

Bartlesville Independent School District 30
Science Department

Environmental Science Curriculum

Environmental Science is a full-year study of the interrelationships between organisms and their physical surroundings focusing on the effects man has within the worldwide ecosystem. This course provides students with knowledge to evaluate choices that can reduce the negative impact man has made on the environment and optimize worldwide living standards. The course emphasizes the development of scientific principles, which allow students to identify and analyze environmental problems and associated risks. Students also examine solutions that can resolve/prevent ecological problems through critical and creative thinking skills.

Grade Level: **Pre-requisites:**

11-12 None

- **Quarterly Assessments Topic List**
- **Course Objectives - Printable Summary (Adobe PDF; 83 kB)**
 - A. [Risk and Toxicity](#)
 - B. [Recognizing Global and Local Environmental Issues](#)
 - C. [Identify Humans' Adverse Effects on Our Environment](#)
 - D. [Impact on the Planet of an Ever-Increasing Human Population](#)
 - E. [Biotic and Abiotic Factors](#)
 - F. [Cycles in Nature](#)
 - G. [Energy](#)
 - H. [Biomes](#)
- **Core Labs**
 - Summary (Word; 87 kB) | Process Skills (Web; 484 kB)**
 1. [Testing a Hypothesis--The Black Box Lab](#)
 2. [Toxicity and Threshold Levels](#)
 3. [Study of a Pond Community/Biological Communities](#)
 4. [What is a Food Pyramid?](#)
 5. [Owl Pellet Analysis](#)
 6. [Population Ecology Exercise](#)
 7. [How Competition Establishes a Niche! / Finding a Niche](#)
 8. [Climatogram](#)
 9. [Oklahoma Grassland Biome](#)
 10. [It's a Small World After All](#)
 11. [Keep the Heat](#)
 12. [Energy Audit](#)
 13. [Why Are Some Soils & Lakes Damaged by Acid Rain?](#)

Environmental Science

Quarterly Assessments Topic List

First Quarter

- [A: Risk and Toxicity](#)
- [B: Recognizing Global and Local Environmental Issues](#)
- [F: Cycles in Nature](#)

- Textbook Alignment:

Introduction to Environmental Science & Ecology

- Safety, Scientific Method
- Chapter 1: Science and the Environment
- Chapter 2: Tools of Environmental Science
- Chapter 3: The Dynamic Earth (*do only section 3*)
- Chapter 4: The Organization of Life
- Chapter 5: How Ecosystems Work

Second Quarter

- [E: Biotic and Abiotic Factors](#)
- [H: Biomes](#)
- [D: Impact on the Planet of an Ever-Increasing Human Population](#)
- Textbook Alignment:

Ecology & Populations

- Chapter 6: Biomes
- Chapter 7: Aquatic Ecosystems
- Chapter 8: Understanding Populations
- Chapter 9: The Human Population

Third Quarter

- [C: Identify Humans' Adverse Effects on Our Environment](#)
- [D: Impact on the Planet of an Ever-Increasing Human Population](#)
- Textbook Alignment:

Water, Air, and Land

- o Chapter 10: Biodiversity
- o Chapter 11: Water
- o Chapter 12: Air
- o Chapter 13: Atmosphere and Climate Change
- o Chapter 14: Land

Fourth Quarter

- **A: Risk and Toxicity**
- **C: Identify Humans' Adverse Effects on Our Environment**
- **G: Energy**
- Textbook Alignment:

Energy Resources & Our Health and Future

- o Chapter 17: Nonrenewable Energy
- o Chapter 18: Renewable Energy
- o Chapter 19: Waste
- o Chapter 20: The Environment and Human Health
- o all Risk/Toxicity handouts and labs

The following textbook chapters may be worked in as and if time permits:

- Remainder of Chapter 3: The Dynamic Earth
- Chapter 15: Food and Agriculture
- Chapter 16: Mining and Mineral Resources
- Chapter 21: Economics, Policy, and the Future

Revision Date:

May 2008



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Environmental Science Objectives

A: Risk and Toxicity

ABACUS 01-SCES-05

Links:

[Environmental Science Curriculum Page](#)

[Next Objective](#)

Objectives:

- A. Students will analyze costs, trade-offs of various hazards and evaluate possible solutions to environmental problems and related health issues at the local/regional level.

