WINONA STATE UNIVERSITY
PROPOSAL FOR NEW COURSES

Department _____GEOSCIENCE_____________________________ Date ______10/5/03______

Course No. __________ Course Name ___________________ Credits ________3________

ENVIRONMENTAL GEOSCIENCE

This proposal is for a(n) _____ Undergraduate Course ______ Graduate Course

Applies to: ___XX__ Major ______ Minor ______ University Studies*

_____ Required ______ Required

_____ Elective __XX__ Elective

Prerequisites ____Completion of a University Studies Natural Science laboratory course or Instructor's permission_____

Grading method ___XX__ Grade only ______ P/NC only ______ Grade and P/NC Option

Frequency of offering ____Yearly ____________

*For University Studies Program course approval, the form Proposal for University Studies Courses must also be completed. submitted according to the instructions on that form.

Provide the following information (attach materials to this proposal):

A. Course Description

1. Catalog description.
2. Course outline of the major topics and subtopics (minimum of two-level outline).
3. Basic instructional plan and methods.
4. Course requirements (papers, lab work, projects, etc.) and means of evaluation.
5. Course materials (textbook(s), articles, etc.).
6. List of references.

B. Rationale

1. Statement of the major focus and objectives of the course.
2. Specify how this new course contributes to the departmental curriculum.
3. Indicate any course(s) which may be dropped if this course is approved.

C. Impact of this Course on other Departments, Programs, Majors, or Minors

1. Does this course increase or decrease the total credits required by a major or minor of any other department? If so, which department(s)?
2. List the departments, if any, which have been consulted about this proposal.

D. University Studies Course Proposals

The form Proposal for University Studies Courses must also be completed and submitted according to the instructions on that form.

Attach a Financial and Staffing Data Sheet.

Attach an Approval Form.

Department Contact Person for this Proposal:

_Toby Dogwiler_________________________________ x5267_______________ tdogwiler@winona.edu__________

Name (please print) ____________________________ Phone ___________ e-mail address ____________
Include a Financial and Staffing Data Sheet with any proposal for a new course, new program, or revised program.

Please answer the following questions completely. Provide supporting data.

1. Would this course or program be taught with existing staff or with new or additional staff? If this course would be taught by adjunct faculty, include a rationale.

Geoscience 325, ENVIRONMENTAL GEOSCIENCE, will be taught by existing staff.

2. What impact would approval of this course/program have on current course offerings? Please discuss number of sections of current offerings, dropping of courses, etc.

The Geoscience Department anticipates offering GEOS 325, Environmental Geoscience, on a yearly basis during the fall semester. One section, enrolling 65-70 students, will be offered. GEOS 325 will replace GEOS 225 Environmental Geoscience. GEOS 325 will be taught on the same schedule as GEOS 225 previously was.

3. What effect would approval of this course/program have on the department supplies? Include data to support expenditures for staffing, equipment, supplies, instructional resources, etc.

None. GEOS 325 will replace an existing course: GEOS 225 Environmental Geoscience.
Routing form for new and revised courses and programs.

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Please forward to Registrar.

Registrar: ______________
Date entered: ______________

Please notify department chair via e-mail that curricular change has been recorded.
A. Provide a Description of the Course

Sample Syllabus

GEOS 325 Environmental Geoscience

MWF 11:00 – 11:50
Room 206 Stark Hall

Instructor: Dr. Toby Dogwiler, PA 114A, 457-5267, tdogwiler@winona.edu

Course Catalog Description:

325 – Environmental Geoscience—3 S.H.
Study of the environmental implications of human interactions with natural geological systems. An emphasis is placed on understanding environmental science concepts and how scientific findings ultimately shape public policy and political decisions. Topics typically include climate change, water resources, alternative energy resources, soils and weathering, and coastal processes. Course is taught from an Earth systems perspective. Discussion-oriented lecture format. Lecture only. Prerequisites: University studies natural science laboratory course or instructors permission.

Course Philosophy

Environmental science is an inherently interdisciplinary endeavor. Environmental issues span the realm of geoscience, chemistry, biology, atmospheric science, soil science and other natural sciences. An environmental scientist must be well versed in how concepts from these disciplines are integrated to address environmental issues. Thus, although we will deal primarily with Geoscience-related environmental issues it will be necessary to appreciate the insight provided by other disciplines. The course is taught from an Earth Systems Science perspective. This paradigm emphasizes the integrated nature of Earth systems and stresses an interdisciplinary approach.

Nonetheless, this course strives to not only teach the concepts of environmental science but also the manner in which this knowledge is applied in social and public policy decision making processes. To this end, approximately 2/3 of class meetings will be devoted to learning relevant geoscience concepts and the remaining 1/3 of the course meetings will focus on discussing and debating how these concepts should inform policy decisions.

Course Objectives

Course objectives will be achieved via a scholarly review of primary and secondary literature, lectures, homework assignments, and discussions.

• Investigate how the scientific method is applied to solving environmental problems in the geosciences
• Explore geoscience concepts related to environmental issues
• Learn how to delineate scientific fact from interpretation as well as delineate assumptions inherent in scientific analysis.
• Analyze how scientific results and knowledge are utilized in public policy decision making processes
• Discuss the ethical framework within which environmental scientists must work and what their obligations are to ensure that public policy is based on sound scientific principals.
**Literature**

Required texts:


In addition to readings from the primary literature, readings from the following text will be assigned:


Wright, H.E., Jr., et al. (eds.), 1993, Global Climates since the Last Glacial Maximum: University of Minnesota Press, Minneapolis.

