WINONA STATE UNIVERSITY
GENERAL EDUCATION PROGRAM APPROVAL FORM

Routing form for General Education Program Course approval.

Course GEOS 113 Natural Disasters with Laboratory

Department Approval

Department Chair | 1/23/14 Date | tdogwiler e-mail address

Dean's Recommendation ✓ Yes ____ No*

Charles S Mutschler | 1/28/14
Dean of College | Date

*If the dean does not approve the proposal, a written rationale should be provided to the General Education Program Subcommittee.

GEPS Recommendation ____ Approved ____ Disapproved

Chair, General Education Program Subcommittee | Date

A2C2 Recommendation ____ Approved ____ Disapproved

Chair of A2C2 | Date

Faculty Senate Recommendation ____ Approved ____ Disapproved

President of Faculty Senate | Date

Academic Vice President Recommendation ____ Approved ____ Disapproved

Academic Vice President | Date

Decision of President ____ Approved ____ Disapproved

President | Date

Please forward to Registrar.

Registrar ____ Date entered

Please notify department chair via e-mail that curricular change has been recorded.

[Revised 10-22-12]

5/21/14

WINONA STATE UNIVERSITY
PROPOSAL FOR GENERAL EDUCATION PROGRAM COURSES

Department Geoscience Date 1/22/2014

113	Natural Disasters with Laboratory	4
Course No.	Course Name	Credits

Prerequisites none

GEP Goal Area(s):*

CORE GOAL AREAS

- [ ] Goal 1: Communication
- [x] Goal 3: Natural Science
- [ ] Goal 4: Mathematics/Logical Reasoning
- [ ] Goal 5: History and the Social and Behavioral Sciences
- [ ] Goal 6: The Humanities and Fine Arts

THEME GOAL AREAS

- [ ] Goal 7: Human Diversity
- [ ] Goal 8: Global Perspective
- [ ] Goal 9: Ethical and Civic Responsibility
- [x] Goal 10: People and the Environment

* Courses may be submitted for up to two Goal Areas.

Additional Requirement Categories (list number of credits desired in appropriate category):

- [ ] Intensive:
  - [ ] 1. Writing
  - [ ] 2. Oral Communication
  - [ ] 3a. Mathematics/Statistics
  - [ ] 3b. Critical Analysis
- [ ] Physical Development and Wellness

Provide information as specified in the previous directions.

Attach a ***General Education Program Approval Form***.

Department Contact Person for this Proposal:

Candace L. Kairies-Beatty	x5789	ckairiesbeatty@winona.edu
Name (please print)	Phone	e-mail address

[Revised 9-6-11]

Application for GEOS 113 Natural Disasters with Lab to satisfy Goal Area 3 Natural Sciences AND Goal Area 10: People and the Environment

Outline:

1. Introduction
    a. Difference between natural hazard and natural disaster
    b. Effects of hazards
    c. Disasters in developed and developing countries
    d. Mitigation of natural disasters
2. Plate tectonics
    a. Layers of the Earth
    b. Convergent boundaries
    c. Divergent boundaries
    d. Transform boundaries
    e. Hot spot volcanism
    f. What moves the plates?
3. Earthquakes
    a. Stress & strain
    b. Faults
    c. Seismic waves
    d. Earthquake intensity
    e. Effects of earthquakes
    f. Intraplate earthquakes
    g. Predicting earthquakes
        i. Early warning systems
        ii. Reducing earthquake risks
4. Volcanoes
    a. Products of volcanic eruptions
    b. Volcanic hazards
    c. Eruptive styles and associated landforms
    d. Caldera formation & eruptions
    e. Monitoring & forecasting
5. Stream processes
    a. Erosion
    b. Transport
    c. Deposition
    d. Types of streams
6. Floods
    a. Hydrographs
    b. Flood frequency curves & recurrence intervals
    c. Flood styles
    d. Controlling flood hazards
7. Weather
    a. Atmosphere
    b. Weather processes
    c. Hazards related to weather
8. Thunderstorms & tornadoes
    a. Storm development
    b. Hazards associated with storms
    c. Origins of tornadoes
    d. Mitigation
9. Climate change
    a. Climate vs. weather
    b. Albedo
    c. Greenhouse effect
    d. Feedbacks
    e. Carbon cycle
    f. Climate change trends & impacts
    g. Mitigating climate change
10. Hurricanes
    a. How do hurricanes develop?
    b. Hurricane movement
    c. Hurricane damage
    d. Prediction, warning and planning
    e. Can we reduce the energy of a hurricane?

