ARIZONA STATE UNIVERSITY

GENERAL STUDIES PROGRAM COURSE PROPOSAL COVER FORM

COURSES submitted to the GSC between 2/1 and 4/30 if approved, will be effective the following Spring. Courses submitted between 5/1 and 1/31 if approved, will be effective the following Fall.

(SUBMISSION VIA ADOBE.PDF FILES IS PREFERRED)

DATE December 30, 2010

1. ACADEMIC UNIT: Division of Mathematical and Natural Sciences

2. COURSE PROPOSED: LSC 394 Environmental Disasters 3
   (prefix) (number) (title) (semester hours)

3. CONTACT PERSON: Name: Todd Sandrin Phone: 602-543-6934
   Mail Code: 2352 E-Mail: Todd.Sandrin@asu.edu

4. ELIGIBILITY: New courses must be approved by the Tempe Campus Curriculum Subcommittee and must have a regular course number. For the rules governing approval of omnibus courses, contact the General Studies Program Office at 965-0739.

5. AREA(S) PROPOSED COURSE WILL SERVE. A single course may be proposed for more than one core or awareness area. A course may satisfy a core area requirement and more than one awareness area requirements concurrently, but may not satisfy requirements in two core areas simultaneously, even if approved for those areas. With departmental consent, an approved General Studies course may be counted toward both the General Studies requirement and the major program of study. (Please submit one designation per proposal)

   Core Areas
   Literacy and Critical Inquiry-L
   Mathematical Studies-MA CS
   Humanities, Fine Arts and Design-HU
   Social and Behavioral Sciences-SB
   Natural Sciences-SQ SG

   Awareness Areas
   Global Awareness-G
   Historical Awareness-H
   Cultural Diversity in the United States-C

6. DOCUMENTATION REQUIRED.
   (1) Course Description
   (2) Course Syllabus
   (3) Criteria Checklist for the area
   (4) Table of Contents from the textbook used, if available

7. In the space provided below (or on a separate sheet), please also provide a description of how the course meets the specific criteria in the area for which the course is being proposed.

   CROSS-LISTED COURSES: ☐ No ☐ Yes; Please identify courses: ________________________________

   Is this an multissection course?: ☐ No ☐ Yes; Is it governed by a common syllabus? ________

   Roger L Berger
   Chair/Director (Print or Type)
   Date: ________/____/____

Rev. 1/94, 4/95, 7/98, 4/00, 1/02, 10/08
Course Description

LSC394: Environmental Disasters
Fall 2011  Credit hours: 3

Instructor Information

Instructor: Dr. G. Douglass Dixon,
Division of Mathematical and Natural Sciences, Arizona State University at the West Campus.
PO Box 37100, Phoenix, AZ 85069
Mail stop: CLCC217.

Course Catalog Description

The purpose of the course is to explore the effects of wandering chemicals spread accidently or purposely upon the
global environment and upon personal health. It will cover insults to land, air and waters, globally and nationally,
which will also include local situations. Additionally, we will briefly explore how chemical and biological hazards
have been deliberately aimed at population centers. The course will finish with an exploration of how modern industry
and commerce mitigate environmental hazards during their activities’ life cycles.

Integrated throughout the course will be explorations of local cultural issues and their importance in how they
influenced these occurrences and their responses in their aftermath.

Course Overview

During the course, we will explore hazardous situations that have been identified nationally and globally, and students
will provide opinions and insights into why they occurred, how they can be remediated, and how similar future events
could be prevented.

Biography

G. Douglass Dixon, Fellow Royal Chemical Society (UK), BSc (special honors), Chemistry and PhD, Chemistry,
Durham University, England, has many years experience in research for medical, environmental, aerospace, and
military applications. He has 45 scientific publications and over 100 patents issued internationally.

Dr. Dixon is an ASU adjunct professor having taught Polymer Chemistry in the Chemistry Dept. and Engineering
Design of Materials in the School of Materials at the Tempe Campus. Currently, he is teaching Chemistry at the West
Campus in the Division of Mathematics and Natural Science. He has been honored twice for teaching excellence by
the ASU student organization Apple Polishers.

In 1969, he was co-founder and Executive VP for a citizen’s environmental group that rewrote the air pollution code
for Allegheny County, PA. This became the model for the State of Pennsylvania and then, nationally, for the Nixon
White House EQA (now the EPA).

Prerequisites

CHM101 Introduction to Chemistry, or a similar science, is the minimum requirement. Internet computing skills are
essential.

Course Textbook and Materials (subject to change).

The material considered will be drawn from the many sources, including books, journals, and newspapers.
No single book covers the scope of this course.
Syllabus and Schedule

Module 1. Week 1. Introduce concepts and explain student roles and expectations and how they will be graded. Make sure each student has all the necessary tools for internet research, and is able to communicate with the instructor and with each other. Each student to provide a personal statement covering expectations; what are your goals, why are you taking this course...

If time permits, we will explore many of the following hazards: why they occurred, how they can be mitigated, and what can be done to prevent them again. Students will provide short essays on several of these topics.

