

# General Education Course Proposal

FEB 28

Proposed Course: GEOG 128 Environmental Pollution Units 3  
Prefix No. Title

Department: Geography School: College of Social Sciences

### GE Category (Indicate one category only):

Foundation: A1\_\_\_; A2\_\_\_; A3\_\_\_; B4\_\_\_  
Breadth: B1\_\_\_; B2\_\_\_; C1\_\_\_; C2\_\_\_; D\_\_\_; E\_\_\_  
Integration: B X; C\_\_\_; D\_\_\_; International/Multicultural\_\_\_

Existing Course X; Revised Course \_\_\_; New Course \_\_\_

Course Included in Current GE Program \_\_\_

New courses require the Undergraduate Course Proposal form in addition to this form.  
Revised courses require the Undergraduate Course Change Request in addition to this form.

Proposed catalog description: Limit course description to 40 words using succinct phrases. Include prerequisites, limitations, lecture/lab hours. Indicate former course number, e.g., (Former Biol 105)

Enrollment limit per section: 50

Expected number of sections per semester – Year 1 1; Year 3 2

### Attachments:

1. A statement presenting the ways in which this course meets the Specifications provided in the appropriate section of the General Education Policy as well as in the Policies for Inclusion and Evaluation of General Education Courses.
2. A statement of elements common to all sections of this course, identifying content, objectives, required student activities, grading policy, representative texts, and an approximate schedule for the course. Required student activities include such things as papers, research projects, homework, laboratory and/or studio performance, recitations, participation, attendance, and exams.
3. A typical syllabus for a particular offering of the course.
4. Any special cost factors associated with this course.

### Approval for Inclusion in General Education

[Signature] 5-1-01  
Department Chair Date

[Signature] Date  
School Curriculum Committee

[Signature] Date  
School Dean

[Signature] 10/8/04  
General Education Subcommittee Date

[Signature] 10/8/04  
Associate Provost Date

General Education Course Proposal  
Attachment II

Common Syllabus

Elements Common to All Sections of the Course

**Geography 128: Environmental Pollution**

Elements common to all sections of Geography 128, Environmental Pollution, include contact information, course prerequisites, objectives, content, student activities, textbook and grading policy.

Instructor:  
Office:  
Office hours:  
Telephone:  
Email:

Semester:  
Lecture Time:  
No. of Units:

Prerequisites

Completion of all the General Education Area B Breadth requirements as well as the General Education Foundation requirements.

Objectives

The objectives contained in the accompanying Typical Syllabus (Attachment III) are common to all sections of the course.

Course Content

All sections of the course will address the full range of topics outlined in the common syllabus. Differences in the conduct of the various sections of the course will reflect the degree to which the treatment of certain topics varies. Thus, in one section water pollution might receive greater emphasis while in another air pollution might receive greater emphasis. However, it is to be understood that all topics will be addressed in all sections of Geography 128 (see the common syllabus).

Student Activities

All students enrolled in Geography 128 will be expected to attend class and participate in discussions and other classroom activities. They will all be expected to read the textbook and other assigned papers. They will complete the University's General Education writing requirement of 4000 words (minimum), including at least 2000 words of sustained writing. All students will be expected to demonstrate an ability to employ appropriate mathematical skills.

## Textbook

A common textbook will be used in all sections of the course. It is expected, furthermore, that there will be a high degree of commonality in the use of supplemental readings and/or other materials.

## Grading Policy

The faculty of the Department of Geography maintains rigorous standards that will apply no less to this course than they do to others we conduct.

In order to encourage the application of comparatively common standards, all faculty members teaching sections of Geography 128 will meet at the beginning of each semester to discuss grading practices, student assignments and workload, and the content of examinations. In keeping with University policy, furthermore, grading practices will be reviewed by the Department Chair on a regular basis.

