

Geol 108, Crises of a Planet, Spring 2022, syllabus

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Crises of a Planet description

We will examine the power and limitations of science to improve our lives through the example of geophysical natural hazards. The prof's specialties, earthquakes and volcanoes, will be emphasized. 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, as well as prone to landslides, flooding, and fires.

We'll discuss practical hazard mitigation, including discovery, denial, alarmism, and acquiring state and federal manpower and funds. Earthquake and volcano prophecies offer many examples of social media false proclamations of "breakthroughs" and conspiracies involving the deep state. 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, sometimes against entrenched interests, also is a recurrent theme.

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

The intended audience is those who wish to more deeply understand the process of mitigating hazards through research, activism, legislation, and enforcement of improvements.

Half the course presents the background geophysics - the science and history of earthquakes, volcanoes, tsunamis, landslides, flooding, hurricanes, and wildfires. The other half will be discussion of case studies of individual disasters and actions to avert disasters across these topics. Exploration for oil and nuclear test treaty monitoring will be additional hazard 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.



Prerequisite: none

Co-Requisite: none

Concurrent Enrollment: none

Recommended preparation: perusing the two required books would be helpful, but is not necessary.

Course Notes

Standard letter grades. Copies of lecture slides will be posted on Blackboard prior to class.

Technological proficiency required

We will use only the standard features of Blackboard and Poll Everywhere. The students will also create a 3-minute final report in video form, easiest with Zoom or Powerpoint.

Required books

The Big Ones by Lucy Jones, 255 pages

- Sold by: Random House LLC, on Amazon
- Kindle - \$12
- Hardback - \$10
- Paperback - \$14
- ISBN 0385542704

Natural Hazards and Disaster by Donald Hyndman and David Hyndman

- Either the 4th (2013) or 5th edition (2016) is fine.
- New, used, electronic, paper, buying, renting – any would work
- Choices range from ~\$20 to ~\$300 on Amazon
- Just needed for reading and reference – fancy extras unnecessary.
- ISBN-13: 978-1305581692, ISBN-10: 1305581695

The rest of the readings are be freely available on Blackboard or the web.

Assignments

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

1. Weekly very short quizzes,
2. PollEverywhere participation in each class,
3. Each week, students will undertake a lab, as overseen by a TA.
4. Record a 3-minute Zoom on a case-study at the end of the semester, which will be presented and critiqued in the final week of lab.

NO field trip, despite the outdated claim in the catalog.



Learning objectives

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 science and 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

Labs conducted in section

Essays on final exam, class video projects

Essays on final exam, class video projects

Class video projects

Grading details

- 30% Weekly lab assignments
- 15% Midterm exam
- 15% In-class Blackboard quizzes
- 10% Participation in in-class polling questions
- 10% Zoom recording report
- 20% Final exam

Grading Scale

A curve will be applied.

Assignment Submission Policy

Weekly lab assignments 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 labs without arranging with us how the work will be covered ahead of time.

Date	Topics
Jan 10	Introduction
Jan 12	General natural hazards
Jan 14	more natural hazards
Jan 17	Martin Luther King day
Jan 19	Plate tectonics
Jan 21	more plate tectonics
Jan 24	more plate tectonics
Jan 26	Earthquakes
Jan 28	more Earthquake details (report scope due)
Jan 31	Earthquake case studies
Feb 2	more earthquake case studies
Feb 4	Early California earthquake mitigation
Feb 7	Later California earthquake mitigation
Feb 9	Earthquake Early Warning
Feb 11	Volcanoes across the solar system
Feb 14	More volcanoes
Feb 16	More volcanoes
Feb 18	Mount St Helens case study
Feb 21	Presidents' Day
Feb 23	More case studies and current plans
Feb 25	Landslides
Feb 28	More landslides (report progress report due)
Mar 2	Landslide case studies
Mar 4	More landslide case studies
Mar 7	Midterm
Mar 9	Heat waves
Mar 11	Storms
Mar 14	Spring recess
Mar 16	Spring recess

Mar 18 **Spring recess**

Mar 21 more storms

Mar 23 **Hurricanes**

Mar 25 more hurricanes

Mar 28 more hurricanes

Mar 30 **Floods**

Apr 1 more floods

Apr 4 **Tornadoes**

Apr 6 more tornadoes

Apr 8 **Fracking**

Apr 11 **Tsunamis**

Apr 13 more tsunamis

Apr 15 Tsunami case studies **(3-minute report video due)**

Apr 18 **Homeopathy**

Apr 20 **Nuclear testing**

Apr 22 Rest of nuclear testing

Apr 25 **Wildfire**

Apr 27 **Earthquake prediction**

Apr 29 EQ prediction case studies, **15 min for evaluation**

Apr 30 to May 3 Study days

May 4 2pm to 4pm **Final exam**

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