

Spectrum Program Session 2 Course Title: Aquatic Ecosystems Honors

Course Description

Our understanding of aquatic ecosystems is still evolving, but we do know human activity has had a detrimental impact on these environments. Unfortunately, lakes, rivers and streams are among the most endangered habitats. In this intensive, field-study-based course, students make use of Chicago area aquatic ecosystems, including the Chicago River, Lake Michigan, and the Skokie lagoons to explore the ecology, reproduction, and health of aquatic life. Students collect samples and gather data, and then work in groups to develop hypothesis and design experiments to test their ideas. The course will conclude with a final project based on student research.

Essential Questions

How do local geography, climate, and hydrology combine to create the basis for freshwater ecosystems?
How do aquatic organisms interact with their environment and with each other to create dynamic lake and stream communities?
What effect has human activity had on the health of aquatic ecosystems, both locally and globally?

Outcomes

Students who successfully complete this class will be able to:

- Describe the global and local, living and non-living factors that affect lake and stream communities
- Describe the principles by which freshwater communities are established and how they change over time
- Recognize the biological and physical differences between the world's major freshwater ecosystems
- Identify the various members of freshwater ecosystems and describe their roles in the community
- Conduct field surveys and related research to collect data on lakes and streams
- Engage in scientific research to plan and conduct ecological experiments
- Interpret scientific data to determine the parameters and health of an aquatic ecosystem
- Recognize possible hazards to local ecosystems from human activity and identify steps to mediate them

Instructional Strategies

In addition to more standard instructional methods, weekly group sessions will focus on several independent and group activities designed to provide alternative learning modes on key concepts and topics.

Students will have the opportunity to engage in a research project of flexible design that will enable them to participate in additional studies of related topics of their choice. These projects, either as individuals or a group, could engage student interest in scientific research, hands-on experimentation, or the analysis and evaluation of current issues in the field. Project presentations will be similarly open to a wide variety of student-selected modes.

Resources and Materials

Texts:

Trefil, J. *Earth Science: Earth's Waters*, 2007. (978-0-618-84242-1)

Trefil, J., *Life Science: Ecology*, 2007. (978-0-618-84221-6)

Reading Packets (to be handed out by instructor)

Materials: Students should have clothing appropriate for aquatic field research, including footwear, that will allow them to be submerged up to their waist. A rain coat or poncho and a pair of heavy use canvas or leather gloves (e.g. gardening gloves) is also recommended.

Student Assessment

Students will be evaluated on their preparation and participation in daily discussions, their completion of homework assignments and lab/field reports, on a written research project report and class presentation, and two unit tests.

Final Grade Basis:

Discussions & Worksheets:	15%
Lab & Field Reports:	40%
Project Report & Presentation:	15%
Tests (15% each):	30%

CTD Grading Scale:

A+	100-97%	A	96-93%	A-	92-90%
B+	89-87%	B	86-83%	B-	82-80%
C+	79-77%	C	76-73%	C-	72-70%
D+	69-67%	D	66-63%	D-	62-60%
F	below 60%				

Schedule

Date(s)	Topic(s)	In-class Activities	Graded Assignments and/or Assessment
Monday, 7/18	Introduction, Water Physics and Chemistry	Lab 1. Making Observations Lab 2. Properties of Water	Lab reports (1, 2)
Tuesday, 7/19	The World's Waters	Lab 3. Water Sampling; Water Table Setup	Lab report 3
Wednesday, 7/20	Water & Nutrient Cycles	Lab 4. Water Chemistry	Lab report 4
Thursday, 7/21	Lakes	Lab 5. Lake Sampling Lab 6. Water Tables	Lab report 5
Friday, 7/22	Rivers & Streams	Lab 6. (cont.)	Lab report 6
Monday, 7/25	Principles of Ecology	Test I; Lab 7. Plankton Sampling	Test I, Lab report 7
Tuesday, 7/26	Ecological Niches & Resources	Lab 8. Zebra Mussels	Lab report 8
Wednesday, 7/27	Ecological Interactions	Lab 9. Hatching Artemia; Research Projects	Lab report 10
Thursday, 7/28	Aquatic Plants	Lab 9. (cont.) Lab 11. Plant Sampling	Lab report 11
Friday, 7/29	Aquatic Animals	Lab 9. (cont.) Lab 12. Plankton Behavior	Lab reports (9, 12)
Monday, 8/1	Invasive Species	Field Trip: Shedd Aquarium	Field Trip report
Tuesday, 8/2	The Great Lakes	Lab 13. Invasive Species; Research Projects	Lab 13 report

Wednesday, 8/3	Aquatic Ecology of Chicago	Lab 14: Skokie Lagoons Sampling	Lab 14 report
Thursday, 8/4	Ocean Ecosystems	Test II; Research Projects	Test II
Friday, 8/5	Summary	Presentations	Project Reports; Project Presentations

CTD Statement on Third-Party Web Sites

Instructors are required to thoroughly review any third-party web sites they intend to use in their courses for inappropriate content. However, because web content continuously changes, CTD disclaims any responsibility

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