Course ID and Title: Geology 108, Crises of a Planet

Units: 4

Spring—MWF—11:00 to 11:50am:

NO field trip this semester. The claim in the catalog is outdated.

Location: SLH 200

Instructor: Prof. John Vidale
Office: 107 Zumberge Hall of Science
Office Hours: Monday noon to 1pm or any time by appointment
Contact Info: jvidale@usc.edu, 310-210-2131, responds within three hours during the day.

Teaching Assistant: Ruoyan Wang

Course Description

We will examine the power and limitations of science to improve our lives through the example of geophysical natural hazards. Prof. Vidale's specialties, earthquakes, and volcanoes, will be emphasized. Landslides, flooding, wildfires, hurricanes, tornedos, flooding, and other hazards will be explored.

Half the course presents the background geophysics - the science and history of the hazards. The other half will be discussion of case studies of individual disasters and actions to avert disasters across these topics. Exploration for oil and mitigation of nuclear weapons risk will be additional topics addressed with similar science and tools.

The objective is a greater understanding of science and case-history knowledge of how we fight natural disasters. The intended audience is those who wish to understand the process of mitigating hazards more deeply through research, activism, legislation, and enforcement of improvements.

Geophysics is a particular strength of the Earth Sciences department at USC, and Los Angeles is the epicenter of the ~$6B average annual earthquake risk in the US.

We'll discuss practical hazard mitigation, including discovery, denial, alarmism, and acquiring state and federal resources. Earthquake and volcano prophecies offer examples of social media rumors of "breakthroughs" and conspiracies. Short-term earthquake and volcano prediction does not yet work, but still there is hope at the cutting edge of current research. The more general issue of clarifying contentious science also is a recurrent theme, but the main theme is natural threats and how they are addressed.

Learning Objectives

Objectives	Assignment/Assessment
By the end of this course, students should be able to:	This learning objective skill is measured by:
1. Understand the qualitative physical process responsible for a range of natural hazards and other societal problems that can be ameliorated through geophysical methods.	Midterm, final exam, polls
2. Remember cases studies of these disasters, their history, and the actions taken to mitigate them.	Midterm, final exam, polls
3. Extend the case history to interpret additional science and similar cases not addressed in class.	Labs conducted in section
4. Analyze the outcomes in case studies to judge their societal impact.	Questions on final exam
5. Evaluate whether the measures taken have been sensible.	Questions on final exam

Prerequisite(s): none.
Co-Requisite(s): none.
Concurrent Enrollment: none.
Recommended Preparation: perusing the textbooks would be informative but not necessary.

Course Notes

Grading type: letters, a curve will be applied.
Lecture PowerPoint PDFs will be posted on Blackboard before class.

Technological Proficiency and Hardware/Software Required

We will use only the standard features of BrightHand and Poll Everywhere.

Required Readings and Supplementary Materials

The Big Ones by Lucy Jones, 255 pages

- Sold by: Random House LLC, on Amazon
- Kindle - $14, Paperback - $15
- ISBN 0385542704

Natural Hazards and Disaster by Donald Hyndman and David Hyndman

- Any of the 4th (2013), 5th (2016), or 6th edition (2024) is fine.
- New, used, electronic, paper, buying, renting – any would work
- Choices range from ~$0 to ~$175 on Amazon
- Just needed for reading and reference – fancy extras unnecessary.

Description and Assessment of Assignments

The midterm and final will be in-class Blackboard multiple choice tests. Polls and quizzes in class will be graded for participation but not correctness.

Participation

Participation will be scored by answering Poll Everywhere questions and engaging with TA in section.

Grading Breakdown

Assessment Tool (assignments)	% of Grade
Weekly lab assignments	35
Midterm exam	25
In-class polls and in-lab quizzes	10
Final exam	30
TOTAL	100

Tentative Lecture Schedule

	Topics	Readings/Preparation
Week 1	Natural Hazards	14 of 18 chapters in Hyndman's book and
Week 2	Plate tectonics	all chapters in Jones' short book will be assigned readings.
Week 3	Earthquakes	
Week 4	California earthquake mitigation	
Week 5	Notable global earthquakes	
Week 6	Volcanoes	
Week 7	Volcano case studies	
Week 8	Landslides	
Week 9	Storms	
Week 10	Hurricanes	
Week 11	Floods and tornedos	
Week 12	Earthquake prediction	
Week 13	Wildfire	
Week 14	Tsunamis	
Week 15	Disaster of nuclear weapons	

Tentative Lab Schedule

	Topics	Quizzes
Week 1	**No Lab**	
Week 2	Topographic Maps	
Week 3	Plate Tectonics	Quiz 1
Week 4	Earthquakes	Quiz 2
Week 5	Earthquake Hazards	Quiz 3
Week 6	Volcanoes	Quiz 4
Week 7	**No Labs - midterm**	
Week 8	Landslides	Quiz 5
Week 9	Atmosphere and Hurricanes	Quiz 6
Week 10	**No Labs - Spring Recess**	
Week 11	Weather and Tornados	Quiz 7
Week 12	Rivers and Flooding	Quiz 8
Week 13	Fires (California Science Center)	Quiz 9
Week 14	Tsunamis	Quiz 10
Week 15	Radioactivity	Quiz 11

Grading Scale
Class GPA average will be in the range 3.4 to 3.6.

Assignment Submission Policy
Weekly lab assignments will be due in class by the corresponding lab time the following week.

Grading Timeline
Grades and feedback will generally be within a week.

Course Specific Policies
Late assignments lose 10% of the score each week, no more than two labs may be missed without arranging with us how the work will be covered ahead of time.

Course Evaluations
Course evaluation will occur near the end of the semester.

Policies will adhere to the standard USC Academic and Support System guidelines:
https://cet.usc.edu/teaching-resources/syllabus-template/