14.330 SOIL MECHANICS
SPRING 2014
M, W, F 11-11:50am, Kitson301

Instructor: Edward L. Hajduk, D.Eng, PE
Pasteur Hall Room 105D (PA105D)
E-Mail: Edward_Hajduk@uml.edu
Office Hours: See office door or website. Also by appointment.

Prerequisites: 14.204 Strength of Materials
14.301 Fluid Mechanics
14.310 Engineering Materials

Corequisite: 14.333 Geotechnical Laboratory

Text: None. Lecture notes will be provided to students as PDF files.

Supplemental Course Material (To be made available via PDF on course website or provided by Instructor):

- Additional material as determined by Instructor.

Course Description:
Development of the fundamental principles of soil mechanics as utilized in soil and foundation engineering. Topics include: soil classification, index properties, strength and stress-strain behavior, effective stress principle, permeability, flow and consolidation. Introduction to basic soil mechanics laboratory practice (theory).
Course Objectives:
Upon completion of this course, a student should be able to:

1. Determine various soil properties (e.g. dry unit weight, moist unit weight, saturation, void ratio, Specific Gravity, and water content) using known weight-volume relationships for a given soil mass.
2. Classify soil in accordance with the Unified Soil Classification System (USCS) and American Association of State Highway Transportation Officials (AASHTO) standards.
3. Calculate compaction characteristics (i.e. OMC and MDD) and determine field compaction percentage (R) for a given soil from provided laboratory and field test data.
4. Evaluate pore water pressures within a soil mass using soil permeability concepts such as Darcy’s law and flow nets and solve soil seepage problems.
5. Calculate total and effective in-situ vertical stresses within a soil mass and changes in total and effective vertical stresses within a soil mass due to loading.
6. Calculate soil settlement due to one-dimensional (1D) consolidation.
7. Calculate Mohr-Coulomb soil shear strength parameters (e.g. soil friction angle, undrained shear strength) based on soil laboratory shear strength test data.

Basis of Course Grade:

<table>
<thead>
<tr>
<th>Component</th>
<th>% of Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assignments/Practice Problems/Quizzes</td>
<td>40%</td>
</tr>
<tr>
<td>Exams (3)</td>
<td>30%</td>
</tr>
<tr>
<td>Final Exam</td>
<td>30%</td>
</tr>
</tbody>
</table>

Grading Breakdown (based on total percentage from components listed above):

91% ≤ A
88% ≤ A- < 91%
85% ≤ B+ < 88%
81% ≤ B < 85%
78% ≤ B- < 81%
75% ≤ C+ < 78%
71% ≤ C < 75%
68% ≤ C- < 71%
64% ≤ D+ < 68%
60% ≤ D < 64%
F < 60%
Example: If you get 450/500 points from assignments/practice problems/quizzes, an 80/100 on Exam #1, 84/100 on Exam #2, 73/100 on Exam #3, and 65/100 on the Final Exam, your grade is \((450/500)*0.4 + (237/300)*0.3 + (65/100)*0.3 = 0.79 = 79 \% = \text{B-} .\)

Grades will be dependent on your work and performance. Grading will NOT be conducted on a curve; it is theoretically possible for the whole class to earn an A or an F.

Assignment guidelines are provided in a separate handout. Assignments must be handed directly to the Instructor unless directed otherwise by the Instructor. **Students have one week after the return of assignments and tests to discuss grading with the Instructor.**

Assignments will have 20\% late penalty deduction from the earned points for each day past the assignment due date unless an extension is granted by the Instructor. Note the assignment due date will be determined by the Instructor and told to students in class the day the assignment is given. Any assignment extensions will also be told to students in class and/or via email. For example, an assignment due on a Friday is turned in the following Monday. The student earned a grade of 82/100 points for the assignment. The assignment is three days late (Saturday is 1 day late, Sunday is 2 days late, Monday is 3 days late). 20\% of 82 points is 16.4 points, times 3 equals 49.2 points. The final assignment grade = 82 - 49.2 = 32.8 points.

