CE 341- Soil Mechanics *Spring 2018*

Text: Das, B.M., and Sobhan, Khaled, Principles of Geotechnical Engineering, 9th Edition, Cengage Learning ISBN# 13: 978-1-305-97093-9

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Prerequisites: Mech 237 Strength of Materials, Co requisite - CE 341A Soil Mechanics Laboratory

Week	Topics	Sections*
1	Introduction, Geology, Origin of Soils, Clay Minerals	2.1-2.6
2	Particle Size Distribution and Atterberg Limits	2.7-9, 4.1-8
3	Weight-Volume Relationships	3.1-6
4	Soil Classification	Chapter 5
5	Compaction	6.1-9,11
6	Hydraulic Conductivity, **Midterm Exam 1**	7.1-6,9,10
7	Seepage Drainage	8.1-5,8
8	Effective Stress	9.1-5,9,10
9	Mohr Circle, Geonvironmental Applications; Stress Distribution	10.1-3, handout
10, 11	Consolidation, **Midterm Exams 2**	11.4-14
12, 13	Shear Strength	12.1-12. 14
14	Open topic	Handout
15	**Final Exam**	

Course Contents: *A study of soil types and properties is made with the objective of developing a basic understanding of engineering behavior of soils. Engineering principles pertaining to compaction, permeability, seepage, consolidation, and shear strength are presented. The methods of subsurface investigation are introduced.*

* Refer to sections in textbook

Course Objectives:

1. Learn index properties of soils, methods of soil classification and subsurface investigations.
2. Learn principle of seepage through porous media and effective stress.
3. Learn principles of consolidation and shear strength.

POLICIES

• The NJIT Honor Code will be upheld and any violations will be brought to the immediate attention of Dean of Students.
• Students will be notified by the instructor to any modifications or deviations from the syllabus throughout the semester.

• **Absence from 4 or more weeks will result in a failing grade for the course.**
• Make sure that your email address stated in Moodle is correct and you are using it regularly. Communication from the instructor will be sent only to the NJIT e-mail address.
• Always bring your text book, a calculator and writing paper to class.
• All material handed out or discussed in class by the instructor will be part of course material and students will be responsible for studying them in addition to the prescribed sections of the text book.
• Homework/projects must be done on 8 ½" × 11" engineering calculation paper, in a manner consistent with professional engineering calculation in practice.
• Electronic versions of homework will not be accepted.
• Please keep a copy of all your work until you received a final grade.
• Please save a copy of your homework before submitting it to the instructor, since it may not be always possible for the instructor to return the corrected homework back in time for you to study for quizzes and examinations.
• All work should be done in a professional manner.
• Homework is due at the beginning of class. Late homework will incur a 50% deduction if handed in the same day, and 100% deduction after that. **Online submissions will not be accepted.**
• The instructor may photocopy and save your assignments and tests, as part of the effort necessary to renew accreditation of our educational programs. The copies, which will be accessible only to faculty, administration, and external reviewers, will be destroyed afterwards.
• No make-up examination will be administered.
• Switch off laptops and cell phones during class, quizzes and examinations. Plan on

bringing a watch to keep time during examinations.
• No recording devices shall be used during class or examinations.

BASIS OF GRADING

Midterm Exam I	25 points
Midterm Exam II	25 points
Final Exam	30 points
Homework	10 points
Quizzes	10 points
Total	100 points

Final Score	Grade
Above 90	A
89-85	B+
84-80	B
79-75	C+
74-70	C
69-65	D
64 and Below	F

Department of Civil and Environmental Engineering

CE 341 – Soil Mechanics

Description:

A study of soil types and properties is made with the objective of developing a basic understanding of soil behavior. The methods of subsurface investigation and compaction are presented. Fundamentals pertaining to permeability, seepage, consolidation, stress distribution, and sheer strength are introduced. Settlement analysis is also presented.

