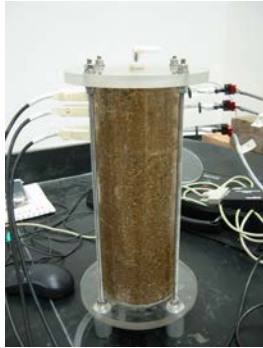


Properties of Soils (Graduate Level Course)



Instructor:
Office Location
Email:
Phone:

Prof. Milind V. Khire, PhD, PE
3260 EPIC
email: mkhire@uncc.edu
(704) 687-0069

Course Description:

Measurement and interpretation of geotechnical properties of soils for geotechnical and geoenvironmental applications including soil texture and classification, saturated and unsaturated hydraulic properties, consolidation, and frictional properties and numerical modeling of saturated/unsaturated flow through soils.

Class Hours/Place: TBA

Prerequisites: None. Undergraduates need to email me for pre-approval. Notwithstanding that there are no prerequisites, you take full responsibility for your performance in this course.

Laboratory: 3.5 hours/week (average); (the schedule may vary for the experiments due to data collection timeframes)

Office Hours: TBA
(Mutually suitable schedule to be finalized during the first two weeks)

Make up Classes: As part of my job responsibilities related research, I travel and may be out of town for up to 3 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 using the scheduled lab time on Friday until the lost time is made up.

Textbooks:

1. ***Introduction to Geotechnical Engineering***
by Holtz and Kovacs, Prentice Hall Publisher.
2. ***Soil Physics***
by Jury and Gardner, John Wiley Publisher.

Reference Books:

- Bardet, JP: **Experimental Soil Mechanics**, Prentice Hall
- Tindall, Kunkel, and Anderson: **Unsaturated Zone Hydrology for Scientists and Engineers**, Prentice-Hall Inc.
- Fredlund and Rahardjo: **Soil Mechanics for Unsaturated Soils**, John Wiley and Sons, Inc.

Teaching /Lab Assistants: TBA

Course Syllabus:

- Soil Classification (Holtz & Kovacs, Chapters 2, 3, and 4) ~ **1 class session**
 - a. Grain Size and texture, Clay minerals, Atterberg limits
- Soil Phase Relationships and Compaction (Holtz & Kovacs, Chapter 5) ~ **1 class session**
- Flow Through Soils (Holtz & Kovacs Chapters 6 and 7; Hillel, Chapters 5 to 9) ~ **7 class sessions**
 - a. Saturated Soils – Darcy’s Law, Construction of Flownets- FEHT/HYDRUS-2D Computer Model to draw flownets
 - b. Unsaturated Soils – water content and suction relationship, Richards’ equation, measurement of suction, water content, and unsaturated hydraulic conductivities, fitting functions, prediction functions
 - c. Vadose Zone Hydrology, Applications of Sat/Unsat Flow: Dams, Landfill Caps
 - d. Numerical Methods for Sat/Unsat Flow
- Consolidation of Soils (Holtz & Kovacs Chapters 8 and 9) ~ **2 class sessions**
- Shear Strength of Soils and Use of Geosynthetics (Holtz & Kovacs Chapters 10 and 11, Qian, Koerner, and Gray Chapters 4, 5, and 8) ~ **3 class sessions**
 - a. Mohr Circle for stress analysis
 - b. Loose/Dense Sands vs. NC/OC Clays
 - c. Direct Shear Test, Triaxial Shear Test
 - d. Hydraulic properties of Geosynthetic Clay Liners (GCLs), Geotextles, and Geonets
 - e. Interface friction between geosynthetics (geotextiles, HDPE/PP/PVC geomembranes) and soils

Lab Experiments:

1. Moisture-Density Relationship for Soils (Compaction Curves)
2. Saturated Hydraulic Conductivity Testing of Soils & Effect of Compaction
3. Soil Water Characteristic Curves (Multiple Tests – Hanging Column, Dewpoint Hygrometer)
4. Unsaturated Hydraulic Conductivity Testing
5. 1-D Consolidation Testing
6. Shear strength testing

Grading Criteria:

Quizzes and Class/Lab Participation (10% of total grade)

You will be assigned a grade for your class and lab attendance and active participation in discussions. Spontaneous quizzes will be given throughout the semester to assess your knowledge gain.

Lab Reports (45% of total grade)

You are required to submit reports for the lab experiments you will conduct during the semester for this course. The total grade for these reports will be worth 45%.

Exams (35% of total grade)

One midterm exam (10%) and a final exam (25%) will be held during the semester. The schedule for the midterm exam will be confirmed at least a week before the scheduled date. It is your responsibility to attend the class and record any schedule deviations. The final exam will be scheduled on the day/time according to MSU final exam schedule. It will be held in 2320 Engr. Building unless otherwise announced differently in the class. The final exam would cover the entire syllabus (comprehensive). You can re-schedule the class exam times only by obtaining written (email is fine) consent of the instructor at least 2 working 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.

Project (10% of total grade)

You as an individual or group will be assigned a project topic or an experiment. Feel free to suggest a topic or an experiment for yourself or your group. However, the instructor needs to approve the topic to make sure that it meets the objectives of the course.

The instructor reserves the right to change the grading criteria after the semester is in session if the instructor determines that it will meet the course objectives better and benefit a majority of students to learn the material.

Other Grade Related Rules:

1. I will not negotiate partial credit that you may receive for graded assignments including exams.
2. You need to collect graded materials during the class hours. Otherwise, you must collect graded materials from the instructor's office located at 3577 EB before the end of the semester. After that, it will be assumed that you have waived your right to access your graded material and hence it can be shredded, destroyed, or disposed off.

3. 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. If the class average is above 80, grades will be based on the “traditional” scale presented in the above table. If the class average is below 80, I may translate the grading scheme by statistical curving to reflect the true class average.
2. The instructor reserves the right to 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 or Religious Observance: 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, when applicable, a written authorization from the faculty member of the other course or from a university administrator.

Amendments:

If we make any changes to this syllabus including grading policies, we will note down the amendments in this section.

- 1.