

# General Education Course Proposal

Proposed Course: <sup>NatSci</sup> NatSc 115 Environmental Earth and Life Science Units 3  
Prefix No. Title

Department: Biology & Geology School: Natural Science

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

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)

NatSc 115. Prerequisites: Completion of B1 and B2 requirements. Environmental problems related to population, energy and resource use, pollution. Will involve social and ethical issues along with technological and scientific factors. Independent work on case studies required.

Enrollment limit per section: 50

Expected number of sections per semester - Year 1 1; Year 3 1

**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**

James C. Malters 9/29/98 James C. Malters 9/30/98  
Department Chair Date School Curriculum Committee Date

William W. By 10/27/98 Paul A. Arnold 12/15/98  
School Dean Date General Education Subcommittee Date

Brandt Kehoe 12/22/98  
Associate Provost Date

## Attachment 2

### COMMON COURSE ELEMENTS

#### Content

- Week 1.** Introduction to earth science. The nature of the physical environment: earth surface, climate and weather, natural hazards.
- Week 2.** Introduction to ecology. How populations of organisms are regulated. Ecological structure: the nature of communities and ecosystems.
- Week 3.** A systems approach to the environment: atmosphere, biosphere, hydrosphere, lithosphere.
- Week 4.** Human populations. History and methods of analysis. Environmental effects.
- Week 5.** Human responsibility for the planet: resource management. Conservation of resources. Preservation of natural systems. Restoration of damaged natural systems.
- Week 6.** The nature of energy and the principles of thermodynamics. The costs and benefits of fossil fuel use. Modifications of fossil fuel technology. Alternates to fossil fuel generation of electricity.
- Week 7.** The costs and benefits of mineral exploitation. The geology of the resources. Legislation and economics affecting mineral exploitation.
- Week 8.** The hydrologic cycle. The problems with water and population distributions. Ways of managing a limited resource. The roles of law and economics.
- Week 9.** The values of biodiversity. Biodiversity, extinction, and management.
- Week 10.** Problems with adequate food production. The differences between western and developing societies. Maintaining genetic resources. Soil as a resource.
- Week 11.** The nature of pollution. Adequate versus perfect control. The role of economic activity. Public perceptions and policy.
- Week 12.** The principles of toxicology. The ethics of testing on animals. Toxicity versus risk. Pesticide use. Regulating risk.
- Week 13.** Water pollution. How water is purified: natural systems and human technology. Legal and social solutions.
- Week 14.** The nature of air pollution. Primary effects of air pollution. Transportation sources of air pollution: legal and social solutions.

**Week 15.** CFC's as global air pollutants. Effects on stratospheric ozone. Consequences of ozone destruction. Carbon dioxide as a green house gas. Evaluation of the evidence for global warming. Possible disastrous consequences of ozone destruction and global warming.

Other course content includes the case studies which are listed in the syllabus. These case studies will change over time with changes in the edition of the text and additions to the web site.

The last part of the course content is the web site at, <http://www.jbpub.com/environet>  
This will change regularly as new material is added to reflect recent information about environmental problems.

### **Course objectives.**

To increase student awareness of how human activities, the biosphere, and natural resources interconnect.

To give students some sophistication about the complexity of environmental issues.

To teach the students how to analyze environmental issues using lecture content, the term paper, and the web-based case studies.

To teach the student how to access and use information available on the web.

### **Required student activities - Web based assignments.**

Students will be put into groups of five and will be given a biweekly web assignment based on the case studies listed in the syllabus. Student groups will select from the two case studies listed for the two week period. The students will be required to do web searching for the case study to 1) describe the specific problem in the case study and its causes, 2) characterize the social, political, and economic factors, and 3) assess one or two possible solutions. This material must be condensed into a typed three page synopsis plus a half page listing of the relevant web sites. A group grade will be given. Students will also be required to evaluate the contributions of their group members. This will be done to reinforce group work ethics.

### **Required student activities - Term paper.**

The course will require a 2000 word essay which will be graded and returned for rewriting and a second grading. The subject of this essay will be the description of an environmental problem, a description of the basic science and social factors relevant the problem, and an analysis of the policy options available. Finally, the paper must defend one single solution to the environmental problem chosen.

### **Grading policy.**

Grades will be based on web-based papers (students will be required to do five group papers), a term paper of 2000 words (which will be graded and rewritten), three midterms, and a final.

Web-based papers                      20%

Term paper	20%
Three mid-term exams	45%
Final	15%

The grading scale will be:

88-100%	A
78-87%	B
65-77%	C
58-64%	D
Below 58%	F

**Representative text.**

To our knowledge, there is only one text available that has the desired combination of earth science and biology material. Other books cover only one of the two areas.

