COURSE TITLE

Environmental Science

LENGTH

Full Year

DEPARTMENT

STEM Department

SCHOOL

Rutherford High School

DATE

September 10, 2018

Initial BOE Approval Date (Born on): 6/15/2015

Environmental Science

I. Introduction/Overview/Philosophy

Environmental Science introduces students to a broad view of the biosphere and the physical parameters that affect it. The full year course emphasizes Physical and Earth Science components involved in biogeochemical cycles that impact biomes. Students study a variety of topics including biotic and abiotic factors in habitats, ecosystems, and biomes; interrelationships between resources and environmental systems; sources and flow of energy through environmental systems; factors that influence carrying capacity; and natural and man-made environmental changes.

The course encourages critical thinking, use of the scientific method, integration of technology, and application of knowledge and skills learned to practical questions/problems. Safe field and laboratory investigations are used in instruction to illustrate scientific concepts and principles and support inquiry instruction.

II. Objectives

Course Outline:

1. Chemistry of the Universe
    a. Formulation, evolution, and workings of the solar system
    b. Radiometric dating
2. Dynamic Earth Systems
    a. Impacts of feedback
    b. Carbon cycle's influence on the geosphere, hydrosphere, atmosphere, and biosphere
    c. Plate tectonics
3. Physics of Earth's Systems
    a. Kepler's Laws
    b. Orbital motion
    c. Momentum
4. Human Activity and the Climate System
    a. Global climate change
    b. Cycling of matter
    c. Mining
    d. Fracking
5. Human Sustainability
    a. Human populations
    b. Impacts on biodiversity from human energy consumption
    c. Human dependence on technology for development
6. Human Activity and Energy
    a. Impacts of technology on the environment
    b. Limits of energy use and production

Student Outcomes:

After successfully completing this course, the student will:

- Discuss science as a body of knowledge and an investigative process.
- Conduct scientific investigations systematically.
- Form a hypothesis
- Develop a practical and logical procedure
- Present conclusions based on investigation/previous research
- Exhibit behaviors appropriate to the scientific enterprise consistently. Examples: curiosity, creativity, integrity, patience, skepticism, logical reasoning, attention to detail, openness to new ideas
- Demonstrate correct care and safe use of instruments, equipment, and living organisms.
- Demonstrate the ability to choose, construct, and/or assemble appropriate equipment for scientific investigations.
- Apply critical and integrated science thinking skills.
- Measure with appropriate units and significant figures
- Use mathematical models, simple statistical models, and graphical models to express patterns and relationships determined from sets of scientific data.
- Use written and oral communication skills to present and explain scientific phenomena and concepts individually or in collaborative groups using technical and non-technical language.

New Jersey Student Learning Standards

CAREER READY PRACTICES

CRP1 Act as a responsible and contributing citizen and employee.

Career-ready individuals understand the obligations and responsibilities of being a member of a community, and they demonstrate this understanding every day through their interactions with others. They are conscientious of the impacts of their decisions on others and the environment around them. They think about the near-term and long-term consequences of their actions and seek to act in ways that contribute to the betterment of their teams, families, community and workplace. They are reliable and consistent in going beyond the minimum expectation and in participating in activities that serve the greater good.

CRP2 Apply appropriate academic and technical skills.

Career-ready individuals readily access and use the knowledge and skills acquired through experience and education to be more productive. They make connections between abstract concepts with real-world applications, and they make correct insights about when it is appropriate to apply the use of an academic skill in a workplace situation

CRP4 Communicate clearly and effectively and with reason.

Career-ready individuals communicate thoughts, ideas, and action plans with clarity, whether using written, verbal, and/or visual methods. They communicate in the workplace with clarity and purpose to make maximum use of their own and others' time. They are excellent writers; they master conventions, word choice, and organization, and use effective tone and presentation skills to articulate ideas. They are skilled at interacting with others; they are active listeners and speak clearly and with purpose. Career-ready individuals think about the audience for their communication and prepare accordingly to ensure the desired outcome.

