

## CURRICULUM GUIDE

**NAME OF COURSE:** ENVIRONMENTAL SCIENCE

**COURSE NUMBER:** SCI 010

**WRITTEN/REVISED:** SEPTEMBER, 2011

**LEVEL OF COURSE:** REPLACEMENT

**NUMBER OF CREDITS:** SIX (6)

**PREREQUISITES:** NONE

**GRADE LEVEL OFFERED TO:** 9th

### **PREFACE/BACKGROUND STATEMENTS (INCLUDES STATEMENT OF PHILOSOPHY):**

This course is designed to fulfill the needs of a college preparatory student. The course emphasis is on laboratory exercises and the techniques for solving problems and conducting investigations. Science is a number of processes, a way of thinking, and a way of learning how to solve a problem. This course should therefore encourage students to regard the scientific method as a way of being open minded about possible answers, not as a set of rules for solving problems.

### **GENERAL OBJECTIVES:**

When the course has been completed successfully, students should be able to:

1. explain how all sciences are related rather than being separate and independent areas.
2. formulate hypotheses (including, at times, the idea of *Multiple Working Hypotheses*), devise procedures to test them, and carry out the investigations.
3. design, interpret, and perform experiments in the laboratory or in the natural environment.
4. collect real data, process it in meaningful ways, and make appropriate interpretations and conclusions from it.
5. select and use apparatus and materials appropriate to the investigation being conducted, with minimal error.
6. deduce information from appropriate data instead of relying on hearsay, superstition, or "tradition" for the answer.
7. work independently and/or in a group situation in order to gather data, carry out investigations, solve problems, etc.
8. write coherent, organized labs following the logic of the scientific method.

9. distinguish between scientific laws and scientific theories.
10. measure and compute using the metric system.
11. work safely in the science classroom.
12. research effectively using computers, reference texts, and library materials.
13. effectively take multiple-choice tests.
14. use examples from Sussex County and New Jersey whenever possible.

### **CORE CURRICULUM CONTENT STANDARDS ADDRESSED:**

- 5.1 - Scientific Practice** – Understand Scientific Explanation, Generate Scientific Knowledge through Active Investigation, Reflect on Scientific Knowledge, Participate Productively in Science
- 5.2 - Physical Science** – Properties of Matter, Forms of Energy, Energy Transfer and Conservation
- 5.3 - Life Science** – Matter and Energy Transformation, Interdependence, Evolution and Diversity
- 5.4 - Earth Science System** – Properties of Earth Materials, Energy in Earth Systems, Climate and Weather, Biogeochemical Cycles

### **Marking Period 1**

#### **Chapter 1/2 – Science and the Environment/Tools of Environmental Science Days=20**

**Goal:** Students will gain a basic understanding the history of our environmental problems.

**Objectives:** The students will be able to:

1. Demonstrate lab safety skills and class management procedures.
2. Recognize the basic themes and topics of the course and of science.
3. Discover the major fields of study that contribute to environmental science.
4. Perform the scientific method and write a lab report.
5. Distinguish between *Facts, Laws and Theories* and the importance of observation.
6. Distinguish between accuracy and precision with lab equipment and basic metrics.
7. Collect and organize information into graphs and data tables.

#### **Recommended Assignments, Labs and Projects**

1. Lab safety activity
2. Measuring with Accuracy and Precision Practice Sheets
3. Define Vocabulary

4. Concept Reviews
5. Active Readings: Scientific Method
6. String Lab – problem solving
7. Measurement Activity
8. Exploring the Environment Poster
9. Chapter Concept Review

**Evaluation:**

1. Graded homework
2. Graded lab reports
3. Vocabulary quizzes
4. Content quiz/test

**Audio-visuals:**

1. PowerPoint notes

**Evaluation:**

**Chapter 11 – Water**

**Days = 15**

**Goal:** To understand the importance of water in our environment.

**Objectives:** The students will be able to:

1. Describe the distribution of Earth's water resources.
2. Identify patterns of global water use and how water is a limited resource.
3. Explain how water can be treated and managed for future use.
4. Describe major sources of water pollution.
5. Conduct testing on local water.

