

COURSE OUTLINE

Environmental Science

Rutherford High School
Rutherford, New Jersey

I. OVERVIEW OF THE COURSE

The purpose of the course is to introduce students to basic ecological concepts and environmental problems. The full year course is designed to provide a general science requirement for high school students who have no prior knowledge of this science. As an environmental education program, the course provides information dealing with ecology, the atmosphere, agriculture, water, and energy.

II. BEHAVIORAL OBJECTIVES AND GOALS

1. To develop an understanding of ecology and the relationships and cycles in the ecosystem.
2. To study the atmosphere and weather.
3. To explore the sources and effects of air pollution.
4. To investigate ways of controlling air pollution.
5. To study agriculture and tool supply.
6. To develop an understanding of pesticides.
7. To introduce study of the aquatic environment.
8. To develop an understanding of the aquatic ecosystem.
9. To investigate water quality and the chemical and physical factors that are involved.
10. To explore water supply and treatment.
11. To introduce the concept of energy.
12. To examine energy sources.

III. COURSE OUTLINE

The course will focus on five areas of study:

- I. First, there will be an introduction to what environmental science is all about. This will be done by focusing on such topics as ecology, food chains, and the characteristics of a living and dynamic ecosystem.

A. LABORATORY EXPERIENCES

1. Tracks (Project Wild (p. 45)
2. Habitat Running (p. 51)
3. My Kingdom for a Shelter (p.w.p. 65)
4. Urban Nature Search (p.w.p. 79)
5. Pond Succession (p.w.p. 95)
6. Succession Transect (p.w.p. 97)

7. How Many Bears Can Live in the Forest (p.w.p. 101)
8. Fire Ecologies (p.w.p. 111)
9. Here Today , Gone Tomorrow (p.w.p. 115)
10. Too Close for Comfort (p.w.p. 121)
11. Improving Wildlife Habitat in the Community (p.w.p. 131)

B. AUDIO-VISUAL MATERIALS

1. Natural Resources: Human and Natural Perspectives - F.S. #5
2. Environment: Changing Man's Values - F.S. #11 and 12
3. Living Things and Their Habitats - F.S. #633-638
4. What is a Forest? F.S. #2501
5. Grassland Biome - F.S. 1261
6. Desert Biome - F.S. #1262
7. Deciduous Forest - F.S. #1293
8. Introduction to Ecology - F.S. #1545
9. Succession and Web of Life - F.S. #1546
10. Toxic Wastes - F.S. #2698-2699

C. RELATED CAREERS

1. Ecologist
2. Conservationist
3. Environmentalist

II. Two other areas to be studied in detail are the atmosphere and the hydrosphere, each critical to a viable environment. After a brief definition and description of what the atmosphere is and its role in our environment, emphasis will be placed on its pollution and consequent effects on the environment. A similar approach will be taken in the study of the hydrosphere, with emphasis on the collection, storage, use and abuse of water in its liquid state.

A. LABORATORY EXPERIENCES

1. Some Aspects of Air Pollution (Laboratory and Field Investigations in General Ecology - p. 13).
2. Ecological Comparison of Clean and Polluted Streams - p. 151).
3. How Wet Is Our Planet (Project Wild - Aquatic - p. 7).
4. Wetland Metaphors (p. 49 p.w.).
5. Fashion a Fish (p. 81 p.w.).

6. Where Have All the Salmon Gone (p. 103 p.w.)
7. Deadly Skies (p.w. p. 133).
8. Watershed (p. 163 p.w.)
9. Alice in Waterland (p. 175 p.w.).
10. Rainfall and the Forest (p. 75 p.w.)

