Fall 2019

CE 341-101: Principles of Geotechnical Engineering

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CIVIL AND ENVIRONMENTAL ENGINEERING

NJIT New Jersey Institute of Technology

CE 341 Principles of Geotechnical Engineering Fall 2019
Section: 101

Prerequisite: MECH 237 with a grade of C or better or equivalent. Corequisite: CE 341A. 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, and shear strength are introduced. Settlement analysis is also presented. Lab must be taken concurrently.

"Academic Integrity is the cornerstone of higher education and is central to the ideals of this course and the university. Cheating is strictly prohibited and devalues the degree that you are working on. As a member of the NJIT community, it is your responsibility to protect your educational investment by knowing and following the academic code of integrity policy that is found at*:*
http://www5.njit.edu/policies/sites/policies/files/academic-integrity-code.pdf.

Please note that it is my professional obligation and responsibility to report any academic misconduct to the Dean of Students Office. **Any student found in violation of the code by cheating, plagiarizing or using any online software inappropriately will result in disciplinary action. This may include a failing grade of F, and/or suspension or dismissal from the university.** If you have any questions about the code of Academic Integrity, please contact the Dean of Students Office at dos@njit.edu

Date	Class Lecture	Subject	Homework Assignment
	One Class per Week **(Tuesdays, 6-850 pm)**		Re: Das and Sobhan, 9th Edition, "Principles of Geotechnical Engineering", 2018
	Prior to Class		**Read Chapter 1**
9/3 **(112)**	1 (1st Half)	Introduction and Origin of Soil (Chapter 1, 2.1-2.5)	Lecture 1: Chapter 1, and Chapter 2.1-2.5
9/3 **(52)**	2 (2nd Half)	Chapter 2.6 -2.7 (Particle Size/Hydrometer)	Lecture 2: Chapter 2.6 - 2.7 **HW**: Look up and submit write-up of the rock types under Newark/NJ, Mid-Town Manhattan, Roosevelt Island/NJ, and your hometown or country Problem (given in class) Read Chapter 2.8-2.10
9/10 **(40)**	3(1st Half)	Chapter 2.8 -2.10 (Particle Size)	Review HWLecture 3: Chapter 2.8 - 2.10 **HW** Problems (given in class) Read Chapter 4.1- 4.6, 4.8
9/10 **(52)**	4(2nd Half)	Chapter 4.1-4.6, 4.8 (Plasticity)	Lecture 4: Chapter 4.1 – 4.6, 4.8 **HW:** Problems (given in class) Read Chapter 5.1-5.6

9/17	5(1st Half)	Soil Classification (Chapter 5.1-5.5)	Review HW Lecture 5: Chapter 5.1-5.5
9/17	6(2nd Half)	Soil Classification (Chapter 5.6-5.7)	Lecture 6: Chapter 5.6-5.7 **HW**: Problems(given in class) Read Chapter 3.1-3.8
9/24	7(1st Half)	Phase Relationships - Weight, Volume (Chapter 3.1-3.4)	Review HW Lecture 7 , Chapter 3.1-3.4
9/24	8(2nd Half)	Phase Relationships - Density (Chapter 3.5-3.8)	Lecture 8 , Chapter 3.5-3.8 **HW**: Problems (given in class) Read Chapter 6
10/1	9 (1st Half)	Compaction (Chapter 6.1-6.8)	Review HW Lecture 9: Chapter 6.1-6.8
10/1	10 (2nd Half)	Compaction (Chapter 6.9-6.14)	Lecture 10, Chapter 6.9-6.14 **HW**: Problems (given in class) Study for Mid-Term Exam #1 (Chapters 2--6)

10/8	11 (1st Half)	EXAM #1	Exam #1 (1hr-20 min) Chapters 1-- 6
10/8	12 (2nd Half)	Permeability and Conductivity (Chapter 7.1-7.5)	Lecture 12, Chapter 7.1 to 7.5 **HW:** Problems (given in class) Read Chapters 7.1-7.6, 7.9 and 7.10, 8.1-8.5, 8.8 -8.11
10/15	13 (1st Half)	Continue Permeability and Conductivity (Chapter 7.6. 7.9 and 7.10)	Review Exam & HW Lecture 13, Chapter 7.6, 7.7, 7.9 and 7.10
10/15	14 (2nd Half)	Seepage and Drainage (Chapter 8.1-8.5, 8.8 -8.11)	Lecture 14, Chapter 8.1 to 8.5, 8.8 and 8.11 **HW** Problems (given in class) Read Chapter 8.1 to 8.5,8.8 and 8.11, 9.1 to 9.3
10/22	15 (1st Half)	Effective Stress (Chapter 9.1-9.2)	Review HW Lecture 15, Chapter 9.1 - 9.2
10/22	16 (2nd Half)	Effective Stress (Chapter 9 .3 Continued)	Lecture 16, Chapter 9. **HW:** Problems (given in class) Read Chapter 10.1 -10.5, 10.7, 10.12 and 10.13

