Syllabus for GEO 1012
Natural Hazards and Disasters
Department of Geology and Geophysics
3 credits

Instructors:

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Meeting Time: MWF at a time to be specified later.

Meeting Place: In a general use classroom to be assigned at a later date.

Course Web Site: To be made shortly and maintained by Feinberg

Course Objectives: The primary goals of this course are three-fold: (1) To educate students about the underlying natural process that give rise to natural hazards such as earthquakes, volcanic eruptions, tsunamis, floods, and more. (2) To emphasize how society evaluates and confronts the dangers posed by these natural processes from a political, social, and ethical perspective. (3) Expose students to the technological innovations that are allowing an increasing large human population to monitor, predict, and warn society about natural hazards and impending disasters. The aim here is not simply to better understand geologic hazards or be able to assess how hazards are minimized; it is also to give students a foundation for critically evaluating future approaches to managing hazards, from a technical, personal, and societal point of view. Case studies of recent and past natural disasters will be discussed, focusing on both the geological context of the hazard and its impact on society, individuals and the environment. Geo 1012 is designed for students without an extensive background in science or math and can be used to partly satisfy minor programs in either Geology or Environmental Geosciences.

Satisfies the **TECHNOLOGY & SOCIETY** theme of the Liberal Education Requirements.

Prerequisites: None.

Reading Assignments: The primary textbook for this course will be "Natural Hazards & Disasters" by Hyndman and Hyndman. (Cost ~$100). A limited number of copies of the textbook are available at the reserve desk of the Walter Science Library. Additional readings from a variety of individual sources will be provided electronically via the class website, or as handouts during class.

Course Grading:
Exam I, II 25%
Final Exam 25%
Hazard & Disaster Log 10%
Homework Assignments 15%

For those taking the course on an S/N basis, an S grade will be considered equivalent to a **C-** grade or better.

Examinations: There will be two exams during the course and one cumulative final exam at the end. Exams will consist of short answer, multiple choice and simple numerical problem solving questions. For some short answer questions, grades will be determined, in part, by how well students articulate their point of view, rather than whether they get some pre-ordained "right answer". Students are expected to take the exams at the indicated times. Exceptions will be made only for legitimate excuses or for conflicts that you anticipate and inform me about during the first week of class.

Hazard & Disaster Journal: Throughout the term students are required to keep a journal of five significant natural hazard events that happened over the semester and have made the media headlines. This will necessitate you locating and evaluating technical information from online agency sites such as the U.S. Geological Survey and the National Oceanic and Atmospheric Administration. Links to the most relevant sites can be found on the course webpage.

Each entry must contain the following parts:

1. Date of the event
2. Sources for information concerning the event - the sources could be from the newspaper, magazines or the web.
3. A paragraph summary of the event, including a description of the affects the event had on humans and society.
4. A short discussion, displaying critical thinking, of the importance, implications or consequences of the event and actions that could have been taken to mitigate the damages.

Journals must be typed.

Journals are due on the last day of class.

Homework Assignments: There will be four extended problem sets. All assignments are required and are due one week from when they are handed out – unless otherwise specified. The assignments will emphasize the quantitative aspects of what is being discussed in class. Many of the assignments will require the use of a computer and the Microsoft program Excel (or equivalent software). Late assignments are not acceptable.

Incompletes: An incomplete shall be assigned at the discretion of the instructors when, due to extraordinary circumstances, a student was prevented from completing the work of the course on time. The assignment of an "I" grade requires a written agreement between the instructor and the student specifying the time and manner in which the student will complete the course requirements during the student's next period of enrollment.

Regarding Academic Honesty: The Institute of Technology expects the highest standards of honesty and integrity in the academic performance of its students. Any act of scholastic dishonesty is regarded as a serious offense, which may result in expulsion. The Institute of Technology defines scholastic dishonesty as submission of false records of academic achievement; cheating on assignments or examinations; plagiarizing; altering, forging or

misusing and academic record; taking, acquiring, or using test materials without faculty permission; acting along or in cooperation with another to obtain dishonestly grades, honors, awards, or professional endorsement. Aiding and abetting an act of scholastic dishonesty is also considered a serious offense. (From the IT Student Guide). Academic dishonesty in any portion of the academic work for a course shall be grounds for awarding a grade of F or N for the entire course.

Course resources: The class web page will be a major source of information.

Students with Disabilities: It is University policy to provide on a flexible and individualized basis, reasonable accommodations to students who have disabilities that may affect their ability to participate in course activities or to meet course requirements. Students with special needs are encouraged to contact us during the first week of class to discuss your individual needs for accommodations.

GEO 1012 Natural Hazards and Disasters **Spring 2011**

Week	Lecture Topic	Technological Theme	Societal Issues
1	Introduction to Natural Hazards & Plate Tectonics; Producing a Prepared and Knowledgeable Populace.	GPS Detection of Plate Motions	The overlap of human populations and natural hazards
2	Earthquakes & Their Causes	Quantification of Earthquakes: Seismometer Design and Multi-frequency Applications	Reporting earthquakes to society in a meangful way.
3	Earthquake Prediction and Mitigation	Early Warning Systems: Leveraging the internet and cellular phone networks	Centralized hazard mitigation: Sometimes hazards are too big for a single community to manage.
4	Case Study I: A comparison of the 2010 Earthquakes in Haiti and Chile - Why did a magnitude 7.0 cause more loss of life than an 8.8?	Strong motion seismometers & building codes	How and why do societies develop hazard mitigation technologies?
5	EXAM 1 & Volcanoes: Tectonic Environments and Eruptions	Volcano Monitoring: Seismicity, Gases, and Crustal Deformation	How do contrasting eruptive styles effect societies differently?
6	Volcanic Hazards Volcanoes: Tectonic Environments and Eruptions	Lahar warning systems - Acoustic flow monitors at Mt. Rainier, WA	How does a society educate itself about a new mitigation technology?
7	Mitigating Volcanic Hazards	Monitoring the spread of volcanic ash using the MODIS satellite constellation	Volcanoes: When and how should communities be evacuated?
8	Case Study II: Pinatubo: Predicting volcanic eruptions and the decision to evacuate a community.	An in depth discussion of how scientists and public policy makers successfully navigated a major volcanic eruption	
9	Tsunamis: Causes & Prediction	Tsunami Warning System (DART)	When should scientists issue tsunami warnings to the public?
10	EXAM 2 & Landslides and Other Downslope Movements	Creep Meters, Debris basins, and Avalanche Control Measures	Localized hazard mitigation: Sometimes hazards are best managed by local communities.
11	Streams and Flood Processes	Dams: Their construction and environmental consequences	Dams: Water availibility, flood control, downstream environmental change.
12	Floods and Human Interactions	Levee Systems & Flood Control	Successes and Unanticipated Societal Consequences of Levee Systems
13	Case Study III: The 1931 and 1938 Yellow River Floods, China	The deveopment of levee systems outside the United States and their occassional manipulation for non-hazard related reasons.	
14	Impacts from Asteroids and Comets	International Efforts to Monitor Potential Impactors using Infrasound	What is the argument for monitoring for extraterrestrial impacts?
15	Case Study IV: Red River Flood Prevention	An in depth discussion of the various segments of our society competing for limited resources to mitigate against future flooding.	