Module 2. Weeks 2, 3 and 4. Describe major environmental land hazards.
Natural events like Tunguska, Katrina, volcanoes, pine bark beetles.
Man-made events like Bopal and Chernobyl, deforestation of tropical forests, Agent Orange, Love Canal, and Times Beach. Population growth creating heat islands, Superfund sites, land fills.
Forest fires, mud slides, gypsy moth, alien vegetation (Kudzu, displacement of natives).
Power plants: How does energy development affect the environment.

Module 3. Weeks 5, 6 and 7. Describe major environmental water hazards.
Global warming: rising sea levels and effects on glaciers.
Sea dead-zones from agricultural run-off, oil spills - BP Gulf blow-out, insecticides and herbicides poisoning pelicans.
Brackish water: loss of wetlands and delta and effect on fish hatcheries, mine runoff, strip mining sedimentation.
Drinking water: lakes, rivers, eutrification, residential supplies.

Global warming, ozone layer ‘hole’, jet planes, volcanoes Krakatoa & Eyjafjallajokull, spread of Sahara dust.
FEMA trailers
Automobiles & vegetation/ pollen, mold.
Acid rain.

Poisons which are readily available. (Do not include naturally occurring pandemics).
Pharmacology & Biologicals: Tylenol poisoning, autism, getting ‘high’- paraquat, endocrine disrupters.
Medical testing and treatments (radiation and chemical).

Identify current potential chemical or biological threats to the Homeland (not explosives, but ‘dirty bomb’ counts). How widespread could they be? Remember, both attacks on the World Trade Center were extremely local.
Anthrax mailings, Smallpox deaths. Agent Orange, chlorine gas in WW1.
What potential threat by an outside agent could rival deaths by automobiles and guns?
What other future threat can be imagined? What is the greatest current threat to Maricopa County?
Read ‘Dark Knight’ and comment. Movie “Blindness” on how survivors may be treated.
After a spill, or attack, what do you do with the clean-up materials?
Expert authorities will present their views of these situations.

The role of Congress in prevention, public health and The Desirability Quotient.
Explore how major industrial and commercial organizations attempt to be ‘green’ by considering the complete life-cycle of their products, from birth to death. Examples will include such diverse organizations as Nike and the computer industry.

Review Week 15. Review final projects.
Final project Week 16. Submission of group projects.
<table>
<thead>
<tr>
<th>year</th>
<th>event</th>
</tr>
</thead>
<tbody>
<tr>
<td>79</td>
<td>Pompeii volcano</td>
</tr>
<tr>
<td>535</td>
<td>Krakatoa volcano</td>
</tr>
<tr>
<td>1883</td>
<td>Krakatoa volcano</td>
</tr>
<tr>
<td>1908</td>
<td>Tunguska asteroid</td>
</tr>
<tr>
<td>1930</td>
<td>Oklahoma dust bowl</td>
</tr>
<tr>
<td>1950</td>
<td>acid rain</td>
</tr>
<tr>
<td>1960</td>
<td>mining</td>
</tr>
<tr>
<td>1961</td>
<td>air pollution</td>
</tr>
<tr>
<td>1970</td>
<td>agent orange</td>
</tr>
<tr>
<td>1974</td>
<td>Times Beach chemical</td>
</tr>
<tr>
<td>1978</td>
<td>Love Canal chemical</td>
</tr>
<tr>
<td>1984</td>
<td>Bhopal chemical</td>
</tr>
<tr>
<td>1986</td>
<td>Lake Nyos CO2 suffocation</td>
</tr>
<tr>
<td>1987</td>
<td>Chernobyl nuclear spill</td>
</tr>
<tr>
<td>1990</td>
<td>Brazilian deforestation</td>
</tr>
<tr>
<td>1991</td>
<td>Bangladesh hurricane</td>
</tr>
<tr>
<td>2004</td>
<td>Indonesian tsunami</td>
</tr>
<tr>
<td>2005</td>
<td>Katrina hurricane</td>
</tr>
<tr>
<td>2006</td>
<td>Sahara dust</td>
</tr>
<tr>
<td>2010-1</td>
<td>Haiti earthquake</td>
</tr>
<tr>
<td>2010-2</td>
<td>Madeira mudslide</td>
</tr>
<tr>
<td>2010-3</td>
<td>Hungary chemical</td>
</tr>
<tr>
<td>2010-4</td>
<td>BP oil spill</td>
</tr>
<tr>
<td>2011</td>
<td>rising sea level</td>
</tr>
<tr>
<td>2012</td>
<td>global warming</td>
</tr>
</tbody>
</table>
## ASU--[H] CRITERIA

The Historical Awareness [H] Course must meet the following criteria:

