

Course Code: BIO 104 (IAI L1 905L)

Course Title: Environmental Biology and Sustainability

Department: Natural Sciences

Effective Date: Summer 2026

PCS Code: 1.1 - Baccalaureate/Transfer

CIP Code: 26.1305

Repeatability: 0

Credit Hours

Catalog Notation: 3-3-4

Credit Hour Distribution:

Lecture: 3

Lab: 3

Clinical: 0

Total: 4

General Course Information

Catalog Description

Examines relationship of humans to their environment, including consideration of natural cycles and balances, populations, energy, material goods (consumption and solid waste pollution), air, climate, water, food security, and tools to help us move into the future sustainably (government, action, ethics). Field trips, virtual or in person, may be included.

General Course Objectives

- To introduce the basic principles and applications of environmental science;
- to utilize course information in a better understanding of global, national, and local environmental problems;
- to generate a more informed voting citizen in matters of environment concern;
- to increase scientific literacy with regard to environmental science;
- to recognize that environmental sciences is an interdisciplinary field;
- to determine connections existing among environmental, economic, ecological, and social issues;
- to change personal attitudes and behaviors toward more environmentally sound beliefs and practices;
- and to determine sustainable solutions to environmental problems, and gain the skills necessary to carry them out.

Minimum Placement Levels

English	Reading	Math
Placement out of ENG 099	Placement out of CCS 098	None

Prerequisites

None

Methods of Evaluation

Online reading assignments (10%), 8 objective quizzes (10%), 8 summative assessments (10%), 14 lab exercises and associated assignments (30%), comprehensive final exam (10%), portfolio of personal environmental impact (10%), instructor assignments [discussion, reports, presentations, etc.] (15%), work ethic (5%).

Instructional Materials and Additional Supplies

Environmental Science for a Changing World, Karr, Houtman, and Interlandi; 4th edition, 2021.

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Lab kit

Course Content

General Learning Outcomes (GLOs)

- Critical Thinking and Information Literacy: Students will demonstrate the ability to evaluate perspectives, evidence, and implications, and to locate, assess, and use information effectively.
- Reasoning and Inquiry: Students will demonstrate the ability to solve problems using deductive reasoning and logic, quantitative reasoning, or the scientific method.
- Global Awareness and Cultural Reasoning: Students will demonstrate their understanding of global issues, gender and sexual orientation, and multicultural perspectives.

Course Segments and Student Learning Outcomes

Course Segment	Learning Outcomes	Lecture Hours	Lab Hours	Clinical Hours
Ecology	<ol style="list-style-type: none">1. Describe the basic principles of scientific inquiry, environmental science, and sustainability.2. Compare the chemistry and functionality of photosynthesis and cellular respiration in organisms and the global carbon cycle.3. Define and use basic concepts regarding ecology, including niches, nutrient cycling, succession, symbiosis, carrying capacity, environmental resistance, and biomes.4. Apply Barry Commoner's Four Laws of Ecology to ecosystems and human society.5. Describe the layers of the earth.6. Define and use basic concepts of natural capital (resources and services).	6	6	0
Demography and Biodiversity	<ol style="list-style-type: none">1. Describe how populations grow and decline and interpret simple demographic statistics and graphs.2. Examine the stages of demographic transitions, population growth statistics, and recognize and interpret age-structure diagrams.3. Explain global trends of population growth and correlations between human development index and demographic statistics.4. Describe what biodiversity is and how to measure it.5. Use biodiversity indexes as a tool to measure ecosystem stability.6. Describe the laws and economic and ecological tools used to protect declining species and biodiversity.	4	3	0

Course Segment	Learning Outcomes	Lecture Hours	Lab Hours	Clinical Hours
Energy	<ol style="list-style-type: none"> 1. Summarize how the pattern of energy consumption has changed with the development of human civilization. 2. Discuss the prospects of energy conservation for reducing fossil fuel consumption, strengthening the economy, and decreasing pollution. 3. Compare and contrast nonrenewable energy sources. 4. Compare and contrast renewable energy sources. 5. Describe global efforts to move toward sustainable energy sources and energy efficiency. 	6	6	0
Stuff	<ol style="list-style-type: none"> 1. Describe how modern western society is based on material consumption of goods, focusing on Affluenza and the environmental consequences. 2. Examine what natural capital is used to make material goods. 3. Describe the stages of the product life cycle and efforts to move toward sustainable manufacturing. 4. Analyze shopping choices, their impact, and how to make them more sustainable. 5. Define, compare, and contrast various methods of solid waste management, including their benefits and consequences toward a sustainable future. 	6	6	0
Air	<ol style="list-style-type: none"> 1. Label the layers of the earth's atmosphere. 2. Describe the problems of atmospheric pollution, particularly primary air and indoor air pollution, and their possible solutions. 3. Interpret and analyze data regarding climate change, and discuss the global issues and solutions. 4. Describe ozone depletion and explain the consequences and global efforts to decrease the loss of stratospheric ozone. 	6	6	0
Water	<ol style="list-style-type: none"> 1. Define the hydrologic cycle. 2. Summarize the issues surrounding the supply of clean, fresh water globally. 3. Explain the processes of drinking water and wastewater treatment. 4. Describe problems of aquatic pollution and their possible solutions. 	4	6	0
Food Security	<ol style="list-style-type: none"> 1. Describe the natural capital (water, air, soil, energy, land surface, pest control, breeding/genetics) required for food production, both conventional and traditional. 2. Label soil horizons and describe basic characteristics of horizons A, B, and C. 3. Describe environmental challenges of conventional farming: pesticide use, pesticide resistance, lack of biodiversity, and fossil fuels. Identify and describe global sustainable farming solutions. 4. Describe the modern "food superhighway", comparing and contrasting this to "eating locally". 	4	6	0

Course Segment	Learning Outcomes	Lecture Hours	Lab Hours	Clinical Hours
Regeneration	<ol style="list-style-type: none"> 1. Compare ethics and morals, and analyze how each plays a role in making environmental decisions. 2. Describe the role of economics in making environmental decisions. 3. Describe the roles of individuals, EPA, and local, state, and federal governments in regulating environmental quality. 4. Describe the ideal of sustainable development, and evaluate the reality of sustainable practices. 5. Use a cost/benefit analysis to help make environmental decisions. 6. Define pollution, and analyze contributions to it. 7. Define toxins, LD50, and describe the major categories of toxins in the environment. 8. Explain how risk (assessment and management) are used when dealing with environmental toxins. 9. Compare and contrast sustainability, resilience, and regeneration with regard to societal development. 10. Answer the question, "What happens if we focus on regeneration and 'getting things right'?". 	7	6	0
Cities (distributed throughout course)	<ol style="list-style-type: none"> 1. Describe the ecosystem of a city. Summarize the issues surrounding the maintenance, transportation, economics, and social justice of modern cities, and design solutions that will make cities more sustainable. 	2	0	0

Total Contact Hours

Lecture Hours	Lab Hours	Clinical Hours
45	45	0