investigated to understand the scope and urgency of the issue. The unit introduces the tools and methods scientists use to study climate, including data collection and climate modeling. Special attention is given to identifying the major causes of climate change, particularly the buildup of greenhouse gases like carbon dioxide and methane released from burning fossil fuels, deforestation, and other human activities.

The unit also examines the effects of climate change on both natural ecosystems and human communities. Low-lying areas are especially vulnerable, facing increased flooding, stronger storms, and the risk of long-term displacement. These impacts extend beyond coastlines, affecting biodiversity, habitats, agriculture, and water supplies, all of which contribute to the global significance of climate change. To address these challenges, the unit explores a range of responses, from reducing emissions through cleaner energy and more efficient transportation to using technology and land management strategies. The importance of international cooperation is emphasized, highlighting the need for nations to work together in developing solutions that limit future damage and promote a more sustainable and resilient future for all.

Enduring Understandings

- Earth's climate is influenced by both natural forces such as solar energy, wind patterns, and ocean currents, and human activities that have accelerated climate change in recent decades.
- Rising global temperatures, shrinking glaciers, and rising sea levels are key pieces of evidence that demonstrate Earth’s climate is warming at an unprecedented rate.
- Human activities, particularly the emission of greenhouse gases from burning fossil fuels, deforestation, and industrial processes, are the primary drivers of modern climate change.
- Climate change poses significant threats to ecosystems and human populations, especially in low-lying areas that face increased flooding, coastal erosion, and the risk of displacement.
- Scientists use tools like data collection and climate modeling to study climate patterns and predict future changes, helping inform decision-making and policy.

- Addressing climate change requires a combination of strategies, including reducing emissions, advancing clean energy technologies, and changing land use practices.
- Global cooperation is essential for effectively mitigating climate change and building a sustainable and resilient future for communities around the world.

Essential Questions

- What natural forces influence Earth's climate, and how do they interact to regulate global temperatures?
- How is today's climate change different from past natural climate shifts in Earth's history?
- What evidence supports the idea that Earth's climate is warming?
- How do human activities contribute to the increase of greenhouse gases in the atmosphere?
- Why are low-lying areas like the Maldive Islands especially vulnerable to climate change?
- In what ways does climate change affect ecosystems, biodiversity, and human communities?
- How do scientists study and model climate change, and why is this work important for predicting future impacts?
- What actions can individuals, communities, and nations take to reduce greenhouse gas emissions and adapt to climate change?
- Why is international cooperation necessary in addressing the global challenges posed by climate change?

Summative Assessment and/or Summative Criteria

Assessments can include, but are not limited to the following:

- Research/Presentations Projects
- Group Projects
- Posters
- Labs
- Unit Assessments
- Section Quizzes
- Quarterly Exam

Resources

Board approved textbook(s) and accompanying resources
Digital textbook access resources
Teacher resource binder
Student generated resources
OnCourse Classroom materials
Other supplemental materials mentioned in Unit Plans
Digital media and simulations including but not limited to the following:

- Kahoot website
- https://learn.concord.org/

- https://science.nasa.gov/earth/climate-change/arctic-and-antarctic-sea-ice-how-are-they-different/
- https://www.usgs.gov/special-topics/water-science-school/science/ice-snow-and-glaciers-and-water-cycle#:%7E:text=The%20va
- https://oceanservice.noaa.gov/facts/how-hurricanes-form.html
- https://www.weather.gov/tae/HurricaneMichael2018
- https://www.youtube.com/watch?v=7W9LRCZMZfQ
- https://insideclimatenews.org/news/28082017/southern-pine-beetles-spreading-climate-change-northern-canada-new-jersey-maine/
- https://www.nature.com/nclimate/articles
- https://climate.ncsu.edu/
- https://climate.mit.edu/ask-mit/how-do-greenhouse-gases-trap-heat-atmosphere#:%7E:text=Greenhouse%20gas%20molecules%20in%20the,raises%20the%20planet%27s%20average%20temperature.
- https://www.ngssphenomena.com/
- https://stemteachingtools.org/brief/42
- https://www.youtube.com/watch?v=c426FJrju5I

Unit Plan

Topic/Selection Timeframe	General Objectives	Instructional Activities	Benchmarks/Assessments
Our Dynamic Climate 4-5 Days	• Assess the central case study, in order to connect how climate change impacts low-lying areas. • Determine the factors that affect how the sun warms Earth, while engaging in the guided reading assignment. • Identify the three ways that solar radiation is transferred as it enters	• Rising Seas May Flood the Maldive Islands case study • Guided Reading citing evidence from the text • Lecture Google Slides Presentation	• Central Case analysis questions • Guided Reading Assignment Whole class discussion

