CE 725 – EARTHQUAKE ENGINEERING AND SEISMIC DESIGN

COURSE OBJECTIVE

At the conclusion of the course, students will (1) Be able to develop analytical models and conduct analysis of structures under the influence of seismic actions. (2) Develop an understanding for the effects that earthquakes have on structural systems. (3) Develop an understanding of basic aspects critical for seismic design, assessment, and retrofit. (4) Apply the basic principals of Performance-Based Earthquake Engineering, through the use of Direct Displacement-Based Design, to a variety of structural systems. (5) Apply the principals of capacity design for the proper detailing of RC structures subjected to seismic conditions.

PREREQUISITES

Structural Dynamics (CE 722 or equivalent), Advanced structural analysis (CE 425 or equivalent), structural design (courses in concrete)

TEXT


http://www.iusspress.it/pc/viewCategories.asp?idCategory=21&lvl1=17

Also available via the NCSU bookstore.

GRADING

Homework – 60% (8 Assignments) NOTE: While I encourage you to discuss concepts and homework in groups if you like, all homework assignments must be done individually, and be unique to each student.

Final Exam - 30% 

Journal and Text Readings – 10% (3 Research Article Reviews; 6 Text Summaries)

Final grades are obtained based on a relative scale with the course average at the boundary between A- and B+. In the past, the course average has varied from 88% to 89%.

LECTURES

Tuesday and Thursday: 10:15am-11:30am Mann 406

OFFICE HOURS

Mon 1:30-3:15; Tues 2:45-5:00; Thursday 2:45-4:00. My office is Mann Hall 417.

CONTACT INFORMATION

Phone: 515-7261
Email: kowalsky@ncsu.edu;
Course Website: http://courses.ncsu.edu/ce725/lec/001/
Course Modules: http://www4.ncsu.edu/~kowalsky/teaching/CE725/725main.htm
<table>
<thead>
<tr>
<th>Lecture</th>
<th>Date</th>
<th>Topic</th>
<th>Read by</th>
<th>HW Due</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>8-21</td>
<td>Introduction: Earthquake Characteristics, Seismicity and History</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>8-26</td>
<td>Introduction: Earthquake Characteristics, Seismicity and History</td>
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<tr>
<td>3</td>
<td>8-28</td>
<td>Performance-Based Earthquake Engineering Overview</td>
<td></td>
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<tr>
<td>4</td>
<td>9-2</td>
<td>PBEE and Capacity Design Overview</td>
<td>T1</td>
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<tr>
<td>5</td>
<td>9-4</td>
<td>NO CLASS</td>
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<td>6</td>
<td>9-9</td>
<td>NO CLASS</td>
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<tr>
<td>7</td>
<td>9-11</td>
<td>Ductility and Non-Linear Behavior – Cross Section</td>
<td>Ch4 133-146</td>
<td>J2</td>
</tr>
<tr>
<td>8</td>
<td>9-16</td>
<td>Ductility and Non-Linear Behavior – Cross Section</td>
<td></td>
<td></td>
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<tr>
<td>9</td>
<td>9-18</td>
<td>Ductility and Non-Linear Behavior – Member</td>
<td>Ch4 147-170</td>
<td>H1</td>
</tr>
<tr>
<td>10</td>
<td>9-23</td>
<td>Ductility and Non-Linear Behavior – Member</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>9-25</td>
<td>Earthquake Representations: Time History and Response Spectra</td>
<td>Ch4 170-192</td>
<td>H2</td>
</tr>
<tr>
<td>12</td>
<td>9-30</td>
<td>Earthquake Representations: Response Spectra</td>
<td>Ch2 37-61</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>10-2</td>
<td>IBC Response Spectra</td>
<td></td>
<td></td>
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<tr>
<td>14</td>
<td>10-7</td>
<td>Equivalent Viscous Damping</td>
<td></td>
<td>H3</td>
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<tr>
<td>15</td>
<td>10-9</td>
<td>Fall Break - NO CLASS</td>
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<td>16</td>
<td>10-14</td>
<td>Equivalent Viscous Damping</td>
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<td>17</td>
<td>10-16</td>
<td>Equivalent Viscous Damping</td>
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<td>J3</td>
</tr>
<tr>
<td>18</td>
<td>10-21</td>
<td>Substitute Structure Method</td>
<td></td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>10-23</td>
<td>Overview of FBD and DBD</td>
<td></td>
<td>H4</td>
</tr>
<tr>
<td>20</td>
<td>10-28</td>
<td>Methods of Analysis: Force-Based ELF</td>
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<tr>
<td>21</td>
<td>10-30</td>
<td>Methods of Analysis: Force-Based ELF</td>
<td>Ch 1 1-35</td>
<td>T3</td>
</tr>
<tr>
<td>22</td>
<td>11-4</td>
<td>Methods of Analysis: Displacement-Based SDOF</td>
<td></td>
<td></td>
</tr>
<tr>
<td>23</td>
<td>11-6</td>
<td>Methods of Analysis: Displacement-Based SDOF</td>
<td>Ch 3 63-95</td>
<td>T4</td>
</tr>
<tr>
<td>24</td>
<td>11-11</td>
<td>Methods of Analysis: Displacement-Based MDOF</td>
<td></td>
<td>H5</td>
</tr>
<tr>
<td>25</td>
<td>11-13</td>
<td>Methods of Analysis: Displacement-Based MDOF</td>
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<tr>
<td>26</td>
<td>11-18</td>
<td>Methods of Analysis: Displacement-Based MDOF</td>
<td>95-115</td>
<td>H6</td>
</tr>
<tr>
<td>27</td>
<td>11-20</td>
<td>Methods of Analysis: Displacement-Based MDOF</td>
<td>127-132</td>
<td>T5</td>
</tr>
<tr>
<td>28</td>
<td>11-25</td>
<td>Methods of Analysis: Displacement-Based MDOF</td>
<td></td>
<td>H7</td>
</tr>
<tr>
<td>29</td>
<td>11-27</td>
<td>Thanksgiving Holiday – NO CLASS</td>
<td>Ch 5 221-250</td>
<td></td>
</tr>
<tr>
<td>30</td>
<td>12-2</td>
<td>Comparison – DBD and FBD</td>
<td>Ch 10 465-512</td>
<td>T6</td>
</tr>
<tr>
<td>31</td>
<td>12-4</td>
<td>Methods for Response Verification</td>
<td></td>
<td></td>
</tr>
<tr>
<td>32</td>
<td>12-6</td>
<td>Methods for Response Verification</td>
<td>Ch 4 192-220</td>
<td>H8</td>
</tr>
</tbody>
</table>
HOMEWORK PROBLEMS

