Fall 2020

CE 341-001: Soil Mechanics

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NJIT New Jersey's Science & Technology University

DEPARTMENT OF CIVIL AND ENVIRONMENTAL ENGINEERING

CE CE-341-001
Course Title: Soil Mechanics Fall 2020

Course 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, and shear strength are introduced. Settlement analysis is also presented. Lab must be taken concurrently or prior.

Co-requisite or Pre-requisite:
MECH 237 with a grade of C or better or equivalent. Corequisite: CE 341A.

Canvas: All course work, class power-point slides, homework, tests, assignments, etc. will be posted on Canvas

Instructor: Andrew J. Ciancia, PE, LEED AP
Office: By appointment via e mail

Office Hours: By appointment via e mail

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

Course Section: 001

Date 2020	**Lecture No. CE-341-001 Soil Mechanics**	Subject	Homework Assignment
	TWO SESSIONS PER WEEK Mondays & Thursdays, 12:30 pm -1:50 pm		Re: Das and Sobhan, 9th Edition, "Principles of Geotechnical Engineering", 2018
	Prior to Class		**Read Chapter 1, 2.1-2.5**
9/3	1	Introduction and Origin of Soil (Chapter 1, 2.1-2.5)	Lecture 1: Chapter 1, and Chapter 2.1-2.5 **HW**: Look up and submit 1 page write-up (single space) of the bedrock type under Newark, NJ; Bethlehem, Pa; Brooklyn, NY; and your home town or country Read Chapter 2.6-2.7

9/8 Tuesday**	2	Chapter 2.6 -2.7 (Particle Size/Hydrometer)	Review HW Lecture 2: Chapter 2.6 - 2.7 **HW** Problems (given in Canvas) Read Chapter 2.8-2.10
9/10	3	Chapter 2.8 -2.10 (Particle Size)	Review HW Lecture 2: Chapter 2.8 - 2.10 **HW** Problems (given in Canvas) Read Chapter 4.1- 4, 4.8
9/14	4	Chapter 4.1- 4.8 (Plasticity)	Review HW Lecture 3: Chapter 4.1 – 4.8 **HW:** Problems (given in Canvas) Read Chapter 5.1-5.5
9/17	5	Soil Classification (Chapter 5.1-5.5)	Review HW Lecture 5: Chapter 5.1-5.5 **HW**: Problems (given in Canvas) Read Chapter 5.6 -5.7
9/21	6	Soil Classification (Chapter 5.6-5.7)	Review HW Lecture 6: Chapter 5.6-5.7 **HW:** Problems (given in Canvas) Read Chapter 3.1-3.4
9/24	7	Phase Relationships - Weight, Volume (Chapter 3.1-3.4)	Review HW Lecture 7 , Chapter 3.1-3.4 **HW**: Problems (given in Canvas) Read Chapter 3.5-3.8
9/28	8	Phase Relationships - Density (Chapter 3.5-3.8)	Review HW Lecture 8 , Chapter 3.5-3.8 **HW**: Problems (given in Canvas) Read Chapter 6.1-6.8
10/1	9	Compaction (Chapter 6.1-6.8)	Review HW Lecture 9: Chapter 6.1-6.8 **HW** Problems (given in Canvas) Read Chapter 6.9-6.14
10/5	10	Compaction (Chapter 6.9 -6.14)	Review HW Lecture 10, Chapter 6.9-6.14 **HW:** Study for Mid-Term Exam #1 (Chapters 2--6)

