

DeRuyter Central School District

Environmental Science

12 Benchmarks

Grades 11 and 12

Global Environment

► **Standard 1: Students will learn to think critically about scientific methods, interpretations, and environmental issues.**

GE 1.1 Students will become familiar with the basics of logic, various logical fallacies, inductive, and deductive reasoning.

GE 1.2 Students will learn that there are several methods used in science and that data interpretation is dependent upon methodology and researcher presuppositions.

► **Standard 2: Students will understand that the basis of solving environmental issues rest on an understanding of sustainability.**

GE 2.1 Students will learn the four principles of sustainability

- Sustainable use of natural resources and environmental services
- Systems perspective
- Equity and fairness
- Incentives for sustainable behavior

GE 2.2 The collapse of Easter Island civilization will be studied as a microcosm of what might happen to the planet if we continue to use resources unsustainably.

► **Standard 3: Students will gain a basic understanding of how the environment works from a systems perspective.**

GE 3.1 Students will grasp an understanding of the laws of thermodynamics.

GE 3.2 Students will see that the earth acts like an engine and the sun is the driving force behind it, enabling the planet to support life.

GE 3.3 Students will understand an engine in the context of a system and how a system works.

- Using energy to generate order (entropy)
- Spontaneous processes
- Homeostasis
- System stability and set point
- Resistant vs. Resilient systems
- Positive vs. negative feedback
- The difficulty in managing and predicting systems because of their complexity and the integration of the above concepts in the context of ecological systems

GE 3.3 Students will be able to integrate the laws of thermodynamics and apply them to energy flow through biological systems.

- Maintenance respiration
- Heterotrophs and Autotrophs
- Energy allocations for life
- Energy allocation strategies
- Food webs and chains
- Biomagnification

GE 3.4 Students will understand the concept of the conservation of matter in the context of biogeochemical cycles, the accumulation of human waste, and how these affect various environmental issues.

- The building blocks of life
- The flow of matter
- Liebig's law of the minimum
- Independent research on specific biogeochemical cycles

► **Standard 4: Students will make the connection that the economy is directly dependent on natural resources, which is directly dependent on sustainable resource use.**

GE 4.1 Students will recognize that there is an ecological view of the economy.

- Two views of the economy
- Four steps of the economic process
- Economic growth
- Economic value of environmental goods
- Energy return on investment
- Best First Principles
- Driving forces of economic change

► **Standard 5: Students will be able to understand that the world faces a number of environmental challenges.**

GE 5.1 Students will be able to compare, contrast, and analyze several environmental issues in the context of data known and the presuppositions made

- Human population issues and exponential growth
- Planet biodiversity
- Global climate change
- Ozone reduction
- Sustainable agriculture
- Water and air pollution
- Primary vs. secondary pollutants
- Fossil fuel use and peak oil

► **Standard 6: Students will be encouraged to develop a stewardship mindset.**

GE 6.1 Students will be made aware of the ways they can build a worldview based on environmental stewardship and how they can work toward being part of the solution to global environmental challenges, instead of part of the problem.

- Getting outside and appreciating the wild places.
- Getting involved with local or state government in order to have a voice in local environmental issues
- Decreasing their ecological footprint: using resources wisely, recycling, composting, not wasting water, walking/biking, increasing powers of observation and not taking the natural world for granted, participating in nature writing, painting, photography, and research