GEOL 104: Living with Earthquakes in California: Spring 2013

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Class time TT, 11:00-12:15, Live Oak 1219.
Office hours: W 1100-1200, or by appointment.

This course fulfills the General Education, Lifelong Learning requirement for the Baccalaureate Degree at CSUN. As stated in the catalog, "Lifelong Learning coursework encourages students to develop an appreciation for the importance of the continued acquisition of new and diverse knowledge and skills, and offers opportunities to integrate personal, professional, and social aspects of life." This course examines the revolution in earthquake hazard awareness that has occurred in California since the mid-1980's, when the scale of the earthquake hazard began to emerge from scientific discovery. The 1994 M6.7 Northridge earthquake played a pivotal role in pushing earthquake hazard assessment to the fore. Students will investigate the reciprocal ways in which science has informed the public, political, and economic debate over the implications of earthquake hazard as well as exploring the manner by which public and political priorities have shaped the direction of scientific and engineering response to the hazard. 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*). Students will explore the political and economic dimensions of scientific and technological change. The current understanding that the population of California is exposed to a significant hazard is an excellent example of a scientific revolution. The nature of the scientific enterprise and its relationship to technology and the complexity of major revolutions in science and technology is a central theme of this course.

Student learning outcomes include:

- *Locate major physiographic provinces and tectonic boundaries in California*
- *Recognize that scientific data caused a paradigm shift in society's perception of natural hazards in California*
- *Describe the earthquake cycle.*
- *Analyze evidence for past earthquakes from geologic data and strain accumulation leading up to earthquakes*

- *Describe the major effects of earthquakes for ground motion and tsunami generation and the effects of earthquake shaking on the built environment*
- *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.*
- *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.*

Critical thinking skills will be developed through in-class exercises and discussion, participation in the panel of experts, and through the writing of a 5-page paper on some aspect of earthquakes.

Texts: *Living with Earthquakes in California: A Survivor's Guide (1st edition by R. S. Yeats)*

Putting Down Roots in Earthquake Country (PDR) (http://www.earthquakecountry.info/roots/)

Predicting the Unpredictable (1st edition by S.E. Hough)

Peace of Mind in Earthquake Country (3rd edition by P.I. Yanev and A.C.T. Thompson)

Grading is based on Total Points Earned out of 500 possible:

1) Moodle quizzes/in-class exercises (50 pts)
2) Exams (200 pts total)
   Mid-term and Final each 100 pts
3) CSUN Emergency Preparation Festival (100 pts)
4) Field Trip Sat. Feb. 23th (1000-1700) (50 pts)

5) **Essay Due** at start of class **May 9** (no exceptions) (100 pts)
Choose to write an essay (5 pages, double-spaced) on ANY earthquake-related topic covered during this course. Possibilities include:

1. Pros/cons of Earthquake Insurance
2. How safe is safe enough for your
   a. Home?
   b. Office?
3. Pros/cons of spending money before the earthquake to minimize damage vs. saving money for after the earthquake to expedite recovery efforts
   a. from a Government perspective
   b. from a Business perspective
   c. from a personal perspective
4. Failures/successes of earthquake preparedness during the (fill in the blank) earthquake

CLASS SCHEDULE (Reading assignments in parentheses are to be completed PRIOR to class day listed)

Week of Jan. 21
22nd) Introduction (LA Times article about new San Andreas fault study)
24th) Impact from Historical Earthquakes in California (Yeats, p.1-25); Ready to Rumble (Hough, p. 1-28)

Week of Jan. 28
29th) In-class video/assignment
31st) A concept of Time, Plate Tectonics, and Earthquake Basics (Yeats, p. 26-74; PDR p. 26-31; Hough p. 29-46)

Week of Feb. 4
5th) The San Andreas fault system (Yeats, p.75-115; Hough, p. 47-57; PDR, p. 4-13)
7th) The San Andreas fault system, continued.

Week of Feb. 11
12th) The Transverse Ranges (Yeats, 116-132)
14th) Shakes in the Back Country (Yeats, Chapter II, p.133-158)

Week of Feb. 18
19th) Memories of the Future: The Uncertain Art of Earthquake Forecasting (Yeats, p.185-216; Hough, p. 58-85)
21st) Earthquake prediction: From Percolation to Heyday to Hangover (Hough 86-124)
23rd) Mandatory Field Trip, 1000-1700

Week of Feb. 25

26th) Highly Charged Debates and Reading Tea Leaves (Hough, 125-149)
Catch up and review
28th) Midterm Exam (covers Yeats p. 1-216, Hough p. 1-149)

Week of Mar. 4
5th) Shaky Ground and Big Waves (Yeats, p. 217-259)
7th) Acclerating Moment Release/On the Fringe (Hough, p. 150-170)

Week of Mar. 11
12th) Complicity and Measles (Hough, 171-195)
14th) Prevention and Countermeasures (Yeats, Chapter IV, p. 260-296)

Week of Mar. 18
19th) Engineering Large Structures for Seismic Safety (Yeats, p. 297-311; Yanev and Thompson, p. 51-74)
21st) Simple Ways to Make Your Home Safer Against Earthquakes (Yanev and Thompson, p. 111-144)

Week of Mar. 25
Mar. 26th) CSUN Emergency Preparedness Fair preparation
Mar. 28th) Save the People or Save the Building (Yanev and Thompson, p. 75-110)

Week of Apr. 1
2nd) CSUN Emergency Preparedness Fair – Guest speaker (TBA)
4th) Earthquake Insurance: General Principles (Yanev and Thompson, ch 8-9, p. 145-166)

Week of Apr. 8 – SPRING BREAK, NO CLASS

Week of Apr. 15
16th) CSUN Emergency Preparedness Fair preparation
18th) CSUN Emergency Preparedness Fair

Week of Apr. 22
23rd) Role of Federal Government in Earthquake Hazard Mitigation (Yeats, p. 312-328), of State and Local Government: Disaster Preparedness (Yeats, p. p. 329-347).
25th) NO CLASS MEETING.

Week of Apr. 29
30th) Role of Individual Citizens (PDR. p. 16-19; Yeats, p. 348-360).
May 2nd) An Uncertain Appointment with a Restless Earth (Yanev and Thompson, p. 167-173)

Week of May 6

7th) We all have our faults, The Bad One, Whither Earthquake Prediction (Hough, 196-229).
9th) Term paper due. Catch up and review.

Week of May 13
14th) Final Exam, 10:15 – 12:15.