## Course Topics

- A Introduction to the course.  
Human Impacts on the Environment. What is Pollution? Underlying Causes. Extent of Global Pollution. Worldviews & Ethics in Environmental Pollution. EPA's Mandate.
- B1 Procedures for Addressing Pollution Problems.  
Environmental Monitoring. Quality Assurance Project plan (QAPP)  
2-D and 3-D Sampling Patterns. Water Sampling. Soil Sampling. Air Pollution Monitoring. Sources and Types of Errors. Hypothesis Formulation. Models.
- B2 The concept of Risk Assessment  
Exposure Assessment, Risk Assessment Process. Ecological and Microbial Risk Assessments. Risk Characterization. Dose-Response Assessment Models. Uncertainty analysis, projections. Evaluation of Risk Management Strategies. Cost-Benefit Analysis. Environmental Literacy and Involvement. Political Action. Environmental Impact Statement (EIS).
- C1 Processes Affecting Atmospheric Pollution  
Chemical Composition of the Atmosphere. Vertical Structure, The Boundary Layer. Pressure, Density, and Winds. Temperature. Inversions. Radiative Transfer. Atmospheric Stability. Global Wind Circulation.
- C2 Air Pollution  
Sources and Classification of Air pollutants. Principal air Pollutants: Sources, Effects, and Trends. Secondary Pollutants. Long-range Transport. Factors

Affecting Pollution Concentration. Vertical Stratification of Pollutants- Junge Formula. Dispersion Plumes and Atmospheric Stability. Concentration Equation of Air Pollutants. Air Quality Index (AQI).  
Case Study: San Joaquin Valley

- C3 The Greenhouse Effect / Global Warming.  
Global Evidences. Anthropogenic Contribution. Consequences of Global Warming. Prevention, Mitigation, and Adaptation.
- C4 Stratospheric Ozone Depletion  
Chemical Formation of Stratospheric Ozone. Physiological and Environmental Effects of UV-b Radiation. NO<sub>x</sub>, CFC, H<sub>2</sub>O Destruction Cycles, Ozone Hole Trends in Stratospheric Ozone Depletion. Restoration of Stratospheric Ozone Layer. Photochemical Smog and PANs. Measurement of Ozone, Impacts of Ozone Pollution.
- C5 Acid Precipitation.  
Main Acid-forming Emissions. Majors Sources – The Big 9 States. Measurement of Acidity – pH Scale. Impacts of Acid Precipitation. Strategies for Reducing Acid-forming Emissions. Politics of Acid Precipitation. The Clean Air Act.
- D Processes Affecting Contaminant Fate in Soil and Water  
Physical processes. Water in Soil. Porosity, Hydraulic Conductivity. Transport of Contaminants in Soil and Groundwater. Movement of Contaminants through Fields. Chemical processes. Solubilization. Volatilization. Evaporation. Sorption of Pollutants. Transformation Processes – Radioactive Decay and . Hydrolysis. Biological processes. Biodegradation. Microbial Transformation of Metal Pollutants
- E1 Surface Water Pollution  
Sources of Pollution. Intestinal Diseases Transported by Polluted Water Fecal Coliform Test. Die-Off Rate Constant of Organisms. Chemical and Biological Oxygen Demands. Impacts and Measurements of BOD. Dilution of Effluents, Tracing of Plumes. Treatment of Drinking Water.
- E2 Groundwater Pollution  
Sources of Pollution. Agricultural Fertilizer as a Source. Pesticides as a Source Animal Wastes as a Source. Physical Processes Affecting the Transport of Contaminants. Other groundwater Problems.
- E3 Water Quality.  
Fresno County's Classification of Water Pollutants. Water Quality Standards. Maximum Containment Level Goal (MCLG). Compliance Monitoring, Sampling Frequency. Water Treatment Methods. Wastewater Treatment. Sewage Sludge Disposal. The Clean Water Act.

