GEOL 104: Living with Earthquakes in California (Spring 2018)
Mondays and Wednesdays, 11:00 AM-12:15 PM, Live Oak 1219

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Office hours: Mondays, 12:30-2:30 PM, or by appointment

California is earthquake country. From the long-term evolution of the landscape to the damage brought on by a few short seconds of strong shaking, living in California means having your life shaped by seismic activity in some way or another. Over the course of the semester, we will come to terms with our faults, and build a foundation of general earthquake knowledge. We will begin with the science of how earthquakes work, why California has so many, and how seismologists have come to understand this hazard. But getting a handle on the science is only part of living with earthquakes; we will also address the topics of earthquake-resistant engineering, mitigation and preparedness from the individual to the government scale, how science affects policy, the much-misunderstood issue of earthquake prediction, and how hazard and risk are conveyed to everyday people and communities. My hope is that, by the end of the semester, you will feel more informed about and prepared for that inevitable earthquake, and that you will all be able to be earthquake awareness advocates to your families and communities.

This course fulfills a General Education Lifelong Learning requirement for a bachelor's degree at CSUN. This course addresses the Lifelong Learning objectives via: (1) integration of knowledge about the process of earthquake formation and recognition from the geologic record (science); (2) how technologies such as monitoring of Earth deformation using seismometers, GPS, tsunami warning systems, and other sensors are used to characterize earthquake hazard (technology); and (3) how those data are used to inform the insurance industry, engineers, local, state and national hazard mitigation organizations, and individuals as they implement change to limit impacts from earthquake-related hazards (society).

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

- Recognize that scientific data caused a paradigm shift in society's perception of natural hazards in California.
- Describe the earthquake cycle.
- Identify major faults and physiographic provinces of California on a map.
- Analyze evidence for past earthquakes from geologic data and strain accumulation leading up to earthquakes.
- Describe factors that contribute to earthquake ground motion.
- Describe secondary hazards that may be induced by earthquakes.
- Assess earthquake hazard at a site based on geologic maps, fault maps, and past earthquake history.
- Differentiate between earthquake forecasting and prediction.
• Compare and contrast how Local, State, and National emergency response organizations have shaped policy related to earthquake hazards.
• Justify societal concerns about hazards using historical analysis of news reports and other sources.
• Evaluate the validity of a mainstream media story about earthquakes.
• Summarize the main historical, economic, scientific and technological information used to create earthquake coverage by the insurance industry.
• List the major earthquake-related variables used by engineers to address societal needs for safe dwellings, workspaces, and transportation corridors.
• Interpret available data for earthquake hazards to develop a mitigation plan.
• Summarize case studies where individuals and communities have developed and participated in hazard mitigation strategies.
• Describe the linkage between societal impacts arising from earthquake disasters and response by the Federal Government in the form of earthquake preparedness, mitigation, and legislation.
• Synthesize concepts developed in the course to write a term paper that includes critical evaluation of information related to earthquake awareness.

There are no required texts for this class.

There have been in the past, but they are out of date to the point of being out of print. All of the material that will be covered on the tests will be addressed directly in class, and I will provide handouts each class listing the key topics for that lecture. Additionally, I will post relevant and interesting articles on Canvas throughout the semester. I strongly suggest that you take good notes, as that will make it easier for you to study later.

Your Responsibilities
1. Come to class prepared. This means being up to date on previous lectures, and being ready to answer questions and discuss with me and with each other.
2. Respect your classmates and professor. There will be a lot of discussion in this class, and a group project as well, so please treat everyone as you wish to be treated in a learning environment. Respect includes being on time, paying attention to each other, and putting social media away during class.
3. Please let me know as soon as possible if you will be absent or unable to turn in an assignment as listed in this syllabus. You may not always be able to make up for the work, but the later I find out that you may miss something, the harder it will be for me to make accommodations for you.
4. If you need any special physical or learning accommodations, please let me know as soon as possible. I can't account for things that I don't know about.

