CE 533 Geotechnical Earthquake Engineering
Fall 2011

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Textbook: Kramer, Steven L. (1996). Geotechnical Earthquake Engineering. Prentice Hall

Course Description:

This course aims to provide understanding of the fundamental physics and mathematics governing soil response to earthquake loading, and the parameters controlling that response. Once the fundamental concepts are firmly established, design procedures incorporating these concepts will be introduced.

Topics covered:

Potential Topic	Reading
Vibratory motion; Single degree-of-freedom systems	Appx. A & B
Wave propagation through soils	Ch. 5
Dynamic soil properties	Ch. 6.1 – 6.3
Strength and deformation characteristics of cyclically loaded soils	Ch. 6.4 – 6.5
Earthquake site response analysis	Ch. 7
Ground motion characterization	Ch. 3 &4
Liquefaction	Ch. 9
Ground settlement	Ch. 9.6.3
Seismic analysis and stability of slopes	Ch. 10, notes
Seismic analysis and design of retaining structures (time permitting)	Ch. 11, notes

Grading:

Homework:	30%
Final exam:	35%
Project:	35%

Course Project:

Each student will research recent advances related to a topic of interest in the subject of Soil Dynamics/Geotechnical Earthquake Engineering. Each student will prepare a 7-10 page paper describing the results of their research and deliver a 15- to 20-minute oral presentation in class describing the results of their research. Below is a non-exhaustive list of journals you may wish to consult in conducting your research. An *approximate* timeline is as follows:

Identify research project topic:	Oct. 24 & 31
Papers due and presentation:	Nov. 21 & 28 (last day of class)

Journals publishing Geotechnical Earthquake Engineering topics (a non-exhaustive list):

- Earthquake Spectra
- Earthquake Engineering and Structural Dynamics (Wiley)
- Soil Dynamics and Earthquake Engineering (Elsevier)
- Journal of Geotechnical and Geoenvironmental Engineering (ASCE)
- Geotechnical Testing Journal (ASTM)
- Soils and Foundations (Japanese Geotech. Journal)

Other Sources of Information:

a. CA State Seismic Hazard Maps:
Department of Conservation, California Geological Survey: www.consrv.ca.gov

(The following are available on Blackboard):

b. Southern California Earthquake Center (SCEC), USC: www.scec.org
Recommended Procedures for Implementation of DMG [Division of Mines and Geology] Special Publication 117:

- Guidelines for Analyzing and Mitigating Liquefaction Hazards in California
- Guidelines for Analyzing and Mitigating Landslide Hazards in California

c. Federal Highway Administration (FHWA):
Geotechnical Engineering Circular No. 3 - Design Guidance: Geotechnical Earthquake Engineering for Highways:

- Vol. 1 – Design Principles (Publication No. FHWA-SA-97-076)
- Vol. 2 – Design Examples (Publication No. FHWA-SA-97-077)