- E4 Remediation of Soil and Groundwater  
The Superfund Sites. Types of Containment. Physical and Hydraulic Barriers. Contaminant Removal Processes. Excavation. Pump-and Treat Method. Soil Vapor Extraction, Etc. Treatment Techniques. In-situ Bioremediation Techniques. In-situ Chemical Treatment.
- F Nuclear Pollution  
Nuclear Fission and Fusion. Properties and Effects of  $\alpha$ ,  $\beta$ ,  $\gamma$  Radiations. Transuranics, radioisotopes, Fertile and Infertile Transuranics. Half-life. Applications of Nuclear Radiation. Types of Reactors and Moderators. The Nuclear Fuel Cycle. Natural and Anthropogenic Sources of Nuclear Pollution. Characterization of Nuclear Wastes. Hazards of Nuclear Pollution. Disposal of Nuclear Wastes and Nuclear Reactors. Nuclear Accidents, Nuclear Safety. The Linear NonThreshold Hypothesis (LNTH).
- G Noise Pollution  
Factors Affecting Sound, The Decibel. Comparative Noise Levels. Definition of Noise Pollution. Major Sources of Noise, Measurement of Noise Levels. Sound Exposure Level (SEL), Day-Night Sound Level (DNL). Noise Contours or Footprints, Noise Sensitive Locations. Human Perception of Noise. Emotional and Physical Factors Affecting Human Response to Noise. Effects of Noise on Hearing: TTS, NIPTS, Tinnitus. Health and Performance Effects. Effects on Wild and Domesticated Animals. Effects on Real Estate Values. Mitigation and Adaptation to Noise. Strategies for Reducing Vehicular, Train and Aviation Noise Levels. Strategies for Reducing Industrial, Neighborhood, and Domestic Noise. Responsibility for Noise Control.
- H Thermal Pollution  
Sources of Thermal Pollution. Effects on Dissolved Oxygen, Photosynthesis, Metabolism Rate. Effects on Toxicity, Behavior, Reproduction, Etc. Prevention and Mitigation. Van't Hoff's Law (Q10 Law)
- I Electromagnetic Pollution  
Definition and Sources. The Electromagnetic wave Spectrum. Low Frequency Electric Fields. Impacts of Electromagnetic Pollution on Geomagnetic Clues. Health Effects of Electromagnetic Fields. Electromagnetic Stress (EMS) Test. Prevention, Mitigation, and Adaptation.
- J Waste Disposal: Solid and Hazardous Wastes.  
Extent of the problem. Main Generators. Characterization. Potentially Hazardous Products. Characteristics of HAZMAT. Disposal of MSW: Landfilling, Incineration; Immobilization; Deep-well Injection; Landfarming. Special Wastes. MSW: Source Reduction, Dematerialization, Reusing, Recycling.

- K Industrial Sources of Pollution and Disposal  
Characterization of Industrial Wastes. Treatment and Disposal Methods:  
Chemical Precipitation, Flocculation, Coagulation, Oxidation, Etc. Treatment and  
Reuse. Strategy for Sustainable Living.

#### Writing Requirement

- Because the course addresses problems that have both scientific, social and ethical implications, examinations will contain short answer questions for which students will be required to utilize proper English.
- Each student will be required to present a short written review of an environmental impact statement (approximately 500 words)
- The majority of the GE writing requirement will be met by a term paper (10-15 pages, minimum 3,000 words).

#### Make-up Exams

Makeup exams (if approved) are given the week before the final examination.

#### Students with Disabilities

Upon identifying themselves to the instructor and the university, students with disabilities will receive reasonable accommodation for learning and evaluation. For more information, contact Services to Students with Disabilities in Madden Library, Room 1049 (Telephone 278-2811).

#### Cheating and Plagiarism

Cheating and plagiarism are not condoned. The university policy will be addressed if they occur. For more information, refer to the Schedule of Courses (Legal Notices on Cheating and Plagiarism) or the University Catalogue (Policies and Regulations).

#### Disruptive Classroom Behavior

“The classroom is a special environment in which students and faculty come together to promote learning and growth. It is essential to this learning environment that respect for the rights of others seeking to learn, respect for the professionalism of the instructor, and the general goal of academic freedom, are maintained.....Differences of viewpoints or concerns should be expressed in terms which are supportive of the learning process, creating an environment in which students and faculty may learn to reason with clarity and compassion, to share of themselves without losing their identities, and to develop an understanding of the community in which they live..... Student conduct which disrupts the learning process shall not be tolerated and may lead to disciplinary action and/or removal from class.”

#### Special Note:

This syllabus and the schedule are subject to change in the event of extenuating circumstances. If you are absent from class, it is your responsibility to check on the announcements made while you were absent.