<table>
<thead>
<tr>
<th>YES</th>
<th>NO</th>
<th>Identify Documentation Submitted</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td></td>
<td>History is a major focus of the course. The Syllabus identifies historical environmental tragedies, natural and man-made, which have occurred around the globe within the last 2,000 years and are the focus of the course.</td>
</tr>
<tr>
<td>Yes</td>
<td></td>
<td>The course examines and explains human development as a sequence of events. 6 of the 7 individual modules identified in the Syllabus explore how and why specific communities put themselves at risk of recurring environmental disasters by repeating traditional activities.</td>
</tr>
<tr>
<td>Yes</td>
<td></td>
<td>There is a disciplined systematic examination of human institutions as they change over time. We will systematically explore the sequence of disasters that have occurred on land, then water hazards, then airborne hazards. In each case, we will explore how societies are preparing to deal with future events.</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
<td>The course examines the relationship among events, ideas, and artifacts and the broad social, political and economic context. In modules 2 - 6, students will explore how communities and nations have responded to previous environmental disasters and what, if anything, has changed in their behavior patterns. Why do many nations still perform activities that will result in future disasters? Modules 5 and 7 specifically address how modern political environments have changed to produce regulations that have caused major commercial and industrial organizations to alter their approach to make their products 'green' in order to minimize man-made hazards, including waste disposal. Module 6 will address how industrialized nations have responded to previous terroristic attacks designed to affect the political and economic landscape and discuss some preparations to mitigate the damage arising. This course emphasizes the effects upon the environment of chemicals and how social and political forces are often in opposition because of the economics involved in mitigating future events or because &quot;that is the way we have always done things&quot;. In modules 2 - 6, students will explore how communities and nations have responded to previous environmental disasters and what, if anything, has changed from future chemical or biological attacks.</td>
</tr>
<tr>
<td>Course Prefix</td>
<td>Number</td>
<td>Title</td>
</tr>
<tr>
<td>--------------</td>
<td>--------</td>
<td>-------------------------</td>
</tr>
<tr>
<td>LSC</td>
<td>394</td>
<td>Environmental Disasters</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Criteria (from checksheet)</th>
<th>How course meets spirit (contextualize specific examples in next column)</th>
<th>Please provide detailed evidence of how course meets criteria (i.e., where in syllabus)</th>
</tr>
</thead>
<tbody>
<tr>
<td>History is a major focus of the course.</td>
<td>The course examines the historical record, over the past 2 millennia, for environmental disasters. The Syllabus presents the information in a series of 7 modules. Each module describes a specific kind of hazard or disaster and provides specific examples, placing each into its appropriate historical context.</td>
<td>Each module describes disasters that occurred in a related manner, such as those on land (Module 2), those involving water (Module 3), those affecting air quality (Module 4), those arising from health products (Module 5), those that have or might arise from terroristic events (Module 6), and efforts to ameliorate man-made environmental impact (Module 7).</td>
</tr>
</tbody>
</table>
The course examines and explains human development as a sequence of events. The students will develop answers to why communities are vulnerable to environmental hazards. For instance, in Pacific nations, communities live in a region known as the Ring of Fire. Why do they persist in building their communities on the sides of active volcanoes? Why do Californians build large cities on known earthquake fault lines? Bangladesh is a typical low lying country that is frequently devastated by cyclones. Why do millions of people live in this region?

Some typical examples that the students will explore are:

In Module 2, we question why nations allow massive deforestation, especially in the rain forests. The consequences can have disastrous consequences for agriculture, fishing, and climate change.

In Module 3, we ask what is the availability of potable water around the globe? What activities have reduced its availability and is it worth going to war to maintain water rights?

In Module 4, what are the indicators of global warming and what will be the future impact on all civilizations?

In Module 5, we explore how disease spreads and how pharmaceuticals have been badly used. Instances are phthalidomide in Europe and Tylenol in the US. How were these events handled?
<table>
<thead>
<tr>
<th>There is a disciplined systematic examination of human institutions as they change over time.</th>
<th>Air- and water-based hazards have greater global consequences than land based hazards, affecting larger populations. We show how nations can legislate for land based hazards but are frequently impotent about air and water hazards. Consequently, there is an international effort being developed to monitor and warn even isolated regions around the globe of impending disasters. In modern times, many societies are being given sufficient warning to evacuate affected areas because of technological advances.</th>
<th>In each module, we follow the course of specific types of disasters, distinguishing in each module between naturally occurring and man-made hazards. We systematically differentiate between land, water, and air based hazards treating each in a specific module. We follow the historical record then anticipate future hazards. We show how technological advances provide significant warnings for naturally occurring disasters and how nations are now developing protocols through legislation and security systems to minimize the effects of man-made environmental hazards.</th>
</tr>
</thead>
<tbody>
<tr>
<td>The course examines the relationships amongst events, ideas, and artifacts, and the broad social, political, and economic context.</td>
<td>In each module, we examine how a disaster impacts the population. Was it viewed as an Act of God or was there someone to blame? Could a community sue a company or is the local economy more important? Were laws passed nationally to prevent future occurrences?</td>
<td>Students will research specific events in each module and write position papers on the reason the event occurred, what happened to the population affected, how did politicians respond (eventually). Especially important is the availability of aid to the stricken population. From whence does it come? Locally or Internationally?</td>
</tr>
</tbody>
</table>