	Earth's atmosphere • Analyze the role of wind patterns in determining climate • Explain how the oceans affect climate Evaluate how climate is affected by topography, volcanoes, regional vegetation, and periodic changes in Earth's orbit.		
Climate Change 3-4 Days	• Identify evidence of global warming • Explain three methods used to study climate change • Evaluate the probable causes of global climate change • Compare and contrast the Arctic and Antarctic Ice Caps	• Lecture • Google Slides Presentation • Changing Polar Ice Cap phenomenon activity.	• Whole class discussion • Changing Polar Ice Cap phenomenon activity analysis questions

Effects of Climate Change 3-4 Days	• Analyze ways in which the warming atmosphere affects ecosystems and organisms • Explain how climate change is affecting people today • Predict future effects of climate change on people • Evaluate the link between climate change and the spread of Southern pine beetles	• Lecture • Google Slides Presentation • Tree killing beetles spread into Northern U.S. forests as temperatures rise phenomenon activity	• Whole class discussion • Tree killing beetles spread into Northern U.S. forests as temperatures rise phenomenon activity analysis questions
Responding to Climate Change 3-4 Days	• List ways to reduce greenhouse gases related to the use and generation of electricity • Describe ways of reducing greenhouse gases related to transportation • Evaluate strategies for reducing greenhouse gases • Explain how nations are working	• Lecture • Google Slides Presentation	• Whole class discussion • Global Climate Change Assessment

	together to try to address climate change		

Standards

SCI.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.
SCI.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.
SCI.HS-ESS2-6	Develop a quantitative model to describe the cycling of carbon among the hydrosphere, atmosphere, geosphere, and biosphere.
SCI.HS-ESS3-2	Evaluate competing design solutions for developing, managing, and utilizing energy and mineral resources based on cost-benefit ratios.
SCI.HS-ESS3-3	Create a computational simulation to illustrate the relationships among management of natural resources, the sustainability of human populations, and biodiversity.
SCI.HS-ESS3-4	Evaluate or refine a technological solution that reduces impacts of human activities on climate change and other natural systems.
SCI.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.
SCI.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).

Suggested Modifications for Students with Disabilties, Multilingual Learners, At Risk Students and Gifted Students

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Special Education*:

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- Allow for extended time on assessments and assignments
- Access to a quiet testing environment
- Allow wait time for processing before calling on student for response
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- Preferential seating to minimize distractions
- Breaks as needed to support focus and processing
- Repetition of directions and refocus activities

504-Eligible Students*:

- Collaboration between teachers and support staff to ensure accommodations are met
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- Allow wait time for processing before calling on student for response
- Organizational and time management support (checklists, graphic organizers, structured timelines)
- Preferential seating to minimize distractions
- Breaks as needed to support focus and processing
- Access to printed and highlighted notes
- Use of assistive technology (speech-to-text, audiobooks, screen readers)

Multilingual Language Learners (MLL):

- Collaboration between Content Education and ESL teachers
- Use of audio recordings when applicable
- Use of translation dictionaries when applicable
- Provide opportunities for oral responses and assessments
- Allow use of computer or other technological devices for assignments
- Highlight important notes and key concepts
- Use of graphic organizers to support comprehension
- Assign a peer liaison for additional support
- Incorporation of visual aids and real-world examples to reinforce concepts
- Modified assignments to focus on essential content
- Additional scaffolding such as sentence starters and guided practice

At-Risk Students:

- Small group instruction or one-on-one support when possible
- Clear, step-by-step instructions and modeling of tasks
- Use of engaging, real-world connections to make content more relevant
- Frequent feedback and progress monitoring
- Additional scaffolding (sentence starters, guided practice, visual supports)
- Peer mentoring and collaborative learning opportunities
- Encouragement of active participation through hands-on and interactive learning
- Flexible deadlines and opportunities for revision and reassessment

- Regular check-ins with teacher or counselor for academic and emotional support
- Positive reinforcement and goal-setting strategies to encourage motivation and engagement

Gifted Students:

- Provide more elaborate, complex, and in-depth study of major ideas and themes that integrate knowledge within and across the curriculum
- Incorporate outside sources (media, content, community resources) for further study that are thematic in nature
- Promote self-directed and self-initiated learning opportunities
- Allow for the development of productive thinking skills to encourage students to generate new knowledge
- Provide opportunities for leadership roles in collaborative projects
- Offer independent research projects and inquiry-based assignments
- Encourage critical analysis of multiple perspectives and interpretations of historical events

