

05 Human Influence on the Planet - Air, Soil and Water Pollution

Content Area: **Science**
Course(s):
Time Period: **Full Year**
Length: **25 blocks**
Status: **Published**

General Overview, Course Description or Course Philosophy

Environmental Science covers major environmental topics such as acid rain, global warming, pollution, and renewable and non-renewable energy sources. The interdependence of earth's systems, the human population, the loss of biodiversity and the trade-offs between the environment and society will be studied. The course includes laboratory and field investigations.

OBJECTIVES, ESSENTIAL QUESTIONS, ENDURING UNDERSTANDINGS

In this unit of study, students evaluate claims, analyze and interpret data, and develop and use models to explore the core ideas centered on the Earth's human impacts. Students evaluate or refine a technological solution that reduces impacts of human activities on natural systems. Students will design or refine a solution to a complex real-world problem based on scientific knowledge, student generated sources of evidence, prioritized criteria and tradeoff considerations. They apply these core ideas when they view human activities on natural systems. They will see how engineers continuously modify these technological systems by applying scientific knowledge and engineering design practices to increase benefits while decreasing costs and risks including less pollution and waste that preclude ecosystem degradation.

Scientists and engineers can make major contributions by developing technologies that produce less pollution and waste and that preclude ecosystem degradation.

When evaluating solutions, it is important to take into account a range of constraints, including cost, safety, reliability, and aesthetics and to consider social, cultural and environmental impacts.

CONTENT AREA STANDARDS

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

RELATED STANDARDS (Technology, 21st Century Life & Careers, ELA Companion Standards are Required)

Reason abstractly and quantitatively. (HS-ESS3-1),(HS-ESS3-3),(HS-ESS3-4),(HS-ESS3-6),(HS-ETS1-3) **MP.2**

Model with mathematics. (HS-ESS3-3),(HS-ESS3-6),(HS-ETS1-3) **MP.4**

Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. (HS-ESS3-1),(HS-ESS3-4),(HS-ESS3-6) **HSN-Q.A.1**

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

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

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|---------------|---|
| LA.RL.11-12.1 | Cite strong and thorough textual evidence and make relevant connections to support analysis of what the text says explicitly as well as inferences drawn from the text, including determining where the text leaves matters uncertain. |
| LA.RL.11-12.2 | Determine two or more themes or central ideas of a text and analyze their development over the course of the text, including how they interact and build on one another to produce a complex account; provide an objective summary of the text. |
| LA.RI.11-12.1 | Accurately cite strong and thorough textual evidence, (e.g., via discussion, written response, etc.), to support analysis of what the text says explicitly as well as inferentially, including determining where the text leaves matters uncertain. |

STUDENT LEARNING TARGETS

Declarative Knowledge

Students will understand that:

- Evaluating or refining a technological solution that reduces impacts of human activities on natural systems.
- Human activity is affecting that Earth systems in the form of air, water and soil pollution
- Computation representation can be used to illustrate the relationship among Earth systems and how those relationships are being modified due to human activity
- Constructing an explanation based on valid and reliable evidence obtained from a variety of sources and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future.
- Scientists and engineers can make major contribution by developing technologies that produce less pollution and waste and that preclude ecosystem degradation.
- Computational representations can be used to illustrate the relationship among Earth systems and how those relationships are being modified due to human activity.
- How to create a computational simulation to illustrate the relationships among management and natural resources, the sustainability of human populations and biodiversity.

Procedural Knowledge

Students will be able to:

- Use scientific knowledge or information to generate possible design solutions for technical solutions
- Describe criteria and constraints for solutions to the problems and quantifications when appropriate

- Identify and describe the relevant components of each of the Earth systems modeled including boundaries, initial conditions, inputs and outputs, and relationships that determine the interaction
- Illustrate and describe relationships among at least two of Earth's systems, including how the relevant components in each individual Earth system can drive changes in another interacting earth system given computational representation.
- Use evidence from the computational representation to describe how human activity could affect the relationships between the Earth's systems under consideration.

RESOURCES (Instructional, Supplemental, Intervention Materials)

Global Science by Christensen and Christensen

Biozone - Earth and Space Science NGSS - section ESS3.C Human Impacts on Earth Systems

INTERDISCIPLINARY CONNECTIONS

Physical Science

Life Science

Mathematics

EVIDENCE OF LEARNING

Formative Assessments

Homework

Notes

Do-Now

Labs/Experiments/Projects

Activities

video clips/animations

Summative Assessments

- Benchmarks – departmental benchmark given at the end of MP1, MP2, and MP3 based on lab practices
- Alternative Assessments
 - Lab inquiries and investigations
 - Lab Practicals
 - Exploratory activities based on phenomenon
 - Gallery walks of student work
 - Creative Extension Projects
 - Build a model of a proposed solution
 - Let students design their own flashcards to test each other
 - Keynote presentations made by students on a topic
 - Portfolio

ACCOMMODATIONS & MODIFICATIONS FOR SUBGROUPS

See link to Accommodations & Modifications document in course folder.