

**Ridgway Area School District  
Environment and Ecology Curriculum**

The environment and ecology curriculum is structured to be developmental process. Standards established for primary grades will be built upon at higher grade levels, with each level becoming increasingly complex. These standards will be the responsibility of the science classes of the different grade levels. The specific standards outlined in this curriculum will be used for student assessment purposes. Students may participate in additional environment and ecology activities beyond the specified standards and assessments established for various courses. All students will be proficient in all standards established for environment and ecology by the completion of their senior year. Standard related assessments included in portfolios will be identified by specific standard codes. [Example: EE601 equates to Environment and Ecology , Sixth Grade, Standard #1.(Components of Ecological Systems)] Assessments listed for the specific standards are optional choices used at the discretion of the teacher. (i.e.. Standard EE601 with possible choices EE601.01 and EE601.02)

**Environment and Ecology- Academic Standard Overview**

<b><u>Standard #</u></b>	<b><u>Description</u></b>	<b><u>Chapter 4 Reference</u></b>
01	Components of Ecological Systems	4.6
02	Human Impact on Environment and Ecology	4.4, 4.5, & 4.8
03	Solutions to Environmental Issues	4.1, 4.2, & 4.3,
04	Environmental Stewardship Responsibilities	4.7 & 4.9

**Environment and Ecology Curriculum - Kindergarten  
Course Description and Course Academic Standards**

**Course Description:**

Students will begin to develop the basic knowledge of environment and ecology they need to become responsible members of an environmentally aware society.

**Principal Text-** Science Place, Scholastic Inc., 1997.

**Course Academic Standards:**

**EEK03 All students will think critically and generate potential solutions to environmental issues.**

- EEK01.01 Students will share their "*Show and Tell*" illustration depicting littering, recycling, or pollution.
- EEK01.02 Students will identify environmental concerns in their "*Weekly Reader*."
- EEK01.03 Students will participate in Earth Week activities.

## Environment and Ecology Curriculum - Grades One, Two, & Three Course Description and Course Academic Standards

### Course Description:

Students will begin to develop the basic foundation science and technology skills necessary for them to progress to a more complex understanding of the principles and concepts of science and technology.

**Principal Text-** Science Place, Scholastic Inc., 1997.

### Course Academic Standards:

#### **EE101 All students will describe the basic components of plants in ecological systems.**

- EE101.01 Students will grow a "Vowel Garden" and draw how people use these plants.
- EE101.02 Students will work cooperatively to make tacos and use vegetable plants for topping.
- EE101.03 Students will work in cooperative groups to make a chart showing plants and how they are used in ecological systems.

#### **EE302 All students will participate in "Earth Week" activities.**

- EE302.01 Students will use reference books to write and read a paragraph on "Earth Day."
- EE302.02 Students will make a poster on recycling.
- EE302.03 Students will visit an industrial plant to observe recycling processes.
- EE302.04 Students will role play situations saving the earth.
- EE302.05 Students will use the book, *"Fifty Ways to Save the Earth,"* to participate in specific cooperative experiments.

#### **EE303 All students will evaluate the negative impact of pollution and how it affects their county through an ecological activity.**

- EE303.01 Students will participate in a writing project - *"What I can do about Pollution."*
- EE303.02 Students will participate in a poster contest about pollution.
- EE303.03 Students will construct pollution mobiles.
- EE303.04 Students will listen to speakers on pollution problems and solutions followed by classroom discussion.
- EE303.05 Students will participate in cleaning up the school grounds and write a paragraph about the importance of the activity.
- EE303.06 Students will read and discuss pamphlets on pollution.

**EE204      All students will demonstrate, through an ecological activity, the importance of taking care of the environment.**

- EE204.01      Students will participate in a project to collect recyclables.
- EE204.02      Students will plant seedlings.
- EE204.03      Students will demonstrate how we can take care of our environment in a poster.
- EE204.04      Students will use recycled items to create a bird feeder.
- EE204.05      Students will make their own bird food.
- EE204.06      Students will make their own booklets, "*Man Made or Natural*," to distinguish between objects created by humans and those that exist naturally in our environment.
- EE204.07      Students will make a "*Trash-Gobbler*" puppet to help discern the importance of proper trash disposal.
- EE204.08      Students will recycle sawdust into an art project.

