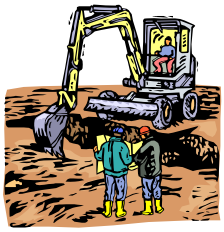

Soil Mechanics

Instructor: **Prof. Milind V. Khire, Ph.D., P.E., Associate Professor**
Contact Details: 3260 EPIC, UNC Charlotte, Ph: (704) 687-0069
email: mkhire@uncc.edu

Class Time/Location: TBA
Lab Location/Hours: TBA

Make up Classes: As part of my job responsibilities related to research, I travel and may be out of town for up to 4 classes during the course of the semester. During those days, I may either find a substitute instructor or cancel the class. If I cancel the class, I will make up the class by starting subsequent classes as early as 8:00 AM until the lost time is made up. If this may become a problem for you, please drop the course immediately.

Office Hours: To be Arranged
At your request, I may revise office hours weekly or bi-weekly to align with the due date of the HWs or exams/quizzes for your benefit.

Required Textbook: ***Soil Mechanics and Foundations*** by Muni Budhu
Publisher: John Wiley

Prerequisite(s): Mechanics of Solids. If the instructor has waived the prerequisite(s), you still take full responsibility for your performance in this course.

Reference Books:

- Bardet, J.P. : ***Experimental Soil Mechanics***, Prentice Hall
- Holtz & Kovacs, Geotechnical Engineering, Prentice-Hall Inc.

Clicker:

- E-instruction (CPS)

Teaching Assistants: TBA

Introduction:

All civil, environmental, and geological engineers and soil scientists require a fundamental understanding of what soils are made up of, how soils are tested in the lab and the field, and how soils behave when subjected to loads (foundation of structures, retaining walls, etc.), ground water pressure, ground water gradients, and other field conditions.

This course will teach you the fundamentals of soil mechanics and geotechnical engineering.

Course Objectives:

CE312 is a 4-credit course. When you complete this course, you will be able to:

1. Describe soils and determine their physical characteristics;
2. Classify soils;
3. Prepare specification for compaction of soils;
4. Compute total and effective stresses in soils;
5. Compute stresses in soil masses due to surface loads;
6. Identify basic lab and field tests used in site characterization;
7. Compute settlement of clayey soils due to consolidation;
8. Compute soil shear strength and deformation parameters;
9. Estimate seepage through saturated soils; and
10. Identify basic flat geosynthetic products.

Course Evaluation/Grading:

Attendance & Participation (4%): Attendance will be randomly recorded during class hours, either manuall, or by using the clicker. YOU MUST BRING THE CLICKER FOR ALL CLASSES. If you missed any class(s) on the days when the attendance is recorded or if you forget to bring the clicker to the class, you will receive a reduced grade proportional to the number of missed classes. Your participation in the class will be recorded based on answering oral questions in the class (right or wrong, does nto matter) and participating in class discussions. Your visits during my office hours will be considered as participation.

Homework (8%). If not specified, homework will be due a week after it is handed out. Homework must be turned in during the class hour in the classroom on the due date. Late homeworks will receive a zero grade. Students are expected to turn in neat and organized homework. Any homework which is sloppy, difficult to read, or difficult to understand will receive a reduced grade.

Quizzes (16%). Total 4 to 8 in-lecture quizzes (15 to 20 min duration) will be given throughout the semester. These quizzes will be unannounced ("spontaneous"). Each quiz will include basic material covered in the class during the previous four weeks. The quizzes will be either in hard copy (conventional) form or in electronic form using the clicker. The total grade for these quizzes will be worth 16%. I will drop one quiz with the least score for final grade computation. Under no circumstances you will be allowed to make up any missed quizzes.

Exams (27%): Three exams (9% each of the total grade) will be given during the semester (60 min duration). The exams are tentatively scheduled for 5 Oct., 9 Nov., and 2 Dec 2010 and will be held at the same location as the class. Students should plan their schedules around these times. These dates will be confirmed 1 week prior to the exam. It is your responsibility to attend the class and record any schedule deviations. Email notifications will be sent. However, there is no guarantee that all schedule changes will be notified via email. You can re-schedule the class exam times only by obtaining consent of the instructor at least 2 days before the exam. If you are sick, you can re-schedule the exams only by providing a registered doctor's certificate within a week after the missed exam or when you attend the next class, whichever comes first.

