

## Course Description

We will examine the power and limitations of science to improve our lives through the worldview of geophysics and natural hazards. 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. Fires, landslides, and flooding are also relevant, and hurricanes, tornados and related topics have national relevance.

We'll discuss hazards, with discoveries, denial, alarmism, and lobbying to legislators for necessary state and federal mitigation 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.

The Prof and TA's specialty, seismology, has enabled assessment of long-term risk from earthquakes, 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 last year. 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.

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 of geophysics 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 Zoom lectures and discussions and internet-based reading material.

## Required Readings and Supplementary Materials

*The Big Ones* by Lucy Jones, 255 pages

- Sold by: Random House LLC, on Amazon
- Kindle - \$5
- Hardback - \$16
- Paperback - \$10<sup>50</sup>

*Natural Hazards and Disaster* by Donald Hyndman and David Hyndman

- Either the 4<sup>th</sup> (2013) or 5<sup>th</sup> edition (2016) is fine.
- Available new, used, electronic, buying, renting
- ~\$20 to ~\$100

The rest of the readings will be freely available on the web.

## Description and Assessment of Assignments

There are four kinds of assignments, plus a short midterm and final exam:

1. Weekly quizzes.
2. Each week, students will write a one-page exploration, summaries and commentaries on the case studies presented in the week's lecture, as specified by TA.
3. Record a 5-minute Zoom on their case-study term project at the end of the quarter.
4. Hand in a 10-page written report on the presented case study at the end of the quarter.

The term project, presented at the end, will concentrate on the mitigation process and lessons learned from the disasters.

### Learning Objective

By the end of this course, students should be able to:

1. Understand the qualitative physical process responsible for a range of natural hazards and other societal problems that can be ameliorated through geophysical methods.
2. Remember cases studies of these disasters, their history, and the actions taken to mitigate them.
3. Extend the case history to interpret additional, similar cases not addressed in class.
4. Analyze the outcomes in case studies to judge their societal impact.
5. Evaluate whether the measures taken have been sensible.
6. Create ideas for how additional problems can be assessed and blunted.

### Assignment/Assessment

This learning objective skill is measured by:

Midterm, final exam, in-class quizzes and polls

Midterm, final exam, in-class quizzes and polls

Weekly 1-page explorations done for discussion section

Essays on final exam, class term projects

Essays on final exam, class term projects

Class term projects

### Grading Breakdown

- 30% weekly writing assignments
- 10% + 10% midterm, final exam
- 20% Thursday 10-question quizzes
- 10% final report in a Zoom recording
- 20% written report (5% based on progress report)

### Grading Scale

A curve will be applied.

### Assignment Submission Policy

Weekly reading assignments will be given in class on Thursday and writing assignments will be given in discussion Fridays and both posted on Blackboard. They will be due by corresponding class time the following week.

### Grading Timeline

Grades and feedback will generally be within a week.

### Additional Policies

Late assignments lose 10% of the score each week, no more than 2 missed classes and 2 missed discussions without notifying us ahead of time.

<b>Date</b>	<b>Topics</b>
Aug 18	Introduction, <b>COVID</b> as an example
Aug 20	<b>Earthquakes</b> and plate tectonics
Aug 25	World earthquake history
Aug 27	California earthquakes history
Sept 1	<b>Hurricanes</b>
Sept 3	California earthquake mitigation
Sept 8	Earthquake Early Warning
Sept 10	<b>Volcanoes</b>
Sept 15	More volcanoes across solar system
Sept 17	Mount St Helens and current plans
Sept 22	<b>Landslides</b>
Sept 24	More landslides
Sept 29	<b>Midterm</b>
Oct 1	Midterm recap, landslide case studies
Oct 6	<b>Tsunamis</b> (term paper progress reports due)
Oct 8	Tsunami case studies
Oct 13	<b>Nuclear testing</b>
Oct 15	rest of nuclear testing
Oct 20	Earthquake <b>prediction</b> and hazard estimation
Oct 22	Prediction case studies
Oct 27	<b>Induced seismicity and groundwater contamination</b>
Oct 29	<b>Tornadoes, wildfire and flooding</b>
Nov 3	<b>Rest of tornadoes, wildfire and flooding</b>
Nov 5	<b>COVID</b> recap, term papers due
Nov 10	Study day
Nov 12	Study day
Nov 15	<b>Final exam</b>

## 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](http://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](http://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](http://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](http://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](http://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](http://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](http://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](http://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](http://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](http://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](http://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](http://dps.usc.edu)