# Environmental Science

## Course Description

This course provides a general introduction to the historical and current status of the environment, with a focus on the most urgent conservation, environment, and pollution issues we face today. It provides the foundation for the study of the natural world, helping to identify and define sustainability, encourage stewardship of the environment, and educate the population through use of sound science. Because environmental science is a multidisciplinary field, this course draws in students whose primary interests are from a wide range of study. While most of the material is grounded in biology, it incorporates anthropology, history, archeology, sociology, and psychology to better understand how humans interact with the environment. In addition, the areas of economics and business management have a growing influence in shaping the quality of our environment and are, thus, included as part of this course.

## Required Text

## The text that accompanies this course is *Environmental Science: Toward a Sustainable Future*. (Wright, 2016)

## Prerequisites

There are no prerequisites for this course.

## Learning Outcomes

* Understand how the natural world works and how human systems are interacting with natural systems.
* Discuss various methods used to promote our long-term, sustainable relationship with the natural world.
* Know the standard guidelines used in the preparation and writing of a scientifically-based term paper.
* Describe the important conservation issues facing us today, with special focus on the threats to biodiversity and to human health.
* Explain the kinds of policies employed to regulate the use of natural resources and deal with pollution.
* List the simple laws that control the transformation of energy from one type to another and its flow through Earth’s systems and back into space.
* Explain how major changes in the Earth facilitate evolutionary change.
* Describe ways in which human actions alter populations and communities.
* Explain why both population growth and consumption patterns must be addressed for stewardship of resources to occur.
* Describe the structure of the atmosphere; distinguish between weather and climate; explain how the greenhouse effect warms the Earth and identify the greenhouse gases.
* Explain how air pollutants impact human health and cause damage to agricultural crops and natural ecosystems.
* Identify steps that can make communities more livable; describe how regions can use urban planning to better provide essential services and jobs to residents.
* Evaluate actions that can help move our society toward greater sustainability, including lifestyle options open to people who want to be responsible stewards.