McKinney, M. L. and Schoch, R. M. (1998) Environmental Science: Systems and Solutions, Web enhanced edition. Jones and Bartlett.

Web site: <http://www.jbpub.com/environet>

**Approximate course schedule.**

Weekly lecture topics are given above in the content section.

Midterms will be given at about four week intervals.

The term paper will be due at about the middle of the semester, returned in three to four weeks, and due again in another two weeks.

The five web based assignments will be due every other week starting the third week of the semester and with breaks the weeks the term papers are due.

## ENVIRONMENTAL EARTH AND LIFE SCIENCES

Natural Science 115

M-W-F 12:00-12:50

McL 280

**Instructors:** Dr. F. Harmsen (278-3086) McL 284  
Dr. F. Schreiber (278-2410) S 328

**Office hours:** MWF 10:00-10:50; 2:00-2:50

**Course Description:** The course addresses issues of environmental science using an integrated systems approach, the systems being the atmosphere, biosphere, hydrosphere, and lithosphere. It is a comprehensive overview of how biological and physical systems work, the use of natural resources by human societies, and the production of pollution and waste. A major emphasis is the critical analysis, using an interdisciplinary approach, to environmental issues that often cause polarization between opposing groups.

**Text (required):** Environmental Systems and Solutions (web enhanced edition) by Michael L. McKinney and Robert M Schoch, 1998

### Course objectives:

- to increase understanding of environmental issues
- to increase awareness of how various aspects of the natural environment interconnect with each other and with human society
- to use the resources of the web to write analyses of the interaction of the scientific, political, economic, and social factors that enter into environmental issues

**Grading:** Grades are based on the following requirements.

Web-based papers	20%
Essay (first draft)	15%
Essay (second draft)	5%
Three midterms	45%
Final	15%

Final grades will be based on the following percentages.

88-100%	A
78-87%	B
65-77%	C
58-64%	D
below 58%	F

**Web-based assignments:** This requirement is constructed with several objectives. First, you will be required to learn how to work cooperatively. One important aspect of your professional

life after school will be the completion of projects working in teams. This part of the course will require you to learn how to schedule so five people can get together, bring independent work to the group, and produce a group product. Second, you need to learn how to use the resources available on the world wide web. This is becoming an increasingly important intellectual resource. Third, you need to study the complexity of environmental issues. The solutions to environmental conflicts involves negotiation between scientific, political, ethical, and economic perspectives. At the least, in these short papers, you will need to show your awareness of the range of issues surrounding your chosen topic. Fourth, you need to learn to write clearly about complex issues.

Students will be put into groups of five either by self selection or by assignment by the instructors. The groups will be given topics selected from those that are listed in the weekly topic syllabus; usually this will be a selection among two topics, sometimes three. Your group will then do web searches to find information about the topic. You will start with web site established by the authors and publishers of your text book. Then you will go from this site to the linked sites to search further. You may also profit by using one of the web search engines such as Hotbot or Yahoo. Then you will get together as a group to integrate the information you have found. Write your paper; put all five names of the group members on the paper. You will be given an evaluation form to describe the group participation of your group mates. This will allow you to assess the amount of work your team members contributed to the paper. If one person consistently does not show up for group work or shows up without having done enough preparation or does not contribute in the group, their grade for the paper will be correspondingly reduced. Ordinarily, a common grade will be given to all members of the group.

Your papers will be three pages long with a fourth page listing the web sites you have used for the paper. The paper should 1) describe the specific problem in the case study and the problem's causes, 2) characterize the scientific, ethical, political, and economic issues involved, and 3) assess one or two possible solutions.

**Essay-term paper:** You will write a 2000 word essay on a single environmental problem. The topic must be different than the ones chosen for the web-based assignments. These papers are to be individually written, longer discussions similar to the web-based papers. You will be required to discuss the scientific and social (political, economic, ethical) issues relevant to the problem chosen and analyze the options available. Finally, you must defend one single possible solution to the problem.

Your papers must be clearly written and use good grammar and punctuation; they must also show thorough library research. While you may use some web sites as references for this paper, the majority must be from the library using traditional written references.

**Cheating and plagiarism:** Each student is expected to perform their own work. Cheating and plagiarism will be dealt with according to University policies. See the standards listed in both the catalog and the schedule of courses.

**Disabled students:** Please identify yourself to the instructors so that reasonable accommodation

for learning and evaluation can be made.