**Environment and Ecology Curriculum - Grades Four & Five**  
**Course Description and Course Academic Standards**

**Course Description:**

At these grade levels students will begin scientific training in experimentation, use of equipment, ecological inter-relationships, basic concepts of earth science and concern for environmental issues.

**Principal Text-** Science Place, Scholastic Inc., 1997.

**Course Academic Standards:**

**EE401 All students will reach conclusions about ecological systems through the study of food chains.**

- EE401.01 Students will role play the elements in the food chain.
- EE401.02 Students will use magazine pictures to develop food webs.
- EE401.03 Students will work cooperatively to construct a poster illustrating the food chain.
- EE401.04 Students will write a paragraph explaining what happens when the food chain is disrupted.

**EE402 All students will hypothesize and analyze the effects of social systems on ecological systems through the study of rainforests.**

- EE402.01 Students will create a "Before and After" poster illustrating the destruction of the rainforest.
- EE402.02 Students will cooperatively construct a scale model of rainforest deforestation.
- EE402.03 Students will write a summary of the effects of the deforestation in the rainforests.

**EE403 All students will think critically and generate potential solutions to environmental problems at the conclusion of "Earth Week."**

- EE403.01 Students will invent hypothetical machines to solve real environmental problems.
- EE403.02 Students will orally present an explanation of their invention to solve environmental problems.
- EE403.03 Students will write a summary of their invention to solve environmental problems.

**EE503 All students will be introduced to the concept of "wetlands" and some of the laws and regulations that govern them.**

- EE503.01 Students will take a field trip to the Historic Little Drummer Boy Trail to observe wetlands and make a poster showing the characteristics of a wetland and laws regulating them.

- EE503.02 Students will write a summary after listening to a talk about the laws and regulations governing wetlands and the environment.
- EE503.03 Students will visit the school pond and observe our wetland area, then make a mind map displaying wetland characteristics and laws and regulations governing them.

**EE404 All students will evaluate the implications of lumbering in Pennsylvania, the need for conservation, and how it affects agriculture and environment.**

- EE404.01 Students will summarize a presentation given by a local forestry representative.
- EE404.02 Students will summarize a forest use video.
- EE404.03 Students will create a "T" chart showing the pros and cons of lumbering.
- EE404.04 Students will list lumber conservation techniques.

**Environment and Ecology Curriculum - Grade Six**  
**Introduction to Life Science**  
**Course Description and Course Academic Standards**

**Course Description:**

This course offers students a wide variety of concepts related to life science. They will learn the basic characteristics of living things, classification, measurement, and scientific problem solving. In addition they will study the inter-relationship between organisms and their environment

**Principal Text-** Life Science, Glencoe, 1997.

Science Insights, Addison-Wesley, 1997.

Science Plus, Holt, Rinehart, & Winston, 1997

**Course Academic Standards:**

**EE601 All students will compare and contrast the ecological diversity of various biomes.**

- EE601.01 Students will use a "T" chart to contrast and compare characteristics of various biomes.
- EE601.02 Students will draw the various biomes.
- EE601.03 Students will work cooperatively to draw various biomes.
- EE601.04 Students will write an essay contrasting and comparing the various biomes.

**EE602 All students will evaluate the environmental impact of population growth.**

- EE602.01 Students will assess the environmental impact of population growth.
- EE602.02 Students will perform a laboratory activity illustrating the effect of population growth on food production.
- EE602.03 Students will write an essay evaluating the effects of population growth on food production.
- EE602.04 Students will draw conclusions on the effect of population growth on food production, given the data

**EE603 All students will speculate on possible solutions to feed a growing population.**

- EE603.01 Students will generate a list of possible solutions to feeding a growing population.
- EE603.02 Students will create a drawing depicting an imaginative approach to feeding a growing population.
- EE603.03 Students will write an essay suggesting possible solutions to feeding a growing population.

**EE604**      **All students will appraise the effects of soil erosion and the need for soil conservation.**

- EE604.01      Students will perform a laboratory activity appraising the effects of soil erosion.
- EE604.02      Students will create a poster or drawing depicting the effects of soil erosion and the need for soil conservation.
- EE604.03      Students will write an essay appraising the effects of soil erosion and the need for soil conservation.
- EE604.04      Students will list the four basic principles of soil conservation and list the effects of soil erosion.