**Justification for Increasing the Course Level/Number**

The content and scope of the course have been narrowed so that more time is spent on fewer topics. This more in-depth examination of the course material facilitates a greater appreciation amongst the students of the interdisciplinary linkages that are vital to understanding environmental issues. Furthermore, the increased emphasis on the science and social policy aspects of the course as well as greater dependence on classroom discussions and debates about environmental issues in the public policy arena require the intellectual maturity typically expected in a 300- or 400-level course. Students are expected to do more out-of-class preparation including research on issues and short writing assignments designed to help them develop their own well-reasoned, scientifically-supported stances on complicated environmental issues. Thus, although I am not necessarily increasing the expected prerequisite knowledge for the course, I am greatly increasing the level of intellectual investment and maturity required to succeed in the course. This combination of changes justifies the increase in the course level.

**Evaluation**

Exams (3) (Final exam will be semi-comprehensive) 50%

Letter to the Editor Assignments 10%

Through a series of shorter assignments, students are required to obtain and read letters to the editor regarding environmental geoscience issues and analyze the motivation, bias, and thesis of the author.
Subsequently, they are required to write a letter to the editor opinion-type article about an environmental geoscience issue that is thoroughly researched, well-supported, and persuasive.

**Homework** 10%
Homework assignments are primarily based on a series of modules (the EarthInquiry series listed in the required bibliography) that guide students through the process of obtaining web-based data on climate change, flood hazards, and energy and mineral resources. After obtaining the data, students quantitatively analyze the information and perform a series of manipulations (graphs, tables, etc.) to the data. Finally, students are asked a series of open-ended questions that give them an opportunity to apply the data to real-world public policy issues. For example, in the “Recurrence Interval of Floods” module, after analyzing flood data for a town on the Mississippi River in Missouri, students are asked if the town should be allowed to rebuild in its current location after the next flood. They are required to support their stance with the data they have obtained. Each module also emphasizes critical analysis of data quality and potential sources of errors.

**Pop Quizzes** 10%
The pop quizzes are short exercises designed to encourage students to complete the assigned reading on time.

**Class Participation/Discussion/Misc** 20%
Students are expected to regularly participate in the in-class discussions. Short writing assignments and other brainstorming activities, both individual and as a group, are assigned to help students organize their thoughts and consider their stance on discussion topics.

**Total** 100%

Grading scale will be the standard >90% A, 80-89% B, 70-79% C, 60-69% D, <60% F

**Course Outline:**

I. Introduction to Environmental Science
   A. Interdisciplinary scope
   B. Related disciplines
      1. Sciences
      2. Humanities
      3. Social Sciences
   C. Geoscience Issues

II. Water Resources
   A. Hydrologic Cycle
      1. Atmospheric, terrestrial, and soil stores
      2. Oceanic circulation (brief introduction)
      3. Glaciers (brief introduction)
   B. Surface Water Systems
      1. Scientific Concepts
      2. Environmental Issues
   C. Groundwater Systems
      1. Scientific Concepts

III. Global Warming
   A. Atmospheric Systems
      1. Evolution of Primordial Atmosphere
      2. Atmospheric Structure and Composition
      3. Circulation Patterns
   B. Oceanic Systems
      1. Paleo-oceanography
      2. Oceanic structure
      3. Global Heat Conveyer
      4. Sea-level change
   C. Soil Systems
      1. Soils and climate
      2. Agricultural practices
         a) Dust bowl era
D. Carbon Cycle
   1. Reservoirs
   2. Stocks
   3. Residence times

E. Greenhouse warming
   1. Concepts
   2. Hazards and Issues

IV. Energy Resources
A. Overview
   1. Renewable vs. Non-renewable resources
   2. Global consumption patterns

B. Fossil Fuels
   1. Formation and Development
   2. Consumption, Reserves, Uses

C. Nuclear Energy

D. Alternative Energies
   1. Biodiesel
   2. Wind
   3. Solar
   4. Biomass
   5. Tidal energy
   6. others

B. Rationale for the New Course

Major Focus and Course Objectives
- Investigate how the scientific method is applied to solving environmental problems in the geosciences
- Explore geoscience concepts related to environmental issues
- Learn how to delineate scientific fact from interpretation as well as delineate assumptions inherent in scientific analysis.
- Analyze how scientific results and knowledge are utilized in public policy decision making processes
- Discuss the ethical framework within which environmental scientists must work and what their obligations are to ensure that public policy is based on sound scientific principals.

How the Course Will Contribute to Geoscience Department Curriculum
This course is a required course for Geoscience majors on the Environmental Science and Earth Science Teaching tracks as well as an elective for our other majors and minors. In addition to addressing many important environmental geoscience issues (e.g., water resources, global warming, energy resources), this course will explore topics not covered in detail in other upper-level Geoscience courses: 1) Earth systems science, 2) Geoscience ethics, and 3) science and social policy issues.

Courses which may be dropped
Geoscience 225 Environmental Geoscience will be replaced by this course

C. Provide a Statement of the Impact of this Course on Other Departments....

Clearly State the Impact of this Course on Course Taught in Other Departments
No impact on courses taught in other departments is anticipated. This course does not duplicate the content of courses taught in other departments. There is no anticipated effect on prerequisites.

Would Approval of this Course Change the Total Number of Credits Required by any Major....
No.
Impact on the Major or Minor of Another Department
This course is an elective in the Biology and Chemistry Environmental Science majors, Law and Society major, and the Global Studies major. The changes proposed here will not affect access to this course for students in these programs.

D. University Studies Program
If approved by the CPPS, this course will be submitted for approval in the University Studies program as a course satisfying Unity and Diversity: Science and Social Policy requirements.