

## CE 4510 – FOUNDATION DESIGN – SPRING 2010

MWF 1:00 p.m. - 1:50 p.m., CAST 204

Civil and Environmental Engineering

University of Connecticut, Storrs, CT 06269

### Course Policies, Course Outline and Relevant Information

#### Your Instructor

Dipanjana Basu - CAST 318, 486 5023, dbasu@engr.uconn.edu

Your instructor has a Ph.D. in geotechnical engineering. His teaching and research interests are in foundation engineering, ground improvement, bio-soil engineering, blast loading in soil, geothermal energy, soil structure interaction, soil dynamics and geosustainability. He has high expectations from the students. **Significant effort is required by the students to do well in this class.** Your instructor normally puts in extra time and effort for his courses if the students show interest. He is also available for individual help/discussion sessions if required. He believes that the students and the instructor are a **team, and together** they work toward success.

#### Your Course

CE 4510 covers the analysis, design, and construction aspects of shallow and deep foundations, and retaining structures. The main objective of CE 4510 is to enable students to select the best foundation-solution for different types of civil engineering structures. After completing the course, students should be able to design shallow and deep foundations for routine projects and supervise their construction. Additionally, students will know how to carry out the geotechnical design of several types of soil retaining structures.

#### Your Textbook

*The Engineering of Foundations* by R. Salgado, McGraw Hill, 1st Edition, 2006. You may be provided with handouts if necessary.

#### Website You Should Check

HuskyCT <<http://huskyct.uconn.edu>> will be used for posting course materials and for communication and discussions. You are strongly advised to **regularly** check the website for updates.

#### Things to Remember about Homework

Your homework is your **study guide** for exams. Homework will be graded for completeness and not for accuracy. Solutions will be provided. Homework must be submitted **in class** at the **beginning** of the class (unless otherwise stated by the instructor). No late submission is allowed.

**Engineering paper** must be used for homework (unless typed), and all diagrams and calculations must be organized and presented clearly to receive credit. Homework must be done individually (unless otherwise instructed) without any improper help.

#### Your Reading Assignments

You should **read** the portions of the text book to be covered in class **before** coming to class.

#### Your Projects

You will do two projects during the semester. You are expected to work in groups to complete the project assignments. **Engineering paper** must be used for the project reports (unless typed), and all diagrams and

calculations must be organized and presented clearly to receive credit. Individual interviews with the students may be conducted, if necessary, to assess the contribution of each student to his/her project work.

#### Short Quizzes You may Encounter

You will occasionally encounter prescheduled (not surprise!) short quizzes. You may expect three or four such quizzes. There will be no make-up quiz.

#### Your Midterm Examinations

You will encounter two midterm examinations during the semester in the **evening** (between 6:00 p.m. and 9:00 p.m.). Tentative dates are: March 18 and April 19, 2010. Make-up examinations may be administered only under extreme circumstances and only with prior consent (at least one day advance notice) of the instructor.

#### Your Final Examination

You will have a final examination during the finals week as per the official schedule given by the Registrar's office.

#### Grading Policy

Final Grade = Homework 15% + Short Quizzes 10% + Projects 25% + Midterm Examinations 30 % (15% + 15%) + Final Examination 20%. Absolute or relative (curved) grading will be done as per the discretion of the instructor depending on your performance and difficulty level of the evaluations.

#### Attendance

You are strongly encouraged to attend **all** classes. You may **lose** certain **privileges** if you have less than 90% attendance.

#### Academic Integrity and Behavior in and out of Class

If you cheat, plagiarize, misbehave or perform any form of misconduct, academic or otherwise, then you will face harsh consequences. You can learn more about your responsibilities and about how to behave in an academic environment at <[http://www.dos.uconn.edu/student\\_code.html](http://www.dos.uconn.edu/student_code.html)>.

#### Office Hours

Instructor: Dipanjan Basu - MWF 3:00 p.m. to 4:00 p.m. or by appointment.

#### Recitation

Review sessions (outside of regular class hours) may be scheduled as required. These are optional sessions of maximum 3-hour duration from 6:00 p.m. to 9:00 p.m. Tentative dates are: March 16 and April 15, 2010.

### Syllabus\*

<u>DATE</u>	<u>WEEK</u>	<u>CHAPTER/ SECTION</u>	<u>TOPIC</u>
1/20 1/22	1 1	2.1-2.4	<b>Foundation Engineering Overview:</b> Introduction; Types of Foundations; Foundation Design Frameworks (WSD, LRFD)
1/25 1/27 1/29 2/01	2 2 2 3	3.1, 3.5, 4.1, 4.3, 4.4	<b>Review of Soil Mechanics:</b> Phase Relationships; Effective and Total Stresses, Mohr Circle of Stresses; Mohr-Coulomb Failure Criterion
2/03 2/05 2/08 2/10	3 3 4 4	5.1, 5.2, 5.3, 5.4, 6.1, 6.2, 6.3, 6.5	<b>Mechanical Behavior of Sands and Clays:</b> Peak and critical state friction angles of sand; compressibility and undrained shear strength of clay; curve-fitted friction angle and cohesion
2/12 2/15 2/17 2/19	4 5 5 5	7.1, 7.2, 7.3, 7.4, 7.6, 7.7, 7.8 2.5	<b>Soil Exploration for Foundation Design:</b> Soil Boring; CPT; SPT; Other in situ Tests; Undisturbed Sampling <b>Tolerable Foundation Movements</b>
2/22	6	8.1, 8.2	<b>Shallow Foundation:</b> Applicability, Type, Construction
2/24 2/26 3/01 3/03 3/05	6 6 7 7 7	9.1, 9.2, 9.3, 9.4, 4.6, 9.5, 9.6, 6.1	<b>Settlement Analysis of Shallow Foundation:</b> Foundation Stress calculation by Boussinesq's and 2:1 methods; Settlement Calculations in Sand and Clay
3/15 3/17 3/19	8 8 8	10.1, 10.2, 10.3, 10.4, 10.5, 10.6	<b>Bearing Capacity of Shallow Foundation:</b> Sand and Clay
3/22 3/24 3/26	9 9 9	11	<b>Shallow Foundation Design</b>
3/29	10	12	<b>Deep Foundations - Piles:</b> Types, Construction/Installation
3/31 4/02 4/05 4/07 4/09 4/12 4/14	10 10 11 11 11 12 12	13.1, 13.2, 13.3, 13.4, 13.5, 13.6, 13.9, 15.1, 15.2, 15.4	<b>Pile and Pile Group:</b> Axial and Lateral Capacities <b>Pile Foundation Design</b>
4/16 4/19 4/21 4/23 4/26	12 13 13 13 14	4.4, 16.1, 16.2, 16.3, 16.4	<b>Retaining Structures:</b> Types and Purpose; Lateral Earth Pressure, At-rest, Active and Passive Stress States; Earth Pressure Theories, Rankine and Coulomb Earth Pressure; Gravity Walls; Cantilever Walls; Mechanically Stabilized Earth Walls
4/28	14	---	<b>Beams and Plates on Elastic Foundations (Time permitting):</b> Winkler Foundation, Modulus of Subgrade Reaction, Plate Load Test
4/30	14	---	<b>Student Presentation</b>

\*This is a tentative course outline. Deviations are possible.