Suggested Technological Innovations/Computer Sci Design Thinking

CS.9-12.8.1.12.DA.5	Create data visualizations from large data sets to summarize, communicate, and support different interpretations of real-world phenomena.
CS.9-12.8.1.12.DA.6	Create and refine computational models to better represent the relationships among different elements of data collected from a phenomenon or process.
CS.9-12.8.2.12.ED.1	Use research to design and create a product or system that addresses a problem and make modifications based on input from potential consumers.
CS.9-12.8.2.12.ED.6	Analyze the effects of changing resources when designing a specific product or system (e.g., materials, energy, tools, capital, labor).

Cross Curricular/Career Readiness, Life Literacies and Key Skills Practice

WRK.K-12.P.1	Act as a responsible and contributing community members and employee.
WRK.K-12.P.3	Consider the environmental, social and economic impacts of decisions.
WRK.K-12.P.4	Demonstrate creativity and innovation.
TECH.9.4.12.CI	Creativity and Innovation
TECH.9.4.12.CI.1	Demonstrate the ability to reflect, analyze, and use creative skills and ideas (e.g., 1.1.12prof.CR3a).
TECH.9.4.12.CT	Critical Thinking and Problem-solving
TECH.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).
TECH.9.4.12.CT.2	Explain the potential benefits of collaborating to enhance critical thinking and problem solving (e.g., 1.3E.12profCR3.a).
TECH.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.).
TECH.9.4.12.TL.3	Analyze the effectiveness of the process and quality of collaborative environments.

Unit 8: Renewable and Nonrenewable Resources

Content Area: **Science**
Course(s): **Environmental Science (s)**
Time Period: **4th Marking Period**
Length: **5 weeks**
Status: **Not Published**

Summary of the Unit

In this unit, students will investigate how society produces and consumes energy and the environmental, economic, and social consequences of those choices. Energy is at the core of modern civilization– powering our homes, transportation systems, industries, and technologies. But how we generate that energy has far-reaching effects on the health of the planet and future generations.

The unit begins with a foundational understanding of energy itself– its forms, how it's measured and how it flows through systems. Students will then dive into the dominant sources of global energy: nonrenewable fossil fuels such as coal, oil, and natural gas. They'll explore how these resources are formed, extracted, used, and how long supplies may last. Through case studies and data interpretation, students will examine the environmental degradation, climate implications, and geopolitical consequences tied to fossil fuel dependence.

Next, students will evaluate nuclear energy, a controversial but low-carbon power source. They'll assess the technological, environmental, and safety challenges associated with nuclear power, as well as its potential to play a larger role in a decarbonized energy future.

Shifting focus to solutions, students will explore a wide range of renewable energy alternatives, including solar, wind, geothermal, hydropower, biomass, ocean energy, and hydrogen fuel technologies. Using renewable energy – such as reduced greenhouse gas emissions, energy independence, and sustainability – outweigh the economic and technological costs.

Throughout the unit, students will be asked to think critically about questions such as:

- What energy future do we want, and what trade-offs are we willing to make?
- How can we transition away from fossil fuels while ensuring reliable, equitable energy for all?
- What roles do innovation, conservation, and policy play in shaping our energy systems?

By the end of this unit, students will be equipped with scientific knowledge and thinking skills to evaluate energy issues, engage in civic discussions, and consider their own role in creating a more sustainable energy future.

Enduring Understandings

- Nonrenewable energy resources such as fossil fuels are finite and formed over millions of years, making them unsustainable in the long term.
- Extracting and using fossil fuels has significant environmental, economic, and political consequences, including pollution, habitat destruction, and climate change.

- Energy use and dependence on fossil fuels are closely tied to global politics and national security.
- Nuclear power offers a low-carbon alternative to fossil fuels but raises safety, waste disposal, and public health concerns.
- Energy conservation and efficiency are critical strategies to extend the life of nonrenewable resources and reduce environmental impacts.
- Renewable energy sources are more sustainable and environmentally friendly alternatives to fossil fuels, but they come with economic, technological, and ecological challenges.
- Each type of renewable energy – solar, wind, geothermal, hydropower, biomass, ocean, and hydrogen– has unique advantages and limitations.
- Transitioning to renewable energy requires changes in infrastructure, policy, and public behavior.
- Global examples, such as Germany's renewable energy transition, demonstrate both the potential and the complexity of shifting to cleaner energy systems.