CRP5. Consider the environmental, social and economic impacts of decisions.

Career-ready individuals understand the interrelated nature of their actions and regularly make decisions that positively impact and/or mitigate negative impact on other people, organization, and the environment. They are aware of and utilize new technologies, understandings, procedures, materials, and regulations affecting the nature of their work as it relates to the impact on the social condition, the environment and the profitability of the organization.

CRP6. Demonstrate creativity and innovation.
Career-ready individuals regularly think of ideas that solve problems in new and different ways, and they contribute those ideas in a useful and productive manner to improve their organization. They can consider unconventional ideas and suggestions as solutions to issues, tasks or problems, and they discern which ideas and suggestions will add greatest value. They seek new methods, practices, and ideas from a variety of sources and seek to apply those ideas to their own workplace. They take action on their ideas and understand how to bring innovation to an organization.

CRP7. Employ valid and reliable research strategies.
Career-ready individuals are discerning in accepting and using new information to make decisions, change practices or inform strategies. They use reliable research process to search for new information. They evaluate the validity of sources when considering the use and adoption of external information or practices in their workplace situation.

CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.
Career-ready individuals readily recognize problems in the workplace, understand the nature of the problem, and devise effective plans to solve the problem. They are aware of problems when they occur and take action quickly to address the problem; they thoughtfully investigate the root cause of the problem prior to introducing solutions. They carefully consider the options to solve the problem. Once a solution is agreed upon, they follow through to ensure the problem is solved, whether through their own actions or the actions of others.

CRP11. Use technology to enhance productivity.
Career-ready individuals find and maximize the productive value of existing and new technology to accomplish workplace tasks and solve workplace problems. They are flexible and adaptive in acquiring new technology. They are proficient with ubiquitous technology applications. They understand the inherent risks-personal and organizational-of technology applications, and they take actions to prevent or mitigate these risks.

CRP12. Work productively in teams while using cultural global competence.
Career-ready individuals positively contribute to every team, whether formal or informal. They apply an awareness of cultural difference to avoid barriers to productive and positive interaction. They find ways to increase the engagement and contribution of all team members. They plan and facilitate effective team meetings.

TECHNOLOGY

Standard 8.1 Educational Technology: All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and to create and communicate knowledge.
Strand A. Technology Operations and Concepts: Students demonstrate a sound understanding of technology concepts, systems and operations.

8.1.12.A.2- Produce and edit a multi-page digital document for a commercial or professional audience and present it to peers and/or professionals in that related area for review.
8.1.12.A.3- Collaborate in online courses, learning communities, social networks or virtual worlds to discuss a resolution to a problem or issue.
8.1.12.A.5- Create a report from a relational database consisting of at least two tables and describe the process, and explain the report results.
Strand B. Creativity and Innovation: Students demonstrate creative thinking, construct knowledge and develop innovative products and process using technology.
8.1.12.B.2- Apply previous content knowledge by creating and piloting a digital learning game or tutorial.
Strand C. Communication and Collaboration: Students use digital media and environments to communicate and work collaboratively, including at a distance, to support individual learning and contribute to the learning of others.
8.1.12.C.1- Develop an innovative solution to a real world problem or issue in collaboration with peers and experts, and present ideas for feedback through social media or in an online community.
Strand D. Digital Citizenship: Students understand human, cultural, and societal issues related to technology and practice legal and ethical behavior.
8.1.12.D.4- Research and understand the positive and negative impact of one's digital footprint.
8.1.12.D.5- Analyze the capabilities and limitations of current and emerging technology resources and assess their potential to address personal, social, lifelong learning, and career needs.
Strand E: Research and Information Fluency: Students apply digital tools to gather, evaluate, and use information.
8.1.12.E.1- Produce a position statement about a real world problem by developing a systematic plan of investigation with peers and experts synthesizing information from multiple sources.
8.1.12.E.2- Research and evaluate the impact on society of the unethical use of digital tools and present your research to peers.
Strand F: Critical thinking, problem solving, and decision making: Students use critical thinking skills to plan and conduct research, manage projects, solve problems, and make informed decisions using appropriate digital tools and resources.
8.1.12.F.1- Evaluate the strengths and limitations of emerging technologies and their impact on educational, career, personal and or social needs.

