CE-UY 3153 Geotechnical Engineering
FALL 2017 COURSE OUTLINE

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Phone: (646) 997-3016

Class Time: Mondays 3:00–4:30 PM and Wednesdays 3:00–4:30 PM

Substitute Class Times: We are only required to meet every third Wednesday. I will try to finish all Wednesdays early in the semester, and will use the time for make up sessions for when I am out of town on professional travel commitments.

At this time I know I will be attending the International Conference of Soil Mechanics and Geotechnical Engineering in Korea, so class is canceled for Monday September 18, Wednesday September 20 and possibly Monday September 25.

Laboratories: Mondays 11-2:30 PM
NOTE: Some experiments will require that you take readings at other times.
Important: You must attend every lab to pass this class.

Office Hours: Mondays 4:30-5:30 PM, or by appointment

Required Reading:

Teaching Assistants: Dr. Ivan Guzman, PE
Email: guzman@nyu.edu
Office Hours: TBD
Ms. Lynn Li  
Email: ll3256@nyu.edu  
RH 407c  
Phone (646) 997-3967  
Office Hours: TBD

Prerequisite  
- Mechanics of Materials CE 2123 or equivalent  
- Fluid Mechanics CE 2213 or equivalent

COURSE OBJECTIVES

1. Become familiar with the subject and terminology of soil mechanics.

2. Become familiar with principles that govern the use and application of soil as an engineering material in civil and construction engineering.

3. Develop proficiency in the classification and quantitative evaluation of soil engineering properties.

4. Develop proficiency in solving fundamental problems related to soil mechanics, foundation engineering, and environmental geotechnology using theoretical and empirical geotechnical methods, including (1) Soil stress analysis, (2) effective stress, (3) consolidation, and (4) seepage.

5. Become familiar with standard laboratory soil testing equipment and be able to use them to determine soil properties.

6. Become familiar with mechanical behavior of soil including stress strain behavior, hydraulic conductivity; and volume change characteristics.

7. Prepare you for design courses in geotechnical engineering such as CE-UY 4173 Foundation Engineering.

COURSE POLICY

1. **Read** the relevant portion of the text book ahead of class, it will greatly aid your comprehension of the subject matter.

2. **Notes:** Take thorough notes during the lecture, because you are responsible for what is presented verbally as well as the textbook. After each lecture you should review your notes and study appropriate readings and work (not read) examples in the textbook.
3. **Participation** in class discussion is encouraged and expected. One of the objectives of this course is to help you develop your own communication skills.

4. **Attendance** in this course is mandatory. Missing more than five (5) lectures without a supported, documented and excused absence (i.e. Doctor, court, religious holidays, etc) will lower your final grade by 10%. Missed laboratory sessions will results in obtaining grade 0 for that session.

5. **Homework** will be assigned and collected regularly (typically due in one week). Home work will typically be assigned by the lab instructors. Only selected problems will be graded (Typically, only 2 problems will be randomly selected from each assignment and graded). Because the teaching assistant may not have enough time to finish grading your homework before an exam, you are advised to make a duplicate copy of your homework before you turn it in. Students are welcome to discuss the problems with each other, but all homework submittals must be done individually. Late homework assignments will be graded with late penalty; unless prior arrangements are made before the due date (requires a documented justifiable reason).

6. **Quizzes:** Unannounced quizzes may be given at any time during the semester. Quizzes will assess students on recent lecture and homework topics. No make-up quizzes will be administered. Any quiz or test missed without a documented and excused absence (i.e. Doctor, court, religious holidays, etc.) will represent a zero grade.

7. **Midterm:** A mid-term examination will be given during the class period. Actual date will be announced in class. Exam will be based on lecture and homework materials. The examination will contain numerical problems, and may also contain short answer questions and essays.

8. **Final:** The final is cumulative, covering all material covered in lectures and lab.

9. **Cell phones** Use and Texting are not allowed during the class and laboratory times.

### Lecture Outline

<table>
<thead>
<tr>
<th>Week</th>
<th>Topic</th>
<th>Required Reading in Principles of Geotechnical Engineering</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>Introduction to Soil Mechanics &amp; Foundation Engineering</td>
<td>Chapter 1</td>
</tr>
<tr>
<td>1</td>
<td>Phase Diagrams &amp; Weight Volume Relationships</td>
<td>Chapter 3</td>
</tr>
<tr>
<td>2</td>
<td>Classification of Soils</td>
<td>Chapter 2, 4, 5</td>
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<tr>
<td>3</td>
<td>Flow of Water in Soils, Hydraulic Gradient, Darcy’s Law</td>
<td>Chapter 7</td>
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Tentative Laboratory Outline

All Laboratory reports should be prepared individually and follow the recommended format. All Laboratory reports are due a week after completion of the respective experiment. Laboratory reports must be typed.

