## ENVIRONMENTAL SCIENCE

This course will give a lower division introduction to environmental science as a discipline and as a way of thinking. Fundamentals of social, physical, chemical, and biological processes important to environmental science at local and global scales will be discussed. Topics will include, but are not limited to, human population growth and distribution, biogeochemical cycling and energy flows, ecological restoration, biodiversity, atmospheric and oceanic sciences, agriculture and food production, environmental systems and society, and water resource management.

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#### COURSE OBJECTIVES

The primary objectives of this class are that students:

1. Become informed of the major long-term environmental challenges we face as a modern global civilization.
2. Understand social and biophysical processes affecting the environment.
3. Understand Ecosystems and the human population’s effect on it.
4. Explain Renewable and Non-renewable resources and how to create sustainability.
5. Understand how the scientific method is applied in the environmental sciences to develop responses to environmental problems.
6. Have an increased capacity to integrate information and communicate about complex environmental issues.

#### REQUIRED TEXT

Chiras, Environmental Science, 9th Edition Jones &Bartlett Learning Burlington, MA

ISBN-13: 978-1-4496-4531-1

#### COURSE OUTLINE

**IMPORTANT NOTE:** TheGameScape episodes below are mapped to course “Topics”; however, it is recommended that students experience episodes 1 through 5 sequentially.

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| **Week** | **Chapter** | **Topic** | **Course Objective** | **GameScape Episode** |
| 1 | 1&2&3 | Environmental Science, Sustainability, and Critical Thinking + Environmental Protection and Sustainability + Understanding the Root Causes of the Environmental Crisis | 1,2 |  |
| 2 | 4&5&6 | Principles of Ecology: How Ecosystems Work + Biomes and Aquatic Life Zones + Self-Sustaining Mechanisms in Ecosystems | 3 | Episode 1: Balancing Ecosystems |
| 3 | 7&8&9 | Human Ecology: Our Changing Relationship with the Environment + Population: Measuring Growth and Its Impact + Stabilizing the Human Population: Strategies for Sustainability | 3 | Episode 2: Managing Population Growth |
| 4 | 10&11 | Creating a Sustainable System of Agriculture to Feed the World’s People + Preserving Biological Diversity | 2 |  |
| 5 | 12&13 | Grasslands, Forests, and Wilderness: Sustainable Management Strategies + Water Resources: Preserving Our Liquid Assets and Protecting Aquatic Ecosystems | 3,4 |  |
| 6 | 14&15 | Nonrenewable Energy Sources + Foundations of a Sustainable Energy System: Conservation and Renewable Energy | 4 | Episode 4: Controlling Energy Systems |
| 7 | 16&17 | The Earth and Its Mineral Resources + Creating Sustainable Cities, Suburbs, and Towns: Sustainable Community Development and Environmental Protection | 4 |  |
| 8 | 18&19 | Principles of Toxicology and Risk Assessment + Air Pollution and Noise: Living and Working in a Healthy Environment | 2 | Episode 3: Maintaining Terrestrial and Atmospheric Resources |
| 9 | 20&21 | Global Air Pollution: Ozone Depletion, Acid Deposition, and Global Climate Change + Water Pollution: Sustainably Managing a Renewable Resource | 2 |  |
| 10 | 22&23 | Pests and Pesticides: Growing Crops Sustainably + Hazardous and Solid Wastes: Sustainable Solutions | 2 |  |
| 11 | 24&25 | Environmental Ethics: The Foundation of a Sustainable Society + Sustainable Economics: Economics and Challenges Facing the Industrial Nations | 2,5 | Episode 5: Building a Positive Environmental Legacy |
| 12 | 26&27 | Sustainable Economic Development: Challenges Facing the Developing Nations + Laws, Government, and Society | 5,6 |  |

**How to Use GAMEScapes**

**WEEK 2 – TOPIC – PRINCIPLES OF ECOLOGY**

**Objectives**

* Explain Renewable and Non-renewable resources and how to create sustainability.
* Understand how the scientific method is applied in the environmental sciences to develop responses to environmental problems.
* Have an increased capacity to integrate information and communicate about complex environmental issues.

**Homework**

* GameScape Episode: “Balancing Ecosystems”
  + - During this episode, students will encounter several reflection questions (See below). Instructors can count the assessments for the five episodes as 25% of the final grade (5% per episode) or any percentage deemed most appropriate for a given course.

**WEEK 3 – TOPIC – HUMAN ECOLOGY**

**Class Agenda (Options)**

1. **Discussion**

GameScapes are valuable tools for exposing students to authentic real life environments and scenarios designed to provide meaningful “teachable moments”. Engage your students in a discussion about how they handled certain situations and what the experience was like. A few questions you might ask include:

* + - Did you feel prepared to play the role?
    - If not, what additional knowledge and skills were you lacking?
    - How can you fill that knowledge and skill gap?
    - Did you enjoy playing this role? If yes, why? If no, why not?
    - Did you learn anything new about the field of Environmental Science If so, what did you learn? How does that affect your attitude about pursuing a course of study in Environmental Science?
  1. **Reading Review**

GameScapes are designed to spark student’s intrinsic motivation and inspire them to investigate course concepts and materials in more depth. With that in mind, use the GameScape episode to call students’ attention back to reading assignments and other course materials. A few questions you might ask include:

1. Now that you’ve completed this episode, have you reviewed any of the course content to make connections between the course and the role you played?
   * If yes, what connections did you make?
   * If not, how might reviewing the course content be helpful if you were to play the episode again?
   1. **Guided Critical Thinking and Research Exercise**

These student-centered, interactive exercises place students in control of their learning and encourage them to be proactive, life-long learners who can problem solve and identify information they need in order to be successful. Challenge students to consider additional resources outside of your course that might help them in future situations. A few questions you might ask include:

* What are some additional resources that you could use if you were to encounter situations like these in the future?
* What are some of the key words and phrases that you might use in an online search?