B. AUDIO-VISUAL MATERIALS

1. Freshwater: Aquatic Environment (F.S. 7)
2. Resources of the Oceans (F.S. 214)
3. Air Pollution (F.S. 11910-1911).
4. Acid Rain - The Choice is Ours (F.S. 2259)
5. Salt Marshes (F.S. 2502-2503)
6. Freshwater Life: Living in Freshwater (F.S. 567, 628)
7. Freshwater Ecology (F.S. 1263)
8. Seashore - A Continually Changing Environment (F.S. 1576)

C. RELATED CAREERS

1. Hydrologist
2. Oceanographer
3. Marine Biologist
4. Timnologist
5. Meteorologist
6. Atmospheric Scientist
7. Technician

III. Finally, two more areas to be studied, again somewhat related, and necessary to man's survival: Energy as food and energy as fuel. In the first area the emphasis will be on the production and distribution of foodstuffs throughout the world, with emphasis on how man's technological prowess has become and still is a two-edged sword insofar as its impact on the environment is concerned. In the second the focus will be on a descriptive overview of the history of man's changing needs insofar as fuels are concerned, and the impact their use has had on the environment down through the years. This area of study will close with an emphasis on the need to consider the future when choosing and using fuels because of their potential (via their waste products) to seriously damage the life-sustaining support systems previously examined in

the course (i.e. the atmosphere, the hydrosphere, etc.)

A. LABORATORY EXPERIENCES

1. The Mysterious Swing (Energy 80 - Vol. II p. 21)
2. Fuel From Water (E. 80 p. 49)
3. Tracking the Elusive Calorie (E. 80 p. 58)
4. Sand Bottle (E. 80 p. 72)
5. Copper Cup (E. 80 p. 77)
6. Converting With Activities to Calories (E. 80 p. 130)
7. Following a Shadow (E. 80 Vol. III, p. 5)
8. Estimation of Tolerance Limits to Pollutants
(Laboratory and Field Investigations in General Ecology, p.

25)

B. Audio-Visual Materials

1. Energy Alternatives (F.S.#2256)
2. Solar Energy (F.S.#2257)
3. Nuclear Energy (F.S.#2258)
4. Energy Crisis (F.S. #2378)
5. Energy and Life (F.S.#2382)
6. Energy Future (F.S.#2383)
7. Story of Coal, Oil, and Uranium (F.S.#1919)
8. Science and Society (F.S.#1301-1302)
9. Energy: What Lies Ahead (F.S.#1554)

C. Related Careers

1. Agronomist
2. Geologist
3. Biochemist

IV. Outdoor Activities

1. Field Trips - e.g. DeKorte Environmental Center
Liberty State Park Science Center
2. Activities Within Rutherford:
 - Survey of flora and fauna
 - Meadowlands
 - Memorial Field
 - Lincoln Woods

IV. BIBLIOGRAPHY

1. **Textbook:** Environmental Science, Jane L. Person
2. **Lab Manuals**
 - a. Laboratory and Field Investigations in General Ecology
by Robert Rolan.
 - b. Project Wild
 - c. Project Wild - Aquatic
 - d. Energy 80 - Vol. II and III
3. **Filmstrips** are all located in the Rutherford High School Library.

V. Evaluation of Students

1. Participation during class discussions.
2. Laboratory work during class and a write-up of the work completed.
3. Chapter tests that will be given periodically.
4. Preparation for class with the text, a notebook and a writing implement.
5. Research on career opportunities.
6. Special Assignments:
 - a. Environmental poster
 - b. Summary of an article related to current class topics.
 - c. Special video presentations.

VI. MINIMUM PROFICIENCIES

1. Be introduced to major ecological concepts.
2. Be made aware of the environmental problems that affect the world.
3. Be taught about local environmental concerns affecting our surrounding areas.
4. Learn about the development of technology and the problems they have created, as well as the technology developed to solve them.
5. Be able to understand the interactions between humans and their environment.

6. Understand practical solutions to everyday problems which affect our lives.
7. Be encouraged to participate in class discussions concerning environmental problems and their possible solutions.
8. Understand the concepts in ecology relating to succession, to wildlife management, and to food webs.
9. Comprehend information on the atmosphere pertaining to weather patterns, to sources of pollution, and to the effects of pollution and controlling it.
10. Be introduced to the problems relating to radiation, by natural sources and man-made sources.
11. Comprehend the importance of soil and its relationship to providing the population of the world with a sufficient food supply.
12. Understand the importance of water to the environment: its uses and how it has been abused.
13. Comprehend the importance of energy sources to our society, understanding their limits and looking toward future demands for clean, dependable energy sources.
14. Students are required to compile and maintain an up-to-date notebook.
15. Students will demonstrate concern for their safety and that of others during laboratory activities by following the guidelines outlined by their teacher.