General Education Proposal  
Attachment III

**Geography 128:  
ENVIRONMENTAL POLLUTION**

**Typical Syllabus**

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**Dr. Aribilola S. Omolayo**

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Department of Geography

Phone: 278-2195

Mail box: S 182

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**COURSE DESCRIPTION AND OBJECTIVES**

**Catalog Description:**

Current environmental pollution problems involving the atmosphere, land and water. The adverse effects of transportation, surface mining, sewage and waste disposal, noise, the use of pesticides, energy production and consumption, and related topics will be examined. Specific examples drawn from various regions of the world will be used to illustrate each topic. Geography 128 satisfies the 3-unit Integration requirement for the upper division Area IB of the General Education.

**Prerequisite:**

Completion of all the General Education Area B Breadth requirements as well as the General Education Foundation requirements.

**Overview**

Environmental Pollution is an interdisciplinary course that integrates relevant methods and information from many different scientific fields, such as geology, physics, chemistry, biology, geography, and economics. The course is presented with lectures, audiovisual resources, and a field trip. In addition, students are expected to participate in class discussions, read assigned materials, take exams, and write one paper.

**Objectives**

Geog. 128 is designed and taught to achieve the following objectives:

1. To promote an understanding of scientific reasoning and methods, as exemplified by the study of environmental pollution;
2. To foster an appreciation of the world's unique but fragile environments, their roles in the maintenance of natural ecosystems as well as human economies, and the effects of pollution on such ecosystems and economies;

3. To guide students in the critical review of key facts and principles related to natural and anthropogenic pollution of the atmosphere, oceans, land, and fresh water;

4. To acquaint students with the history of pollution, environmentalism, and environmental policies in the U.S. and worldwide;

5. To explore the contributions of various fields of science to the study of pollution, and thereby to provide opportunities for students to discover (a) relationships among specific fields of knowledge and (b) the value of an interdisciplinary approach;

6. To foster a sense of curiosity about the world in which we live, an awareness of interrelationships among the climatic, edaphic and biotic realms, and an appreciation for the value of scientific inquiry in (a) understanding our world and (b) making enlightened decisions about the environment;

7. To assess the potentials and limits of scientific inquiry insofar as they pertain to the investigation and treatment of environmental pollution;

8. To consider the physical and biological processes evinced by different types of environmental pollution, and to involve students in discussions of (a) scientific methods used to test relevant hypotheses and (b) current methods and technology used in environmental studies;

9. To apply physical principles and mathematics to pollution phenomena so that students develop an understanding of analytical techniques used in scientific inquiry;

10. To acquaint students with some of the salient economic, legal, ethical, and scientific issues and debates regarding environmental pollution nationally and globally;

11. To draw attention to the different types, causes, effects, and magnitudes of environmental pollution worldwide, and to raise the level of awareness of students regarding the growing impact of human activities as a source of pollution;

12. To make students more keenly aware of the dangers of pollution, and to inspire them to use knowledge gained in this course to develop informed judgments and influence societal views about science and technology generally, and environmental quality specifically.

13. To help students become familiar with the concepts and terminology used in environmental law, science, and other disciplines concerned with pollution and its remediation;

14. To develop in students the ability to prepare, and critically assess, such documents as Environmental Assessments (EAs), Environmental Impact Statements (EISs), and Environmental Impact Reports (EIRs).



## COURSE WORK

### Readings

The required textbook is *Environment*, 3rd Ed., by Raven and Berg (Saunders College Publishing). Reading assignments, keyed to lecture topics and exams, are given in the Class calendar and Course Outline (below). Additional readings will be in the form of handouts from various sources.

### Exams

Four exams worth 75-125 points each will be given on the dates shown in the Course Calendar (below). Exams will include questions to which short answers are required. Further information about the exams will be provided in class.

### Written Work

The GE writing requirement will be met by satisfactory completion of all of the following three assignments:

1. Answers to exam questions; these are expected to be in proper English as well as factually correct;
2. A short (approximately 500 words) written review of an Environmental Impact Statement; and
3. A term paper of not less than 3000 words (10-15 pages). Further information regarding the paper will be provided in class.