Standard 8.2 Technology Education, Engineering, Design, and Computational Thinking - Programming: All students will develop an understanding of the nature and impact of technology, engineering, technological design, computational thinking and the designed world as they relate to the individual, global society, and the environment.
Strand A. The Nature of Technology: Creativity and Innovation Technology systems impact every aspect of the world in which we live.
8.2.12.A.2- Analyze a current technology and the resources used, to identify the trade-offs in terms of availability, cost, desirability and waste.
8.2.12.A.3- Research and present information on an existing technological product that has been repurposed for a different function.
Strand B. Technology and Society: Knowledge and understanding of human, cultural and societal values are fundamental when designing technological systems and products in the global society.
8.2.12.B.2- Evaluate ethical considerations regarding the sustainability of environmental resources that are used for the design, creation and maintenance of a chosen product.
8.2.12.B.4- Investigate a technology used in a given period of history, e.g., stone age, industrial revolution or information age, and identify their impact and how they may have changed to meet human needs and wants.

8.2.12.B.5- Research the historical tensions between environmental and economic considerations as driven by human needs and wants in the development of a technological product, and present the competing viewpoints to peers for review.
Strand C. Design: The design process is a systematic approach to solving problems.
8.2.12.C.1- Explain how open source technologies follow the design process.
8.2.12.C.2- Analyze a product and how it has changed or might change over time to meet human needs and wants.
8.2.12.C.3- Analyze a product or system for factors such as safety, reliability, economic considerations, quality control, environmental concerns, manufacturability, maintenance and repair, and human factors engineering (ergonomics).
8.2.12.C.7- Use a design process to devise a technological product or system that addresses a global problem, provide research, identify trade-offs and constraints, and document the process through drawings that include data and materials.
Strand D. Abilities for a Technological World: The designed world is the product of a design process that provides the means to convert resources into products and systems.
8.2.12.D.1- Design and create a prototype to solve a real world problem using a design process, identify constraints addressed during the creation of the prototype, identify trade-offs made, and present the solution for peer review.
8.2.12.D.4- Assess the impacts of emerging technologies on developing countries.
8.2.12.D.5- Explain how material processing impacts the quality of engineered and fabricated products.
8.2.12.D.6- Synthesize data, analyze trends and draw conclusions regarding the effect of a technology on the individual, society, or the environment and publish conclusions.
Strand E. Computational Thinking: Programming: Computational thinking builds and enhances problem solving, allowing students to move beyond using knowledge to creating knowledge.
8.2.12.E.1- Demonstrate an understanding of the problem-solving capacity of computers in our world.

21ST CENTURY LIFE AND CAREERS

9.1 Personal Financial Literacy

Strand A: Income and Careers

9.1.12.A.4 Identify a career goal and develop a plan and timetable for achieving it, including educational/training requirements, costs, and possible debt.
9.1.12.A.9 Analyze how personal and cultural values impact spending and other financial decisions.

Strand E: Becoming a Critical Consumer

9.1.12.E.4 Evaluate how media, bias, purpose, and validity affect the prioritization of consumer decisions and spending.

Strand F: Civic Financial Responsibility

9.1.12.F.1- Relate a country's economic system of production and consumption to building personal wealth and achieving societal responsibilities.
9.1.12.F.3 Analyze how citizen decisions and actions can influence the use of economic resources to achieve societal goals and provide individual services.
9.1.12.F.5 Compare and contrast the role of philanthropy, volunteer service, and charities in community development and quality of life in a variety of cultures.

