

## CURRICULUM GUIDE

**NAME OF COURSE:** ENVIRONMENTAL SCIENCE

**COURSE NUMBER:** SCI 304

**WRITTEN / REVISED:** SEPTEMBER, 2011

**LEVEL OF COURSE:** COLLEGE PREP B **NUMBER OF CREDITS:** SIX (6)

**PREREQUISITES:** "70" in Foundations of Science B

**GRADE LEVELS OFFERED TO:** 11,12

### **COURSE DESCRIPTION:**

Science is a way of thinking about and investigating the world in which we live, not merely a collection of facts and theories. Learning Environmental Science should therefore be an active process that is lab oriented. The content of the course is organized around the scientific processes, the serendipitous interplay of chemistry, physics and biology within natural systems. This course will prepare the students to take the required end of the year course assessment in Environmental Science.

### **COURSE OBJECTIVES:**

The student should be expected to succeed in the following objectives to the satisfaction of both the teacher and student.

1. Demonstrates the ability to set reasonable goals.
2. Demonstrates the responsibility for carrying out self-set goals.
3. Demonstrates cooperation by working constructively with other students.
4. Demonstrates cooperation with the instructor by using time constructively and with purpose, relative to course oriented goals.
5. Demonstrates cooperation with the instructor by performing requested special program oriented tasks.
6. Demonstrates independence by exploring all possible avenues in the solution of problems with the minimum of help.
7. Demonstrates independence and scholastic growth by using resources efficiently.
8. Progresses at a rate satisfactory to the teacher.

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

**5.1 - Scientific Practice**

**5.2 - Physical Science**

**5.3 - Life Science**

**5.4 - Earth Science System**

## **SPECIFIC BEHAVIORAL OBJECTIVES/PROFICIENCIES AND TIME LINES:**

### **Chapter 1 – Global problems/ Local Impacts = 10 days**

**Goal:** The student will gain an understanding of environmental issues challenging humanity.

#### **Objectives:**

1. Explain the goal of environmental science.
2. Explain a global crisis.
3. Describe how scientists study the environment.

#### **Audio/Visual:**

1. hi tech audio visual as well as chalk

#### **Assignments:**

1. difficult

#### **Lab Activities:**

1. Problems of the world lab.

#### **Evaluation:**

1. Homework/class work.
2. Chapter test/quiz.
3. Graded labs.

### **Chapter 3 – Biomes Time = 20 days**

**Goal:** The students will identify major biomes of the world.

#### **Objectives:**

1. Identify the defining characteristics of a biome .
2. Describe the biome of northern New Jersey in detail.
3. Identify the major flora an fauna of our bioregion.
4. Trace the flow of energy through living systems.
5. Evaluate the efficiency of energy transfer among organisms in an ecosystem.

**Terminology covered:** ecology, biosphere, species, population, community, ecosystem, biome, autotroph, producer, photosynthesis, chemosynthesis, heterotroph, consumer, herbivore, carnivore, omnivore, detritovore, decomposer, food chain, food web, trophic level, ecological pyramid, biomass, *water cycle*

#### **Audio/Visual: 4**

1. Overhead: levels of organization
2. Video – DVD – Planet Earth

#### **Assignments:**

#### **Evaluation:**

1. Homework/Class work.
2. Graded Labs.
3. Chapter Quizzes/Test.

#### **Chapter 4 – Soil Time = 20 days**

**Goal:** Students will understand the difference between topsoil and subsoil and how it affects agriculture.

**Objectives:**

1. Explain the components of soil.
2. Describe how human activities affect the soil.
3. Describe tests used to evaluate soil.

**Terminology covered:** agriculture, monoculture, renewable resource, nonrenewable resource, soil erosion, desertification, deforestation.

**Audio/Visual:**

1. Video – DVD – The story of soil

**Evaluation:**

1. Soil Project

#### **Chapter 5 – Water Time = 20 days**

**Goal:** The students will be able to explain issues surrounding water and water use.

**Objectives:**

1. Explain the water cycle.
2. Describe how researchers test the water.
3. Identify common water pollutants.
4. Identify causes and effects of acid rain.

