

**UMBC UGC New Course Request: GES 312 Natural Hazards**

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Proposed Effective Date: Spring 2019

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**COURSE INFORMATION:**

Course Number(s)	GES 312
Formal Title	Natural Hazards
Transcript Title (≤30c)	Natural Hazards
Recommended Course Preparation	
Prerequisite NOTE: Unless otherwise indicated, a prerequisite is assumed to be passed with a "D" or better.	GES 110 with a C or better
# of Credits Must adhere to the <u>UMBC Credit Hour Policy</u>	3
Repeatable for additional credit?	Yes X No
Max. Total Credits	3
Grading Method(s)	X Reg (A-F) X Audit <input type="checkbox"/> Pass-Fail

**PROPOSED CATALOG DESCRIPTION** (Approximately 75 words in length. Please use full sentences.):

In this course we explore the vulnerability of human populations to natural hazards and the ways susceptibility arises both from natural events and distinctly human elements - including burgeoning population and property, risk behavior and inadequate disaster mitigation strategies. We examine the panoply of natural hazards, including volcanoes, earthquakes, debris flows, tsunamis, severe storms, drought and flood, wildfires, extraterrestrial impactors, global warming and emerging (zoonotic) disease. For each of these categories, students will obtain a working knowledge of physical processes, historical cases, social impacts, mitigation strategies, and the manner in which one type of hazard may precondition or trigger another.

**RATIONALE FOR NEW COURSE:**

**a) Why is there a need for this course at this time?**

This course has been a semi-regular offering in GES for many years as a special topics course that typically fills to capacity. This proposal seeks to formalize the course. The topic is highly pertinent in U.S. and globe, particularly given the recent devastating hurricane seasons in the U.S. (2004, 2005, 2012, 2017) and ongoing vulnerability to natural disasters in communities worldwide. There is a demand for the more specialized knowledge to understand their scientific underpinnings and social implications of natural hazards. There is a great tendency in the media and popular press to overhype, exaggerate and undermine the science behind natural hazards; this course provides students with a solid scientific understanding, based on the latest research.

**b) How often is the course likely to be taught?**

Once a year, spring semester.

**(c) How does this course fit into your department's curriculum?**

When offered yearly as a special topics course, Natural Hazards nearly always fills to 40 seats. While it focuses on the physical aspects of natural hazards, the course also addresses social aspects of vulnerability; thus the course serves as an elective for both those majoring in the BS in Environmental Science and the BA in Geography and Environmental Studies. Many students take the course to bridge natural science and social science thinking. While it is specialized and can serve as a versatile elective, the material is accessible enough that student with only one prerequisite can take it.

**d) What primary student population will the course serve?**

Those in geography and environmental science; emergency health services; and global studies majors at UMBC. The course instructor is working closely with Rick Bissell in EHS to promote this offering.

**e) Why is the course offered at the level (ie. 100, 200, 300, or 400 level) chosen?**

It is more advanced and specialized than our foundation (100 level courses) and first requires the fundamental knowledge of one or more foundation courses. The geophysical content is more thoroughly explored than what is offered in GES 110 Physical Geography (i.e. more time spent developing certain concepts).

**f) Explain the appropriateness of the recommended course preparation(s) and prerequisite(s).**

The prerequisite is one of our foundation courses (110, Physical Geography). The course treats topics touched upon in 110 more thoroughly. For instance, earthquakes in GES 110 were introduced in the context of plate tectonics, along with basic properties of how seismic energy propagates through Earth's crust. In GES 312, we include new information on how this energy interacts with structures such as buildings and bridges, how people have implemented warning systems, the socioeconomic after-effects of earthquakes on vulnerable populations, and lessons learned from some historically significant case studies.

**g) Explain the reasoning behind the P/F or regular grading method.**

This course has always been evaluated using a regular grading method. It is appropriate for the more specialized nature of the work, to evaluate with periodic exams, assignments and a final project. It is standard practice for all of our upper division courses to utilize the regular grading method.

**h) Provide a justification for the repeatability of the course.**

Not repeatable; it is a popular course that fills an important niche in the department, and to allow repeating would crowd out students for whom the material is important.

**ATTACH COURSE SYLLABUS (mandatory):**

# **GES 312: Natural Hazards**

## **Spring 2018**

**M, W, F 10:00-10:50 AM Sondheim Rm. 108**

Instructor: Dr. Jeffrey Halverson  
Professor, GES  
Associate Dean, The Graduate School  
ADMIN 208 410-455-3350  
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Office Hours: MW Free Hour or By Appointment

### **1. Course Description**

In this course we explore the vulnerability of human populations to natural hazards, adopting the central paradigm that our susceptibility arises from both the incidence of natural events, AND human behaviors - including burgeoning population, risky location, unheeded warnings and inadequate disaster mitigation strategies. We examine the spectrum of natural hazards, including volcanoes, earthquakes, tsunami, severe storms, drought and flood, wildfires, extraterrestrial impactors, pandemics and plagues. For each of these hazards, students will obtain a working knowledge of physical processes, historical cases, societal impacts, development of mitigation strategies, and the manner in which one type of hazard may precondition or trigger another.

