WINONA STATE UNIVERSITY
GENERAL EDUCATION PROGRAM APPROVAL FORM

Routing form for General Education Program Course approval.

<table>
<thead>
<tr>
<th>Department Approval</th>
<th>1/23/14</th>
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<tbody>
<tr>
<td>Department Chair</td>
<td></td>
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<tr>
<td>Date</td>
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<td>e-mail address</td>
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<thead>
<tr>
<th>Dean's Recommendation</th>
<th>Yes</th>
<th>No*</th>
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<tbody>
<tr>
<td>Dean of College</td>
<td></td>
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<tr>
<td>Date</td>
<td>1/28/14</td>
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*If the dean does not approve the proposal, a written rationale should be provided to the General Education Program Subcommittee.

<table>
<thead>
<tr>
<th>GEPS Recommendation</th>
<th>Approved</th>
<th>Disapproved</th>
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<tbody>
<tr>
<td>Chair, General Education Program Subcommittee</td>
<td>Date</td>
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<tr>
<th>A2C2 Recommendation</th>
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<tr>
<td>Chair of A2C2</td>
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<tr>
<th>Faculty Senate Recommendation</th>
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<tbody>
<tr>
<td>President of Faculty Senate</td>
<td>Date</td>
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<tr>
<th>Academic Vice President Recommendation</th>
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<tr>
<td>Academic Vice President</td>
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<tr>
<th>Decision of President</th>
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<tr>
<td>President</td>
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Please forward to Registrar.

| Registrar | Date entered | Please notify department chair via e-mail that curricular change has been recorded. |

[Revised 10-22-12]
WINONA STATE UNIVERSITY
PROPOSAL FOR GENERAL EDUCATION PROGRAM COURSES

Department: Geoscience
Date: 1/22/2014

<table>
<thead>
<tr>
<th>Course No.</th>
<th>Course Name</th>
<th>Credits</th>
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<tbody>
<tr>
<td>103</td>
<td>Natural Disasters</td>
<td>3</td>
</tr>
</tbody>
</table>

Prerequisites: none

GEP Goal Area(s):*

**CORE GOAL AREAS**
- Goal 1: Communication
- 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
- Goal 10: People and the Environment

(Note: this course is already listed under Goal Area 10, but we are requesting renewal of this goal area at this time so that in the future GEOS 103 and GEOS 113 (Natural Disasters with Lab) will come up for renewal at the same time.)

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  cskairiesbeatty@winona.edu
Name (please print)  Phone  e-mail address

[Revised 9-6-11]
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?
<table>
<thead>
<tr>
<th><strong>Student Competencies for GEP Goal 3</strong></th>
<th><strong>Learning Opportunity</strong></th>
<th><strong>Assessment Method</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Demonstrate understanding of scientific theories</td>
<td>Students will have multiple opportunities to investigate scientific theories and processes pertinent to the study of geoscience and natural hazards.</td>
<td>In <strong>in-class assignments</strong>, 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 <strong>quizzes</strong> and <strong>exams</strong>.</td>
</tr>
<tr>
<td>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</td>
<td>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.</td>
<td>During <strong>small group activities</strong>, 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 <strong>classroom discussions, quizzes</strong> and <strong>exams</strong> students will be asked to interpret graphical presentations of data in order to answer questions.</td>
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<tr>
<td>Communicate their experimental findings, analyses, and interpretations both orally and in writing</td>
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<tr>
<td>Evaluate societal issues from a natural science perspective, ask questions about the evidence presented, and make informed judgments about science-related topics and policies</td>
<td>Students will have multiple opportunities to explore the ways society and geology intersect, and to evaluate implications of these interactions.</td>
<td>In <strong>in-class assignments, quizzes</strong> and <strong>exams</strong> 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.</td>
</tr>
<tr>
<td>Student Competencies for GEP Goal 10</td>
<td>Learning Opportunity</td>
<td>Assessment Method</td>
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<tr>
<td>Explain the basic structure and function of various natural ecosystems and of human adaptive strategies within those systems</td>
<td>Students will examine how science and society intersect under the umbrella of natural disasters.</td>
<td>During <strong>in-class discussions and exercises, quizzes and exams</strong>, 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.</td>
</tr>
<tr>
<td>Discern patterns and interrelationships of bio-physical and socio-cultural systems</td>
<td>Students will examine the role of the geosciences in public policy.</td>
<td>Students will engage in <strong>discussions</strong> and <strong>in-class exercises</strong> 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 <strong>quizzes and exams</strong>.</td>
</tr>
<tr>
<td>Describe the basic institutional arrangements (social, legal, political, economic, religious) that are evolving to deal with environmental and natural resource challenges</td>
<td>Students will examine the role of the geosciences in public policy.</td>
<td>Students will engage in <strong>discussions</strong> and <strong>in-class exercises</strong> 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 <strong>quizzes and exams</strong>.</td>
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<td>Evaluate critically environmental and natural resource issues in light of understandings about interrelationships, ecosystems, and institutions</td>
<td>Students will critically evaluate the interaction between a changing climate and natural disasters.</td>
<td>Students will be assessed through <strong>in-class assignments and discussions, quizzes and exams</strong>. 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.</td>
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<tr>
<td>Propose and assess alternative solutions to environmental problems</td>
<td>Students will identify possible mitigation strategies for specific disasters.</td>
<td>Students will periodically work in <strong>small groups and as part of whole-class discussions</strong> on ways to identify areas at risk and possible mitigation strategies for specific disasters. Their understanding will also be evaluated on <strong>quizzes and exams</strong>.</td>
</tr>
<tr>
<td>Articulate and defend the actions they would take on various environmental issues</td>
<td>Students will debate and discuss environmental issues under the umbrella of natural disasters.</td>
<td>Students will be assessed through <strong>in-class discussions and exams</strong>, 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.</td>
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