Course Title – Environmental Science

Implement start year – 2018-2019

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Unit #2 , topic – Global Climate Change

Transfer Goal –

Students will be able to independently use their learning to relate the importance of global warming to its impacts on present and future generations and make every day changes to contribute positively to the movement to slow climate change.

Stage 1 – Desired Results

Established Goals

www.nextgenerationscience.org
Next Generation Science Standards
HS. Weather and Climate

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

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

21st Century Themes
(www.21stcenturyskills.org)

X_ Global Awareness
___Financial, Economic, Business and Entrepreneurial Literacy
X___Civic Literacy
X___Health Literacy
X___Environmental Literacy

21st Century Skills

Learning and Innovation Skills:
X___Creativity and Innovation
X___Critical Thinking and Problem Solving
X___Communication and Collaboration

Information, Media and Technology Skills:
X___Information Literacy
X___Media Literacy
___ICT (Information, Communications and Technology) Literacy

	Life and Career Skills: X___Flexibility and Adaptability X___Initiative and Self-Direction X___Social and Cross-Cultural Skills X___Productivity and Accountability X___Leadership and Responsibility
Enduring Understandings: *Students will understand that . . .* *EU 1* the sun, wind, and oceans affect Earth's climate more than any other environmental factor. *EU 2* as the atmosphere warms, ecosystems on land and in oceans are changing. *EU 3* global climate change is affecting aspects of human life such as farming, forestry, the economy and health. *EU 4* alternate energy sources are needed to replace fossil fuels and reduce pollution.	**Essential Questions:** *EU 1* • How is the Earth's atmosphere impacted by the greenhouse effect, latitude and sunspot cycles? • How does wind distribute heat and moisture? • How do oceans affect climate? • How are Earth's climates changing? *EU 2* • When Earth's climates change, how are organisms impacted? • How does the carbon cycle impact ecosystems? *EU 3* • How have farming practices changed to adjust to the changes in climate? • How are nations cooperating to reduce the emission of greenhouse gases? • How has the transportation industry adopted more eco-friendly practices? • How can an individual impact greenhouse gas emissions in their daily routines? *EU 4* • Why is there a need for alternate forms of energy? • How can alternate forms of energy lessen the impact of greenhouse gases?

Knowledge: *Students will know . . .*	**Skills:** *Students will be able to . . .*
EU 1 • how the sun warms the Earth. • the role of wind patterns in determining climate. • how the oceans affect climate. EU 2 • how the warming atmosphere affects ecosystems and organisms. • the role of the carbon cycle on global warming and climate change. EU 3 • agreements between nations to reduce greenhouse gas emissions. • the ways in which local and global agriculture, health and the economy are influenced by climate change. EU 4 • fossils fuels are a non renewable source of energy that contribute to the global warming. • alternate options for energy including solar, wind, water, geothermal and nuclear are available.	*EU 1* • define the greenhouse effect, latitidue and sunspot cycles in relation to energy from the sun. • determine how winds distribute heat and moisture globablly. • explain how oceans affect climate. EU 2 • identify changes in organism behavior due to global climate change. • predict how global climate change will continue to impact organisms in the future. • diagram the carbon cycle. EU 3 • analyze how changes in human behavior have been necessary to adjust the impacts of global climate change. • identify ways greenhouse gases can be reduced in our daily lives. • describe health effects of global climate change. EU 4 • identify various forms of fossil fuels and how they are used in their everyday lives. • describe environmental consequences of using fossil fuels. • investigate the advantages and disadvantages of alternate energy sources.

Stage 2 – Assessment Evidence

Recommended Performance Tasks: *Each unit must have at least 1 Performance Task. Consider the GRASPS form.*

The student is preparing for a school Science Fair. The student selected the topic of global warming and climate change. The student will create a tri-fold display board of global warming and its effects on organisms and humans. The project must include a definition and explanation of global warming and climate change, examples of organisms/ecosystems effected by global warming, how humans have been impacted and have adapted to global warming and at least one recommendation on how an individual can play a role in reducing global warming. (EU 1, EU 2, EU 3)

The student will take on the role of an architect designing homes for buyers looking to reduce their ecological footprint from greenhouse gases. The homes need to include as many alternate energy sources as possible along with energy efficient appliances and features. The student will create a flier for an open house on a model home highlighting at least five energy efficient features and one alternate energy source being used to power the home. (EU 4)

Other Recommended Evidence: *Tests, Quizzes, Prompts, Self-assessment, Observations, Dialogues, etc.*

- Tests/quizzes
- Labs and lab reports
- Models, graphs, diagrams (atoms, molecules, physical and chemical changes)
- Student reflection in journal
- Teacher observation during class discussion

Stage 3 – Learning Plan

Suggested Learning Activities to Include Differentiated Instruction and Interdisciplinary Connections: *Consider the WHERETO elements. Each learning activity listed must be accompanied by a learning goal of A= Acquiring basic knowledge and skills, M= Making meaning and/or a T= Transfer.*

- Design a poster showing the difference between global warming and climate change. (A, M)
- Diagram global wind patterns over oceans and land. (A)
- Diagram the patterns of El Niño and La Niña. (A)
- Illustrate the 3 different climate zones of the Earth. (A)
- Explore the Hoover Dam and its ability to create hydroelectric energy. (A)
- Create a Google slides presentation showing 5 ways organisms of an ecosystem have responded to global climate change. (A, M)
- Color a diagram of the carbon cycle and label each part (A, M)
- Analyze data (charts, tables, graphs, etc.) that predicts future changes in the global environment (A, M)
- Create a graphic organizer identifying the causes and consequences of a warming Earth. (A)
- Research energy efficient appliances for use in the home. (M)
- Write a letter to the school principal identifying ways the school can reduce energy and water use. (T)
- Give examples of health effects caused by global warming and climate change. (A)
- Outline the ideas of The Clean Air Act, Kyoto Protocol, Paris Climate Accord, and Carbon Tax. (A)
- Create a visual showing how energy is used in our daily lives. (A, M)
- Provide examples of fossil fuel uses. (A)
- Research catastrophic disasters from fossil fuel use (ie: oil spills) (A, M)
- Research prototypes of cars and planes that use alternate forms of energy. (A)
- Identify local Superfund sites (A).
- Describe techniques for using solar energy to heat buildings and generate electricity. (A)
- Analyze the benefits and costs of alternate energy sources (A, M)
- Give examples of when too much of a good thing can become harmful- as in greenhouse gases. (M)
- Use different colored balloons (filled with ice cubes) to investigate what colors absorbs the suns energy quickest. (M)
- Complete a graphic organizer showing the potential uses and limitations of renewable energy sources. (A)
- Photograph solar panels in your local community. (A)
- Community Based Activity to a local solar, wind or water energy use site. (A, M)