GENERAL INFORMATION:
Course Reference Number: 62586
Semester: Fall 2008
Credit: (3-0-0)
Prerequisite: CIVE 450 (Introduction to Geotechnical Engineering)

SEMESTER SPECIFIC INFORMATION:
Location: Engineering B101
Time: M, W and F (8:00 – 8:50 am)
Instructor: Dr. Antonio Carraro
Office: Engineering A219
E-mail: carraro@colostate.edu
Phone: 491-4660
Office Hours: M, W and F (9:00 – 10:00 am)

COURSE DESCRIPTION: Foundation engineering combines the study of soil behavior (the material you learned in CIVE 450 or other equivalent soil mechanics course) with topics from engineering mechanics and structures. CIVE 550 covers the analysis, design, and construction aspects of shallow and deep foundations. In general, we discuss practical concepts of soil behavior, develop mechanistic methods of analysis, and apply our knowledge of soil properties and basic mechanics to the design of foundation elements.

COURSE OBJECTIVES: Upon completion of this class, students should be able to:
   a) Interpret field and laboratory data to obtain design properties.
   b) Identify major types of shallow and deep foundations.
   c) Predict foundation settlement.
   d) Properly use bearing capacity equations.
   e) Select the best foundation solution for different types of civil engineering structures.
   f) Design deep and shallow foundations for routine projects and supervise their construction.


ADDITIONAL REFERENCES:
   b) ASTM standards may be referenced throughout the course, whenever appropriate.

CLASS ATTENDANCE: Students should attend all classes to obtain maximum educational benefits. Absence or lateness does not excuse students from required course work. Students must inform the instructor prior to the anticipated absence and take the initiative to make up missed work in a timely fashion.

READING ASSIGNMENTS: Students are expected to read all textbook chapters provided according to the tentative course outline (see below).

GRADING: The final course grade will consist of two exams, one design project, and homework and quizzes. The grade distribution will be as follows (the +/- system for grading will be used):

<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Highest Exam Score</td>
<td>25 %</td>
</tr>
<tr>
<td>Lowest Exam Score</td>
<td>20 %</td>
</tr>
<tr>
<td>Design Project</td>
<td>30 %</td>
</tr>
<tr>
<td>Homework and Quizzes</td>
<td>25 %</td>
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<tr>
<td>Total</td>
<td>100 %</td>
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EXAMS: The Mid-Term Exam will be given one week from the day on which the last topic for that exam has been covered in class, thus offering you time to study and formulate questions over the material. The Final Exam will be given on 15-Dec (11:20 am – 1:20 pm), according to the University Schedule, and will not be comprehensive.

You must take the exams on the scheduled exam dates; no excuses will be accepted except for an incapacitating illness or a death in the immediate family. For these last two excuses, a signed medical note from a doctor (including address and phone number) will be required. Failure to take an exam on the assigned date without prior approval of the instructor will result in a score of zero.

HOMEWORK: Homework will be assigned on occasion. A due date will be established at the time the homework assignment is distributed. Homework is due at the beginning of class on the due date. Late homework will neither be graded nor collected. Engineering paper must be used, and all diagrams and calculations must be clearly presented to receive credit. Solutions to the homework will be posted on RamCT after the homework is graded to allow for review prior to the exam.

QUIZZES: Pop quizzes may be given at any time during the semester. Quizzes and Homework scores will be averaged to count as 25% of your total course grade.

GRIEVANCES: You may contest homework, quiz and exam grades in writing only. You should submit a complaint by the next class from the date the graded homework/quiz/exam is returned to you, indicating the item and question in which you believe a grading error was made. Please note that all grades reflect not only the correctness of the solutions but also organization and clarity of presentation.

DESIGN PROJECT: A design project will be assigned during the semester and should be completed in groups of 4-5 members. Peer evaluations will be used to determine if each group member is performing to standard and will be used to adjust individual grades given for group work. A final design report should be submitted by each group. Each group also will present the project to the class during one of the class periods (TBD). Details about the design project will be provided during the semester.

ACADEMIC INTEGRITY: While problems of this nature are not anticipated, please be advised that there are penalties and other serious consequences, as described in the Colorado State University Regulations whenever a student is involved in academic dishonesty. For further details on this issue please review the University rules on the following website:

<http://www.conflictresolution.colostate.edu/>
## Tentative Course Outline:

<table>
<thead>
<tr>
<th>TOPICS</th>
<th>PERIODS</th>
<th>READING ASSIGNMENTS</th>
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</table>
| 1) OVERVIEW  
- Foundations  
- The design process; Working Stress Design (WSD) and Load and Resistance Factor Design (LRFD)  
- Foundation types | 3 | Chapters 1 and 2 |
| 2) SOIL MECHANICS REVIEW  
- Mechanical behavior of sands  
- Mechanical behavior of clays  
- Critical State soil mechanics | 4 | Chapters 5 and 6 (Recommended reading: Chapters 3 and 4) |
| 3) SITE EXPLORATION FOR FOUNDATION DESIGN  
- Soil borings, sampling and SPT  
- CPT  
- Other in situ tests | 5 | Chapter 7 |
| 4) TOLERABLE MOVEMENTS OF BUILDING FOUNDATIONS  
- Measures of foundation movements  
- Criteria for tolerable settlements | 3 | Chapter 2 (2.5-2.6) |
| 5) SHALLOW FOUNDATIONS  
- Applicability  
- Types  
- Construction  
- Settlement analyses  
- Limit bearing capacity failure  
- Design | 8 | Chapters 8, 9, 10 and 11 |
| **Mid-Term Exam (TBD)** | | |
| 6) DEEP FOUNDATIONS IN SOIL  
- Types  
- Installation  
- End bearing and shaft resistance calculations  
- Design of piles for vertical loads  
- Pile load tests | 10 | Chapters 12 and 13 |
| 7) FOUNDATION DESIGN IN EXPANSIVE SOILS | 2 | TBD |
| 8) ADDITIONAL TOPICS | 4 | Chapters 14 and 15 |

Final Exam (December 15, 2008)