

Readington Township Public Schools

Sustainable World: An Introductory Course for Sustainability

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Readington Township Public Schools
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I. OVERVIEW

Sustainable World is an elective cycle course for 7th and 8th grade students designed to expose students to the basic concepts and principles of sustainability, energy, and systems thinking. Students will engage in hands-on explorations in the areas of global warming, sustainability and systems dynamics. Specifically, students will learn how humans interact with and manage natural systems, such as ecosystems, population, and earth systems.

II. STUDENT OUTCOMES

(Linked to National Education for Sustainability K-12 Student Learning Standards)

EfS Standard 1 – Students understand and are able to apply the basic concepts and principles of sustainability (i.e.: meeting present needs without compromising the ability of future generations to meet their needs).

EfS Standard 2 – Students recognize the concept of sustainability as a dynamic condition characterized by the interdependency among ecological, economic, and social systems and how these interconnected systems affect individual and societal well-being. They develop an understanding of the human connection to and interdependence with the natural world.

EfS Standard 3 – Students develop a multidisciplinary approach to learning the knowledge, skills, and attitudes necessary to continuously improve the health and well-being of present and future generations, via both personal and collective decisions and actions. They are able to envision a world that is sustainable, along with the primary changes that would need to be made by individuals, local communities, and countries in order to achieve this.

III. COURSE OBJECTIVES

Identifying Sustainability

- Define
Students will be able to:
 - identify Sustainability as a concept with multiple meanings and definitions
- Identify
Students will be able to:
 - apply their understanding of sustainability to generate examples of sustainable items/actions

Sustainable Energy

- What is Energy?
Students will be able to:
 - Define what energy is
 - Identify and describe different forms of energy
- Energy Sources
Students will be able to:
 - Describe and identify nonrenewable sources
 - Describe and identify renewable sources
 - Evaluate sources of sustainable energy
 - Determine Pros and Cons of renewable energy and the importance of sustainability
- Consumer Decisions/Practices
Students will be able to:
 - Describe the concept of Cradle to Grave analyses
 - Weigh considerations of durability, environmental impact, and cost in consumer decisions.
- What is global warming?
 - Define global warming and discuss the cause/effect relationship
 - What role does population dynamics play in global warming? Who will be impacted most?

Systems Thinking

- What is systems thinking?

Students will be able to:

- Understand and apply the concept of systems thinking to an environmental or sustainability issue.
- Consider where ethics and civic responsibility fit into systems thinking.

IV. STRATEGIES

- Group discussions
- Teacher presentation
- Student projects
- Guided groups
- One to one instruction
- Interactive SmartBoard lessons
- Tutorials
- Local field trips

V. SCOPE AND SEQUENCE

Identifying Sustainability (1 day)

- Define
- Identify

Sustainable Energy (1 day)

- What is Energy?
- Renewable and Non-Renewable Energy Sources
- https://www.ted.com/talks/arthur_potts_dawson_a_vision_for_sustainable_restaurants?language=en Ted Talk about reducing waste and renewable energy sources in restaurants (8 minutes)

Consumer Decisions/Practices (2-3 days)

- Introduce Cradle to Grave concept
- <http://study.com/academy/lesson/cradle-to-grave-definition-analysis-approach.html> (At the ½ mark, you'll be asked to sign up for a free trial.)
- Students might choose a product to research and conduct their own cradle to grave analysis/life cycle assessment of that product.
- Review the 4 R's - Refuse, Reduce, Reuse, Recycle – and explain that this is a hierarchy of priorities with recycling being the least impactful.

What is global warming? (2-3 days)

- As this is likely not a new concept, review global warming and the scientific evidence supporting global warming. Discuss the cause/effect relationship and present real-life examples of global warming.
- Present the concept of population dynamics and discuss its influence in global warming and sustainability.

Student Research (2-3 days)

- Students will research renewable energy sources (solar, hydroelectricity, wind, wave power, geothermal, bioenergy, tidal power, etc.) and discuss the process by which energy is produced, examples of where this energy is currently being produced, and outlook for future expansion.

Introduction to Systems Thinking (1-2 days)

- http://www.thinking.net/Systems_Thinking/OverviewSTarticle.pdf 3-page article by Daniel Aronson
- http://educators.brainpop.com/wp-content/uploads/2014/07/IOP_QDesignPack_SystemsThinking_1.0.pdf

- https://www.ted.com/talks/alex_steffen_sees_a_sustainable_future Ted Talk (17 minutes)

Application of Systems Thinking (2-3 days)

- Teacher will use the example of either coral reefs or melting ice caps or California's drought to model systems thinking and discuss the factors that relate to the issue.



Case Study (1-2 days)

With teacher guidance, students will examine an environmental issue through the lens of systems thinking and identify the following:

- ★ What relationships are present?
 - ★ What cause and effect seems present?
 - ★ What factors are impacting this issue?
 - ★ What is the problem or problems?
 - ★ What are possible solutions to solve the problem?
 - ★ What will the impact be of each solution?
 - ★ Are there ethics and responsible civic behavior to be considered in the solution?
- **Lesson 9: Hot, Hotter, Hottest - Extreme Weather's Impact On Our Resources** Students analyze drought maps and examine the effects of drought on crops.
 - **Thirsty For Drought Relief** Students research drought-related concerns and propose and assess the viability of steps for government to take in case of drought.
 - <http://www.ecoliteracy.org/download/oak-woodland-learning-activities> Oak Woodland Interconnectedness Activity (This is a less sophisticated activity for students.)

Independent Projects (8-10 days)

- Students will look at the world from a systems perspective and recognize, analyze, and present solutions for a sustainability problem. Working independently or in small groups, students will select an issue to study and present their proposals.

VI. EVALUATION

Assessments may include but are not limited to:

- Teacher Observations
- Class Participation
- Student Projects
- Anecdotal Records

VII. RECOMMENDED RESOURCES

- Intermediate Energy Infobook, National Energy Education Development Project
- Energy from the Sun Teacher Guide, National Energy Education Development Project
- Exploring Solar Energy Teacher Guide, U.S. Department of Energy
- Schools Going Solar Teacher Guide, National Energy Education Development Project
- <http://mariana68.wix.com/h2opollutionhotspots> Water Pollution Hot Spots
- <http://mariana68.wix.com/drought> Drought!
- <https://tackk.com/ehrhfg> Source to Mouth project
- <http://mariana68.wix.com/trashtalk> Trash Talk in the US
- <http://www.thenaturalstep.org/education/>