Everyone makes mistakes: no one is perfect. If the Instructor makes a mistake in class and you are the first to notify him during that class, you are eligible for two (2) extra credit points towards your assignment grade. To receive these extra credit points, you must email the Instructor within one (1) day of noting the mistake. The email should have the course number in the Subject Field and you need to summarize the mistake and state the solution within the body of the email (e.g. “The equation in Slide 4 on your lecture notes on 2/2/12 was F=me. The equation should have been F=ma)."

**Honor and Ethics:** Engineers have a trust placed on them by society to ensure that the public safety is held paramount. People constantly depend on engineers to provide safe bridges, buildings, drinking water, etc. **This trust must not be violated.** For this reason, no form of academic dishonesty will be tolerated in this class. Students are encouraged to work together on homework assignments and class projects (if assigned). However, any evidence of direct copying of a homework assignment will result in a zero grade for that assignment for all students involved. Any evidence of academic dishonesty during a weekly test or the final exam will also result in a zero grade for that assignment for all students involved. Refer to the University of Massachusetts Lowell’s Academic Integrity
Policy (https://www.uml.edu/Catalog/Undergraduate/Policies/Academic-Integrity.aspx) for additional details.

During all exams, only calculators that cannot communicate with other electronic devices are allowed. Students are encouraged to use calculators approved for the Fundamentals of Engineering (FE) exam to prepare themselves for the FE Exam. Information on FE Exam can be found at http://ncees.org/exams/calculator-policy/. However, the use of the approved FE calculators is not required. All other electronic devices, such as mobile phones, music players, computers, tablets, etc. are not allowed during any exam.

You must cite and acknowledge all people and sources used in your work. Students submitting academic work for an individual grade are individually held to not plagiarize. Plagiarism is defined as representing the words or ideas of another as one's own work in any academic exercise. Materials from outside sources must be documented using the American Society of Civil Engineers Author-Date format detailed at http://www.asce.org/Content.aspx?id=29606.

Attendance:
The University of Massachusetts Lowell’s policy on class attendance is in effect for this course.

All exams including the final examination must be taken on the assigned day. The Instructor must approve any exception to this policy in advance. Exceptions will be granted only for reasons beyond the control of the student.

Classroom Demeanor:
The expectation for students to participate as engineering professionals is implicit. In addition, no active cell phones, pagers, or sound or image recording devices shall be allowed in the classroom.

E-Mail Policy:
When required, I will send class information to students via email using the Intercampus Student Information System (iSiS) system. iSiS sends emails to your UML student email address. Every student who registers for courses at the University of Massachusetts Lowell receives a UML student email address. Students are responsible for checking this email account for messages from the Instructor for this course.
Academic Support:
Please contact me privately if you need accommodations because of a disability. The University’s Policy for Students with Disabilities will be followed for this course (http://www.uml.edu/student-services/disability/policy.html).

Tentative Course Outline:

<table>
<thead>
<tr>
<th>Topic</th>
<th>Approximate No. of Classes</th>
<th>Assignment Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction to Geotechnical Engineering</td>
<td>½</td>
<td>1</td>
</tr>
<tr>
<td>Soil Composition &amp; Formation of Soil Deposits</td>
<td>1½</td>
<td>2</td>
</tr>
<tr>
<td>Soil Classification</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Soil Compaction</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Hydraulic Conductivity and Seepage</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Stresses in a Soil Mass</td>
<td>6</td>
<td>6</td>
</tr>
</tbody>
</table>

EXAM #1
Consolidation 8 7 & 8

EXAM #2
Shear Strength of Soils 8 9 & 10

EXAM #3 (4/25/13)
Final Exam Review (5/2/13) 1

FINAL EXAM

Key Dates (Check Academic Calendar):
01/27/14  Last Day to Add a Course without permission number
02/03/14  Add/Drop Period Ends
02/17/14  No Class (President’s Day)
02/18/14  Monday Class Schedule
03/14/14  Spring Break Begins
04/07/14  Faculty Advising Begins
04/09/14  Last Day to Withdraw from course with grade of W
04/21/14  No Class (Patriot’s Day)
04/25/14  University Day (Classes Meet)
05/03/13  Reading Day