

## Syllabus

# Environmental Science, Semester A

### Course Overview

This one-semester course is intended to introduce you to the concepts and processes of environmental science. This course has 13 lessons organized into four units, plus four Unit Activities. Each lesson contains one or more Lesson Activities.

In Environmental Science, Semester A, you will learn about the importance of environmental science as an interdisciplinary field. You will describe abiotic and biotic factors of an ecosystem. You will describe the importance of biodiversity for the survival of organisms and the importance of the food chain and the food web in the ecosystem. You will learn about ecological interactions and succession. You will discuss the effects of climate change and explore different types of adaptation. Further, you will describe the steps of the water cycle, and discuss how carbon, oxygen, nitrogen, and phosphorous cycle in the global environment.

Your teacher will grade your work on the Unit Activities, and you will grade your work on the Lesson Activities by comparing them with the given sample responses. The Unit Activities (submitted to the teacher) and the Lesson Activities (self-checked) are major components of this course. There are other assessment components, namely the mastery test questions that feature along with the lesson; the pre- and post-test questions that come at the beginning and end of the unit, respectively; and an end-of-semester test. All of these tests are a combination of simple multiple-choice questions and technology-enhanced (TE) questions.

### Course Goals

By the end of this course, you will be able to do the following:

- Discuss the history of environmental science and the use of the scientific method in environmental science.
- Describe abiotic and biotic factors of an ecosystem.
- Describe the characteristics of major biomes on Earth.
- Describe the significance of the food chain, the food web, and biodiversity in the ecosystem.
- Explain how succession takes place over a period of time in an ecosystem.
- Discuss factors that determine a region's climate and the effects of climate change.
- Discuss adaptation of organisms to environmental pressures.

- Describe the effects of invasive species on biodiversity.
- Describe how water, carbon, oxygen, nitrogen, and phosphorous cycle in the global environment.

## **General Skills**

To participate in this course, you should be able to do the following:

- complete basic operations with word processing software such as Microsoft Word or Google Docs
- complete basic operations with presentation software such as Microsoft PowerPoint or Google Docs presentation
- perform online research using various search engines and library databases
- communicate through email and participate in discussion boards

*For a complete list of general skills that are required for participation in online courses, refer to the Prerequisites section of the Plato Student Orientation document, found at the beginning of this course.*

## **Credit Value**

Environmental Science, Semester A is a 0.5-credit course.

## **Course Materials**

- computer with Internet connection and speakers or headphones
- scanner
- printer
- digital camera/video camera
- two thermometers, two glass beakers, glasses or glass jars, two empty coffee cans (3-lb. size), an aerosol can of “flat black” spray paint, some tap water, a hair dryer, one or more buckets of water, and disposable gloves for laboratory experiments
- Microsoft Word or equivalent
- Microsoft PowerPoint or equivalent

## Course Pacing Guide

This course description and pacing guide is intended to help you keep on schedule with your work. Note that your course instructor may modify the schedule to meet the specific needs of your class. Fieldwork is required for Unit Activities 2 and 4. This will involve a long in-depth investigation into a local ecosystem with multiple visits, observations, and analyses. For Unit Activity 3, you can do fieldwork if possible, or you can research online.

### Unit 1: Earth's Environment

#### Summary

In this unit, you will explore the history of environmental science in the United States, and describe the importance of this interdisciplinary field. You will also learn about the four spheres that constitute Earth and discuss the importance of the biosphere. You will describe biotic and abiotic factors of an ecosystem. Finally, you will discuss what a biome is and learn about the major biomes on our planet.

