

Science Department Guide Environmental Science Overview

Course Description: Environmental Science

This course is for students who are interested in understanding the basic concepts of Ecology. It is intended for students at all levels who are motivated to learn more about man and his environment. The course is designed to include the ecology of the local communities so that the students may investigate local environmental problems. Field trips will be used for this purpose. Appropriate laboratory activities will be utilized as an integral part of the course. The major areas of study will include the following topics: (1) Ecosystems, (2) Habitats and Niches, (3) Population and Communities, (4) Pollution, (5) Biomes, (6) Man's role in the environment. Particular emphasis will be placed on the practical aspects of the listed topics and their relationship to our community. The students' progress will be evaluated using tests, quizzes, and class participation.

Prerequisite: Grade 11 or 12

Major Course Objectives

When students have completed Environmental Science, they will know and be able to:

1. Apply the scientific method to solve problems
2. Define biotic and abiotic environments
3. Compare plant cells and animal cells
4. Distinguish between producers
5. Define kingdom, phylum and species
6. Identify the five biological kingdoms
7. Describe the process of photosynthesis
8. Distinguish between the light and dark reactions in photosynthesis; autotrophs and heterotrophs
9. Contrast aerobic and anaerobic respiration
10. Explain the predator-prey relationship
11. Define food chain and food web
12. Distinguish between the pyramid of numbers and the pyramid of mass
13. Diagram food chains and food webs
14. Explain how the atmosphere was formed
15. Discuss the greenhouse effect
16. Describe what is meant by carbon sink
17. Explain how hydrogen bonding affects the properties of water
18. Define capillary action, specific heat, and precipitation
19. Diagram the water cycle
20. Describe the role of scavengers and decomposers in the biosphere
21. Explain the nitrogen cycle and the phosphorus cycle
22. Discuss how detritivores increase the fertility of soil

23. Distinguish between primary and secondary succession
24. Describe the life cycle of the lake
25. Compare the process of eutrophication with cultural eutrophication
26. Contrast the characteristics of an immature river and a mature river
27. Discuss how waves and tides affect the shoreline
28. Define biota, flora, and fauna
29. Describe how ecosystems function
30. Identify the biotic and abiotic factors in an ecosystem
31. Describe the taiga and deciduous forest biomes
32. Distinguish between the tropical and temperate rain forests

Relationship to the Massachusetts Science Curriculum Framework

Students engage in problem solving, communicating, reasoning as they

1. Explain how biotic and abiotic factors cycle in an ecosystem.
2. Use a food web to identify and distinguish producers, consumers, and decomposers, and explain the transfer of energy through trophic levels.
3. Identify the factors in an ecosystem that influence fluctuations in population size.
4. Analyze changes in an ecosystem resulting from natural causes, changes in climate, human activity, or introduction of non-native species.
5. Explain how symbiotic behavior produces interactions within ecosystems.
6. Describe how the taxonomic system classifies things into domains and kingdoms
7. Illustrate how genetic variation is preserved or eliminated from a population through Darwinian natural selection resulting in biodiversity.

Assessment Tools

Success in Marine Biology will be measured by the following methods:

1. Homework may be checked for completeness, accuracy, and/or understanding.
2. Classwork will be evaluated overall by the teacher.
3. Formative and summative quizzes are given as needed.
4. Tests are primarily summative, yet various parts may, as needed, be treated as formative.
5. Unit tests may consist of multiple choice, short answer, and/or open response items.
6. Emphasis is put on organization, notation, accuracy and proficiency of student work.
7. The final exam will consist of primarily multiple choice, short answer and open response questions.
8. Extra credit opportunities will be provided.

Materials and Resources

Schacter, Martin, Environmental Science , AmSCO School Publications, New York, 1999 (primary text for this course)

INSERT NEW., Marine Biology Coloring Book, Harper Perennial, Oakville, CA, 1982

Charton, Barbara, Marine Science, Checkmark Books, New York, 2002

Ripple, Jeff, Sea Turtles, Voyageur Press, Stillwater, MN, 1996

Zim, Herbert S. and Ingle, Lester, Seashores, Golden Books, New York, 2000

Bannister, Keith and Campbell, Andrew, Aquatic Life, Facts on File, New York, 1985

Clayton, JM, Seashells, Crescent Books, New York, 1974

Gosner, Kenneth L., Atlantic Seashore, Houghton Mifflin, Boston, 1978

Berrill, N.J. and Berrill, Jacquelyn, 1001 Questions Answered About the Seashore, Dover, New York, 1957

Videos (located in the storage closet)

Class handouts

Relationship to the High School Student Expectations

The members of the Scituate High Science Department will offer to every student the opportunity to:

1. Be an effective reader
2. Be an effective writer
3. Be an effective speaker/presenter/performer
4. Be an effective problem solver
5. Be an effective information seeker/organizer
6. Contribute to the community at large

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