COURSE SYLLABUS: CE 744: Foundation Engineering

INSTRUCTOR:  Roy H. Borden, Professor  
Department of Civil, Construction, and Environmental Engineering  
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Office Hours:  Wednesday 1-5pm  
Lecture Room:  Mann Hall 406

COURSE GOAL

Although the practice of foundation engineering requires significant knowledge in the areas of structural analysis, concrete and steel design, as well as construction means and methods, this course will focus on the geotechnical aspects of foundation engineering. This course is designed to provide graduate students in civil engineering with methods of analysis and design for various geotechnical systems. Topics to be covered include: subsurface investigations; excavations; design of sheeting and bracing systems; control of water; footing, grillage and pile foundations; drilled shaft and cofferdam methods of construction.

COURSE LEARNING OBJECTIVES

At the end of the semester, the student will be able to:
* Interpret subsurface information to propose material properties;
* Select appropriate models and analysis methodologies for a range of foundation engineering problems;
* Perform the geotechnical engineering (not structural) design functions for: shallow and deep foundations for vertical and lateral loads, retaining walls and basic excavation support systems.

PREREQUISITES

Graduate standing in Civil Engineering, CE 342, “Introduction to Geotechnical Engineering” or equivalent, or permission of instructor.

SUBMISSION OF WORK

For off-campus students, assignments shall be either faxed to the attention of Mike Myers at (919) 515-8415 or sent to Mike as an email attachment at mike_myers@ncsu.edu prior to the start of class on the day the assignment is due. Once the materials have been graded, they will be converted into a PDF file and sent out as an email attachment.
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<thead>
<tr>
<th>Week-Date</th>
<th>Topic</th>
<th>Reading Assignment</th>
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<tbody>
<tr>
<td>1- 1/11</td>
<td>Introduction –Foundation Design</td>
<td>Chs. 1, 2, 5, 6, 21</td>
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<tr>
<td>2- 1/16,18</td>
<td>Bearing Capacity / (cont.)</td>
<td>Chs. 6, 8</td>
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<tr>
<td>3- 1/23,25</td>
<td>Inclined Loads &amp; Moments /Layered Systems, and Sloping Ground</td>
<td>Ch.6, 8 &amp; Handout</td>
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<td>4- 1/30,2/1</td>
<td>Shear Strength / Compressibility</td>
<td>Ch. 3, Handout</td>
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<tr>
<td>5- 2/6,8</td>
<td>Site Characterization</td>
<td>Ch. 4, Handout</td>
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<tr>
<td>6- 2/13,15</td>
<td>Settlement-Clays / Sands</td>
<td>Ch. 7, 8</td>
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<td>7- 2/20,22</td>
<td>(cont.) / Deep Foundations</td>
<td>Chs. 11, 12, 17</td>
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<td>8- 2/27,3/1</td>
<td>Laterally Loaded Piles &amp; Shafts / <strong>EXAM (Chs 1-8)</strong></td>
<td>Ch. 16</td>
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<td>9- 3/6,8</td>
<td><strong>SPRING BREAK</strong></td>
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<td>10-3/13,15</td>
<td>Subgrade Reaction Analysis</td>
<td>LTBASE Manual</td>
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<td>11-3/20,22</td>
<td>Axial Capacity of Piles</td>
<td>Ch. 13, 14</td>
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<td>12-3/27,29</td>
<td>Pile Groups/ Pile Dynamics</td>
<td>Chs. 15</td>
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<td>13- 4/3,5</td>
<td>Wave Equation (cont.)/ GRLWEAP</td>
<td>GRLWEAP Manual</td>
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<td>14-4/10,12</td>
<td>(cont.) / Lateral Pressure</td>
<td>Chs. 22, 23</td>
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<td>15-4/17,19</td>
<td>Retaining Walls</td>
<td>Chs. 24</td>
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<td>16-4/24,26</td>
<td>Sheet Pile Walls /Excavation Support &amp; Dewatering</td>
<td>Ch. 25, Handout</td>
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<td>17-5/8</td>
<td>(Tuesday) Final Exam 1-4 pm</td>
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**Text:** Foundation Design: Principles and Practices, by Donald P. Coduto, 2000, Prentice Hall.

**Additional References:** A number of technical papers and on-line technical reports will be assigned for supplemental reading.

**Computer programs:** LTBASE computer code for laterally-loaded shafts available from instructor. GRLWEAP is made available as a student version.
COURSE GRADING

Mid Term Exam 20%
Final Exam 30%
Engineering Work 50%
TOTAL 100%

Grading Scale:
A-/ A / A+ 90.0-100.0  B- / B / B+ 80.0-89.9  C- / C / C+ 70.0-79.9
D- / D / D+ 60.0-69.9  F <60.0

COURSE POLICIES AND PROCEDURES

1. There will be one mid-term exam and one comprehensive final exam. These exams are
   closed-book exams. The final will be given during the regularly scheduled exam period and
   will be a closed-book exam.
2. If a student misses his/her final exam without a valid excuse, a zero will be averaged into
   his/her grade. See http://www.ncsu.edu/policies/academic_affairs/pols_regs/REG205.00.4.php for a detailed
   description of the University’s attendance regulations.
3. Assigned work will be due at the beginning of the class period on the assigned due date.
   Deductions of 2% credit per day will be assessed for late work.

   Engineering work will be assigned to help you understand the material. Professional
   presentation of work including discussion of assumptions and methodologies, neat sketches
   drawn to scale and appropriate references are required. Unprofessionally -presented work, or
   work that is not presented in a way that it can be clearly followed, will be returned for revision.
   Full credit will only be given for work presented on time and in a professional manner, unless,
   due to extenuating circumstances, a request for a time extension is made and permission is
   granted before an assignment is due.

   The development of spreadsheets is encouraged, but sufficient hand solutions must be
   provided to prove that the developed tool is correct. Typewritten solutions are not required, but
   if an individual’s printing is not clearly legible, it may be necessary.

ACADEMIC INTEGRITY STATEMENT

Students are expected to adhere to the guidelines for academic integrity as outlined in the NC
State University Code of Student Conduct (http://www.fis.ncsu.edu/ncsulegal/41.03-
codeof.htm). Cheating and plagiarism will result in loss of credit for the test or assignment in
question. A second occurrence would result in a failing grade for the course.

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. For more information on
NC State's policy on working with students with disabilities, please see the Academic
Accommodations for Students with Disabilities Regulation (REG02.20.1)"