Essential Questions

- What are the main sources and uses of nonrenewable energy?
- How do fossil fuels form, and why are they considered nonrenewable?
- What are the environmental and societal impacts of extracting and using fossil fuels?
- How does our dependence on fossil fuels affect global relationships and national security?
- What are the risks and benefits of using nuclear energy?
- How can energy conservation help reduce our reliance on nonrenewable resources?
- What are the major types of renewable energy, and how do they work?
- What are the environmental and economic trade-offs of using renewable energy sources?
- How do the benefits of renewable energy compare to the costs?
- Why is it challenging to replace fossil fuels with renewable alternatives?
- How are different countries and communities addressing the energy transition?
- What role do individuals, governments, and business play in advancing renewable energy?

Summative Assessment and/or Summative Criteria

Assessments can include, but are not limited to the following:

- Research/Presentations Projects
- Group Projects
- Posters
- Labs
- Unit Assessments
- Section Quizzes
- Quarterly Exam

Resources

Board approved textbook(s) and accompanying resources
Digital textbook access resources
Teacher resource binder
Student generated resources

OnCourse Classroom materials
Other supplemental materials mentioned in Unit Plans
Digital media and simulations including but not limited to the following:

- Phosphate mine in Florida
  https://www.youtube.com/watch?v=BMh8HkvWjPo
- Mine reclamation in Alaska
  https://www.youtube.com/watch?v=3zEAicSEBME
- How Does the Power Grid Work?
  https://www.youtube.com/watch?v=v1BMWczn7JM
- The Path of Electricity
  https://www.youtube.com/watch?v=v1BMWczn7JM
- Fossil Fuels 101
  https://www.youtube.com/watch?v=zaXBVYr9Ij0
- Fossil Fuel Formation Complete
  https://www.youtube.com/watch?v=pvH-h7TzSsE&authuser=0
- Ecological Footprint Calculator
  https://www.footprintcalculator.org/home/en

Unit Plan

Topic/Selection & Timeframe	General Objectives	Instructional Activities	Benchmarks/ Assessments
Energy: An Overview 1-3 days	• Identify different forms of energy and describe how society uses them	• Lecture • Guided Notes • Class Discussion • Energy Video • Alaska's North Slope Case Study	• Central Case Study Analysis Questions • Unit Test • Quarterly Exam
Fossil Fuels 1-2 days	• Analyze how fossil fuels form, and how they are obtained and used • Recreate a model for mining nonrenewable resources	• Lecture • Guided Notes • Chocolate Chip Cookie Mining Activity • Fossil Fuel Videos	• Chocolate Chip Cookie Mining Activity Questions

Consequences of Fossil Fuel Use 1-2 days	• Analyze the consequences of using fossil fuels for energy	• Lecture • Guided Notes • Class discussion • Fossil Fuel Videos	• Questions Sheet • Quarterly Exam
Nuclear Power 1-2 days	• Compare the advantages and disadvantages of nuclear energy	• Lecture • Guided Notes • Class Discussion • Nuclear Energy Videos	• Question Sheet • Quarterly Exam
Biomass and Geothermal Energy 2-4 Days	• Research the different forms of renewable energy • Explain the different forms of renewable energy and how society uses them • Analyze the advantages and disadvantages of the different forms of renewable energy	• Renewable Energy Project (Google Slides Presentation) • Lecture • Class Discussion	• Renewable Energy Project • Quarterly Exam
Hydropower and Ocean Energy 2-4 Days	• Research the different forms of renewable energy • Explain the different forms of	• Renewable Energy Project (Google Slides Presentation) • Lecture	• Renewable Energy Project • Quarterly Exam

	renewable energy and how society uses them • Analyze the advantages and disadvantages of the different forms of renewable energy	• Class Discussion	
Solar and Wind Energy 2-4 Days	• Research the different forms of renewable energy • Explain the different forms of renewable energy and how society uses them • Analyze the advantages and disadvantages of the different forms of renewable energy	• Renewable Energy Project (Google Slides Presentation) • Lecture • Class Discussion	• Renewable Energy Project • Quarterly Exam
Energy from Hydrogen 2-4 Days	• Research the different forms of renewable energy • Explain the different forms of renewable energy and	• Renewable Energy Project (Google Slides Presentation) • Lecture • Class Discussion	• Renewable Energy Project • Quarterly Exam

	how society uses them • Analyze the advantages and disadvantages of the different forms of renewable energy		

Standards

SCI.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.
SCI.HS-ESS3	Earth and Human Activity
SCI.HS-ESS3-2	Evaluate competing design solutions for developing, managing, and utilizing energy and mineral resources based on cost-benefit ratios.
SCI.HS-ESS3-4	Evaluate or refine a technological solution that reduces impacts of human activities on climate change and other natural systems.