Final Exam (20%): A final exam (20% of the total grade) will be given at the end of the semester as listed in the MSU Calender (Friday, 17 Dec 2010; 7:45 AM). The final exam would cover the entire syllabus (comprehensive).

Lab (25%): The lab grade will be based on your attendance and participation in the labs, lab reports, lab quizzes, and lab exams including lab finals. The total grade for the lab component will be worth 25%. The teaching assistants (TAs) will be primarily responsible for assigning the lab grade. You shall contact me if you have any disputes related to your lab grades.

Other Grade Related Rules

1. If your final answer is incorrect, I will not negotiate partial grades that you may receive for homework, quiz, or exam problems. Your goal must be to get every answer 100% correct and not depend on partial credit.
2. You must collect graded material during the class hours within one week after it is handed out in the class. After one week, you will need to stop by the instructor's office in A135 RCE to pick up your graded material before the end of the semester. After that, I will assume that you have waived your right to access your graded material.

Grading Scale:

Total Score	Grade Point
≥ 90	4.0
≥ 80 to < 90	3.0
≥ 70 to < 80	2.0
≥ 60 to < 70	1.0
< 60	0.0

Notes: 1. The instructor reserves the right to translate the grading scheme by statistical curving to reflect the true class average.
2. The instructor will make any borderline decisions based on the student's motivation, attendance, participation in the class, and quality of work.

Other Important Notes:

Missing Class to Participate in a Required Activity: To be excused from this class to participate in a required activity for another course, a university-sanctioned event, or a religious event, you must provide the instructor with advanced notice and a written authorization from the faculty member of the other course or from a university administrator, as appropriate to the event.

Amendments:

TENTATIVE CLASS SCHEDULE (TOTAL ~30 CLASS SESSIONS)

Sr. No.	Topic	Textbook Reading (2009 Edition)
1	Introduction, Soil Types, Soil Minerals	*Ch. 1, Ch. 2*
2	Soil Fabric, Soil Phase Relationships	*Ch. 3*
3	Grain Size Analysis	*Ch. 3*
4	Atterberg Limits, Soil Plasticity	*Ch. 3*
5	Soil Classification, Engineering Suitability	*Ch. 3*
6	Soil Compaction	*Ch. 3*
7	Field Exploration	*Ch. 2*
12	***Exam -1***	*Cumulative*
8	Stresses and Strains in Soils	*Ch. 5*
9	Mohr's Circle	*Ch. 5*
10	Total and Effective Stresses, Lateral Stresses	*Ch. 5*
11	Stresses in Soils from Surface Loads	*Ch. 5*
13	Consolidation of Fine-grained Soils	*Ch. 6*
14	Consolidation Laboratory Test	*Ch. 6*
15	Consolidation Settlement Calculations	*Ch. 6*
16	Time Rate of Consolidation Settlement	*Ch. 6*
17	***Exam -2***	*Cumulative after Exam 1*
18	Consolidation Example Problems	*Handout*
19	Behavior of Soils under Shear	*Ch. 7*
20	Soil Failure Theories	*Ch. 7*
21	Shear Strength of Sands and Clays	*Ch. 7*
22	Laboratory Shear Strength Tests	*Ch. 7*
23	***Exam -3***	*Cumulative after Exam 2*
24	Introduction to Geosynthetics	*Handout*
25	One-dimensional Flow of Water Through Soils	*Ch. 4*
26	Field Tests	*Ch. 2*
27	Two-dimensional Flow of Water Through Soils	*Ch. 11*
28	Flow Net Construction Using FEHT Finite-Element Software	*Handout*
29	Interpretation of Flow Nets	*Ch. 11*
30	***Final Exam***	*All*

Note: The course outline presented above is tentative. It is your responsibility to attend classes and note any deviations. The quizzes and exams will be designed based on what is covered and discussed in the class and not necessarily based on what is presented above.