Syllabus **CSU Sacramento**

CE 184: Introduction to Earthquake Engineering **Fall 2015**

Mondays and Wednesdays, 7:30 – 8:45 AM
Riverside 1006
Course website: http://sacct.csus.edu

Instructor:

Richard Armstrong, Ph.D., P.E.
Office: 4046 Riverside Hall
Office hours: Tuesdays and Wednesdays, 9:30 – 11:00 AM
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Recommended Textbooks:

Kramer, S. L. (1996), Geotechnical Earthquake Engineering, Prentice Hall

Bolt, B. A. (2006), Earthquakes, W. H. Freeman and Company
(Textbook resources are found at http://bcs.whfreeman.com/earthquakes/default.asp)

Computer Software:

- Python, recommended distribution by Continuum Analytics. Free for download (https://store.continuum.io/cshop/anaconda/) but also available in computer laboratories.

Prerequisites: CE 161 and CE 171A.

Course Description:

The purpose of CE 184 is to help students understand the theory and develop the tools necessary to estimate seismic loading for the analysis and design of civil infrastructure. Coverage will include basic concepts of seismology, seismic hazard analysis, and ground motion development and selection, as well as the soil site effects and soil-structure interaction. CE 184 complements the undergraduate curriculum, providing students with helpful background for the seismic portion of the P.E. examination, and also provides an important foundation for subsequent graduate courses in geotechnical and structural engineering.

Grading:

Grades will be weighted as follows:

Problem Sets	**20%**
Term Report and Presentation	**20%**
Class Participation and Attendance	**5%**
Midterm Exam	**20%**
Final Exam	**35%**

Grades will be based upon the standard percentages.

Problem Set Details:

Problem sets will involve hand-calculations and Python computing assignments. Problem sets must be prepared professionally – see "Grading Problem Sets." The due date specified on the problem sets must be met. Late assignments will not be accepted without a compelling reason. Students can work in groups to share and discuss ideas and processes but must do the actual work individually.

Term Report and Presentation:

The term project will involve summarizing a previously well-documented earthquake event. Deliverables will include a short report (around 10 pages) and a Powerpoint presentation and should include at least a description of the engineering seismology and earthquake ground motions as well as the recorded structural and geotechnical damage. Students will be required to work in groups of three, submitting a group report and performing a group presentation. The workload should be split evenly among group members. The grade for the term project will be determined based on each individual student's effort in his/her portion of the report and presentation.

Examination Details:

Exams will involve a combination of conceptual and computational problems. A summary sheet will be allowed: 1 page (double-sided) for midterm, 2 pages (double-sided) for final exam.

Tentative Schedule:

Module	Topic	Approx. Duration	Suggested Reading
Module 1	**Seismology & Earthquakes**	2 weeks	• Kramer Chapters 1–2 • Bolt Chapters 1–4, 7
Module 2	**Strong Ground Motion**	1 week	• Kramer Chapter 3 • Bolt Chapters 5, 7, 8 • Borzorgnia and Campbell (2004)[1]
Module 3	**Seismic Hazard Analysis**	3 weeks	• Kramer Chapter 4 • Bolt Chapter 8 • Borzorgnia and Campbell (2004)[1]
Module 4	**Ground Motion Selection & Modification**	2 weeks	• Kramer Chapter 8
Midterm			
Module 5	**Soil-site Effects**	4 weeks	• Kramer Chapters 5–7 • Bolt Chapter 10
Module 6	**Soil-structure Interaction**	2 weeks	• Kramer Chapter 7
Final Exam			

[1] "Engineering characterization of ground motion", Y.Bozorgnia and K.W. Campbell, Book Chapter 5, *Earthquake Engineering: From Engineering Seismology to Performance-Based Engineering*, Bozorgnia and Bertero (Eds.), CRC Press, June 2004.

--- Scope and coverage of course may change through the semester. ---

Course Policies:

Course Preparation – Students are expected to complete the readings of assigned materials prior to each lecture.

Academic Dishonesty – Any instance of academic dishonesty will result in a grade of "F" for the course and all other sanctions as applicable by the current University policy. Academic dishonesty includes, but is not limited to, copying another student's work.

Add/Drop – The add/drop policies are the same as those outlined for the Fall 2015 schedule.

Class Disturbance – Professional behavior is required of all class participants during all aspects of the course. Coming to class late is a form of class disturbance. Chitchatting disturbs the class, too. It is unprofessional to eat food in class.

Disability Access – If you have a disability and require accommodations, please provide disability documentation to SSWD, 1008 Lassen Hall, (916) 278-6955. Please discuss your accommodation needs with me during the first week of the semester.

Grading Problem Sets:

The habits you form as an engineering student will follow with you in practice. For this reason, strive to develop good habits of producing neat, legible, and accurate calculations. Remember that your associates in practice and your future clients may review your calculations and notes, and thus form an impression of your qualifications based on your presentations. Always make your work complete by using clear sketches. Use a straightedge, compass, Excel, or other engineering tools to plot. Try to keep your sketches reasonably close to true scale. Place plenty of information on your sketches, as it will prove useful. Use engineering paper and only one side of the paper. Finally, record your final results to no more than three significant figures after the decimal point.

The following ground rules will apply in the grading of problem sets for this course. Points will be deducted for each of the following items:

1. Not using engineering paper.
2. No sketches where sketches are necessary or desirable.
3. No units where units are applicable.
4. No rounding off of final answers to an appropriate number of significant figures and no underlining of final answers.
5. Not numbering each page and each problem.
6. Not stapling each problem set.