Suggested Modifications for Students with Disabilties, Multilingual Learners, At Risk Students and Gifted Students

*Consistent with individual plans, when appropriate.

Special Education*:

- Modifications for any individual student's IEP plan must be met
- Collaboration between Content Education and Special Education teachers
- Modified tests, quizzes, worksheets, and written assignments
- Allow for extended time on assessments and assignments
- Access to a quiet testing environment
- Allow wait time for processing before calling on student for response
- Organizational and time management support (checklists, graphic organizers, structured timelines)
- Preferential seating to minimize distractions
- Breaks as needed to support focus and processing
- Repetition of directions and refocus activities

504-Eligible Students*:

- Collaboration between teachers and support staff to ensure accommodations are met

- Modified tests, quizzes, worksheets, and written assignments
- Allow for extended time on assessments and assignments
- Access to a quiet testing environment
- Allow wait time for processing before calling on student for response
- Organizational and time management support (checklists, graphic organizers, structured timelines)
- Preferential seating to minimize distractions
- Breaks as needed to support focus and processing
- Access to printed and highlighted notes
- Use of assistive technology (speech-to-text, audiobooks, screen readers)

Multilingual Language Learners (MLL):

- Collaboration between Content Education and ESL teachers
- Use of audio recordings when applicable
- Use of translation dictionaries when applicable
- Provide opportunities for oral responses and assessments
- Allow use of computer or other technological devices for assignments
- Highlight important notes and key concepts
- Use of graphic organizers to support comprehension
- Assign a peer liaison for additional support
- Incorporation of visual aids and real-world examples to reinforce concepts
- Modified assignments to focus on essential content
- Additional scaffolding such as sentence starters and guided practice

At-Risk Students:

- Small group instruction or one-on-one support when possible
- Clear, step-by-step instructions and modeling of tasks
- Use of engaging, real-world connections to make content more relevant
- Frequent feedback and progress monitoring
- Additional scaffolding (sentence starters, guided practice, visual supports)
- Peer mentoring and collaborative learning opportunities
- Encouragement of active participation through hands-on and interactive learning
- Flexible deadlines and opportunities for revision and reassessment
- Regular check-ins with teacher or counselor for academic and emotional support
- Positive reinforcement and goal-setting strategies to encourage motivation and engagement

Gifted Students:

- Provide more elaborate, complex, and in-depth study of major ideas and themes that integrate knowledge within and across the curriculum
- Incorporate outside sources (media, content, community resources) for further study that are thematic in nature
- Promote self-directed and self-initiated learning opportunities
- Allow for the development of productive thinking skills to encourage students to generate new knowledge
- Provide opportunities for leadership roles in collaborative projects
- Offer independent research projects and inquiry-based assignments
- Encourage critical analysis of multiple perspectives and interpretations of historical events

Suggested Technological Innovations/Computer Sci Design Thinking

CS.9-12.8.1.12.DA.5	Create data visualizations from large data sets to summarize, communicate, and support different interpretations of real-world phenomena.
CS.9-12.8.1.12.DA.6	Create and refine computational models to better represent the relationships among different elements of data collected from a phenomenon or process.
CS.9-12.8.2.12.ED.1	Use research to design and create a product or system that addresses a problem and make modifications based on input from potential consumers.
CS.9-12.8.2.12.ED.6	Analyze the effects of changing resources when designing a specific product or system (e.g., materials, energy, tools, capital, labor).

Cross Curricular/Career Readiness, Life Literacies and Key Skills Practice

WRK.K-12.P.1	Act as a responsible and contributing community members and employee.
WRK.K-12.P.3	Consider the environmental, social and economic impacts of decisions.
WRK.K-12.P.4	Demonstrate creativity and innovation.
TECH.9.4.12.CI	Creativity and Innovation
TECH.9.4.12.CI.1	Demonstrate the ability to reflect, analyze, and use creative skills and ideas (e.g., 1.1.12prof.CR3a).
TECH.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).
TECH.9.4.12.CT.2	Explain the potential benefits of collaborating to enhance critical thinking and problem solving (e.g., 1.3E.12profCR3.a).
TECH.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.).
TECH.9.4.12.TL.3	Analyze the effectiveness of the process and quality of collaborative environments.