**Environment and Ecology Curriculum - Grade Seven**  
**Introduction to Physical Science**  
**Course Description and Course Academic Standards**

**Course Description:**

In this course students will learn the basic methods of science. Major areas of study will be: simple and compound machines, the laws of motion, heat, electricity, various forms of energy, and light and sound waves.

**Principal Text-** Physical Science, Glencoe, 1997.

Science Insights, Exploring Matter and Energy, Addison-Wesley, 1997.

**Course Academic Standards:**

**EE701 All students will evaluate the consequences of the "Green House Effect" on world ecosystems.**

EE701.01 Students will design a diagram that depicts the changes in an ecosystem resulting from future "Green House Effect" problems.

**EE702 All students will evaluate the impact of advanced technologies' energy demands on environmental quality.**

EE702.01 Students will evaluate the environmental consequences and advantages and disadvantages of alternative energy sources in a written activity.

EE702.02 Students will cooperatively evaluate the environmental consequences and the advantages and disadvantages of alternative energy sources on a "T" chart.

**EE703 All students will consider the environmental consequences of alternative energy sources.**

EE703.01 Students will evaluate the environmental consequences and advantages and disadvantages of alternative energy sources in a written activity.

EE703.02 Students will cooperatively evaluate the environmental consequences and the advantages and disadvantages of alternative energy sources on a "T" chart.

**EE704 All students will evaluate the implication of finite natural resources and the need for conservation when considering future energy sources.**

- EE704.01 Students will evaluate the environmental consequences and advantages and disadvantages of alternative energy sources in a written activity.
- EE704.02 Students will cooperatively evaluate the environmental consequences and the advantages and disadvantages of alternative energy sources on a "T" chart.

**Environment and Ecology Curriculum - Grade Eight**  
**Earth and Universe Science**  
**Course Description and Course Academic Standards**

**Course Description:**

In this course students will take part in the design, implementation, and reporting of various scientific experiments. Students will study the solar system and the effects of gravity, volcanism, world oceans, geological formations, states and property of matter, the electromagnetic spectrum, and environmental concerns.

**Principal Text-** Earth Science, Glencoe, 1997.

Science Insights, Exploring Earth and Space, Addison-Wesley, 1997.

**Course Academic Standards:**

**EE801 All students will compare Earth's ecosystem to those of another planet or natural satellite.**

- EE801.01 Students will chart the comparison of Earth's ecological characteristics to that of another planet or natural satellite.
- EE801.02 Students will identify parts of an ecosystem and how the parts compare to other planets or natural satellites of the Solar System.

**EE802 All students will identify the causes and consequences of acid rain.**

- EE802.01 Students will complete a water quality study experiment on various water sources.
- EE802.02 Students will work cooperatively to complete a water quality study experiment on various water sources.
- EE802.03 Students will list various sources of Acid Rain.

**EE803 All students will speculate on possible solutions to improve water quality.**

- EE803.01 Students will work cooperatively to design possible solutions to water pollution in the future.

**EE804 All students will compare and contrast ecological advantages and disadvantages of various mining techniques.**

- EE804.01 Students will create a "*The Good and The Bad*" written summary of mining techniques.
- EE804.02 Students will create a "T: chart illustrating advantages and disadvantages of various mining techniques.
- EE804.03 Students will visit a local mining site and report their observations.
- EE804.04 Students will summarize the presentation of an expert guest speaker on the local mining industry.

**Environment and Ecology Curriculum - Grade Nine  
Academic Biology  
College Prep  
Course Description and Course Academic Standards**

**Course Description:**

This course provides an introduction to biology oriented toward the needs of the college bound student who lives in our ever increasing technological society. Topics included are the science of life, the living condition, the chemical basis of life, the structural basis of life, the cell and its environment, cell energy, respiration, photosynthesis, nucleic acids and protein synthesis, and dissection of the earthworm and frog. A variety of laboratory and class activities are utilized.

**Principal Text-** Biology, Addison-Wesley, 1996.

**Course Academic Standards:**

**EECP901 All students will express the significance of a global perspective of ecology.**

- EECP901.01 Students will list personal activities and describe their impact on the local and global environment.
- EECP901.02 Students will create a “T” chart listing ecosystems and how they are impacted by human activity.