My Responsibilities
I am here to help you learn. I certainly hope that I can also instill some enthusiasm about this topic in you, but at the very least, I am here to help you learn this material. I cannot do the learning for you, but I'll do what I can to facilitate. You can expect me to be available for class and office hours, and readily reachable by email.
Your grade is based on total points earned out of 500:

1. **In-class discussions and exercises, out-of-class Canvas quizzes** (50 points)

2. **Exams** (200 points total)
   - Midterm: 14 March 2018, during class (100 points)
   - Final: 16 May 2018, 10:15 AM – 12:15 PM (100 points)

3. **Field trip** (50 points)
   - **Saturday**, 7 April 2018, 9 AM to approximately 5 PM

4. **Preparation for and presentation of group project** (100 points)
   - Presentation date: 25 April 2018, during class
   - For this project, you will be working in groups of ~3 to assess the earthquake hazard and risk at different sites across California. You will be making a poster with this information, and presenting as part of a poster session, most likely as part of an outdoor earthquake preparedness event geared toward the general campus community.

5. **Final paper** (100 points)
   - Due date: 9 May 2018, on Canvas, by 11:59 PM
   - You will each be writing a five-page (double-spaced) paper on an earthquake-related topic of your choice.
   - Possible topics include (but are not limited to):
     - The hazard and risk posed by a particular fault in California.
     - Earthquake hazard and risk in a particular city in California, and how that city has chosen to address those issues.
     - Analysis of how well a particular building/structure in California may withstand a large local earthquake.
     - Pros and cons of earthquake insurance.
     - Pros and cons of spending more money on mitigation before an earthquake vs. saving money for recovery afterward.
     - An earthquake awareness and mitigation plan for your neighborhood or hometown.
     - How safe is safe enough for your home or workplace?

**Late Assignment Policy**

For papers and group projects, 20% will be deducted from your grade for each day the assignment is late, including weekends and holidays.

Assignments that are to be completed on Canvas are short, are graded entirely on completion, and will be open for at least a week each. Once these are closed, they’re closed, and cannot be made up.

If you absolutely cannot attend the mandatory field trip on the scheduled day, you will be given instructions on how to complete the trip on your own and provide proof that you did so.

If you know you will not be able to attend a project work day or an exam, you must let me know in advance. I will allow you to reschedule or make up for work if you let me know beforehand, but I will not accept the excuse of a scheduled conflict if you only tell me after the fact.

If you miss a project work day or exam due to an emergency, I will only let you reschedule or make up for it if you can provide me proof for your excuse.
Course Schedule

Week of 22 January
22 January — Introduction
24 January — Earthquake common knowledge, myths, and misconceptions

Week of 29 January
29 January — Plate tectonics
31 January — How faults work

Week of 5 February
5 February — Seismic waves and ground motion
7 February — Secondary effects of earthquakes

Week of 12 February
12 February — California tectonics and the San Andreas Fault
14 February — The San Andreas Fault and friends

Week of 19 February
19 February — Other faults of California
21 February — Group project introduction and planning

Week of 26 February
26 February — Risk, mitigation, and insurance
28 February — Engineering for earthquake resistance

Week of 5 March
5 March — The role of government in earthquake mitigation
7 March — Walking tour of buildings on campus

Week of 12 March
12 March — Review for midterm
14 March — Midterm; topics for final paper due

Week of 19 March
No class (spring break)

Week of 26 March
26 March — Early warning, forecasting, and prediction
28 March — In search of earthquake precursors

Week of 2 April
2 April — No class (in exchange for field trip)
4 April — Preparation for group projects
7 April (Saturday) — Mandatory field trip, 9 AM to approximately 5 PM
Week of 9 April
9 April — Predictions from the fringe
11 April — Earthquake science, prediction, and the media

Week of 16 April
16 April — No class (in exchange for the field trip)
18 April — The Great San Francisco Earthquake of 1906

Week of 23 April
23 April — Preparation for group projects
24 April — If you'd like Dr. Lozos to print your poster, he needs a PDF by noon
25 April — Group project presentations

Week of 30 April
30 April — No class (in exchange for the field trip)
2 May — How scientists study earthquakes
   OPTIONAL due date for paper DRAFT, if you want feedback

Week of 7 May
7 May — Personal earthquake preparedness
9 May — Review for final exam
   Final paper due on Canvas by 11:59 PM

Week of 14 May
16 May — Final exam, 10:15 AM to 12:15 PM