## Course Topics

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| Category/Topics | Learning Content |
| Science and the Environment | Explains the main reasons for concern about the health of our planet today and describes what the environmental movement has achieved in recent years. Defines sustainability and stewardship. Explains the process of science, how the scientific community tests new ideas, and contrasts sound science with junk science. |
| Economics, Politics, and Public Policy | Describes how economic activity relates to environmental goods and services, then differentiates between green and brown economies. Describes a typical policy life cycle. Discusses how cost-benefit analysis is applied to environmental policy regulations. Lists several international policies and innovative ways in which economies can be changed in order to make them environmentally sound. |
| Basic Needs of Living Things | Explains how the science of ecology can be described as a hierarchy of questions and describes the different types of questions ecologists ask and study. Defines an organism’s niche and explains how living things need materials to build tissues and energy to carry out life processes such as photosynthesis and cellular respiration. Describes the biogeochemical cycles of the elements of carbon, phosphorus, nitrogen, and sulfur as they cycle through living and nonliving spheres. |
| Populations and Communities | Describes three models of how populations grow and explains the graph that illustrates each. Identifies factors that limit populations, including those that are density-dependent and density-independent. Defines the types of interactions that can occur between species in a community and the effect of those interactions on each species. Describes the major ideas in the theory of evolution, such as inheritance and natural selection, and lists examples of adaptations that allow organisms to survive. |
| Ecosystems: Energy, Patterns, and Disturbance | Describes how matter and energy flow through ecosystems by moving from one trophic level to another. Defines and recognizes characteristics of major broad regions called biomes, major aquatic regions, and factors that determine their placement on the globe. Explains the effects of ecological disturbances that are normal in ecosystems and can even be beneficial. Describes ways that humans alter ecosystem services and explains why we need to manage ecosystems to protect their components from overuse. |
| Wild Species and Biodiversity | Defines and gives examples of both the instrumental and intrinsic value of wild species. Explains the causes, extent, relation to human activities, and impacts of the tremendous loss of species occurring today. Explains how cutting-edge science, policies for protection, and changes in the way people think can be used to protect wild species. Describes international efforts to protect wild species. |
| The Use and Restoration of Ecosystems | Lists ways natural ecosystems have economic value as they provide goods and services vital to human well-being. Compares the consumptive and productive uses of ecosystems. Describes the value of ocean ecosystems; identifies the main threats to these ecosystems and solutions to these problems. Explains how the public and private management of lands is key to protecting habitats and provides examples of ecosystem restoration projects. |
| The Human Population | Explains how humans, like other organisms, are subject to natural laws and ecological processes. Explains the relationship between income and fertility in countries around the world. Describes the likely outcome of unlimited population growth and the unlimited use of natural resources. Explains how age structure, population momentum, and the demographic transition help social scientists understand populations and predict future population trends. |
| Population and Development | Describes the main schools of thought about what causes the demographic transition. Explains how development, fertility, and environmental health relate to each other. Discusses the Millennium Development Goals and the move to the Sustainable Development Goals. Describes how development can reduce fertility but also increase environmental stressors. Identifies the five components of social modernization that countries focus on to achieve lower fertility rates. |
| Water: Hydrologic Cycle and Human Use | Describes the unique properties that make water so vital, the differences in water availability in different societies, and conflicts over availability of clean water. Explains the movement of water through the hydrologic cycle and human impacts on the cycle. Describes the ways humans try to provide clean freshwater and some of their outcomes. Describes options for meeting rising demands for water, new innovations in water science and technology, and public policies for water in a water-scarce world. |
| Soil: The Foundation for Land Ecosystems | Describes the basic parts of soil, soil communities, and soil profiles. Explains how soils are degraded by human activities. Describes how soil conservation requires action at different levels, from individual landholders through national and international public policy. |
| The Production and Distribution of Food | Explains how the Industrial Revolution and the Green Revolution radically transformed the practice of farming; compares them to subsistence agriculture and animal farming. Describes genetically modified crops and identifies their advantages and disadvantages. Distinguishes between hunger and malnutrition. Identifies the causes of food shortages. Describes new trends in agriculture; identifies the key elements of sustainable agricultural systems. |
| Pests and Pest Control | Defines the major groups of pests and the different methods we use to control them. Explains the serious problems that accompany overuse of new and more effective chemical pesticides such as DDT. Explains the main principles and gives examples of the integrated pest management approach to reducing the use of pesticides. Lists and describes the federal and international policies for controlling pests and those that regulate the use of pesticides. |
| Energy from Fossil Fuels | Explains the three kinds of fossil fuel and evaluates the changes in crude oil sources and prices and their impact on the U.S. economy, and examines the concept of peak oil and its consequences. Describes the versatility of natural gas and explains how it can be extracted from shale. Discusses the advantages and disadvantages of coal as a power source, and evaluates the methods used to mine coal. Compares supply-side and demand-side energy policies that have been developed in recent years. |
| Nuclear Power | Reviews the basics of nuclear power and compares the benefits and disadvantages of nuclear power with those of coal power. Summarizes the essentials of radioactivity and nuclear wastes; evaluates nuclear power in the light of high-level wastes, nuclear accidents, and economic considerations. Describes how fast-neutron reactors are used to reprocess spent nuclear fuel and assesses the potential for fusion as a source of energy. Examines the impact of global climate change on the nuclear energy option. |
| Renewable Energy | Explains why it is essential to replace fossil fuels with renewable energy sources. Describes how much solar energy reaches Earth and explains how this energy is being used to heat water and produce electricity. Summarizes what is being done to employ hydropower, wind power, and biomass energy to meet energy needs. Evaluates the potential for geothermal energy, tidal power, and wave power to meet current and future energy needs. Explains how national and international energy policies encourage both renewable energy and energy conservation. |
| Environmental Hazards and Human Health | Describes three types of hazards—biological, physical, and chemical—and compares them with cultural hazards. Explains how risk factors including exposure to diseases, toxic chemicals, and physical hazards, as well as poverty and climate change, lead to human mortality. Describes the process of risk assessment and management as the EPA and the World Health Organization apply it to human health. Identifies the key elements that determine risk perception. |
| Global Climate Change | Summarizes the evidence that human activities are causing climate change; evaluates the various greenhouse gases and their effects on present and future climates. Explains how climatologists model Earth’s climate and predict future outcomes; describes the impact of climate change on natural and human systems. Explains why climate change is controversial; describes the ethical principles underlying the need for a response to climate change. Defines mitigation, adaptation, and geoengineering. |
| Atmospheric Pollution | Describes normal atmospheric cleansing and the formation of industrial and photochemical smog. Identifies global trends in air pollution. Identifies the variety and sources of the major air pollutants and classifies them as primary or secondary pollutants. Explains how U.S. laws such as the Clean Air Act have helped reduce air pollution; describes the role of the Environmental Protection Agency in controlling air pollution. Assesses how chlorofluorocarbons and other gases have been implicated in the destruction of stratospheric ozone. |
| Water Pollution and Its Prevention | Summarizes the impacts that disease organisms, organic wastes, chemical pollutants, sediments, and nutrients have on human health and the environment. Examines the methods used by cities and towns to deal with human and domestic wastes. Describes the undesirable changes that take place in aquatic ecosystems when nutrients are introduced. Explains how the Clean Water Act and its amendments are used by the EPA and states to manage U.S. water pollution. |
| Municipal Solid Waste: Disposal and Recovery | Describes global trends in the production of municipal solid waste (MSW); identifies the problems caused by disposable products and escaped trash. Describes the advantages and disadvantages of the disposal of MSW in landfills and combustion facilities. Evaluates these two options for reducing the amount of MSW that must be managed. Compares the roles of U.S. federal, state, and local governments in the management of MSW. Explains how international cooperation can help resolve global issues related to waste. |
| Hazardous Chemicals: Pollution and Prevention | Defines toxicology and explains how it applies to many of the chemicals in use in our society; identifies the two most toxic chemical groups in use and assesses their involvement in food chains. Reviews the laws put in place to prevent illegal disposal of toxic wastes, reduces accidents and accidental exposure, and evaluates new chemicals. Lists several international treaties that regulate hazardous wastes. Discusses the issue of environmental justice and identifies strategies that prevent toxic chemicals from being used. |
| Sustainable Communities and Lifestyles | Summarizes global trends in the growth of cities; describes the advantages and disadvantages of urbanization; identifies the factors that contribute to the growth of urban slums; explains how urbanization affects rural areas. Describes the connections among urban sprawl, car dependency, and highway construction; summarizes the factors leading to urban blight; explains how urban sprawl affects the environment and public health. Evaluates actions that can help move our society toward greater sustainability. |