Day	Activity/Objective	Type
1 day: 1	<b>Syllabus and Plato Student Orientation</b> <i>Review the Plato Student Orientation and Course Syllabus at the beginning of this course.</i>	Course Orientation
4 days: 2–5	<b>Introduction to Environmental Science</b> <i>Explore the history of environmental science and the use of the scientific method in environmental science.</i>	Lesson
4 days: 6–9	<b>Biosphere</b> <i>Describe abiotic and biotic factors of an ecosystem.</i>	Lesson
4 days: 10–13	<b>Biomes on Earth</b> <i>Describe the characteristics of major biomes on Earth.</i>	Lesson
1 day: 14	<b>Para Jumble</b>	Game
5 days: 15–19	<b>Unit Activity and Discussion—Unit 1</b>	Unit Activity Discussion

Day	Activity/ <i>Objective</i>	Type
1 day: 20	<b>Posttest—Unit 1</b>	Assessment

## Unit 2: Ecological Pyramids, Interactions, and Succession

### Summary

In this unit, you will identify different types of biodiversity such as species diversity, genetic diversity, and ecosystem diversity. You will describe the importance of biodiversity to the survival of organisms. Further, you will describe the significance of the food chain and the food web in the ecosystem. You will explore different types of ecological interactions such as mutualism, competition, and predation. Finally, you will learn about ecological succession.

Day	Activity/Objective	Type
4 days: 21–24	<b>Biodiversity</b> <i>Discuss the significance of biodiversity in the ecosystem.</i>	Lesson
4 days: 25–28	<b>Ecological Pyramids</b> <i>Describe the importance of the food chain and the food web in the ecosystem, as well as the flow of energy from the lowest trophic level to the highest level in the ecological pyramid.</i>	Lesson
4 days: 29–32	<b>Ecological Interactions</b> <i>Describe different types of ecological interactions such as mutualism, commensalism, competition, and predation.</i>	Lesson
4 days: 33–36	<b>Ecological Succession</b> <i>Examine how succession takes place over a period of time in an ecosystem.</i>	Lesson
1 day: 37	<b>Space Jumble</b>	Game
7 days: 38–44	<b>Unit Activity and Discussion—Unit 2</b>	Unit Activity Discussion
1 day: 45	<b>Posttest—Unit 2</b>	Assessment

## Unit 3: Environmental Change and Adaptation

### Summary

In this unit, you will learn about the difference between weather and climate, and discuss the factors that affect climate. You will also learn about the potential effects of climate change on ecosystems. Further, you will explore different types of adaptation, and learn about the adaptive techniques used by organisms to survive in the given environment. Finally, you will learn about the ways in which invasive species are introduced to new environments, and examine the threats posed by them.

Day	Activity/Objective	Type
5 days: 46–50	<b>Climate and Climate Change</b> <i>Discuss factors related to climate and the effects of climate change.</i>	Lesson
4 days: 51–54	<b>Adaptation</b> <i>Discuss adaptation of organisms to environmental pressures.</i>	Lesson
4 days: 55–58	<b>Invasive Species</b> <i>Describe the effects of invasive species on biodiversity.</i>	Lesson
1 day: 59	<b>Para Jumble</b>	Game
6 days: 60–65	<b>Unit Activity and Discussion—Unit 3</b>	Unit Activity Discussion
1 day: 66	<b>Posttest—Unit 3</b>	Assessment

## Unit 4: Biogeochemical Cycles

### Summary

In this unit, you will learn about the properties of water, and describe the steps of the water cycle. You will explore how carbon and oxygen transfer from one form to the other to allow ecosystems to function. You will also learn about the importance of nitrogen and phosphorous to life on Earth, and examine how excess quantities of nitrogen and phosphorous can create environmental problems.

Day	Activity/Objective	Type
5 days: 67–71	<b>The Water Cycle</b> <i>Describe the movement of water from one location to another in the ecosystem.</i>	Lesson
4 days: 72–75	<b>The Carbon Cycle and the Oxygen Cycle</b> <i>Discuss how carbon and oxygen are cycling in the global environment.</i>	Lesson
4 days: 76–79	<b>The Nitrogen Cycle and the Phosphorous Cycle</b> <i>Discuss how nitrogen and phosphorous cycle in the global environment.</i>	Lesson
1 day: 80	<b>Thwack-A-Mole</b>	Game
7 days: 81–87	<b>Unit Activity and Discussion—Unit 4</b>	Unit Activity Discussion
1 day: 88	<b>Posttest—Unit 4</b>	Assessment
1 day: 89	<b>Semester Review</b>	
1 day: 90	<b>End-of-Semester Exam</b>	Assessment