CE 387R.5 Geotechnical Earthquake Engineering
SPRING 2005

Instructor: Dr. Ellen M. Rathje
ECJ 9.227B
232-3683
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Office Hours: MW 10-11 am

Lectures: MWF 11:00-12:00
ECJ 7.202

Rathje, Ellen M. “Course Packet for CE387R5” (available at Texas Union Copy Center, Room 2.214). This course packet includes relevant journal articles that will be assigned for reading throughout the semester.
A number of other papers will be made available or cited during the course.

Objectives: The purpose of this course is to familiarize students with the field of geotechnical earthquake engineering. Lectures will focus on describing earthquake hazards and developing methods used for seismic analysis and design.

Assignments: The course focuses on the student utilizing methods to analyze geotechnical earthquake engineering problems. Individual homework assignments and one project will be assigned. The project will involve a site response study and students will work in two or three person groups. A concise, consulting engineer letter report will be required for this project. Grades for late assignments will be reduced by 25%.

Exams: A midterm exam will be given after Topic 3. A final exam will be given on Saturday, May 14, 2005 from 2 – 5 pm.

Participation: Classroom participation is strongly encouraged.

Grading:

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<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Assignments</td>
<td>20%</td>
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<tr>
<td>Project</td>
<td>15%</td>
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<tr>
<td>Midterm</td>
<td>25%</td>
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<tr>
<td>Final</td>
<td>35%</td>
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<td>Participation</td>
<td>5%</td>
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Students with Disabilities
The University of Texas at Austin provides upon request appropriate academic adjustments for qualified students with disabilities. For more information, contact the Office of the Dean of Students at 471-6259, 471-4241 TDD or the College of Engineering Director of Students with Disabilities at 471-4382.
Course Outline

1. Introduction (Kramer 1996 - Chapter 1, Reader Article 1)

2. Earthquakes (Kramer Ch. 2, 4, and 3, Reader 2-6)
   - Seismicity
     - Recurrence, magnitude and intensity
     - Attenuation relationships
   - Fundamentals of vibration, response spectra (Kramer Appendix B)
   - Characteristics of ground motions
   - Probabilistic Seismic Hazard Analysis
   - Prediction of rock motions for design purposes

3. Influence of Soil Conditions on Ground Motion Characteristics (Kramer Ch. 8, 6, and 7)
   - Recorded data from previous earthquakes (Ch. 8)
   - Dynamic soil properties (Ch. 6)
   - Methods of analyzing level ground response (Ch. 7)
   - One-dimensional wave propagation analysis (Ch. 7)

4. Soil Liquefaction (Kramer Ch. 9 and 12, Reader 8-10)
   - Pore pressure generation during cyclic loading
   - Laboratory testing
   - Field test procedures for evaluating liquefaction potential
   - Liquefaction remediation techniques

5. Seismic Performance of Slopes and Earth Structures (Kramer Ch. 10, Reader 11-12)
   - Observations from previous earthquakes
   - Seismic coefficient and pseudostatic analysis
   - Earthquake-induced permanent displacements
   - Dynamic analysis procedures
   - Seismic analysis and design of earth dams and solid-waste landfills

5. Lateral pressures during earthquakes (Kramer Ch. 11)
   - Retaining systems
   - Analytical procedures
   - Design