HW 1: Section Ductility
HW 2: Member Ductility
HW 2: Response Spectra
HW 4: Substitute Structure Analysis
HW 5: SDOF FBD and DDBD
HW 6: FBD for a Frame
HW 7: DDBD for a Frame
HW 8: DDBD for a Bridge

COURSE MODULES

There are several online course modules for the semester that are designed to help understand some of the concepts. These are optional, however, it is strongly suggested that you spend some time with each of them as they come up in the course.

The four modules are: (1) PBEE, (2) Moment-curvature analysis, (3) Member response, (4) FBD vs. DBD

JOURNAL ARTICLE REVIEWS AND TEXTBOOK READINGS:

1. Journal Article on Seismicity of an area of your choosing (J1)
2. Journal Article on Performance-based earthquake engineering (J2)
3. Journal Article on Seismic Testing of a Structural Component or System (J3)
4. Chapter 4 of Textbook p133-192 (T1)
5. Chapter 2 of Textbook p 37-61 (T2)
6. Chapter 1 of Textbook p 1-35 (T3)
7. Chapter 3 of Textbook p63-132 (T4)
8. Chapter 5 of Textbook p221-250 (T5)
9. Chapter 10 of Textbook p465-512 and Chapter 4 p192-220 (T6)

There are many resources available online through the library. Start by looking at the E-Journal finder on the library web-page and look for journals with electronic editions, such as Earthquake Engineering and Structural Dynamics; Soil Dynamics and Earthquake Engineering; All of the ASCE Journals; Physics of the Earth and Planetary Interiors. In addition, consider: Earthquake Spectra; Journal of Earthquake Engineering; Seismological Research Letters; Bulletin of Seismological Society of America; Bulletin of the New Zealand Society for Earthquake Engineering, Journal of the American Concrete Institute. There are also many others to consider.

ATTENDANCE POLICY

Attendance is strongly encouraged, but not mandatory. Students are responsible for all material presented in class. See http://www.ncsu.edu/policies/academic_affairs/pols_regs/REG205.00.4.php
ACADEMIC INTEGRITY STATEMENT

Students will adhere to the academic policy set forth by University Code of Student Conduct (http://www.ncsu.edu/policies/student_services/student_discipline/POL11.35.1.php)

Plagiarism and cheating are attacks on the very foundation of academic life, and cannot be tolerated within universities. Section eight (8) of the Code defines academic dishonesty and provides information on potential sanctions for violators of academic integrity. You will be asked to sign the following statement on each test and on the final: “I have neither given nor received any unauthorized aid on this test.”

NCSU STATEMENT FOR STUDENTS WITH DISABILITIES:

Reasonable accommodations will be made for students with verifiable disabilities. In order to take advantage of available accommodations, students must register with Disability Services for Students at 1900 Student Health Center, Campus Box 7509, 515-7653.

http://www.ncsu.edu/provost/offices/affirm_action/dss/ For more information on NC State's policy on working with students with disabilities, please see

http://www.ncsu.edu/policies/academic_affairs/courses_undergrad/REG02.20.1.php

HOMEWORK SCHEDULE

Homework will be due at the beginning of class. Late homework accepted only with a valid written excuse.

FINAL EXAM

Exam will be closed book/notes. I will provide equations as appropriate. You will be asked to sign the NCSU Honor Pledge on every test. Missed tests can only be made up if there is a valid excuse.