9.2 Career Awareness, Exploration, and Preparation

Strand C: Career Preparation

9.2.12.C.2 Modify Personalized Student Learning Plans to support declared career goals.
9.2.12.C.3 Identify transferable career skills and design alternate career plans.

COMPANION STANDARDS FOR SCIENCE AND TECHNICAL SUBJECTS

RST.11-12.1. Accurately cite strong and thorough evidence from the text to support analysis of science and technical texts, attending to precise details for explanations or descriptions.
RST.11-12.2. Determine the central ideas, themes, or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms.
RST.11-12.3. Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.
RST.11-12.4. Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11-12 texts and topics.
RST.11-12.5. Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas.
RST.11-12.6. Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying important issues that remain unresolved.
RST.11-12.7. Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.
RST.11-12.8. Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information.
RST.11-12.9. Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.
RST.11-12.10. By the end of grade 12, read and comprehend science/technical texts in the grades 11-CCR text complexity band independently and proficiently.
WHST.11-12.2. Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.
WHST.11-12.5. Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.
WHST.11-12.7. Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.
WHST.11-12.8. Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation.
WHST.11-12.9. Draw evidence from informational texts to support analysis, reflection, and research.
WHST.11-12.10. Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.

NEW JERSEY STUDENT LEARNING STANDARDS- SCIENCE

HS-PS1-8. Develop models to illustrate the changes in the composition of the nucleus of the atom and the energy released during the processes of fission, fusion, and radioactive decay.
HS-PS2-1. Analyze data to support the claim that Newton’s second law of motion describes the mathematical relationship among the net force on a macroscopic object, its mass, and its acceleration.
HS-PS2-5. Plan and conduct an investigation to provide evidence that an electric current can produce a magnetic field and that a changing magnetic field can produce an electric current.
HS-PS3-1. Create a computational model to calculate the change in the energy of one component in a system when the change in energy of the other component(s) and energy flows in and out of the system are known.
HS-PS3-2. Develop and use models to illustrate that energy at the macroscopic scale can be accounted for as a combination of energy associated with the motion of particles (objects) and energy associated with the relative position of particles (objects).

HS-PS3-3. Design, build, and refine a device that works within given constraints to convert one form of energy into another form of energy.
HS-PS3-5. Develop and use a model of two objects interacting through electric or magnetic fields to illustrate the forces between objects and the changes in energy of the objects due to the interaction.
HS-PS4-1. Use mathematical representations to support a claim regarding relationships among the frequency, wavelength, and speed of waves traveling in various media.
HS-PS4-3. Evaluate the claims, evidence, and reasoning behind the idea that electromagnetic radiation can be described either by a wave model or a particle model, and that for some situations one model is more useful than the other.
HS-PS4-4. Evaluate the validity and reliability of claims in published materials of the effects that different frequencies of electromagnetic radiation have when absorbed by matter
HS-PS4-5. Communicate technical information about how some technological devices use the principles of wave behavior and wave interactions with matter to transmit and capture information and energy.
HS-LS4-6. Create or revise a simulation to test a solution to mitigate adverse impacts of human activity on biodiversity.
HS-ESS1-1. Develop a model based on evidence to illustrate the life span of the sun and the role of nuclear fusion in the sun's core to release energy that eventually reaches Earth in the form of radiation. [
HS-ESS1-2. Construct an explanation of the Big Bang theory based on astronomical evidence of light spectra, motion of distant galaxies, and composition of matter in the universe.
HS-ESS1-3. Communicate scientific ideas about the way stars, over their life cycle, produce elements.
HS-ESS1-4. Use mathematical or computational representations to predict the motion of orbiting objects in the solar system.
HS-ESS1-5. Evaluate evidence of the past and current movements of continental and oceanic crust and the theory of plate tectonics to explain the ages of crustal rocks.
HS-ESS1-6. Apply scientific reasoning and evidence from ancient Earth materials, meteorites, and other planetary surfaces to construct an account of Earth's formation and early history.
HS-ESS2-1. Develop a model to illustrate how Earth's internal and surface processes operate at different spatial and temporal scales to form continental and ocean-floor features
HS-ESS2-2. Analyze geoscience data to make the claim that one change to Earth's surface can create feedbacks that cause changes to other Earth systems.
HS-ESS2-3. Develop a model based on evidence of Earth's interior to describe the cycling of matter by thermal convection.
HS-ESS2-4. Use a model to describe how variations in the flow of energy into and out of Earth's systems result in changes in climate
HS-ESS2-5. Plan and conduct an investigation of the properties of water and its effects on Earth materials and surface processes
HS-ESS2-6. Develop a quantitative model to describe the cycling of carbon among the hydrosphere, atmosphere, geosphere, and biosphere.
HS-ESS2-7. Construct an argument based on evidence about the simultaneous coevolution of Earth's systems and life on Earth.
HS-ESS3-1. Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and changes in climate have influenced human activity.
HS-ESS3-2. Evaluate competing design solutions for developing, managing, and utilizing energy and mineral resources based on cost-benefit ratios.
HS-ESS3-3. Create a computational simulation to illustrate the relationships among the management of natural resources, the sustainability of human populations, and biodiversity.
HS-ESS3-4. Evaluate or refine a technological solution that reduces impacts of human activities on natural systems.

