

Environmental Systems Certificate Program

Objectives:

The overall objective of the Environmental Systems Certificate Program is to provide for graduate education in Environmental Systems. Specifically, this includes:

- Enhancing the graduate environmental-education program of the University of Kentucky and offering multidisciplinary courses in Environmental Systems;
- Providing a certificate program in Environmental Systems for traditional and nontraditional students in all departments.

Program Description:

The Environmental Systems Certificate Program is administered by a committee of faculty and private and public representatives. The [Environmental Systems Certificate Program Committee](#) consists of representatives from the Colleges of [Science](#), [Medicine](#), [Engineering](#), [Agriculture](#), [Law](#), the [Graduate School](#), the Kentucky Environmental Protection Cabinet, the [Gatton College of Business and Economics](#), and the private sector. Each Environmental Systems course is coordinated by a faculty member, and course instructors are representatives of their respective disciplines. The committee is the governing body of the program, and the chairman of the committee reports to the Dean of the Graduate School.

The Environmental Systems Certificate Program consists of a core of three survey courses and a seminar course. Students are expected to take two Environmental Systems courses and the seminar twice. The content of the courses and seminars is the responsibility of the coordinator. Students integrate other environmentally-related courses in their major program and generally have an environmental concept in their theses or dissertations. Nontraditional students must have significant experience in an environmentally-related field. A research paper is required for students not enrolled in a graduate program.

A certificate is offered to all students specializing in environmental systems within their department. Individuals desiring a certificate must submit an application for admission to the program to the Environmental Systems Committee along with an outline of their graduate degree program or their experience.

[Click here for more information on the Environmental Systems Certificate Program.](#)



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Interdisciplinary Studies in Environmental Systems

The integration of natural, biological, medical, economics, social, engineering, and physical sciences to solve contemporary, complex environmental problems affecting Kentucky, the nation and the world.

Environmental Systems

The Graduate Certificate in Environmental Systems is a credential indicating that recipients have completed an approved, multi-disciplinary curriculum that provides them with a broad understanding of the interactions of physical, social, biological, economic, and legal parameters of environmental issues. For example, engineers gain insights into the biological and social impacts of pollution and pollution control systems. Social scientists gain an appreciation of the engineering, biological, and physical constraints on solving environmental problems. And environmental biologists gain an understanding of the social and political realities, as well as the physical limitations, in implementing environmental solutions.

The curriculum includes an opportunity for students to apply their understanding of environmental systems within their major academic field. In addition to meeting the requirements of his or her major field, each student also must meet the requirements of the Environmental Systems Certificate. Students who complete the curriculum will therefore be able to compete for traditional employment opportunities within the discipline as well as for positions that cross disciplinary lines. Non-degree students also can receive certificates by meeting separate requirements.

Environmental Issues: The Problem, The Need

The natural resources of the United States are the primary foundation for our national economy. Over the years, certain actions have negatively impacted our water, soil and air resources, which has significantly reduced environmental quality. However, there are some areas where the resources are still largely pure and where life can be pursued without fear of unhealthy pollution.

The most prominent problems relate to water resources, which Kentucky possesses in relative abundance. The seriousness of the problem was demonstrated during a severe drought in the summer of 1988, when several communities ran out of water and some crops suffered. Many of the shortages were due to an inadequacy of water storage, pumping, and treatment facilities. In other cases, the demand has grown beyond the basic water supply.

Water quality problems are even more serious. In many areas, significant pollution of groundwater aquifers is just being recognized. Once polluted, these aquifers will be difficult if not impossible to restore to an unpolluted condition. Strong, immediate steps must be taken to protect all water supplies and particularly the groundwater resources.

The soil issues, though less critical in terms of immediacy, are no less important from a long-range perspective. Kentucky has one of the most serious erosion problems of any state, and unless corrective actions are taken, the land resource will be lost.

The state cannot continue to allow indiscriminate use of the land as a disposal site for any and all forms of solid or hazardous waste. Alternatives other than landfills must be found for waste disposal, particularly hazardous waste.

The air resources, while improving, are threatened. Control technologies that have contributed to the current lessening of air pollution levels will not suffice in the future. The current debate on the greenhouse effect (as a result of atmospheric carbon dioxide increase) and the problem of acid rain are two examples of significant issues that can only be addressed on a national or even global basis. New technologies must be developed along with the necessary education and implementation procedures.

An Environmental Systems Approach Can Make a Difference

We have to find technologically effective and economically viable options for dealing with environmental problems. Solutions for complex environmental problems are best found through interdisciplinary interaction. Approaches that integrate all the pertinent sciences and that fully consider the human, legal, and social dimensions will enjoy the political and financial support necessary for implementation. Students in the Environmental Systems curriculum will develop competency in and understanding of such approaches to environmental issues.

If Kentucky and the nation are to continue to develop economically, it is essential that supplies of clean water and air, and effective waste disposal are provided for current and future generations. Depletion of these environmental resources and our soil resource due to erosion or urbanization will inevitably result in a reduction in agricultural productivity and the economic activity it sustains. The need for well-trained, environmentally-concerned professionals in all disciplines is critical if solutions to these complex problems are to be found. This is the goal of the Environmental Systems curriculum. Its graduates will make a difference in Kentucky, the nation, and in the world.

Course Descriptions and Certificate Requirements

The interdisciplinary Environmental Systems Certificate curriculum is administered by a campus-wide faculty committee. The committee has established the following core courses, which provide the interdisciplinary overview:

● **ES 600: Seminar in Environmental Systems (1 credit hour):** A series of presentations by experts in the field on environmental systems topics, including topics from the fields of law, economics, social sciences, medicine, biology, engineering, and physical sciences. Course can be repeated three times.

● **[ES 610: Engineering and Physical Sciences in Environmental Systems \(3 credit hours\):](#)** Introduction to earth systems; environmental impacts of natural and human processes on the role of the earth's water systems including surface water systems, groundwater systems, and water quality and contamination systems; the role of atmospheric systems on earth including the nature and source of air pollutants, meteorological principles, radiation balance, climatology and air

pollution, and air pollution control methodology; and processes and principles involved in waste-producing organizations. Click here for links to related [Environmental Issue Papers](#).

● **[ES 620: Natural, Biological, and Medical Sciences in Environmental Systems \(3 credit hours\)](#)**: A survey course for students outside the biological and medical sciences. Introduction to environmental systems, ecology, and the environment; introduction to toxicology, ecotoxicology, and environmental health.

● **[ES 630: Legal, Economic and Social Sciences in Environmental Systems \(3 credit hours\)](#)**: Jurisprudential history, ethics, and the rule of law, environmental economics, history of science, governmental structures, process for development and enforcement of standards, social/political implications of environmental systems, regulatory schemes for environmental control.

Students are expected to take the two, three-credit hour courses outside the discipline of their major. In addition, each student is expected to enroll in the one-credit hour seminar course at least twice.

Because environmental systems include subject matter and issues from many disciplines, it is recommended that the student's total curriculum reflect this diversity through inclusion of additional courses that may be in the major field or related disciplines. Students will submit their proposed curriculum plan to the Environmental Systems Committee for approval. Each student completing the curriculum is awarded a certificate that certifies the student has met the guidelines and intent of the Environmental Systems Certificate.

[Click here for Environmental Systems Program application.](#)



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