**Audio-visuals:**

1. PowerPoint notes
2. Garbage Island video
3. Erin Brockovich

**Recommended Assignments, Labs and Projects:**

1. Define Vocabulary
2. Concept Reviews
3. Active Reading: Water Use and Management
4. Local Water Testing
5. Groundwater Filters - Modeling textbook p. 320
6. Wars from Water Project
7. Chapter Concept Review
8. Drop in the Bucket Activity
9. Infamous Cases of Water Pollution PowerPoint Activity

**Evaluation:**

1. Graded homework
2. Graded lab reports
3. Vocabulary quizzes

#### 4. Content quiz/test

### **Chapter 14 – Land**

**Days = 10**

**Goal:** Students will gain an understanding of the many purposes that humans use land for and implications for the future.

**Objectives:** The students will be able to:

1. Describe the major ways in which humans use land.
2. Describe the urban crisis and urban sprawl.
3. Discuss deforestation, sustained management, and preservation.

**Audio-visuals:**

1. PowerPoint notes

**Recommended Assignments, Labs and Projects:**

1. Define Vocabulary
2. Concept Reviews
3. Active Reading: Land Management and Conservation
4. Lab - Creating a Land-Use Model - Design your own Lab textbook p. 402
5. Home Sweet Home Project
6. Chapter Concept Review

**Evaluation:**

1. Graded homework
2. Graded lab reports
3. Vocabulary quizzes
4. Content quiz/test

### **Chapter 15 – Food and Agriculture**

**Days = 10**

**Goal:** Students will discuss food productions, soil maintenance, and the challenges of feeding the world.

**Objectives:** The students will be able to:

1. Compare the environmental costs of producing different types of food.
2. Describe the need for soil conservation.
3. Explain the benefits and environmental impact of pesticide use.
4. Describe the use of aquaculture and raising livestock for food.

**Audio-visuals:**

1. PowerPoint notes
2. Food Inc. video
3. Dirty Jobs Fish Farming video

**Recommended Assignments, Labs and Projects:**

1. Define Vocabulary
2. Concept Reviews
3. Active Reading: Feeding the World
4. Genetically Engineered Foods - Points of View textbook p. 436

5. Lab - Which Crops Tolerate Salt?
6. Chapter Concept Review
7. Dust Bowl Project

**Evaluation:**

1. Graded homework
2. Graded lab reports
3. Vocabulary quizzes
4. Content quiz/test

**Marking Period 2**

**Chapter 12 – Air**

**Days = 7**

**Goal:** Students will understand the different kinds of pollution that affect air quality.

**Objectives:** The students will be able to:

1. Name the major sources of pollution.
2. Describe the short-term and long-term effects of air pollution of human health.
3. Explain how acid precipitation affects plants, soils, aquatic ecosystem, and humans.

**Recommended Assignments, Labs and Projects:**

1. Concept Reviews
2. Clouds of Death: Donora, Pa

**Audio-visuals:**

1. PowerPoint notes

**Evaluation:**

1. Graded homework

**Chapter 13 – Atmosphere and Climate Change**

**Days = 10**

**Goal:** Students will describe Earth's climate and explore ways that human activities may be causing climate change.

**Objectives:** The students will be able to:

1. Identify the four factors that determine climate and the difference between climate and weather.
2. Explain why different parts of the Earth have different climates.
3. Explain how the ozone layer shields the Earth from much of the sun's harmful radiation and how chlorofluorocarbons affect the ozone layer.
4. Describe the greenhouse effect and global warming.

**Audio-visuals:**

1. PowerPoint notes
2. Clips of Inconvenient Truth
3. Day After Tomorrow

**Recommended Assignments, Labs, and Projects:**

1. Define Vocabulary
2. Concept Reviews
3. Active Readings: Global Warming
4. Chapter Concept Review

**Evaluation:**

1. Graded homework
2. Graded lab reports
3. Vocabulary quizzes
4. Content quiz/test

**Chapter 17/18 Nonrenewable and Renewable Energy** **Days = 15**

**Goal:** Students will understand the fundamentals of energy use in society and economic, environmental and political consequences.

**Objectives:** The students will be able to:

1. Identify patterns of energy consumption and production in the world and in the United States.
2. Compare the advantages and disadvantages of fossil-fuel use.
3. Describe how a nuclear power plant and the advantages and disadvantages of nuclear energy.

