Course Syllabus

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EART 11: Earthquakes (Online)

Winter Quarter, 2020

Instruction dates: 01/06/20–03/13/20 (10 weeks)

About

What is the probability of experiencing a big earthquake? Where will it occur and what can we do to be prepared?

This class will investigate the causes and effects of earthquakes. It will address why and where they occur, how they are measured, mitigated, and predicted. The course explores tectonic plate motion, frictional faulting, earthquake triggering, wave propagation, earthquake damage, earthquake-related hazards, human-induced earthquakes and much more. We will look at practical hazard mitigation strategies related to building designs, earthquake forecasting and earthquake early warning. Advanced algebra and high school geometry are required. We will build on these skills to solve quantitative problems that use real earthquake data. (General Education Code: MF)

Course Goals and Learning Objectives

- Determine why, where and when earthquakes happen
- Learn how earthquake effects can be mitigated
- Understand Plate Tectonics and fundamental Earth Sciences concepts
- Learn quantitative problem solving skills

After completing this class students will be able to:

1. Access, plot and evaluate earthquake data from public websites (USGS, etc.)
2. Analyze and interpret seismograms to obtain earthquake locations and size
3. Compare and contrast the probability of earthquake occurrence in different regions
4. Construct and interpret graphs with linear and logarithmic scales
5. Understand the role humans play in inducing earthquakes
6. Best practices and preparedness for future earthquakes

Instructor Information

Instructor	Email	Online Office Hours

Heather Savage	hsavage@ucsc.edu	Wednesdays 11am -12 pm

TA	Email	Online Office Hours
Huiyun Guo	hguo23@ucsc.edu	Thursday 4-5 pm
Natalie Glines	nglines@ucsc.edu	Thursday 9-10 am

Math Tutor		Math Tutorial Hours
Brenton Hirao	bhirao@ucsc.edu	Mon 4-5 pm, Tue 12-1 pm, Fri 5-6 pm

Textbook

Earthquakes, 5th Edition, 2003, Author: Bruce Bolt, ISBN: 9780716756187

Course Requirements

The class consists of 9 modules covering various topics. Each module consists of ~3 lectures and many additional resources that will help you understand the material. Make sure you take notes as you would during an in-class lecture. Reading assignments for each module are posted below. Each module will have a short quiz for you to test your knowledge. To further support the course content there will be online math tutorials and lab sessions with your TAs to help you solve specific problem sets. There will be extra credit for attending and participating in the tutorials/sessions.

Instructor	Online Tutorials/Lab Sessions
Heather Savage	Tuesday 1-2 pm
Huiyun Guo	Tuesday 5-6 pm
Natalie Glines	Wednesday 3-4 pm

Module Workflow

Read & Watch (~7 hours per module)

- Watch mini-lectures – take notes as you would in a face-to-face class
- Read assigned text – take notes that relate to the material in the mini-lectures, you may find it beneficial to alternate reading and watching
- Synthesize material and formulate questions to post on Piazza or bring to tutorials or office hours

Practice (~3 hours per module)

- Review mathematical concepts covered in the module by watching suggested videos
- Attend a 1 hour tutorial to practice mathematical skills required to complete the weekly assignment.
- Complete the short math quizzes specific to some sessions.
- Attend 1 hour lab session to review module material in preparation for module activity and quiz

Apply (~4 hours per module)

- Complete the module activity and submit

Connect (~1 hour per module)

- Interact with your classmates and instructors through Piazza

There will also be 8 short quizzes and 1 final exam. The final will be a 2 hour timed exam administered online by ProctorU (for a fee of $13). Register for your exam (**at least 72 hours in advance**) through the ProctorU link in the menu on the left side of this page or at https://www.proctoru.com (Links to an external site.).

There are hard deadlines for submitting assignments and taking the exam. These deadlines are intended to keep you on pace to finish the course. **LATE ASSIGNMENTS WILL BE PENALIZED BY 50% (i.e. if you get 100% of the questions correct, you will receive a grade of 50%) SO START THE WORK EARLY AND GIVE YOURSELF PLENTY OF TIME TO WORK ON THE MATERIAL AND ASK QUESTIONS.**

DRC Accommodations

The Disability Resources Center reduces barriers to inclusion and full participation for students with disabilities by providing support to individually determine reasonable academic accommodations. If you have questions or concerns about exam

accommodations or any other disability-related matter, please contact the DRC office, located in Hahn 125 or at 831-459-2089 or drc@ucsc.edu.

Math Requirements

This course satisfies a MF general education distribution requirement.

- We will be using algebra and logarithms
- Metric units will be used for all
- Exams will require manipulation of exponents without the aid of a calculator (scientific notation)
- We will do data analysis and lots of problems
- Math tutorials will be offered several times per week. Some tutorials will review that current week's math content, and some will cover the previous week's material.
- Scoring less than 80% on a math quiz will require attendance at both types of math tutorial sessions (i.e. one focusing on the previous week and one focusing on the current week). Attendance at both sessions in this case will result in extra credit points.

Grading (400 Total Points)

50% 8 Interactive exercises, 25 points each, 200 total

10% 5 Math Quizzes, 8 points each, 40 total

10% 8 Lecture-Quizzes, 5 points each, 40 total

30% Final exam, 120 points

Extra Credit:

+10% Possible Extra Credit for Participation (attendance at lab sessions, productive questions, comments, or other posts on Piazza)

Academic Integrity

Academic integrity is the cornerstone of a university education. Academic dishonesty diminishes the university as an institution and all members of the university community. It tarnishes the value of a UCSC degree.

All members of the UCSC community have an explicit responsibility to foster an environment of trust, honesty, fairness, respect, and responsibility. All members of the university community are expected to present as their original work only that which is truly their own. All members of the community are expected to report observed instances of cheating, plagiarism, and other forms of academic dishonesty in order to ensure that the integrity of scholarship is valued and preserved at UCSC.

In the event a student is found in violation of the UCSC Academic Integrity policy, he or she may face both academic sanctions imposed by the instructor of record and disciplinary sanctions imposed either by the provost of his or her college or the Academic Tribunal convened to hear the case. Violations of the Academic Integrity policy can result in dismissal from the university and a permanent notation on a student's transcript.

For the full policy and disciplinary procedures on academic dishonesty, students and instructors should refer to the Academic Integrity pageLinks to an external site. at the Division of Undergraduate Education.

Schedule

Add/drop deadline: Monday, January 27

Request for "W": Tuesday, February 18

Module	Topic	Interactive Exercise	Week & Reading
1	Course Orientation	Quiz on course requirements	Week 1
2	Plate Tectonics and Faults	Investigating global and regional earthquake distributions using the IRIS Earthquake Browser (IEB)	Week 2 Ch. 1 & 7
3	Earthquakes, Forces and Friction	Understanding forces and friction	Week 3 Ch. 2
4	Seismic Waves & Earthquake Location	Earthquake location using Google Earth	Week 4 Chapter 1 pp. 20-25
5	Earthquake Parameters	Earthquake rupture, magnitude, and intensity	Week 5 Chapter 8

6	Earthquake Probability and Forecasting	Probability and earthquake statistics	Week 6 Chapter 10
7	The San Andreas Fault	San Andreas Fault geomorphology using Google Earth	Week 7 Ch. 3
8	Induced Seismicity	Did humans cause these earthquakes?	Week 8 Ch. 4: p. 90 - 101
9	Earthquake preparedness, safety, and early warning	Living in earthquake country	Week 9 Chapter 11 & 12
10	Review and Synthesis	Review sessions to prepare for final exam	Week 10
	FINAL		
		Proctor U	