

The University of Iowa
Department of Civil & Environmental Engineering
SOIL MECHANICS 53:030
Fall Semester 2003
Preview of Second Midterm Examination
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The second midterm exam is scheduled to be given on Wednesday December 3rd at 7:00pm. The exam period is one hour long, and will be used to examine you on the material covered since the last exam: compression/consolidation behavior of soils (Chapter 10); stresses in the soil mass (Chapter 9), and shear strength behavior of soils (Chapter 11). The exam format will include both short answer questions, and problem solving questions. You can anticipate questions similar in nature and complexity to those asked in previous 53:030 exams. The exam will be closed book, closed notes, but you are permitted to bring in two formula sheets: one from midterm exam #1 and a second one with the new material for this exam. On the formula sheets, you can write down basic relations that are difficult to memorize and which may be needed in solving problems. **You are not permitted, however, to have solved problems written down on your formula sheet.** You will be requested to hand in your formula sheet with your exam, and it will be returned with your graded exam. Make sure that your name is on your formula sheet.

In addition to all of the material that was covered in Exam #1 you should also become very familiar with the topics listed below. Once you've studied for the exam by reviewing these topics, you may want to test your readiness by attempting the sample exams provided on the course website. Ideally, it is recommended that you begin studying at least one week prior to the exam so that you will have time to consult with the instructor or TA's about questions and unclear concepts.

Compression/Consolidation of Soils

- Know and understand how to use void ratio versus logarithm of effective stress relations to predict changes in void ratios of soils, and to predict consolidation settlements.
- Understand such ideas as: over-consolidated soils, normally consolidated soils; swelling index; compression index; pre-consolidation stress. Also be able to use these ideas in computing settlements of soils under applied loadings.
- Know how to apply one-dimensional consolidation theory to compute the time scale on which consolidation settlements will occur (For the exam, you will be responsible only for primary consolidation.).
- Be able to identify the assumptions invoked in developing the one-dimensional consolidation theory used in soil mechanics.

Stresses in Soils

- For two-dimensional states of stress be able to use Mohr's Circle and the Pole method to:
 - compute the stresses on a plane of any orientation; and
 - compute the orientation of a plane on which specific stresses (σ, τ) act.
- Know how, give suitable formulas and/or charts, to compute stress changes in the soil mass for the following types of loadings: concentrated point loads; line loads; strip loads; flexibly loaded rectangular areas; and flexibly loaded circular areas.

Shear Strength of Soils

- Understand and be able to apply the effective stress Mohr-Coulomb shear failure criterion.
- Be able to take account of pore fluid pressures, if known.
- Understand the standard lab methods for measuring shear strengths of soils (direct shear test and triaxial compression tests).
- Given a state of stress, be able to calculate whether or not it would lead to failure for a given Mohr-Coulomb criterion with specified parameters c and ϕ .
- Know about the following types of triaxial compression tests and the differences between them: consolidated drained (CD); consolidated undrained (CU); unconsolidated undrained (UU).