**Audio-visuals:**

1. PowerPoint notes
2. 30 Days in a Coal Mine
3. Who Killed the Electric Car

**Recommended Assignments, Labs, and Projects:**

1. Define Vocabulary
2. Concept Reviews
3. From Crude Oil to Plastics textbook p. 489
4. Active Readings: Energy Resources and Fossil Fuels
5. Active Readings: Alternative Energy and Conservation
6. Research project: Home Sweet Home
7. Chapter Concept Review

**Evaluation:**

1. Graded homework
2. Graded lab reports
3. Vocabulary quizzes
4. Content quiz/test

**Midterm Exam - Marking Period 3**

**Chapter 19 - Waste** **Days = 15**

**Goal:** Students will understand society's waste problems and how to alleviate the issues.

**Objectives:** The students will be able to:

1. Describe modern landfills and environmental problems.

2. Identify ways to reduce solid wastes including recycling and composting.
3. Describe hazardous wastes and the proper disposal of these wastes.

**Audio-visuals:**

1. PowerPoint notes
2. Video clip – The History of Stuff
3. Subaru Sustainability

**Recommended Assignments, Labs, and Projects:**

1. Define Vocabulary
2. Concept Reviews
3. Active Readings: Reducing Solid Waste
4. Community Survey of Hazardous Waste
5. Speaker from local waste management
6. Chapter Concept Review
7. SCMUA Online Assignment

**Evaluation:**

1. Graded homework
2. Graded lab reports
3. Vocabulary quizzes
4. Content quiz/test

**Chapter 20 – The Environment and Human Health**

**Days = 10**

**Goal:** Students will discuss how human health is affected by environmental conditions.

**Objectives:** The students will be able to:

1. Explain how scientists use toxicology and epidemiology in observing how pollutants affect human health.
2. Explain how pollution can come from both natural sources and human activities.
3. Describe the relationship between waste, pollution, and human health.
4. Discuss changes how changes in the environment can lead to the spread of infectious diseases.

**Audio-visuals:**

1. PowerPoint notes
2. In Our Water video

**Recommended Assignments, Labs, and Projects:**

1. Define Vocabulary
2. Concept Reviews
3. Active Readings: Pollution and Human Health
4. Research project – pollution and health
5. Chapter Concept Review
6. Human Health PowerPoint Lab

**Evaluation:**

1. Graded homework

2. Graded lab reports
3. Vocabulary quizzes
4. Content quiz/test

## **Chapter 21 – Economics, Policy, and the Future**

**Days = 13**

**Goal:** Students will discuss the ways in which government and people can affect environmental issues.

**Objectives:** The students will be able to:

1. Describe several international meetings and agreements relating to the environment.
2. Describe how economics and environmental science are related.
3. Describe environmental policies in the United States.
4. Identify ways in which the choices that you make as an individual may affect the environment.

**Audio-visuals:**

1. PowerPoint notes

### **Recommended Assignments, Labs, and Projects:**

1. Define Vocabulary
2. Concept Reviews
3. Active Readings: The Importance of the Individual
4. Student Club Saves Eagles and More textbook p. 596
5. Chapter Concept Review
6. Environmental Law Timeline

**Evaluation:**

1. Graded homework
2. Graded lab reports
3. Vocabulary quizzes
4. Content quiz/test

## **Chapter 4/5 – How Ecosystems Work**

**Days = 10**

**Goal:** Students will discuss the parts of the ecosystem and learn how the flow of energy, cycling of materials, and ecological succession combine to affect how ecosystems work.

**Objectives:** The students will be able to:

1. Discuss biotic and abiotic factors found in the environment.
2. Describe how energy transfers from the sun through the food chain.
3. Describe the cycling of carbon, nitrogen, and phosphorus through the ecosystem.
4. Explain how the different types of ecological succession occur and change the ecosystem.

**Audio-visuals:**

1. PowerPoint notes
2. Trash, Inc. video
3. Cool It video



**Recommended Assignments, Labs, and Projects:**

1. Define Vocabulary
2. Concept Reviews
3. Active Readings: Energy Flow in Ecosystems
4. Dissect Owl Pellets
5. Food Web Poster Project
6. Chapter Concept Review

**Evaluation:**

1. Graded homework
2. Graded lab reports
3. Vocabulary quizzes
4. Content quiz/test

**Chapter 6/7 – Biomes/Aquatic Ecosystems****Days = 10**

**Goal:** Students will understand the different terrestrial biomes found throughout the world and will discuss freshwater and marine ecosystems and the threats to these areas.

**Objectives:** The students will be able to:

1. Explain how latitude and altitude affect the temperature, precipitation, flora and fauna found in different biomes.
2. Describe the various biomes and environmental threats in each biome.
3. Describe aquatic ecosystems and functions of wetlands in the environment.
4. Explain threats to coral reefs and ocean organisms.