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.

III. Proficiency Levels

Environmental Science is an inquiry-based science course for students that have completed Biology.

IV. Methods of Assessment

Student Assessment
The teacher will provide a variety of assessments during the course of the year. The assessment may include but is not limited to: chapter and unit tests and quizzes, simulations, application problems, laboratory reports, homework, and projects.

Curriculum/Teacher Assessment
The teacher will provide the subject area supervisor with suggestions for changes on an ongoing basis.

V. Grouping

Environmental Science is appropriate for heterogeneously grouped sophomore/junior/seniors students.

VI. Articulation/Scope & Sequence/Time Frame

Course length is one year.

VII. Resources

Texts/Supplemental Reading/References

Resources include but are not limited to:

- Text
  - Environmental Science, Holt, Reinhart, and Winston, 2008
- Ancillary Textbooks
  - Exercises in Physical Geology, Hamblin and Howard, 1986
  - Essential Biology, Campbell, Reece, and Simon, 2007
  - Environmental Science, Holt, 1996
- Web-based Resources
  - https://www.teachengineering.org/
  - http://betterlesson.com/next_gen_science
  - http://www.ck12.org/
  - http://www.ngsslifescience.com
  - Crash Course: http://www.pbslearningmedia.org/collection/crash-course/
  - Discovery News: http://news.discovery.com/
  - SciShow

VIII. Suggested Activities

Appropriate activities are listed below on the curriculum map.

IX. Methodologies

The following methods of instruction are suggested: lecture, group projects, demonstration, hands-on applications, and class presentations.

X. Interdisciplinary Connections

Connections are made to mathematics by means of collaborative projects. Discussions as to the historical significance and background of scientific experiments and discoveries strengthen the connection to history. The significance of particular biomes to various cultures around the world also connects environmental science to world studies. Writing assignments in the form of laboratory reports and open-ended questions makes use of skills learned in language arts literacy.

XI. Differentiating Instruction for Students with Special Needs: Students with Disabilities, Students at Risk, English Language Learners, and Gifted & Talented Students

Differentiating instruction is a flexible process that includes the planning and design of instruction, how that instruction is delivered, and how student progress is measured. Teachers recognize that students can learn in multiple ways as they celebrate students' prior knowledge. By providing appropriately challenging learning, teachers can maximize success for all students.