**EECP902 a. All students will recognize how diversity impacts environmental stability and health.**

- EECP902.01 a. Students will create “T” charts depicting the effects of human activities on environmental health.
- EECP902.02 a. Students will list management strategies designed to control populations and diversity.

**EECP902 b. All students will recognize the importance of agriculture to Pennsylvania’s economy.**

- EECP902.01 b. Students will complete a woodlot survey and analysis.
- EECP902.02 b. Students will list agricultural improvements due to technological advances.

**EECP903 All students will demonstrate the importance of water to life.**

- EECP903.01 Students determine local drainage patterns using topographic maps.
- EECP903.02 Students will identify Pennsylvania’s major drainage basins.

**EECP904 All students will demonstrate how diversity increases survival of organisms.**

EECP904.01 Students will list members of a different phyla and describe how adaptations have increased their ability to survive.

EECP904.02 Students will list five environmental conditions that have changed over the last century and how these changes have impacted survival.

**Environment and Ecology Curriculum - Grade Ten**  
**Academic Chemistry**  
**College Prep**  
**Course Description and Course Academic Standards**

**Course Description:**

This course offers an introduction to chemistry with the major topics presented to include: energy and matter, atomic structure, bonding, periodic tables, mathematics of chemistry, kinetics and equilibrium, acid-base theories, redox, electro-chemistry, and organic chemistry. A highly oriented laboratory program to help build an excellent foundation for college chemistry.

**Principal Text-** Holt Chemistry: Visualizing Matter, Holt, Rinehart, Winston, 1996.

**Course Academic Standards:**

**EECP1002 All students will analyze how human activities have caused changes in the ecosystem.**

EECP1002.01 Students will research a technology, such as CFC use, fossil fuel consumption, or polymer composites, to discover positive and negative impacts of such technology on society. The research should include solutions to problems introduced by the use of technology.

**EECP1003 a. All students will recognize how renewable and non-renewable resources supply energy and materials used in our daily lives.**

EECP1003.01 a. Students will list renewable and non-renewable resources used in producing the clothes they are wearing.  
EECP1003.02 a. Students will list renewable & non-renewable resources used in transporting themselves to school everyday.

**EECP1003 b. All students will analyze how man-made systems have impacted the management and distribution of natural resources.**

EECP1003.01 b. Students will map a resource cycle, including waste disposal and recycling.

**EECP1004 All students will explain why environmental laws are developed and enacted.**

EECP1004.01 Students will research the origin and application of laws banning CFC use.  
EECP1004.02 Students will research the origin and application of laws banning the use of lead in gasoline.  
EECP1004.03 Students will research the origin and application of the Clean Air Act or other major legislation concerning the control of chemicals in the environment.

**Environment and Ecology Curriculum - Grade Eleven**  
**Academic Physics**  
**College Prep**  
**Course Description and Course Academic Standards**

**Course Description:**

This course offers the study of the physical phenomena of nature. Topics explored are: mechanics, conduction, convection, radiation, sound, Doppler effects, pipes, strings, electricity, voltage, and capacitance. It provides a springboard for further study in physical science.

**Principal Text-** Modern Physics, Holt, Rinehart, & Winston, 1995.

**Course Academic Standards:**

**EECP1102 All students will analyze how man-made systems have impacted the management and distribution of natural resources.**

EECP1102.01 Students will solve a set of problems that apply to the conservation of energy.

**Environment and Ecology Curriculum - Grade Twelve  
Advanced Biology Option  
College Prep  
Course Description and Course Academic Standards**

**Course Description:**

This course is a survey of selected advanced topics expressly planned for the college bound student. These include water ecology studies of Elk Creek; culturing of aquatic organisms and study of biological succession, anatomy of the crayfish, grasshopper, shark, frog, fetal pig, and cat; microbiology; biochemistry; respiration; photosynthesis; and genetics, including genetic defects. A variety of field, laboratory, and class activities are utilized.

**Principal Text-** Biology, Holt, Rinehart, & Winston (Saunders College Publishing), 1995.

**Course Academic Standards:**

**EEAB1201 All students will analyze the interdependence of ecosystems.**

EEAB1201.01 Students will create a backyard food chain model.