## Study Questions

Study questions are similar to homework assignments for reviewing and supplementing what you have learned in a lesson. You can repeat the questions as preferred, but will need to achieve a score of 80% or higher on the study questions associated with a lesson before that lesson is marked as complete. You will then receive the appropriate proportion of the total number of points available for the study questions based on their overall average score for all study questions in the course.

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## Course Time Limit

This course is self-paced, which means you can complete the course requirements at a pace that is comfortable for you. However, there is an overall time limit of 180 days to complete each course, starting from the date on which you registered. This time limit is indicated on your Courses screen as “Course Period.”

Once the time limit has passed, you will no longer be able to attempt any further activities or assessments. Assuming you have not yet attempted the Final Exam, you can immediately unregister and reregister for the course to start over. Otherwise, you will be required to wait to reregister per our Course Retake Policy.

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## Course Retake Policy

There is a one-week waiting period before this course can be re-taken, starting from the date of the last Final Exam attempt.

To retake the course, first unregister from the course on your Courses screen. If it has been over a week since your last attempt, you will then be able to register for this course again.

Your highest final score for the course will be used for the transcript.

## Exams

There are a total of four exams for this course as described below.

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| **Exam** | **Coverage** | **Number of Multiple-Choice Questions** | **Time Limit, Minutes** |
| **First** | Lessons 1-28 | 25 | 60 |
| **Midterm** | Lessons 29-51 with some review of topics from Lessons 1-28 | 50 | 90 |
| **Third** | Lessons 52-78 | 25 | 60 |
| **Final** | Cumulative; everything taught in the course with an emphasis on content from the last half (and particularly the last quarter) of the course | 50 | 90 |

## Grading

To determine your level of mastery for this course, you will earn points by successfully completing the learning and evaluation activities below in sequence.

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| --- | --- |
| Source | Points Available |
| Study Questions | 300 |
| Graded Exam #1 | 100 |
| Midterm Exam | 200 |
| Graded Exam #2 | 100 |
| Final Exam | 300 |

Upon completion of the course and the grading source activities, InstantCert will provide you with a percentage score. The minimum passing score is 700 points, or an overall course grade of 70%.

**Important! Only a passing score on a course marked 100% complete (including the proctored final exam) is eligible for college credit.**

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## Proctoring of the Final Exam

A proctor is a person who monitors the work of another person who is taking an examination. Online proctoring services allow you to take the working remotely and in the same way as if you were sitting in an exam room. Proctoring ensures that the test you take complies with current college level examination policies.

Proctoring is used only for the final exam. It is offered through the online proctoring service RPNow at the Software Secure web site. You will pay a separate fee to RPNow for each final exam attempt.

RPNow requires that students download and install proprietary software. They will need to use a PC or a Mac with a webcam. Students can review the full system requirements for RPNow at:

<http://clientportal.softwaresecure.com/support/index.php?/Knowledgebase/Article/View/252/0/system-requirements-remote-proctor-now>

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## Exam Retake Policy

Both graded exams, the midterm and the final exam can be retaken ONCE. There is a 3-day waiting period before you will be allowed to retake an exam. If you retake an exam, the higher result of your two attempts will be used to calculate your final score.

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## Academic Integrity

You are required to comply with the InstantCert full Student Code of Conduct, which specifically prohibits cheating or any other academically dishonest behavior. Violation of any part of the Student Code of Conduct can result in a grade reduction or even suspension from the course.

## Software Requirements

The operating system, browser, internet access and speed are provided below for use with courses from the InstantCert web site.

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| **Operating Systems** | * Windows XP and above * Mac OS X |
| **Browsers** | * The latest version of Chrome, Firefox of Safari * IE9 or higher |
| **Internet and Speed** | Broadband Internet; 1Mbps or higher |

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## Accessibility and Disability Accommodations

InstantCert strives to make online education accessible to people everywhere in the following ways:

* All course content is available online, accessible from anywhere through an Internet connection.
* All video lessons include a transcript for use by those who are hearing impaired and/or by students that wish to have written copies of the lessons.
* All video lessons have close captioning.
* Lesson pages can be navigated by screen readers.
* Videos may be replayed an unlimited amount of times. Video speed can be increased or slowed.
* Lesson transcripts and quizzes can be printed for offline use.
* The proctoring software RPNow works with screen readers.