**Audio-visuals:**

1. PowerPoint notes

**Recommended Assignments, Labs, and Projects:**

1. Define Vocabulary
2. Concept Reviews
3. Active Readings:
4. Biome PowerPoint
5. Chapter Concept Review
6. Society & the Environment – Hurricane Katrina and New Orleans
7. Water Testing and Population Sampling
8. Amphibian Crossing Survey
9. Field Trip

**Evaluation:**

1. Graded homework
2. Graded lab reports
3. Vocabulary quizzes
4. Content quiz/test

**Chapter 8/9 – Understanding Populations/Human Population****Days = 10**

**Goal:** Students will understand the properties of populations, how populations increase or decrease in response to their environment, and how populations of different species interact.

**Objectives:** The students will be able to:

1. Describe the properties of a population and how they grow in size.
2. Describe the interactions between species including competition, predation, and symbiosis.
3. Describe the size and growth of the human population and the properties used to predict population sizes.
4. Describe problems caused by rapid human population growth.
5. Compare population growth problems in more-developed countries and less developed countries.

**Audio-visuals:**

1. PowerPoint notes

**Recommended Assignments, Labs, and Projects:**

1. Define Vocabulary
2. Concept Reviews
3. Active Readings: How Populations Change in Size
4. Points of View – Where Should the Wolves Roam? textbook p. 232
5. Chapter Concept Review
6. World Populations Lab Packet
7. Active Readings: Studying Human Populations

**Evaluation:**

1. Graded homework
2. Graded lab reports
3. Vocabulary quizzes
4. Content quiz/test

## **Chapter 10 - Biodiversity**

**Days = 10**

**Goal:** Students will discover how biodiversity provides humans with a variety of crops, medicines, and recreational experiences.

**Objectives:** The students will be able to:

1. Describe the diversity of species and how it is important to ecosystems and humans.
2. Define and give examples of endangered and threatened species.
3. Describe several ways that species are being threatened with extinction globally.
4. Discuss ways in which humans are protecting endangered species.

**Audio-visuals:**

1. PowerPoint notes

**Recommended Assignments, Labs, and Projects:**

1. Define Vocabulary
2. Concept Reviews
3. Active Readings:

4. Exploration Lab – Differences in Diversity textbook p. 282
5. Chapter Concept Review

**Evaluation:**

1. Graded homework
2. Graded lab reports
3. Vocabulary quizzes
4. Content quiz/test

**Materials / Resources:**

**Text:** Environmental Science – Holt - 2008

**Labs:** Teacher generated and selected

**Audio-visual:** As selected by instructor

**A. STUDENT PROGRESS:**

The following are the items included in the evaluation of student achievement and in the computation of the grade received by the student.

1. Labs, Unit Tests and Quizzes 75-80%
2. Class Participation/Homework 20-25%

**B. PERIODIC EVALUATION OF OBJECTIVES AND GUIDE:**

This program is due for revaluation in 2013.

**SPECIAL COURSE POLICIES:**

The major portion of instruction involves student discovery of data guided by the laboratory exercises. There is opportunity to develop skills in analyzing results and forming conclusions. In addition to lecture-demonstrations and discussion there is a requirement for outside preparation by the student. The knowledge learned is evaluated by completion of long term projects. Unit tests and mid-term and final examinations are used to evaluate achievement of course goals.

**DATE MID-TERM / FINAL REVISED**

1. Mid-term – January 2011
2. Final – June 2011

**SUPPLEMENTARY READINGS AND INSTRUCTORS BIBLIOGRAPHY:**

1. *Environmental Science* by Karen Arms, Saunders College Publishing, 1990.
2. *General Science* by Richard Moyer and Jeanne Bishop, Merrill Publishing, 1986.
3. *Modern Chemistry* by Metcalfe, Williams and Castka, Holt Rinehart and Winston Publishing, 1996.
4. *Conceptual Physics* by Paul Hewitt, Addison-Wesley Publishing, 1997.

High Point Regional High School's curriculum and instruction are aligned to the State's Core Curriculum Content Standards and address the elimination of discrimination by narrowing the achievement gap, by providing equity in educational programs and by providing opportunities for students to interact positively with others regardless of race, creed, color, national origin, ancestry, age, marital status, affectionate or sexual orientation, gender, religion, disability or socioeconomic status.