### Field Trip

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### Grading

All grades are determined in compliance with the University's academic regulations (see the *General Catalog*). Course grades in Geog. 128 are based on a possible total score of 500 points. Grades will be assigned on the following basis:

		<b>Grades</b>	
Examination #1	75 points	90-100%	<b>A</b>
Examination #2	100	80-89	<b>B</b>
Examination #3	100	70-79	<b>C</b>
Paper	75	60-69	<b>D</b>
Field Trip	25	<60	<b>F</b>
<u>Final Exam.</u>	<u>125</u>		
<b>Total</b>	<b>500</b>		

[Note: In order to ensure the application of common grading standards, all faculty teaching sections of Geography 128 will meet at the beginning of each semester and again at its midpoint to discuss student performance, testing, and grading practices. In keeping with University policy, furthermore, grading practices will be reviewed by the Department Chair on a regular basis.]

## **POLICIES**

### **Attendance and Punctuality**

Lectures and classroom discussions are essential parts of the learning experience in Geog. 128. Reading, while very important, is no substitute for active participation; thus regular attendance is required. Roll may be taken at any time, with or without prior notice. Please note that lectures begin promptly on the hour. Tardiness disrupts the instructional process and will not be permitted.

### **Make-up Exams**

When a compelling justification exists, a missed exam can be made up without penalty. Make-up exams, if approved, are given the week before the final examinations.

### **Students with Disabilities**

Upon identifying themselves to the instructor and the University, students with disabilities will receive reasonable accommodation for learning and evaluation. For more information, contact Services to Students with Disabilities in the Madden Library, Room 1049 (Telephone 278-2811).

### **Cheating and Plagiarism**

Cheating and plagiarism are not condoned. The University policy will be enforced if they occur. For more information, refer to the *Schedule of Courses* (Legal Notices on Cheating and Plagiarism) or the regulations set forth in the *General Catalog*.

### **Disruptive Classroom Behavior**

“The classroom is a special environment in which students and faculty come together to promote learning and growth. It is essential to this learning environment that respect for the rights of others seeking to learn, respect for the professionalism of the instructor, and the general goal of academic freedom, are maintained. ...Differences of viewpoints or concerns should be expressed in terms which are supportive of the learning process, creating an environment in which students and faculty may learn to reason with clarity and compassion, to share of themselves without losing their identities, and to develop an understanding of the community in which they live. ...Student conduct which disrupts the learning process shall not be tolerated and may lead to disciplinary action and/or removal from class.”

## Changes

This Syllabus, including the Class calendar and Course Outline (below), are subject to change. If a student is absent from class, it is the student's responsibility to learn of any changes announced during the missed class meeting(s).

## CLASS CALENDAR AND COURSE OUTLINE

Week	Topic/Activity	Objectives
1.	<p><b>Aug. 27-31</b>  <i>Lecture:</i> Course overview; introduction to environmental issues; the roles of environmental sciences, economics, and ethics; history of environmentalism in the U.S.; environmental assessment.  <i>Readings:</i> Chapters 1, 2.</p>	1, 4, 5, 7, 13, 14
2.	<p><b>Sept. 3-7</b>  <i>Lecture:</i> Ecology and ecosystems; energy flow; ecological pyramids; symbiosis; niche, competition, and resource partitioning; Von Leiberg's Law of Limiting Factors.  <i>Readings:</i> Chapters 3, 4, 5.</p>	1, 2, 5, 6, 9, 13
3.	<p><b>Sept. 10-14</b>  <i>Lecture:</i> Global ecosystems; terrestrial biomes; aquatic ecosystems; soils; interactions among terrestrial, soil, and aquatic ecosystems.  <i>Readings:</i> Chapters 6, 7.  <b>TERM PAPER TOPIC ASSIGNED.</b></p>	1, 5, 6
4.	<p><b>Sept. 17-21</b>  <i>Lecture:</i> Population dynamics; demographic processes; carrying capacity; the human population; demographic profiles of select nations; factors affecting human fertility rates.  <i>Readings:</i> Chapters 8, 9.  <b>EXAM # 1.</b></p>	2, 4, 9-11
5.	<p><b>Sept. 24-28</b>  <i>Lecture:</i> Biodiversity; values of species diversity; endangered and threatened species; the role of humans in reducing biodiversity; extinctions; conservation and management of species; conservation laws, policies, and organizations.  <i>Readings:</i> Chapter 16</p>	2-4, 6, 7, 10-13