Prerequisites: Mech 237 - Strength of Materials **Co requisite** - CE 341A - Soil Mechanics Laboratory

Course Objectives:

1. Learn index properties of soils methods of soil classification and subsurface investigations.

2. Learn principle of seepage through porous media and effective stress.

3. Learn principles of consolidation and shear strength.

Topics:

Soil properties and Classifications

Compaction

Darcy's Law, Seepage and Flow Nets

Geostatic and Effective Stresses

Consolidation and Settlement

Subsurface Investigation, Sampling and Standard Penetration Test

Mohr Circle and Shear Strength

Direct Shear Testing, Unconfined Compression and Triaxial Testing

Slope Stability

Schedule: **(3-0-3)**

Professional Component: Engineering Topics

Program Objectives Addressed: 1, 2

Prepared By: Prof. Raghu **Date:** 11/29/06

CEE Mission, Program Educational Objectives and Student Outcomes

The mission of the Department of Civil and Environmental Engineering is:

- to educate a diverse student body to be employed in the engineering profession
- to encourage research and scholarship among our faculty and students
- to promote service to the engineering profession and society

Our program educational objectives are reflected in the achievements of our recent alumni.

1 – Engineering Practice: Recent alumni will successfully engage in the practice of civil engineering within industry, government, and private practice, working toward sustainable solutions in a wide array of technical specialties including construction, environmental, geotechnical, structural, transportation, and water resources.

2 – Professional Growth: Recent alumni will advance their skills through professional growth and development activities such as graduate study in engineering, professional registration, and continuing education; some graduates will transition into other professional fields such as business and law through further education.

3 – Service: Recent alumni will perform service to society and the engineering profession through membership and participation in professional societies, government, educational institutions, civic organizations, and humanitarian endeavors.

Our student outcomes are what students are expected to know and be able to do by the time of their graduation:

(a) an ability to apply knowledge of math, science, and engineering
(b) an ability to design and conduct experiments, as well as to analyze and interpret data
(c) an ability to design a system, component or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
(d) an ability to function on multi-disciplinary teams
(e) an ability to identify, formulate, and solve engineering problems
(f) an understanding of ethical and professional responsibility
(g) an ability to communicate effectively
(h) the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
(i) a recognition of need for, and an ability to engage in life-long learning
(j) a knowledge of contemporary issues
(k) an ability to use techniques, skills and modern engineering tools necessary for engineering practice

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Course Objectives Matrix – CE 341 Soil Mechanics

Strategies and Actions	**Student Learning Objectives**	**Student Outcomes (a-k)**	**Program Educational Objectives**	**Assessment Methods/Metrics**
Course Objective 1: Learn the properties of soils and the basic principles of soil mechanics and develop the ability to apply these principles to solving problems in civil engineering.				
Introduce index properties of soils and subsurface investigations.	Understand the different types of soils and subsurface investigation methods.	b	1	Homework, quizzes and exams.

Explore subsurface methods of investigation in design.	Knowledge of different methods of soil investigations.	b, c, k	1, 2	Homework, quizzes, and problem solving in class.
Discuss professional design practice.	Ability to select appropriate method of subsurface investigation for different types of structures.	b, h, i, k	1, 2	Class discussions, and problem solving. Quizzes and exams.
Course Objective 2: Learn principles of seepage through porous media and effective stress.				
Introduce basic concepts and flow through soils.	Understand the principles of seepage and effective stress.	a	1	Homework, quizzes and exams.
Apply these principles to problem solving.	Ability to solve problems in Soil Mechanics by applying basic knowledge, skills, tool and techniques.	b, c, k	1	Homework, quizzes, and problem solving in class.
Discuss application of these principles to engineering problems.	Ability to visualize, formulate, analyze and solve problems in Soil Mechanics.	e, b, h, i, k	1	Class discussions, analyses, and problem solving. Quizzes and exams.
Course Objective 3: Learn principles of consolidation and shear strength.				
Introduce consolidation theory and shear strength principles.	Understand the principles of Terzahi's theory of consolidation and shear strength.	a	1	Homework, quizzes and exams.
Discuss analytical methods to solve different types of settlement problems.	Ability to solve settlement problems and learn about shear strength.	b, c, k	1	Homework, quizzes, and problem solving in class.
Discuss professional design practice.	Ability to visualize, formulate, analyze and solve problems in Soil Mechanics.	e, b, h, i, k	1, 2	Class discussions, problem analyses, and problem solving.