FE 315 – Soil Engineering

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Textbook: Principles of Geotechnical Engineering, 7th edition, Braja M. Das.

Course Goal

Introduce Forest Engineering, Ecological Engineering, and Construction Engineering Management students to soil and the engineering properties that determine how it is used as a structural material in cut and fill slope structures, as a part of retaining structures, for building foundation support, as a pavement subgrade, and for earth dams.

Course Learning Objectives

A robust understanding of the engineering properties of soil is well beyond the scope of a single introductory course, hence there will be many aspects of soil properties that will be left to later courses and the professional commitment that all engineers and construction managers must make to life-long learning. However, there are a number of baseline learning objectives that either implicitly or explicitly include the knowledge that it is important for the student to obtain from this course. These specific learning objectives are (with relevant ABET criterion in parentheses):

[1] Identify and classify soils by the Unified Classification System, (ABET Outcomes: b)

[2] Solve for the Phase Relationships in soil (ABET Outcomes: b, g)

[3] Conduct compaction tests, understand compaction specifications (ABET Outcomes: a, b)

[4] Estimate seepage quantities and associated pore water pressures (ABET Outcomes: a, e)

[5] Compute gravity stresses in soil (ABET Outcomes: a, e, k)

[6] Make first order settlement estimates of site-work fills (ABET Outcomes: a, c, e, k)

[7] Make time rate of settlement estimates for site-work fills (ABET Outcomes: a, c, e, k)

[8] Understand basics of the Mohr-Coulomb strength relationship (ABET Outcomes: a)

Accomplishment of the learning objectives is the responsibility of the student. However, the University is a full partner in the learning process through quality instruction provided by the faculty. In addition, reasonable accommodations will be made for students with disabilities. Accommodations are collaborative efforts between students, faculty and Disability Access Services (DAS). Students with accommodations approved through DAS are responsible for contacting the faculty member in charge of the course prior to or during the first week of the term to discuss accommodations. Students who believe they are eligible for accommodations but who have not yet obtained approval through DAS should contact DAS immediately at 531-737-4098.

The Starting Point

Nearly all engineering courses require some prerequisite knowledge and proficiency. The catalog listed prerequisite for FE 315 is ENGR 213, Strength of Materials; one of three Fluid Mechanics courses is at least a co-requisite. However, there is a rather lengthy prerequisite chain, which includes Calculus and Physics, that leads to Strength of Materials and Fluid Mechanics. All components of the courses in the prerequisite chain are not directly required for success in FE 315, but a few noteworthy ones are required. Listed below are some required knowledge, understandings, or skills that will be required for this course.

- Algebraic manipulation for the solution of complex equations.
- Geometry and trigonometry necessary for solution of triangles.
- Differentiation of simple algebraic functions
- Integration of simple algebraic functions
- Ability to draw free body diagrams.
- Ability to formulate the equations of static equilibrium.
- Ability to solve for shear and normal stresses algebraically given principle stresses in a body and vice versa.
- Ability to manipulate Mohr's circle for stress.

If you do not have these abilities, then you must either gain them during the term as they are needed, or drop back and take remedial course work to develop them!!

FE 315 – Forest Soil Properties

Winter term 2014 schedule

Week	Dates	Lecture	Laboratory
1	Jan 6–10	Class Introduction: Course Learning Objectives, Homework policy, Calculator policy, Grading. Physical Properties of Soils: Definition of soil, soil formation – deposition type. Phase Relationships.	Physical and Chemical properties of selected soils.
2	Jan 13–17	Soil Plasticity. Soil Classification. Soil Compaction. Purpose Field Methods	Recitation on Phase Relationships.
3	Jan 20–24	MLK Day on January 20th Soil Compaction. Purpose and Field Methods Laboratory Compaction Tests Compaction Specifications **Quiz – Phase Relationships and Classification**	Identification and Classification Laboratory
4	Jan 27 – Jan 31	Soil Permeability. Potential and Darcy's Law Permeability testing	Soil Compaction Laboratory.
5	Feb 3- 7	Influence of seepage on water pressure – one dimensional seepage. Two dimensional seepage – Flow nets and well drawdown. **Quiz - Compaction**	Recitation on seepage: in-class solution of one dimensional seepage problems.
6	Feb 10–14	Construction de-watering. In Situ Stresses.	Recitation on seepage: in-class construction of a flow net, and solution of a de-watering problem.
7	Feb 17–21	Normal and shear stresses – Mohr's circle. Stress distributions. Compressibility. **Quiz – Consolidation, Flow and Seepage** ***Feb 24th – Last Day to withdraw from the course.***	Recitation on solution of stress problems using Mohr's circle.
8	Feb 24– Feb 28	Compressibility. Consolidation.	Recitation on Settlement Estimates.
9	Mar 3 - 7	Consolidation. Soil Strength. **Quiz – Consolidation**	Recitation on Time rate of Compression.
10	Mar 10–14	Soil Strength.	Laboratory demonstration on Soil Strength.
11		Final Exam: Wednesday March 19, 2012, at Noon	

Homework and Laboratory Report Policies
In brief*

In any course in engineering, homework serves a dual purpose. First, it provides the student with a learning experience, and second, it is an exercise in clear communicative skills, an essential part of the job. Addressing these exercises, there is a general set of guidelines to follow regarding homework.