Differentiating in this course includes but is not limited to:

Differentiation for Support (ELL, Special Education, Students at Risk)

- Peer mentoring on problems
- Differentiated teacher feedback on assignments
- Modeling out problems on whiteboard
- Visual aids as we project problems on whiteboard
- Study guides
- Tiered assignments
- Scaffolding of materials and assignments
- Re-teaching and review
- Guided note taking
- Exemplars of varied performance levels
- Multi-media approach to accommodating various learning styles

Differentiation for Enrichment

- Supplemental reading material for independent study
- Flexible grouping
- Tiered assignments
- Topic selection by interest

- Enhanced expectations for independent study
- Elevated questioning techniques using Webb's Depth of Knowledge matrix

XII. Professional Development

The teacher will continue to improve expertise through participation in a variety of professional development opportunities.

XII. Curriculum Map/Pacing Guide

Unit Topic	Time Allocated	Differentiating Instruction for Students with Disabilities, Students at Risk, English Language Learners, & Gifted & Talented Students	Standards	Assessments
Chemistry of the Universe • Formulation, evolution, and workings of the solar system • Radiometric dating	6 weeks	*For Support:* Guided notes Testing accommodations Teacher modeling Use of assisted technology *For Enhancement:* Inquiry-based instruction Interest-based content Independent study	HS-ESS1-1 HS-ESS1-2 HS-ESS1-3 HS-ESS1-6 HS-PS1-8 CRP1,2,4,7,8,10,11,12 8.1.12.A.3, 8.1.12.B.2 8.1.12.C.1, 8.1.12.D.4,5 8.1.12.E.1,2, 8.1.12.F.1 8.2.12.B.2,4,5, 8.2.12.D.4,5,6 8.2.12.E.1 9.2.12.C.2, 9.2.12.C.3 RST.11-12.1-10 WHST.11-12.2,5,6,9,10	*Formative Assessment:* Lab on the expansion of the universe Homework on the Big Bang Theory Group work *Summative Assessment:* Test on the lifecycle of stars Quarterly benchmark assessments
Dynamic Earth Systems • Impacts of feedback • Carbon cycle's influence on the geosphere, hydrosphere, atmosphere, and biosphere • Plate tectonics	7 weeks	*For Support:* Use of prompts Use of visual and multisensory formats Visual learning with graphic organizers Use of cognates *For Enhancement:* Real-world problems and scenarios	HS-ESS2-2 HS-ESS2-5 HS-ESS2-6 HS-ESS2-7 CRP1,2,4,7,8,10,11,12 8.1.12.A.3, 8.1.12.B.2 8.1.12.C.1, 8.1.12.D.4,5 8.1.12.E.1, 8.1.12.F.1 8.2.12.B.2,5, 8.2.12.D.6 8.2.12.E.1 RST.11-12.1-10 WHST.11-12.2,5,6,9,10	*Formative Assessment:* Classwork Group and cooperative work Homework *Summative Assessment:* Test on the spheres of earth Laboratory exercise on tectonic plate movement Benchmark assessment

Unit Topic	Time Allocated	Differentiating Instruction for Students with Disabilities, Students at Risk, English Language Learners, & Gifted & Talented Students	Standards	Assessments
		Student-driven projects Critical/analytical thinking tasks		
Physics of Earth's Systems • Kepler's Laws • Orbital motion • Momentum	5 weeks	*For Support:* Guided notes Use of a calculator Pairing students with beginning English language skills with students who have more advanced English language skills Rephrase questions, directions, and explanations *For Enhancement:* Real-world problems and scenarios Inquiry-based instruction Independent study	HS-ESS1-1 HS-ESS1-2 HS-ESS1-3 HS-ESS1-5 HS-ESS1-6 HS-ESS2-1 HS-ESS2-3 HS-PS1-8 HS-PS2-1 HS-PS2-5 HS-PS4-1 CRP1,2,4,7,8,10,11,12 8.1.12.A.2,3,5, 8.1.12.B.2 8.1.12.C.1, 8.1.12.D.4,5 8.1.12.E.1, 8.1.12.F.1 8.2.12.B.2,5, 8.2.12.D.6 8.2.12.E.1 RST.11-12.1-10 WHST.11-12.2,5,6,8,9,10	*Formative Assessment:* Questioning Entry/Exit tickets Homework Group and cooperative work *Summative Assessment:* Quiz on Kepler's laws Test on orbital motion and momentum Project--Present on one of Kepler's Laws with a real-world application
Human Activity and the Climate System • Global climate change • Cycling of matter • Mining • Fracking	7 weeks	*For Support:* Modification of content and student products Visual learning, including graphic organizers Pre-teaching of vocabulary and concepts Authentic assessments	HS-ESS1-4 HS-ESS2-2 HS-ESS2-4 HS-ESS2-6 HS-ESS3-5 HS-PS4-4 CRP1,2,4,7,8,10,11,12 8.1.12.A.3, 8.1.12.B.2 8.1.12.C.1, 8.1.12.D.4,5	*Formative Assessment:* Homework Classwork Questioning *Summative Assessment:* Quiz on nonrenewable energy Test on Cool It and An