6. **Oct. 1-5**  
**Lecture:** Principles of resource management; food production and agriculture; environmental impacts of agriculture; pesticide use, effects, and controls. 3, 5, 8-11  
**Readings:** Chapters 18, 22.  
**TERM PAPER OUTLINE DUE.**
7. **Oct. 8-12**  
**Lecture:** Soils and soil pollution; soil formation; physical and chemical properties of soils; soil groups; soil conservation and regeneration; pollution of soils by herbicides, pesticides, and inorganic fertilizers. 2, 3, 5, 8, 10-12, 14  
**Readings:** Chapters 14, 21.  
**Documentary: *The Living Land***
8. **Oct. 15-19**  
**Lecture:** Renewable energy and conservation; solar, tidal, and geothermal energy; cogeneration; energy conservation. 5, 9, 10, 13  
**Readings:** Chapter 12.  
**EXAM # 2.**
9. **Oct. 22-26**  
**Lecture:** Water use and management; global distribution and properties of water; water resource problems in the U.S. and globally; water management and water conservation. 3, 5-8, 10-12  
**Readings:** Chapter 13.  
**Documentary: *Do We Really Care?***
10. **Oct. 29-Nov. 2**  
**Lecture:** Minerals and environmental pollution; geographic patterns of mineral occurrence and use; environmental impacts of mineral exploitation; conservation and substitution; dematerialization; solid waste types and sources; methods of solid waste disposal; source reduction, reuse, and recycling. 3, 5, 8, 11, 12  
**Readings:** Chapters 15, 23.
11. **Nov. 5-9**  
**Lecture:** Principles of pollution control; biogeochemical cycles; the carbon, nitrogen, phosphorous, and hydrologic cycles. 1, 3, 5, 6, 8, 9, 13  
**Readings:** Chapters 6, 7, 19.
12. **Nov. 12-16**  
**Lecture:** Air pollution; composition of the atmosphere; types, sources, and major classes of air pollution; health effects; implementing the Clean Air Act; global warming, causes and consequences; prevention, mitigation, and adaptation to global warming; stratospheric ozone 2, 3, 5-14

depletion, causes and effects; facilitating recovery of the ozone layer.

*Readings:* Chapter 20.

*Documentary: Only One Atmosphere.*

*EXAM # 3.*

13. **Nov. 19-23**  
*Lecture:* Acid precipitation; environmental and political effects of acid precipitation; facilitating recovery from acid precipitation; the 1992 Earth Summit; water and soil pollution: types, sources, and effects; water pollution laws; water purification and sewage treatment; human impact on oceans; chemical aspects of soil pollution and remediation. 2-5, 7, 8, 10-12  
*Readings:* Chapters 20, 21.  
**TERM PAPER DUE.**
14. **Nov. 26-30**  
*Lecture:* Fossil fuels and nuclear pollution; energy consumption in developed and developing countries; global distribution and reserves of coal, oil, and natural gas; global oil supply and demand; the U.S. energy strategy; environmental problems related to fossil fuels; nuclear power plants; nuclear accidents; disposal of radioactive waste; dealing with radioactive contamination of the environment. 1, 3-12  
*Readings:* Chapters 10, 11.  
*Documentary: Red Hot*
15. **Dec. 2-7**  
*Lecture:* Noise pollution; measurement, effects, and control of noise; electromagnetic pollution, sources and possible effects; hazardous wastes: types, sources, and risks; management of hazardous waste; the Superfund Program; environmental justice and ethical issues; integrated waste management. 3, 4, 6, 8, 10-13  
*Readings:* Chapter 23.  
*Documentaries: Noise Pollution; Waste Not, Want Not*
16. **Dec. 10-12**  
*Lecture:* Strategy for sustainable living; environmental literacy; environmental ethics. 2, 4-7, 10, 12-14  
*Readings:* Chapter 24.
17. **Dec. 17-21**  
**EXAM # 4 (FINAL EXAM)**