NOTE: Changes to the following schedule, if any, will be announced on NYU Classes.

<table>
<thead>
<tr>
<th>Week</th>
<th>Topic(s)</th>
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<tbody>
<tr>
<td>1</td>
<td>Introduction to Soils laboratory, Lab Safety &amp; Engineering reports</td>
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<tr>
<td>2</td>
<td>Measurement of Water Content</td>
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<tr>
<td>3</td>
<td>Sieve Analyses</td>
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<tr>
<td>4</td>
<td>Atterberg Limits &amp; Soil Classification</td>
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<td>5</td>
<td>Standard &amp; Modified Proctor Compaction Test</td>
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<td>6</td>
<td>Measurement of Permeability (Falling &amp; Constant Head Tests)</td>
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<tr>
<td>7,8</td>
<td>Consolidation</td>
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<tr>
<td>9</td>
<td>Review for Midterm</td>
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<tr>
<td>10</td>
<td>Direct Shear Test</td>
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<tr>
<td>11</td>
<td>Unconfined Compression Test, and demonstrate Triaxial Test</td>
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<tr>
<td>12</td>
<td>Triaxial Test demonstration</td>
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<tr>
<td>13</td>
<td>Review</td>
</tr>
<tr>
<td>14</td>
<td>Lab Test</td>
</tr>
</tbody>
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Grading

- Quizzes (Four ½ -hour quizzes. We will count the top 3) = 15%
- Mid-term (closed book, equation sheet provided) = 20%
- Final Exam (Cumulative, closed book) = 40%
• Lab reports & home works = 20%. This grade is assigned by the TA and added to my total. **Note that according to the CE department policy, 20% of your lab grade is assigned to presentation**
• Lab test = 5%
• You must attend every lab in order to pass this course.
• The midterm and final will contain material covered in the labs.

**SUBSTITUTE CLASS TIMES**

Every effort will be made to maintain all the university scheduled class times. However, substitute classes may be required to make up for snow emergencies or instructor out of town professional travel commitments.

**COMPUTER FACILITIES**

As an engineer (or soon to be one) you are expected to conduct yourself professionally. As an engineer you are expected to be inherently neat and organized. In this class professional conduct includes timely submission of assignments, punctual attendance, and professional communications. Engineering employers often consider communication skills to be as important as engineering skills in rating prospective employees. At this stage of your career you should become accustomed to professional presentation tools such as word processors, spreadsheets, charting and drafting software, and presentation software.

All Tandon undergraduate students are expected to have a laptop computer. You are expected to use computers to present your work.

**LIBRARY FACILITIES**

Bern Dibner Library at the Metrotech and Bobst library at Washington Square are available for your use. As a student at Tandon, you have access to electronic search facilities through the library web page. If a paper or a book is not available at the library, you can request a copy through inter-library loan. The New York Public Library science section located at Madison and 34’th in Manhattan is also a useful resource available to you.

**ACADEMIC HONESTY**

Academic Honesty is assumed of all students, I will enforce a zero-tolerance policy with respect to cheating, which is defined to include any act to misrepresent someone’s else’s work as your own. Anyone caught cheating will automatically fail this class. Please refer to the university code of conduct for further details (http://engineering.nyu.edu/life/student-affairs/code-of-conduct).
ABET Competencies

The following ABET competencies are addressed in this course:

E  An ability to identify, formulate, and solve engineering problems.
You will learn to design components of engineering systems requiring knowledge of math & science. For example you may be required to design the height and shape of a highway embankment in order to achieve a given design elevation while accounting for consolidation, and other soil specific attributes.

B  An ability to design and conduct experiments, as well as to analyze and interpret data.
During weekly 3 hour lab sessions, teams of students conduct 10 industry-standard experiments, collect, and interpret results. The results are presented in written professional laboratory reports.

I  Recognition of the need for, and an ability to engage in life-long learning.
The instructor emphasizes the importance of developing experience by observing the performance of one’s designs as well as others. The instructor also accompanies the students to note worthy construction sites on the annual Moles trip.

Engineering Analyses Content: 2 credits
Engineering Design Content: 1 credit

Final Comment

Good luck to you in this course. As with anything in life, you will get out of this course, as much as you put into it. Please do not hesitate to ask questions in class, or to contact me at any time. Any specific comments on how this class may be improved are particularly welcomed.