EARTHQUAKES AND SEISMIC HAZARDS - GEOL 344

Instructor: Simon Kattenhorn
Spring Semester 2008: MWF 9.30 a.m. - 10.20 a.m., Mines 306

Course Summary

This course examines the geology of earthquakes and the impact that earthquakes have on society in terms of hazard assessment and preparation. In order to understand the physical process of earthquakes, we examine fundamental reasons for failure along a fault surface in an attempt to answer the question: why do earthquakes occur? From the geophysical perspective, we discuss seismic waves, how they are measured, and what we can learn from them about the fault that produced the earthquake. From the geological perspective, we investigate seismicity associated with all fault types in all types of tectonic settings, emphasizing specific case examples. We will look at how the study of ancient earthquakes, or paleoseismology, can help us understand future earthquakes. We then investigate the methods of assessing seismic hazard in active fault environments and discuss how new scientific concepts about earthquakes may help us better predict the locations of high risk areas.

Course Goals

The course will develop your understanding of why faults produce earthquakes by considering the three-dimensional geometry of faults in nature and examining how failure of those faults is related to the state of stress in seismogenic crustal rocks. Ultimately, you will learn to recognize what information is needed in order to make an adequate seismic hazard assessment in any earthquake-prone region, and how that information can then be used effectively to make the hazard assessment.

Prerequisites

Most concepts will be introduced from first principles, however a rudimentary understanding of structural geology is required from Geol 101 or 111 (Physical Geology).

Please see the instructor if you have any questions regarding these prerequisites.

Course Logistics

Instructor: Simon Kattenhorn (please call me Simon)
I am an Associate Professor in the Dept. of Geological Sciences. My office is in McClure Building (directly opposite the Mines Building), Room 303D. McClure is wheelchair accessible from all entrances and has two elevators (NW and SW corners).

Office hours: Tuesdays from 1.45-2.45 p.m. and Wednesdays from 10.30-11.30 a.m. Please feel free to make an appointment to see me another time if this is not convenient for you, or just stop by my office. The office hours shouldn't be regarded as being exclusively a time to address difficulties you are having with the course. You can use it for general discussion, to collect or borrow materials, to clarify issues from class, to talk about your term paper, or just to share interesting information you've discovered about earthquakes.

Office phone: 5-5063 from on campus (else 885-5063). The best time to reach me is during the office hours. I have voice mail - if you would like me to call you back, leave your name, telephone number and a convenient time to call you and I will attempt to return your call ASAP.

Email: simkat@uidaho.edu (this is the most efficient way to get a hold of me).
Mailbox: if you wish to leave items in my mailbox, it is in the room directly opposite the Geological Sciences departmental office (Mines 322).

FAX: you can FAX materials to me at (208) 885-5724. Be sure to include my name on the FAX.

Course Website: http://www.uidaho.edu/~simkat/geol344.html
From here, you will be able to download class handouts (excluding photocopied papers). The course website includes a link to my "Earthquake Resources on the Web" site. Spend some time browsing the links on this site. Also, make frequent use of the website containing daily updates on current seismicity around the world.

Required textbook: Robert S. Yeats, Kerry Sieh, and Clarence R. Allen
The Geology of Earthquakes (currently out of print so not available in the UI bookstore – you will need to find a copy at an online retail provider such as amazon.com)
Oxford University Press, 1997

Additional Reading: see website for list (I have these texts and you are welcome to borrow them for up to 1 day at a time)

Handouts: a limited number may be provided. Your student account may be billed for some photocopy charges.

Assignments and Examinations

1) Maintaining map of current seismicity in the world (on the bulletin board in the lecture room). Students will receive a bonus of up to 2% on their final exam grade for consistently plotting earthquake locations within 2 days of receiving their assignment. A deduction of up to 2% will be levied against students who consistently fail to complete this assignment adequately.

2) Discussions about major current earthquake events (M>7.0) with short in-class presentations.

3) Homework assignments: handed out on Wednesdays; due in class the following Wednesday. There will not be a homework assignment every week.

4) Midterm examination on Wednesday, March 5th, 9.30 a.m. - 10.20 a.m. in Mines 306.

5) Term project on historic earthquakes of the United States. Due in class on Friday, May 3rd.

6) Final examination on Monday, May 5th, 10 a.m. in Mines 306.

Grading

Homework exercises: 40%
Term paper: 10%
Midterm exam: 25%
Final exam: 25%
Attendance: up to 2% bonus. Up to 10% deduction for poor attendance (1% deduction for each absence in excess of 3 allowed absences)

Please speak to me if you do not fully understand the grading policies for this course or if you have any questions about the expectations for this course.

Field Trip
There is a mandatory 4-day field trip to be held Friday April 25th – Monday April 28th. We will visit the sites of the Borah Peak, ID and Hebgen Lake, MT earthquakes. Student accounts were charged $100 towards the cost of the field trip at the start of the semester. Any excess charges will be posted to student accounts after the field trip.