## LECTURE AND ACTIVITY SCHEDULE

Week	Textbook Chapter	Topics	Case studies
1	1, 2	Introduction to environmental science: the surface of the earth; hydrologic and atmospheric cycles; climate and weather; natural hazards	
2	3	Evolution of the biosphere; population dynamics and human impact; communities and ecosystems	Does extinction reduce ecosystem productivity?
3	4	An integrated system of four spheres; atmosphere; biosphere; hydrosphere, and lithosphere	Global warming and disease
<b>Web-based paper due - cases from weeks two and three</b>			
4	5	Demography; world population changes over time ; carrying capacity; population equations and statistics	Global overpopulation, yet cultural extinction
<b>First midterm</b>			
5	6	Resource management; preservation, conservation, and restoration; natural resources	How to exceed maximum yield
<b>Web-based paper due - cases from weeks four and five</b>			
6	7, 9	Energy, fossil fuels, and hydroelectric power; thermodynamics, energy scenarios of the future	Energy scenarios of the future
7	10	Mineral resources; deposits, ores, and reserves, environmental degradation and exploitation cycles	Trading a mountain for a hole in the ground
<b>Web-based paper due - cases from weeks six and seven</b>			
<b>Second midterm</b>			
8	11	Water resources; hydrologic cycle; water supply and demand	Regional water shortages; inequalities in the hydrologic cycle

**Term paper - first submission**

9	12	Biological resources; measuring biodiversity; causes of extinction	Are habitat conservation plans the answer? The California Gnatcatcher example
10	13	Feeding the world; biotechnology and transgenic crops; soils, nutrients, and erosion; desertification	Should the choice of clothing be an environmental issue?

**Web-based paper due - cases from weeks eight to ten**

11	14	Pollution control; pollutant properties; remediation; cost-benefit approach	Can pollution be solved by economic growth?
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**Third midterm**

12	15	Toxicology; effects of toxic substances; toxic risk assessment; pesticide evolution; regulatory problems	Should we rethink lawns and golf courses
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**Term paper - revised version**

13	16	Water pollution; composition and properties of contaminants; sources; reduction, treatment, and remediation	Are motorboats more harmful than oil spills?
14	17	Air pollution; local and regional; particulates; sulfur dioxides; carbon monoxide; indoor pollution	Is asbestos a classic case of environmental hypochondria?

**Web-based paper due - Cases from weeks eleven to fourteen**

15	18	Global air pollution; destruction of the ozone layer and uv radiation; greenhouse effect and sea level rise	The benefits of CO <sub>2</sub>
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**MATRIX RELATING COMMON COURSE ELEMENTS TO COURSE SYLLABUS AND AREAS B1 AND B2 SPECIFICATIONS**

<b>Week</b>	<b>Topics</b>	<b>B1</b>	<b>B2</b>
1	Introduction to environmental science: the surface of the earth; hydrologic and atmospheric cycles; climate and weather; natural hazards	1,2,3,5f	
2	Evolution of the biosphere; population dynamics and human impact; communities and ecosystems	5f	1,2
3	An integrated system of four spheres; atmosphere; biosphere; hydrosphere, and lithosphere	1,2,3,5f	1,2
	<b>Web-based paper due</b> - cases from weeks two and three	1,2,5b,5c,5e, 5f	1,2
4	Demography; world population changes over time ; carrying capacity; population equations and statistics	2(M),5a	1,2
5	Resource management; preservation, conservation, and restoration; natural resources		1,2
	<b>Web-based paper due</b> - cases from weeks four and five	5b,5c,5f,5e	1,2
6	Energy, fossil fuels, and hydroelectric power; thermodynamics, energy scenarios of the future	1,2,2(M),3, 4,5a,5c	
7	Mineral resources; deposits, ores, and reserves, environmental degradation and exploitation cycles	1,2,3,5c,5d	
	<b>Web-based paper due</b> - cases from weeks six and seven	1,2,5b,5c,5d, 5e,5f	
8	Water resources; hydrologic cycle; water supply and demand	1,2,5c,5d,5e	
9	Biological resources; measuring biodiversity; causes of extinction	5b,5c,5d,5e	1,2

10	Feeding the world; biotechnology and transgenic crops; soils, nutrients, and erosion; desertification	1,2,3,5c,5d,5e	1,2
	<b>Web-based paper due</b> - cases from weeks eight to ten	1,2,5b,5c,5d,5e,5f	1,2
11	Pollution control; pollutant properties; remediation; cost-benefit approach	1,2,5c,5d,5e	
12	Toxicology; effects of toxic substances; toxic risk assessment; pesticide evolution; regulatory problems	5c,5d,5e	1,2
13	Water pollution; composition and properties of contaminants; sources; reduction, treatment, and remediation	1,2,3,5c,5d,5e	
14	Air pollution; local and regional; particulates; sulfur dioxides; carbon monoxide; indoor pollution	1,2,3,5c,5d,5e	
	<b>Web-based paper due</b> - Cases from weeks eleven to fourteen	1,2,5b,5c,5d,5e,5f	1,2
15	Global air pollution; destruction of the ozone layer and uv radiation; greenhouse effect and sea level rise	1,2,3,5b,5c,5d,5e	