USC Dornsife
Dana and David Dornsife
College of Letters, Arts and Sciences

Course ID **Core 103g**
Title **Predicting Disaster: The Applied Science of Seismology**

Units: **4**
Term—Day—Time: **Tuesday and Thursday 3:30 – 4:50pm**

Location: **THH 115**

Instructor: **John Vidale**
Office: 267 Zumberge Hall of Science
Office Hours: Wednesday 3:30-4:30pm
Contact Info: jvidale@usc.edu, phone and text – (310) 210-2131, will reply within 24 hours, usually sooner.

Course Description

An expanded version of the description published in the University catalogue. Describe the student audience for whom the course is appropriate. Aspirational statements are not learning objectives, but are valuable and belong in this section.

This small seminar (< 19 participants) aims to illustrate the power and limitations of science to improve our lives through the worldview of the seismometer and other geophysical sensors. Seismology is a particular strength of the Earth Sciences department in Dornsife College at USC, and Los Angeles is the epicenter of the ~$6B average annual earthquake risk in the US.

We'll discuss examples of specific earthquake and volcano hazards, with discoveries, denial, alarmism, and lobbying to legislators for necessary state and federal funds. Earthquake and volcano prophecies remain fodder for social media false proclamations of "breakthroughs" and conspiracies involving the deep state. Short-term earthquake 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, sometimes against entrenched interests, also requires addressing.

More generally, the seismometer has enabled assessment of long-term risk from earthquakes, massive recovery of oil from deep in the ground (starting in LA), fairly good prediction of volcanic eruptions, minutes of warning of incoming tsunami, arbitrated treaties to limit nuclear weapon development, submarine tracking, and even the incredible recent detection of gravity waves. We will, for example, learn about the history and usefulness of the ShakeAlert smartphone app Mayor Garcetti rolled out this past January.

We will also similarly address other geophysical disasters; landslides, flooding, hurricanes, and wildfires.

The audience is those who wish to more deeply understand the enabling of scientific technology through research, activism, legislation, and enforcement of improvements.

Learning Objectives

Identify what specific, measurable skills a student will demonstrate by the end of the course. Learning objectives should be both taught and assessed in your course. They are aligned with your assignments, assessments and learning materials.

Half the course content is lecture-style learning of the background geophysics - the science and history of earthquakes, volcanoes, tsunamis, landslides, flooding, hurricanes, wildfires, exploration for oil, and nuclear test treaty monitoring. The other half will be understanding case studies of individual disasters and actions to avert disasters in these topics.

The objective is a greater understanding and case-history knowledge of how we fight natural disasters.

Prerequisite(s): none
Co-Requisite(s): none
Concurrent Enrollment: none
Recommended Preparation: perusing the two required books would be helpful but not necessary.

Course Notes

Standard letter grades. Copies of lecture slides and assignments will be posted on Blackboard.

Technological Proficiency and Hardware/Software Required

Use of computers or smartphones to access internet-based reading material.

Required Readings and Supplementary Materials

The Big Ones by Lucy Jones
Natural Hazards and Disaster by Donald Hyndman and David Hyndman
Either the 5th or 6th edition is fine.
The rest of the readings will be freely available on the web.

Description and Assessment of Assignments

What kind of work is to be done and how should it be completed, i.e. how the learning outcome will be assessed. Include any assessment and grading rubrics to be used.

There are four kinds of assignments:
1. Presentation of two 3- to 5-minute reviews of a case study in a Thursday class during the quarter.
2. Each week that a specific topic is covered, write a one-page summary and assessment of each of the case studies heard, both from the students and the professor.
3. Present a term project on a case study at the end of the quarter.
4. Hand in a written report on the presented case study at the end of the quarter.

The quizzes and final will cover mostly the science and a little of the case studies. The students will hand in summaries and commentaries on the case studies presented in class, and do a term project, presented at the end, concentrating on the mitigation process and lessons learned from the disasters.

Grading Breakdown

Including the above detailed assignments, how will students be graded overall? Participation should be no more than 15%, unless justified for a higher amount. All must total 100%.

Assignment	Points	% of Grade
midterm and two quizzes	100	20%
weekly essays on case studies	100	25%
final exam	100	25%
presentation	100	15%
final report	100	15%
TOTAL	500	1

Grading Scale (Example)

Course final grades will be determined using the following scale

A	95-100
A-	90-94
B+	87-89
B	83-86
B-	80-82
C+	77-79
C	73-76
C-	70-72
D+	67-69
D	63-66
D-	60-62
F	59 and below

Assignment Rubrics

There is not a specific, formulaic assignment rubric, as each case study will have a different mix of science, path forward, and state of progress. In general, assignments will be graded on the (1) clarity and accuracy of the summary of the physics of the challenge, (2) clarity and accuracy of the summary of the legal, profit-related, and public relations challenges involved, and (3) whether the actions taken were wise and effective.

Assignment Submission Policy

Weekly assignments will be given in class most Thursdays and posted on Blackboard. They will be due by class time the following Thursday.