Unit Topic	Time Allocated	Differentiating Instruction for Students with Disabilities, Students at Risk, English Language Learners, & Gifted & Talented Students	Standards	Assessments
		For Enhancement: Provide extension activities Inquiry-based instruction Student-driven projects	8.1.12.E.1, 8.1.12.F.1 8.2.12.B.2,5, 8.2.12.C.1,7, 8.2.12.D.5,6 8.2.12.E.1 RST.11-12.1-10 WHST.11-12.2,5,6,9,10	Inconvenient Truth Test on mining and nonrenewable energy Mining Lab
Human Sustainability • Human populations • Impacts on biodiversity from human energy consumption • Human dependence on technology for development	7 weeks	*For Support:* Pre-teaching of vocabulary and concepts Use of assisted technology Testing accommodations Scaffolding (cooperative learning groups) *For Enhancement:* Curriculum compacting Interest-based content Real-world problems and scenarios	HS-ESS3-1 HS-ESS3-3 HS-ESS3-4 HS-ESS3-6 HS-ETS1-3 HS-LS4-6 CRP1,2,4,7,8,10,11,12 8.1.12.A.3, 8.1.12.B.2 8.1.12.C.1, 8.1.12.D.4,5 8.1.12.E.1, 8.1.12.F.1 8.2.12.A.2,3, 8.2.12.B.2,5, 8.2.12.C.1,2,3,7, 8.2.12.D.1,4,5,6 8.2.12.E.1 RST.11-12.1-10 WHST.11-12.2,5,6,9,10 9.1.12.A.4,9, 9.1.12.E.4 9.1.12.F.1, 3	*Formative Assessment:* Classwork Homework Group and Cooperative work Exit tickets *Summative Assessment:* Test on human populations Project on populations in different times/places Benchmark assessment
Human Activity and Energy • Impacts of technology on the environment • Limits of energy use	8 weeks	*For Support:* Rephrase questions, directions, and explanations Use of visual and multisensory formats	HS-ESS3-2 HS-PS3-1 HS-PS3-2 HS-PS3-3 HS-PS3-5 HS-PS4-3	*Formative Assessment:* Homework Group and cooperative work Classwork *Summative Assessment:*

Unit Topic	Time Allocated	Differentiating Instruction for Students with Disabilities, Students at Risk, English Language Learners, & Gifted & Talented Students	Standards	Assessments
and production		Allow errors *For Enhancement:* Real-world problems and scenarios Student-driven projects Inquiry-based instruction Critical/Analytical thinking tasks	HS-PS4-5 CRP1,2,4,7,8,10,11,12 8.1.12.A.3, 8.1.12.B.2 8.1.12.C.1, 8.1.12.D.4,5 8.1.12.E.1, 8.1.12.F.1 8.2.12.A.3, 8.2.12.B.2,5, 8.2.12.C.1,2,3,7, 8.2.12.D.1,4,5,6 8.2.12.E.1 RST.11-12.1-10 WHST.11-12.2,5,6,9,10 9.1.12.F.5	Quiz on hydropower and wind power Test on renewable energy Project on building a working model of a renewable source