EART 11: Earthquakes- Online

Summer Session 2, 2019

Instruction dates: 07/29/19 – 08/30/19 (5 weeks)

About

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

- Explain why earthquakes happen, when we can expect them and what we can do to mitigate their occurrence.
- Introduce some fundamental concepts in the Earth Sciences.
- Teach quantitative problem solving skills applicable to real world data.

After completing this class students will be able to:

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

Instructor Information

Instructor	Email	Online Office Hours
Thomas Goebel	tgoebel@ucsc.edu	Mon, Tue, Fri: 4 to 5 p.m.

TA	Email	Online Office Hours
TBD	TBD	TBD

Textbook

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

Course Requirements – 10 total modules

The class consists of 10 modules covering various topics, designed for you to work on and complete one module within about ~2 to 3 days. Each module consists of about 3 mini-lectures to watch. Make sure you take notes as you would during an in-class lecture. To further support the class content there will be reading assignments specific to each module, online math tutorial sessions and specific problem sets to complete. Each module will have a short quiz for you to test your knowledge.

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 and attending a 1.5 hour synchronous tutorial to practice mathematical skills required to complete the weekly assignment. Complete the short quizzes specific to each session.

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 10 short quizzes and 1 final exam.
There are hard deadlines for submitting assignments and taking the exam. These deadlines are intended to keep you on pace to finish the course in 5 weeks.

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 vigorously.
- Metric units will be used for all measurements.
- Exams will require manipulation of exponents without the aid of a calculator (Scientific Notation).
- We will do data analysis and lots of word problems.
- **If your math is rusty, now is an excellent time to brush up**.
- Look for math review videos/practice problems online. Here are *some* examples:
  - Scientific Notation: http://www.youtube.com/watch?v=i6lfVUp5RW8
  - Multiplying and Dividing in Scientific Notation: http://www.youtube.com/watch?v=497oIjqRPco
  - Exponent and Logarithm Properties: http://www.wtamu.edu/academic/anns/mps/math/mathlab/col_algebra/index.ht m (Tutorials 42---46)
  - Metric System Units: https://www.youtube.com/watch?v=w0nqd_HXHPQ

Grading

50% Weekly interactive exercises (Lowest exercise grade will be dropped) 15% Quizzes (Lowest quiz grade will be dropped)
35% Final exam

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 page at the Division of Undergraduate Education.

Preliminary Class Schedule

(subject to change depending on class progress and participation)

Add/Drop deadline:
Monday, August 5
Request for "W": Friday, August 16

Module	Topic	Interactive Exercise	Week & Reading
1	Plate Tectonics and Faults	Investigating global and regional earthquake distributions using the IRIS Earthquake Browser (IEB)	Week 1 Chapters 3, 4 & 7
2	Earthquakes, Forces and Friction	Understanding forces and friction	Week 1
3	Seismic Waves	Earthquake location using Google Earth	Week 2 Chapter 1 & 5
4	Earthquake Parameters	Earthquake magnitude	Week 2 Chapter 8
5	Earthquake Probability and Forecasting	Probability and earthquake statistics	Week 3 Chapter 10

6	Building for Earthquakes and Earthquake Early Warning		Week 3 Chapter 11 & 12
7	Induced Seismicity	Did humans cause these earthquakes?	Week 4 p. 90 - 101
8	Related Hazards- Landslides, Volcanoes and Tsunamis	Mapping a tsunami wavefront	Week 4 Chapter 9
9	The San Andreas Fault	San Andreas Fault geomorphology using Google Earth	Week 5 p. 7, map
10	The Cascadia and Alaska Subduction Zones	Megathrust earthquakes	Week 5 Chapter 10, p. 230-235
	FINAL		