**Terminology covered:** Water, H<sub>2</sub>O, monohydrogen dioxide, Acid base scale, acid rain, groundwater, urban sprawl, pollution,

**Audio/Visual:**

1. Hi tech visual aids.

**Assignments:**

1. Water lab
1. Fruitvale Story
2. Acid rain project

**Evaluation:**

1. Homework/Class work
2. Graded Labs
3. Quizzes

## **Chapter 2 – Ecosystem Structure = 20 days**

**Goal:** Students will be able to identify relationships among different organisms and between organisms and nonliving factors in a model ecosystem.

### **Objectives:**

1. Identify the structure of an ecosystem.
2. Explain how biotic and abiotic factors influence an ecosystem.
3. Identify the interactions that occur within communities.
4. Describe how ecosystems recover from a disturbance.
5. Review the biomes found around the world.

**Terminology covered:** biotic factor, abiotic factor, habitat, niche, resource, competitive exclusion principle, predation, symbiosis, mutualism, commensalism, parasitism, ecological succession, primary succession, pioneer species, secondary succession, biome, *competition*

### **Evaluation:**

1. Graded Labs
2. Quiz

## **Chapter 7 Atmosphere Time = 20 days**

**Goal:** The students will be able to understand how atmospheres evolve and function.

### **Objectives:**

1. Explain the structure and components of the atmosphere.
2. State the changes in the earth's atmosphere due to living organisms.

**Terminology covered:** stratosphere troposphere, ozone, climate, greenhouse effect, CO<sub>2</sub> emissions pollution, environment.

### **Audio/Visual:**

1. Overhead: layers of atmosphere.
2. global warming overview
3. Laser Disc: The greenhouse effect.

### **Evaluation:**

1. Homework/Class work

## **Chapter 11 – Energy = 20 days**

**Goal:** The students will gain an understanding of the basic uses of energy in the environment.

### **Objectives:**

1. Describe 1<sup>st</sup> law of thermodynamics.
2. Name 2<sup>nd</sup> law of thermodynamics

3. Describe what happens in the environment.
4. Identify a process in which human energy usage effects the environmnet.
5. Describe how the energy cycle is regulated.
6. Explain how ecosystems are different from types of energy production.

**Terminology covered:** energy, environment, solar, fossil fuel, co2, renewable, non-renewable, cheap, expensive, cost, economics.

**Audio/Visual:**

1. Overhead – energy cycle.
2. Overheads – Visualizing the energy flow in the environment.

**Assignments:**

**Lab Activities:**

1. biodiesel lab
2. flammability lab

**Evaluation:**

1. Homework/Class work
2. Graded Labs
3. Chapter Test.

**Chapter 12 – Intro to Waste - Time = 20 days**

**Goal:** The student will discuss the human concept of waste and describe where waste and garbage dumps are located and what their jobs are.

**Objectives:**

1. Describe how waste is managed locally.
2. Summarize the waste stream.
3. Explain the principles of closed and open systems.
4. Describe what happens during recycling.

**Terminology covered:** garbage, waste, dump, landfill, recycling, systems thinking

**Audio/Visual:**

1. Overhead – waste cycle
2. Overheads – Visualizing how materials flow in the environment.

**Assignments:**

**Lab Activities:**

3. The Waste Lab
4. Trip to the sanitary landfill.

**Evaluation:**

1. Homework/Class work
2. Graded Labs

3. Chapter Test.

**Chapter --- Project Lifeship 20 days**

**Goal:** Culminating activity in which students will design an artificial ecosystem including the materials needed, and state how the system will function.

**Objectives:**

1. Describe the members of their ecosystem.
2. Summarize the structure of their ecosystem.
3. Explain the materials needed for their ecosystem.
4. Describe what happens during cycling of water, waste, energy within the ecosystem.

**Terminology covered:** garbage, waste, dump, landfill, recycling, systems thinking Environment, ecosystem, water cycle, energy flow, biome, detritivore,

**Audio/Visual:**

**Assignments:**

1. Project Life ship

**Evaluation:**

1. Project grade

## **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 reevaluation 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.