Time Range:

1st and 4th Quarter

Suggested Teaching Strategies:

Help students understand the concept of risk taking by first ranking major risks of death in the U.S. from least to most hazardous then discussing the actual risk. They then read about risk from a handout on Risk Analysis and answer guided reading questions.

Define toxicology and associated terminology. Explain the ways toxins enter the body and how they build up in the environment. To understand practical aspects of toxicity, show the movie "Silkwood", which is about a plutonium plant here in Oklahoma that had questionable safety practices.

Aligned Resources:

- [Core Lab 2: Toxicity and Threshold Limits - Crest Lab](#)
- Reading and worksheet on Risk Analysis
- Reading and worksheets on Toxicity
- "Silkwood" movie
(this video personally owned by Mary Watson)

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Environmental Science Objectives

B: Recognizing Global and Local Environmental Issues

ABACUS 01-SCES-10

Links:

_____ [Environmental Science Curriculum Page](#)

_____ [Previous Objective](#)

_____ [Next Objective](#)

Objectives:

- B. Students will identify and evaluate attitudes, skills, and services needed to contribute to a healthful national and global environment.

Time Range:

1st Quarter

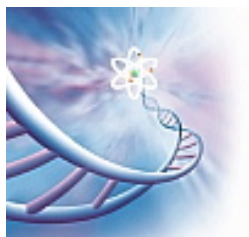
Suggested Teaching Strategies:

Review major environmental problems facing the global society. Examine three types of pollution (air, soil, water) and discuss local and global examples of each. Define renewable and nonrenewable resources and give examples of each. Discuss preservation of plant and animal diversity. Implement a year-long project requiring each student to research and present a current environmental issue once a month.

Aligned Resources:

- Chapters 1 and 2 in the textbook
- Library
- Computer Lab to do internet searches of current environmental news

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Environmental Science Objectives

C: Identify Humans' Adverse Effects on Our Environment

ABACUS 01-SCES-15

Links:

[Environmental Science Curriculum Page](#)

[Previous Objective](#)

[Next Objective](#)

Objectives:

- C. Students will identify how human activities affect our environment: mining, pollution, sewage treatment, acid rain, solid waste, radioactive waste, ozone depletion, global warming, and deforestation.

Time Range:

3rd and 4th Quarter

Suggested Teaching Strategies:

Students will read about and discuss human contribution to the following problems: greenhouse effect, ozone depletion, acid rain, soil pollution, mining, sewage treatment, solid waste disposal, nuclear waste disposal. Assign small groups of students to research cause and effect of a human activity on the environment. Each group then presents their findings to the class.

Aligned Resources:

- [Core Lab 13: Why Are Some Soils and Lakes Damaged by Acid Rain?](#)
- [Core Lab 14: Parts of an Aquifer and Recharge Zone](#)
- [Core Lab 15: Soil Compaction](#)
- [Core Lab 16: Energy and Nutrients as Water Pollutants](#)

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Environmental Science Objectives

D: Impact of an Ever-Increasing Human Population

ABACUS 01-SCES-20

Links:

[Environmental Science Curriculum Page](#)

[Previous Objective](#)

[Next Objective](#)

Objectives:

- D. Students will assess the impact of an ever-increasing human population on the biosphere: social, economic, political and religious issues, use and conservation of natural resources, destruction of habitat, endangered species.

Time Range:

2nd and 3rd Quarter

Suggested Teaching Strategies:

Students should learn the terminology associated with demographics and population. Social, economic, political and religious beliefs and how they impact population growth. Use the video "The People Bomb" to show population problem through out the world. As a follow up to the video, have students write an essay pinpointing a particular countries social, economic, political and religious beliefs. Students should learn classic population growth curves given unlimited resources and effects of diminishing resources on that population growth. An understanding of three different types of graphs related to populations: J - graph, S-graph, and histograms. On those graphs, they will understand lag phase, exponential growth, carrying capacity, equilibrium, and population crash.

Students should learn the impact increasing human population has on natural resources, destruction of habitat causing endangerment of other species.