Student Competencies for GEP Goal 3	**Learning Opportunity**	**Assessment Method**
Demonstrate understanding of scientific theories	Students will have multiple opportunities to investigate scientific theories and processes pertinent to the study of geoscience and natural hazards.	In **laboratory exercises** and **in-class assignments** students will investigate (over multiple weeks) how one of the fundamental theories of the geosciences, plate tectonics, is responsible for creating several of the major natural hazards discussed in class. Students will demonstrate their knowledge of these theories on **quizzes** and **exams**.
Formulate and test hypotheses by performing laboratory, simulation, or field experiments in at least two of the natural science disciplines. One of these experimental components should develop, in greater depth, students, laboratory experience in the collection of data, its statistical and graphical analysis, and an appreciation of its sources of error and uncertainty	Students will have a variety of opportunities to collect and analyze their own data, analyze existing data sets, and graph and interpret data in order to answer questions pertinent to the study of geology and natural disasters.	Most **laboratory exercises** will involve some level of data collection, mathematical and graphical manipulation of data and interpretation (for example, evaluating earthquake probability, determining flood frequency, creating flood hazard maps, etc.). During **small group activities**, students will collect and plot data, and be asked to interpret their plots in order to answer questions (for example, students collect and plot data on earthquakes in order to determine the magnitude and epicenter of an event). In **classroom discussions**, **quizzes** and **exams** students will be asked to interpret graphical presentations of data in order to answer questions.
Communicate their experimental findings, analyses, and interpretations both orally and in writing;	Students will work collaboratively during laboratory sessions, reason out their findings with their partners, and present written lab assignments.	Students will be assessed through **laboratory exercises.**
Evaluate societal issues from a natural science perspective, ask questions about the evidence presented, and make informed judgments about science-related topics and policies	Students will have multiple opportunities to explore the ways society and geology intersect, and to evaluate implications of these interactions.	In **laboratory exercises**, **in-class assignments, quizzes** and **exams** students will be asked to identify the difference between a natural hazard and a natural disaster and the ways in which interactions between humans and the environment have exacerbated and increased the risk of natural disasters.

Student Competencies for GEP Goal 10	Learning Opportunity	Assessment Method
Explain the basic structure and function of various natural ecosystems and of human adaptive strategies within those systems		
Discern patterns and interrelationships of bio-physical and socio-cultural systems	Students will examine how science and society intersect under the umbrella of natural disasters.	During **in-class discussions and exercises**, **quizzes** and **exams**, students will be asked to identify causal differences between the hazards encountered in various locations in the U.S. and globally (why do hazards happen where they do) and explain how natural disasters might be mitigated depending on location, social and political structure, etc.
Describe the basic institutional arrangements (social, legal, political, economic, religious) that are evolving to deal with environmental and natural resource challenges	Students will examine the role of the geosciences in public policy.	Students will engage in **discussions** and **in-class exercises** where they will be able to relate science to public policy (focusing on disaster preparedness and mitigation) and analyze how science is utilized (or not utilized!) in the public policy decision-making processes. Student understanding of these issues will also be assessed on **quizzes** and **exams**.
Evaluate critically environmental and natural resource issues in light of understandings about interrelationships, ecosystems, and institutions	Students will critically evaluate the interaction between a changing climate and natural disasters.	Students will be assessed **through in-class assignments and discussions**, **quizzes** and **exams**. During these activities, students will describe Earth's climate system and explain the many factors that influence global climate, including human influences. Students will outline current and future trends and impacts of global climate change, including how a changing climate will affect weather-related disasters. Students will propose and assess potential ways to address (through mitigation and/or adaptation) a changing climate.
Propose and assess alternative solutions to environmental problems	Students will identify possible mitigation strategies for specific disasters.	Students will periodically work in **small groups and as part of whole-class discussions** on ways to identify areas at risk and possible mitigation strategies for specific disasters. Their understanding will also be evaluated on **quizzes** and **exams**.
Articulate and defend the actions they would take on various environmental issues	Students will debate and discuss environmental issues under the umbrella of natural disasters.	Students will be assessed through **in-class discussions** and **exams**, where they will need to present informed arguments supporting their positions. As an example, students would be required to read several articles before class that highlight the ways in which natural disasters widen the gap between the wealthy and the poor. As part of the in-class discussion of these readings, students would be asked for their ideas to address this gap. Solutions might include anything from addressing impacts of climate change to directing more money toward moving people out of disaster-prone areas, etc.