EEAB1201.02 Students will create a biological energy pyramid showing movement of energy through a food chain.

**EEAB1202 a. All students will describe how agricultural science has influenced biotechnology.**

EEAB1202.01 a. Students will write an informative paper on how bio-engineered crops influence food supplies.

**EEAB1202 b. All students will research health risks associated with global pest management practices.**

EEAB1202.01 b. Students will list global pest management practices and potential environmental impacts.

EEAB1202 b. Students will write a paper describing health risks associated with chemical pesticides.

**EEAB1203 a. All students will analyze local watersheds to categorize stream order and determine stream quality.**

EEAB1203.01 a. Students will list tributaries of the Elk Creek watershed from its origin to end.

EEAB1203.02 a. Students will provide a chemical analysis of Elk Creek.

**EEAB1203 b. All students will demonstrate how multiple variables determine the effects of pollution.**

EEAB1203.01 b. Students will predict water quality from different points of the Clarion River drainage basin and list possible sources of pollution.

**EEAB1204      All students will examine the effects of human and natural activities on extinction of organisms.**

- EEAB1204.01      Students will write a paper comparing normal extinction rates to extinction rates due to human activity.
- EEAB1204.02      Students will create a chart comparing the various levels of protection for organisms affected by changes in the world's environment.

**Environment and Ecology Curriculum - Grade Twelve**  
**Advanced Chemistry Option**  
**College Prep**  
**Course Description and Course Academic Standards**

**Course Description:**

This course provides students who have had at one year of high school chemistry with an advanced modern concept. The program is primarily an extension of academic chemistry principles and a more sophisticated approach to the qualitative and quantitative aspects through an increased emphasis on laboratory investigation.

**Principal Text-** Chemistry: Principles and Reactions, Holt, Rinehart, & Winston, 1997.  
Chemical Principles in the Laboratory, Holt, Rinehart, & Winston, 1996.

**Course Academic Standards:**

**EEAC1203 a. All students will explain how renewable and non-renewable sources supply energy and materials.**

- EEAC1203.01 a. Students will describe the renewable and non-renewable sources of nitrogen through the nitrogen cycle.
- EEAC1203.02 a. Students will compare the use of fossil fuel, solar, nuclear, and alternative energy sources.
- EEAC1203.03 a. Students will discuss use and alternatives for a selected metal resource.

**EEAC1203 b. All students will explain how technology has influenced sustainability of natural resources.**

- EEAC1203.01 b. Students will research positive and negative impacts of polymers on society and the environment
- EEAC1203.02 b. Students will study the development and evolution of the aluminum can.

**EEAC1203 c. All students will analyze how pollution has changed in quality, variety, and toxicity as the United States has developed its industrial base.**

- EEAC1203.01 c. Students will write a report on one industrial pollutant.

**EEAC1204 All students will explain how environmental laws and regulations are developed as a response to environmental issues.**

- EEAC1204.01 Students will research and report laws concerning the disposal of a chemical such as CFCs or mercury.
- EEAC1204.02 Students will research and report laws concerning resource retrieval, such as coal mining or copper mining.

**Environment and Ecology Curriculum - Grade Twelve  
Advanced Physics Option  
College Prep  
Course Description and Course Academic Standards**

**Course Description:**

This course provides students, who have at least one year of high school physics, with a more in-depth look at the physical sciences. It extends academic physics principles and introduces a more sophisticated approach to the physical sciences which involves a greater emphasis on laboratory investigations.

**Principal Text-** Physics, Prentice Hall, 1995.

**Course Academic Standards:**

**EECP1202 All students will analyze how man-made systems have impacted the management and distribution of natural resources.**

EECP1202.01 Students will solve a set of problems that apply to the conservation of energy.

**Environment and Ecology Curriculum - Grade Nine  
Applied Biology-Chemistry I  
Tech. Prep. and Business Education  
Course Description and Course Academic Standards**

**Course Description:**

This course is designed for the Tech Prep student with practical application to biological and chemical problems. Animal life processes, plant growth and reproduction, and nutrition will be examined in detail.