10/29	17 (1st Half)	Stress Distribution (Chapter 10.1-10.5)	Review HW Lecture 17, Chapter 10.1-10.5
10/29	18 (2nd Half)	Stress Distribution (Chapter 10.7, 10.12, 10.13)	 Lecture 18, Chapter 10.7, 10.12, 10.13) **HW:** Problems (given in class) Study Exam #2 (Chapters 7-10)
11/5	19 (1st Half)	Exam #2	Exam #2 (1 hour, 20 min), Chapters 7 – 10
11/5	20 (2nd Half)	Consolidation (Chapter 11,1 -11.3, 11.5)	Lecture 20 , Chapter 11.1-11.3, 11.5 **HW** – Problem (given in class) Read Chapters 11.1-11.3, 11.5, 11.6- 11.14
11/12	21 (1st Half)	Consolidation (Chapter 11.6 -11.9)	Review Exam and HW Lecture 21, Chapters 11.6-11.9
11/12	22 (2nd Half)	Consolidation (Chapter 11.10 - 11.14)	Lecture 22, Chapter 11.10 - 11.14 **HW** Problems (given in class) Read Chapters 11.16-11.17, 12.1 – 12.5

11/19	23 (1st Half)	Consolidation (Chapter 11.16-11.17)	Review HW Lecture 23 , Chapter 11.16 -11.17
11/19 **(NO CLASS 11/26)**	24 (2nd Half)	Shear Strength (Chapter 12.1-12.5)	Lecture 24 , Chapter 12.1 -12.5 **HW** Problems (given in class) Read Chapter 12.6 to 12.12
12/3	25 (1st Half)	Shear Strength (Chapter 12.6-12.9)	Review HW Lecture 25, Chapter 12.6 to 12.9
12/3	26 (2nd Half)	Shear Strength (Chapter 12.10 - 12.12)	Lecture 26, Chapter 12.10 to 12.12 **HW** Problems (given in class) Read Chapter 12.16 - 12.19, and 17.1-17.4,17.6, 17.7, 17.12-17.14
12/10	27 (1st Half)	Shear Strength (Chapter 12.16 - 12.19)	Review HW Lecture 27 , Chapter 12.16 and 12.19
12/10	28 (2nd Half)	Subsurface Exploration (Chapter 17)	Lecture 28 , Chapter 17.1 to 17.4, 17.6, 17.7, 17.12-17.14 **HW**- Study for Final
12/17		Final Exam	Final Exam , Chapters 11,12 and 17

Lecture	Subjects to be Covered
Lecture 1 to 2	Chapters 1 Introduction and Origin of Soils, Introd to Particle Size
Lectures 3 to 4	Chapters 2 and 4 Particle Size, Plasticity
Lecture 5 to 6	Chapter 5 Soil Classification
Lecture 7 to 8	Chapter 3 Phase Relationships
Lecture 9 to 10	Chapter 6 Compaction
Lecture 11	Exam #1 (Chapters 1-6)
Lecture 12 to 13	Chapters 7 Permeability/Conductivity

Lecture 14	Chapter 7 Permeability/Conductivity/Seepage
Lecture 15 to 16	Chapter 9 Effective Stress
Lecture 17 to 18	Chapter 10` Stress Distribution
Lecture 19	Exam #2 (Chapters 7-10)
Lecture 20-23	Chapter 11 Consolidation
Lecture 23 -27	Chapter 12 Shear Strength
Lecture 28	Chapter 17 Subsurface Exploration
	Final Exam (Chapters 11,12 and 17)

Course: Soil Mechanics (CE 341), Soil Mechanics Lab Taken Concurrently CE341A)

Instructor: Andrew J. Ciancia, PE

Text: Re: Das and Sobhan, 9th Edition, "Principles of Geotechnical Engineering", 2018

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Grading Procedure

Attendance, Class Participation, and Quizzes 15%
Homework Problems 10% (Late HW submittals are not accepted)
Exam 1 - 25%, Exam #2- 25%
Final Exam 25%

Exams are open book. However, only your book, class notes, HW problems, and a stand-alone calculator maybe used for exams. No solutions manuals, cell phones or computers are permitted.

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 and/or Canvas are 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 quizzes and examinations. Plan on bringing a watch to keep time during examinations.

Basis of Grading

2 Exams	50 points
Final Exam	25 points
Homework	10 points
Quizzes, Class Participation.	15 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

Outcomes Course Matrix – CE 341- Soil Mechanics

Strategies, Actions and Assignments	ABET Student Outcomes (1-7)	Program Educational Objectives	Assessment Measures
Student Learning Outcome 1: Identify 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.	1	1	Homework, quizzes and exams.
Explore subsurface methods of investigation in design.	1	1, 2	Homework, quizzes, and problem solving in class.
Discuss professional design practice.	2, 7	1, 2	Class discussions and problem solving. Quizzes and exams.
Student Learning Outcome 2: Apply principles of seepage through porous media and effective stress.			
Introduce basic concepts and flow through soils.	1	1	Homework, quizzes and exams.
Apply these principles to problem solving.	1, 2	1	Homework, quizzes, and problem solving in class.
Discuss application of these principles to engineering problems.	2	1	Class discussions and problem solving. Quizzes and exams.
Student Learning Outcome 3: Apply principles of consolidation and shear strength.			
Introduce consolidation theory and shear strength principles	1	1	Homework, quizzes, and exams.
Discuss analytical methods to solve different types of settlement problems.	2	1	Homework, quizzes, and problem solving in class.
Discuss professional design practice.	2, 4	1, 2	Class discussions, problem analyses, and problem solving.

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

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

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

1. an ability to identify, formulate and solve complex engineering problems by applying principles of engineering, science and mathematics
2. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety and welfare, as well as global, cultural, social, environmental and economic factors
3. an ability to communicate effectively with a range of audiences
4. an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental and societal contexts
5. an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks and meet objectives
6. an ability to develop and conduct appropriate experimentation, analyze and interpret data and use engineering judgment to draw conclusions
7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies

Revised: 2/13/18