Grading Timeline

Grades and feedback will generally be by the following Monday.

Additional Policies

Late assignments lose 10% of the score each week, no more than 1 missed class without notifying me ahead of time, attendance expectations.

Course Schedule: A Weekly Breakdown

Provide a detailed course calendar that provides a thorough list of deliverables—readings, assignments, examinations, etc., broken down on at least a weekly basis. The format may vary, but the content must include:

- Subject matter (topic) or activity
- Required preparatory reading, or other assignments (i.e., viewing videos) for each class session, including page numbers.
- Assignments or deliverables.

IMPORTANT:
In addition to in-class contact hours, all courses must also meet a minimum standard for out-of-class time, which accounts for time students spend on homework, readings, writing, and other academic activities. **For each unit of in-class contact time, the university expects two hours of out of class student work per week over a semester.**

	Topics/Daily Activities	Readings and Homework	Deliverable/ Due Dates
Week 1	Intro & earthquake review	Chapter 5 Jones - Tokyo Chapter 2 & 3 Hyndman	
Week 2	California earthquakes Earthquake early warning	Chapter 2 Jones - Lisbon Chapter 2 & 3 Hyndman	Quiz #1 Summary essays
Week 3	Project summaries	none	Summary essays
Week 4	More earthquakes	Not yet chosen	
Week 5	Volcanoes	Chapter 6 & 7 Hyndman volcanoes Chapter 1 & 3 Jones Pompeii, Iceland	
Week 6	Landslides	Chap 8 Hyndman landslides	Summary essays
Week 7	Cascadia topics tsunamis	Chapter 5 Hyndman tsunamis Chapter 8, 11 Jones Indian Ocean, Tohoku	Summary essays
Week 8	midterm	none	Summary essays midterm
Week 9	Nuclear monitoring	Some nuclear readings	
Week 10	Earthquake prediction	Chapter 4 Hyndman prediction Chapter 7, 10 Jones Tangshen, L'Aquila	Summary essays
Week 11	Induced seismicity	Web article plus more	Summary essays Quiz #2
Week 12	Flooding	Chapter 13, 14, 16 Hyndman floods, hurricane Jones Chap 4, 6, 9 Cal, Mississippi floods, Katrina	Summary essays
Week 13	Wild fire	Chapter 17 Hyndman wildfires	Summary essays
Week 14	Cat bonds reports	Chapter 12 Jones LA resilience	Summary essays
Week 15	Rest of the reports	none	Summary essays
FINAL	December 17th, 2 pm		.

Statement on Academic Conduct and Support Systems

Academic Conduct:

Plagiarism – presenting someone else's ideas as your own, either verbatim or recast in your own words – is a serious academic offense with serious consequences. Please familiarize yourself with the discussion of plagiarism in *SCampus* in Part B, Section 11, "Behavior Violating University Standards" policy.usc.edu/scampus-part-b. Other forms of academic dishonesty are equally unacceptable. See additional information in *SCampus* and university policies on scientific misconduct, http://policy.usc.edu/scientific-misconduct.

Support Systems:

Student Counseling Services (SCS) – (213) 740-7711 – 24/7 on call
Free and confidential mental health treatment for students, including short-term psychotherapy, group counseling, stress fitness workshops, and crisis intervention. engemannshc.usc.edu/counseling

National Suicide Prevention Lifeline – 1 (800) 273-8255
Provides free and confidential emotional support to people in suicidal crisis or emotional distress 24 hours a day, 7 days a week. www.suicidepreventionlifeline.org

Relationship and Sexual Violence Prevention Services (RSVP) – (213) 740-4900 – 24/7 on call
Free and confidential therapy services, workshops, and training for situations related to gender-based harm. engemannshc.usc.edu/rsvp

Sexual Assault Resource Center
For more information about how to get help or help a survivor, rights, reporting options, and additional resources, visit the website: sarc.usc.edu

Office of Equity and Diversity (OED)/Title IX Compliance – (213) 740-5086
Works with faculty, staff, visitors, applicants, and students around issues of protected class. equity.usc.edu

Bias Assessment Response and Support
Incidents of bias, hate crimes and microaggressions need to be reported allowing for appropriate investigation and response. studentaffairs.usc.edu/bias-assessment-response-support

The Office of Disability Services and Programs
Provides certification for students with disabilities and helps arrange relevant accommodations. dsp.usc.edu

Student Support and Advocacy – (213) 821-4710
Assists students and families in resolving complex issues adversely affecting their success as a student EX: personal, financial, and academic. studentaffairs.usc.edu/ssa

Diversity at USC
Information on events, programs and training, the Diversity Task Force (including representatives for each school), chronology, participation, and various resources for students. diversity.usc.edu

USC Emergency Information
Provides safety and other updates, including ways in which instruction will be continued if an officially declared emergency makes travel to campus infeasible. emergency.usc.edu

USC Department of Public Safety – UPC: (213) 740-4321 – HSC: (323) 442-1000 – 24-hour emergency or to report a crime.
Provides overall safety to USC community. dps.usc.edu