### **2. Prerequisites**

GES 110

### **3. Course Objectives**

1. Fundamentally – develop a recognition that all natural disasters and catastrophes are controlled in part by frequency and magnitude of geophysical hazards, and in part by distinctly human behaviors and actions;
2. Understand, to first order, the important physical processes and energy flows that cause geophysical hazards – involving tectonic processes, atmospheric and oceanic circulations;
3. Learn about our best methods for quantifying the intensity and coverage of natural hazards and their effects, and also identify where weaknesses lie in natural hazard prediction, surveillance and warning systems;
4. Elucidate frameworks of human/societal response during immediate and long-term recovery periods following natural disasters;
5. Develop a working knowledge of historically significant disasters and catastrophes, and how lessons learned inform our future societal vulnerability

## 4. Required Textbook

Hyndman and Hyndman, Natural Hazards and Disasters, 5 Ed., Brooks Cole.

## 5. Assignments and Grading

Exam 1	15%
Exam 2	15%
Exam 3	15%
Recitation	15%
DVD Short Answer Assignments	20%
Final Exam (cumulative)	20%
Semester Total Points	100%

All exams are TAKE-HOME, based on a combination of lectures and reading material. You will have one full calendar week to complete each exam. Adopting this mode frees up class time so that more material can be covered.

Class lectures will at times include viewing of DVDs, all of them NOVA scientific specials that tell in-depth stories about high-impact, historical natural disasters. After many years of teaching this class, I have assembled a set of NOVA specials that tell compelling, scientifically accurate stories that convey important messages about science and society. There is a core set of knowledge here that is world-class. Each student will answer a set of questions based on the DVD viewing, turned in for grading.

Exams are short-essay style, in response to 3-4 questions, that ask you to think critically and synthesize the material learned in class, in the NOVA DVDs and in the readings. I permit open notes and open book. The exams are to be written on a word processor, printed and turned in, all pages stapled, name on the cover page. Please adhere to double space, 12 point font, one inch margins. The grading rubric for each exam is as follows (100 points total): Accuracy (30 pts), Thoroughness (30 pts), Organization (20 pts), Efficiency (Brevity; 10 pts), Writing Style (10 pts).

DVD Short Answer Assignments are handed out at the beginning of each DVD viewing and consist of 4-5 short-response (2-3 sentences) questions that ask you to focus on the main points presented in each scientific story. I grade these on your completeness and hand these back so that you may reference the material in exams.

The final exam is based on the set of DVD viewings and here I ask the student to synthesize the important, topical lessons learned from these viewings. This exam is take-home. The onus is on you to take careful, comprehensive notes while viewing each DVD, and develop your own organization and synthesis of key ideas that are presented – without this ongoing preparation through the semester, you will not do well on the final exam!

Recitation: Throughout the semester, natural hazards will invariably occur around the world, and there are a great many historical events. Each student will prepare a very short “brief” on a particular event, and present information to the class, as an oral presentation, during the assigned Final Exam day. This is, in essence, a 3 minute recitation that tells the brief story and historical significance of the chosen event. No slides may be used; it is a strait narrative. I will grade based on the significance level of the chosen event, factual accuracy, how you have organized your narrative, and delivery. Think of it as your “elevator speech” for a chosen historical disaster. You will have a list of approved events to select from.

All assignments must be turned in at the start of class on the due date assigned. As a matter of policy, I do not accept late assignments w/out a prior arrangement. Doctor’s note is required for significant illness/hospitalization.

Grading is done according to the standard 10-point letter scheme (i.e. A = 100 to 90, B = 89 to 80, etc.).

## **6. Class Protocols**

1. Students are expected to come prepared, having read assigned text chapters beforehand;
2. You should make every attempt to attend all class lectures and participate fully in discussions;
3. I will lecture using both board notes and slides and we will also view numerous NOVA videos. PPT of the slides will be posted immediately after each lecture;
4. The onus will be on you to listen carefully to the lecture and take good notes;
5. It is OK to use tablets and laptops to take notes, as long as “key clicks” do not distract other students in class. You may also consider bringing a digital voice recorder;
6. You should get in the habit of weekly reviewing and synthesizing class notes along with the text readings and DVD viewings – developing study guides for the exams as you go along;
7. Class announcements will be sent via BB email;
8. I may find it necessary to adjust the syllabus during the semester; updated syllabi will be posted on BB.

## **7. Class Philosophy**

This is an *advanced* course in our department. It synthesizes and builds upon concepts you learned in GES 110 and 120. The course integrates concepts from both the physical sciences and human geography. Natural hazards generate effects on society that are readily quantified. The course is thus designed to give you some experience working with data, performing simple analysis and doing some calculations. It is also likely that one or more natural hazards will unfold somewhere on the globe during this semester. Pay attention to the news and make it a point to learn about these disasters. Think

critically about the information presented in the news and social media. Bring questions and commentary to class!