Aligned Resources:

- [Core Lab 10: It's A Small World After All](#)
- "The People Bomb" video and related essay questions (*this video personally owned by Mary Watson*)
- Chapter 12 in textbook

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Environmental Science Objectives

E: Biotic and Abiotic Factors

ABACUS 01-SCES-25

Links:

[Environmental Science Curriculum Page](#)

[Previous Objective](#)

[Next Objective](#)

Objectives:

- E. Students will examine biotic and abiotic factors within an ecosystem, producers and consumers and local flora and fauna to identify food chains, webs, and pyramids as well as energy flow and relationships.

Time Range:

1st Quarter

Suggested Teaching Strategies:

Define and use energy terms including first and second laws of thermodynamics. Discuss relationships such as predator/prey, symbiosis, parasite/host. Differentiate between autotroph and heterotroph. Differentiate between abiotic and biotic factors the effect ecosystems. Use scientific and common terms used to describe relationships within food chains: producers, consumers, decomposers, tertiary consumers etc. Discuss placement of organisms into food chains and food webs. Discuss the different types of pyramids: biomass, energy and numbers and their relationship to each other.

Aligned Resources:

- [Core Lab 3: Study of a Pond Community / Biological Communities](#)
- [Core Lab 4: What is a Food Pyramid?](#)
- [Core Lab 5: Owl Pellet Analysis](#)
- [Core Lab 7: How Competition Establishes A Niche! / Finding A Niche In a New Environment](#)
- "How Energy Moves Through a Food Chain" activity

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Environmental Science Objectives

F: Cycles in Nature

ABACUS 01-SCES-30

Links:

[Environmental Science Curriculum Page](#)

[Previous Objective](#)

[Next Objective](#)

Objectives:

- F. Students will understand the cycles found in nature (carbon/oxygen, nitrogen, and water).

Time Range:

1st Quarter

Suggested Teaching Strategies:

Discuss carbon, oxygen, nitrogen and water cycles using transparencies and discussing the intricacies of each cycle and their interrelationships. There are several films available through the district to aid in this discussion.

Assess student understanding of the cycles by having them identify each component of each cycle on drawings of each.

Aligned Resources:

Media Center films:

- "Carbon Cycle"
- "Nitrogen Cycle"
- "The Water Cycle"

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Environmental Science Objectives

G: Energy

ABACUS 01-SCES-35

Links:

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[Next Objective](#)

Objectives:

- G. Students will examine aspects of alternative energy sources - origins, safety, benefits, and hazards.

Time Range:

4th Quarter

Suggested Teaching Strategies:

Read chapter 11 about energy sources and alternative energy sources. Have small groups of students research alternative energy resources emphasizing cost effectiveness, history of the development, pollution possibilities, technology issues (is the technology good enough yet to be effective), geographical barriers etc.

Aligned Resources:

- [Core Lab 11: Keep the Heat](#)
- [Core Lab 12: Energy Audit](#)
- "Nuclear Energy/Nuclear Waste" video in BHS library
- Textbook - Ch. 11

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Environmental Science Objectives

H: Biomes

ABACUS 01-SCES-40

Links:

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Objectives:

- H. Students will investigate the influence of climate on the distribution and abundance of plant and animal populations in large ecosystems, i.e. biomes.

Time Range:

2nd Quarter

Suggested Teaching Strategies:

Identify seven major land biomes and the two water biomes: tundra, taiga, desert, rainforest, three types of grasslands, temperate deciduous forest and fresh and marine biomes. Study the flora and faunas of each biome and related terms. Relate environmental problems facing the different biomes.

Aligned Resources:

- [Core Lab 8: Climatogram Lab](#) - relates temperature and precipitation patterns for major biomes
- [Core Lab 9: Oklahoma Grassland Biome](#) - analyzes effect of elevation and rainfall patterns to vegetation and types of biomes found across Oklahoma
- Share the Biome Project - cooperative project between Bartlesville High School and a high school in some other region of the country.
- Biome Wheel Activity or Mobile
- Biome Series of videos to introduce each major biome
- Fashion a Fish - Students design a fish that will survive under particular environmental criteria
- "Medicine Man" video about destruction of the rainforest and species extinction
(*this video personally owned by Mary Watson*)

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