**Principal Text-** Biology, An Everyday Experience, Glencoe/McGraw Hill/ Merrill, 1997.

**Course Academic Standards:**

**EETP901 All students will express the significance of a global perspective of ecology.**

- EETP901.01 Students will list personal activities and describe their impact on the local and global environment.
- EETP901.02 Students will create a “T” chart listing ecosystems and how they are impacted by human activity.

**EETP902 a. All students will recognize how diversity impacts environmental stability and health.**

- EETP902.01 a. Students will create “T” charts depicting the effects of human activities on environmental health.
- EETP902.02 a. Students will list management strategies designed to control populations and diversity.

**EETP902 b. All students will recognize the importance of agriculture to Pennsylvania’s economy.**

- EETP902.01 b. Students will complete a woodlot survey and analysis.
- EETP902.02 b. Students will list agricultural improvements due to technological advances.

**EETP903 All students will demonstrate the importance of water to life.**

- EETP903.01 Students determine local drainage patterns using topographic maps.
- EETP903.02 Students will identify Pennsylvania’s major drainage basins.

**EETP904 All students will demonstrate how diversity increases survival of organisms.**

- EETP904.01 Students will list members of a different phyla & describe how adaptations have increased their ability to survive.
- EETP904.02 Students will list five environmental conditions that have changed over the last century and how these changes have impacted survival.

**Environment and Ecology Curriculum - Grade Ten**  
**Applied Biology-Chemistry II**  
**Tech. Prep. and Business Education**  
**Course Description and Course Academic Standards**

**Course Description:**

This course continues the practical application to biological and chemical problems. The chemical aspect will receive special emphasis at this level. Research and problem solving skills will be developed in relation to the sciences.

**Principal Text-** Chemistry in the Community, Kendal/Hunt Publishing, 1993.

**Course Academic Standards:**

**EETP1002 All students will analyze how human activities have caused changes in the ecosystem.**

EETP1002.01 Students will research a technology, such as CFC use, fossil fuel consumption, or polymer composites, to discover positive and negative impacts of such technology on society. The research should include solutions to problems introduced by the use of technology.

EETP1002.02 Students will research the effects of heavy metals on the environment.

**EETP1003 a. All students will recognize how renewable and non-renewable resources supply energy and materials used in our daily lives.**

EETP1003.01 a. Students will list renewable and non-renewable resources used in producing the clothes they are wearing.

EETP1003.02 a. Students will list renewable and non-renewable resources used in transporting themselves to school every day.

**EETP1003 b. All students will analyze how man-made systems have impacted the management and distribution of natural resources.**

EETP1003.01 b. Students will map a resource cycle, including waste disposal and recycling.

**EETP1004 All students will explain why environmental laws are developed and enacted.**

EETP1004.01 Students will research the origin and application of laws banning CFC use.

EETP1004.02 Students will research the origin and application of laws banning the use of lead in gasoline.

EETP1004.03 Students will research the origin and application of the Clean Air Act or other major legislation concerning the control of chemicals in the environment.

**Environment and Ecology Curriculum - Grade Eleven**  
**Principles of Technology I**  
**Tech. Prep. and Business Education**  
**Course Description and Course Academic Standards**

**Course Description:**

This applied physics course features "hands on" investigations in the topics of Force, Work, Rate, Resistance, and Energy. Problem solving skills will continue to be emphasized.

**Principal Text-** Principles of Technology Series, ITP Publishing, 1992.

**Course Academic Standards:**

**EETP1102 All students will analyze how man-made systems have impacted the management and distribution of natural resources.**

EETP1102.01 Students will solve a set of problems that apply to the conservation of energy.

**Environment and Ecology Curriculum - Grade Twelve**  
**Principles of Technology II**  
**Tech. Prep. and Business Education**  
**Course Description and Course Academic Standards**

**Course Description:**

This applied physics course features "hands on" investigations in the topics of power, force transformers, momentum, waves & vibrations, energy converters, transducers, and optical systems. Problem solving skills will continue to be emphasized.

**Principal Text-** Principles of Technology Series, ITP Publishing, 1992.

**Course Academic Standards:**

**EETP1202 All students will analyze how man-made systems have impacted the management and distribution of natural resources.**

EETP1202.01 Students will solve a set of problems that apply to the conservation of energy.