1. **Late Homework will not be accepted without a prior arrangement or notification, and then only with an approved reason – University sanctioned absence, illness, etc.**
2. **Homework should be done independently unless group effort is specifically indicated.**
3. Homework should be completed on engineering paper using one side only.
4. Page headings:

	Course Number	Date & Assignment #	Name	pg# / #pgs

5. Problems should be stated or referenced.
6. Assumptions should be stated where made.
7. **Written documentation with references should accompany all computations, judgments, etc.**
8. **Spreadsheet computations must include documentation of cell formulas used; this should be done as a part of the spreadsheet.**
9. Solutions should be clearly labeled showing the appropriate units.
10. Care should be taken to show numerical results with only the proper number of significant figures.
11. Illustrations and graphs should be carefully drawn using drafting aids (either computer or hand drawn), and completely labeled.
12. Returned homework assignments should be maintained in an organized homework file that also contains any supporting papers or documents.
13. Any incorrect problems should be reworked, and the revised solutions placed in the homework file along with the original work. (I may check on this periodically)

Course Grading

Homework and lab report grading will be partitioned between (1)Professionalism, Ethics and Clarity, (2) Documentation of the work, and (3) Correctness of the solution. The components of these three categories of evaluation are shown on the *Evaluation Rules for Closed-ended Homework Problems* printed above. A similar set of *Evaluation Rules* will be applied to open-ended homework, with the scope of the documentation and correctness of the solution being appropriately expanded. Not all problems of each assignment will be graded. The decision about which problems to grade will be made after the assignment is due. In some cases, partial credit may be assigned on individual problems, in other cases individual problems may be graded on an "all or nothing" basis. Partial credit in these cases can be earned by working some of problems correctly.

Each homework assignment will be grading according to the following percentages:

Professionalism, Ethics and Clarity	15%
Documentation of work	15%
Correctness	70%
Total	100%

A significant degree of latitude will be granted for work on exams, since examinations have time and other constraints that will preclude thorough documentation and referencing. However, to the degree practicable, documentation on exams will support the correctness of the solution method in cases where the numerical solution is incorrect.

Course Grade Distribution

Homework and Lab reports	30%
Quizzes	40%
Final Exam	30%

Special Requirements for Forest Engineering and Forest Engineering/Civil Engineering majors

Homework Assignments 4 and 8 are ABET assignments in which a minimum performance is required to receive a grade in the class. The ABET assignment process is:

1. **FE and FE/CE majors will have their papers graded on the same scale as the other students.**
2. **If a student's score meets the minimum criteria, then their paper is scanned and entered into their work portfolio and the grade is entered in the grade book.**
3. **If a student's score does not meet the minimum criteria, then their score is recorded in a temporary grade list, but their paper is returned for correction to meet the minimum performance criteria.**
4. **When the student turns in a corrected paper that meets the minimum performance criteria, the original grade will be recorded in the grade book.**
5. **If a student does not turn in a corrected paper that meets the minimum performance criteria, he/she will receive an incomplete / backup "F" grade in the class.**
6. **The minimum performance criteria will be described on the Homework assignment sheet.**

Expectations for student conduct both in class and in the course of preparation of homework assignments are in keeping with the College of Forestry Code of Professional Conduct and University policies:

http://www.cof.orst.edu/cof/teach/honorsys.php

http://oregonstate.edu/admin/stucon/achon.htm

Calculator Policy

Summary — Certain calculators are strictly prohibited from exam sites for all National Council of Examiners for Engineering and Surveying [NCEES] engineering and surveying exams. Examinations in this course will adhere to the NCEES policy.

The following statements are taken from the NCEES web pages:

2012 calculator policy

To protect the integrity of its exams, NCEES limits the types of calculators you may bring to the exam room. The only calculator models acceptable for use during the exam are as follows.

Casio: All fx-115 models. Any Casio calculator must contain fx-115 in its model name. Examples of acceptable Casio fx-115 models include (but are not limited to)
- fx-115 MS
- fx-115 MS Plus
- fx-115 MS SR
- fx-115 ES

Hewlett Packard: The HP 33s and HP 35s models, but no others.

Texas Instruments: All TI-30X and TI-36X models. Any Texas Instruments calculator must contain either TI-30X or TI-36X in its model name. Examples of acceptable TI-30X and TI-36X models include (but are not limited to)
- TI-30Xa
- TI-30Xa SOLAR
- TI-30Xa SE
- TI-30XS Multiview
- TI-30X IIB
- TI-30X IIS
- TI-36X II
- TI-36X SOLAR
- TI-36X Pro

last updated: Nov. 16, 2011