## 8. UMBC Policy on Academic Integrity

All UMBC policies and regulations regarding class registration, maintenance of good standing, adding/dropping, cheating, attendance and deportment apply to this course and will be rigorously enforced.

*Academic Dishonesty:* The integrity of the learning environment mandates that we build an atmosphere of trust. CHEATING IN ANY FORM WILL NOT BE TOLERATED, including plagiarism. I will aggressively pursue all available UMBC regulations if I suspect, or I overtly discover, that you are engaging in dishonest practices.

You MUST read and be fully cognizant of UMBC's Student Academic Conduct Policy. Please consult the UMBC Student Handbook, the Faculty Handbook, or the UMBC Policies section of the UMBC Directory.

Resources on properly citing research material are available at <http://www.umbc.edu/provost>, under the academic integrity link. This includes proper citation of web-based (on line) resources.

## 9. About Your Professor

Professor Halverson received his Ph.D. in Environmental Science at the University of Virginia in 1994, then assumed a post-doc under Dr. Joanne Simpson at NASA's Goddard Space Flight Center. He is currently Professor at University of Maryland Baltimore County (UMBC) where he teaches courses on Physical Geography, Natural Hazards, Meteorology, Severe Storms, Advanced Earth Systems Science and Climate Change. He and his team of graduate students investigate severe storms, particularly hurricanes. In 2000 he pioneered a new type of technology for measuring air temperature at high altitudes in the eye of hurricanes.

Halverson has authored nearly 50 scientific publications and has appeared in science documentaries aired by NOVA, National Geographic and The Discovery Channel. He is a columnist, feature writer and assistant editor for *Weatherwise Magazine*, a position held since 2002. Presently he is authoring an undergraduate textbook on severe storms, under Oxford University Press. He is also the Severe Weather Expert for the *Washington Post's* Capital Weather Gang. In early 2017 he assumed the position of Associate Dean in the Graduate School.

## 10. Syllabus (Topics and Readings By Date)

Date	Lecture Topic
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1/29/18	Natural Hazards, Disasters & Catastrophes: An Introduction
1/31/18	Societal Vulnerability to Natural Hazards
2/2/18	Disaster Resilience and Risk Reduction Strategies – What Works, What Does Not
2/5/18	Earthquake Physical Processes
2/7/18	<b>Guest Lecture: Professor Rick Bissell, UMBC Department of Emergency Health Services</b>
2/9/18	Earthquake Physical Processes
2/12/18	Earthquake Physical Processes
2/14/18	Earthquake Historical Cases
2/16/18	Earthquake Historical Cases
2/19/18	<i>NOVA DVD: Killer Quake! (Northridge, CA 1994 Quake)</i>
2/21/18	<i>NOVA DVD: Himalayan Megaquake (2015 Nepal Earthquake)</i>
2/23/18	Tsunami Physical Processes
2/26/18	Tsunami Historical Cases
2/28/18	<i>NOVA DVD: The Wave That Shook The World (2004 Indonesian Tsunami)</i> <b>EXAM 1 ASSIGNED</b>
3/5/18	Volcano Physical Processes
3/7/18	Historical Volcanic Eruptions Pt. 1
3/9/18	Historical Volcanic Eruptions Pt. 2
3/12/18	<i>NOVA DVD: In The Path of a Killer Volcano (1992 Pinatubo Eruption)</i>
3/14/18	Hurricane Physical Processes
3/16/18	Hurricane Damage – Coastal Impacts
3/26/18	Hurricane Damage – Inland Impacts
3/28/18	Hurricanes Katrina (2005) and Sandy (2012)

3/30/18	<i>NOVA DVD: Hurricane Katrina (2005)</i>
4/2/18	<i>NOVA DVD: Killer Typhoon (2013 Super Typhoon Haiyan, Philippines)</i> <b>EXAM 2 ASSIGNED</b>
4/4/18	The Historical 2018 Atlantic Hurricane Season
4/6/18	Tornado Science
4/9/18	Tornado Detection & Warning
4/11/18	Tornadoes & Societal Preparedness
4/16/18	Historical U.S. Tornado Outbreaks
4/18/18	<i>NOVA DVD: Deadliest Tornadoes (2011 Tornado Super-Outbreaks)</i>
4/20/18	Derecho and Downburst Hazards
4/23/18	Flash Floods
4/25/18	Mudslides and Debris Flows
4/27/18	River Floods <b>EXAM 3 ASSIGNED</b>
4/30/18	Wildfire Physical Processes
5/2/18	Historical U.S. Wildfires
5/4/18	Heat Waves and Droughts
5/7/18	Solar Storms – Mary Aronne guest lecture
5/9/18	Earth Impactors
5/11/18	Principles of Infectious Disease
5/14/18	Influenza Epidemics and Pandemics <b>FINAL EXAM ASSIGNED</b>
TBD	<b>CLASS RECITATIONS</b>