10/8	11	EXAM #1	Exam #1 (1hr-20 min) Chapters 1-- 6 **HW:** Read Chapters 7.1-7.5
10/12	12	Permeability and Conductivity (Chapter 7.1-7.5)	Review Exam Lecture 12, Chapter 7.1 to 7.5 **HW**: Problem (given in Canvas) Read Chapter 7.6 - 7.11
10/15	13	Continue Permeability and Conductivity (Chapter 7.6- 7.11)	Review HW Lecture 13, Chapter 7.6 to 7.11 **HW** Problems (given in Canvas) Read Chapter 8.1 to 8.5,8.8 and 8.11
10/19	14	Seepage and Drainage (Chapter 8.1-8.5, 8,8 and 8.11	Review HW Lecture 14, Chapter 8.1 to 8.5, 8.8 and 8.11 **HW** Problems (given in Canvas) Read Chapter 9.1 to 9.2
10/22	15	Effective Stress (Chapter 9.1-9..2)	Review HW Lecture 15 ,Chapter 9.1 to 9.2) **HW**: Problems (given in Canvas) Read 9.3-9.4
10/26	16	Effective Stress (Chapter 9.3-9.4)	Review HW Lecture 16, Chapter 9.3 – 9.4 **HW***:* Problems (given in Canvas) Read Chapter 10.1 -10.5
10/29	17	Stress Distribution (Chapter 10.1-10.5)	Review HW Lecture 17, Chapter 10.1-10.5 **HW**: Problems (given in Canvas) Read Chapters 10.7, 10.11 – 10.14

11/2	18	Stress Distribution (Chapter 10.7, 10.11-10.14)	Review HW Lecture 18, Chapter 10.7, 10.11 - 10.14) **HW:** Problem (given in Canvas) Study Exam #2
11/5	19	Exam #2	Exam #2 (1 hour, 20 min), Chapters 7 – 10 **HW**: Read Chapter 11.1-11.5
11/9	20	Consolidation (Chapter 11,1- 11.5)	Review Exam Lecture 20 , Chapter 11.1-11.5 **HW** – Problems (given in Canvas) Read Chapter 11.6-11.9
11/12	21	Consolidation (Chapter 11.6 -11.9)	Review HW Lecture 21 , Chapter 11.6-11.9 **HW** – Problems (given in Canvas Read Chapter 11.10-11.14
11/16	22	Consolidation (Chapter 11.10 - 11.14)	Review HW Lecture 22, Chapter 11.10 - 11.14 **HW** –Problems (given in Canvas) Read Chapter 11.16-11.18
11/19	23	Consolidation (Chapter 11.16-11.18)	Review HW Lecture 23 , Chapter 11.16 - 11.18 **HW** Problems (given in Canvas) Read Chapter 12.1-12.5
11/23	24	Shear Strength (Chapter 12.1-12.5)	Review HW Lecture 24 , Chapter 12.1 - 12.5 **HW** Problems (given in Canvas) Read Chapter 12.6 to 12.9

11/30	25	Shear Strength (Chapter 12.6-12.9)	Review HW Lecture 25, Chapter 12.6 to 12.9 **HW** Problems (given in Canvas) Read Chapter 12.10-12.12
12/3	26	Shear Strength (Chapter 12.10 -12.12)	Review HW Lecture 26, Chapter 12.10 to 12.12 **HW** Problems (given in Canvas) Read Chapter 12.13 -12.19
12/7	27	Shear Strength (Chapter 12.13 - 12.19)	Review HW Lecture 27 , Chapter 12.13 - 12.19 **HW** Problems (given in Canvas) Read Chapter 17
12/10	28	Subsurface Exploration (Chapter 17)	Review HW Lecture 28, Chapter 17. **HW**- Study for Final
TBD		Final Exam	Final Exam , Chapters 11,12 and 17

Grading Policy:

Attendance, Class Participation, and Quizzes 15%
Homework Problems 10% (Late HW submittals are not accepted, see below)
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. Homework is due no later than 1 hour before the beginning of each class. Late homework will incur a 50% deduction if handed in late the same day and 100% deduction after that. Online submissions are via Canvas

Quizzes (expect at least 3 to 4)

2 Exams	50 points
Final Exam	25 points
Homework	10 points
Quizzes, Class Participation.	15 points
Total	100 points

Grading Scale:

A: 100-90
B+: 89-85
B: 84-80
C+: 79-75
C: 74-70
D: 69-60
F: Below 60

Attendance Policy:

- 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 classed may result in a failing grade for the course.**
- Make sure that your email address stated in Canvas is correct and you are using it regularly. Communication from the instructor will be sent only to the NJIT (Canvas) e-mail address.
- Always bring your textbook, a calculator and writing paper to WebEx.
- All material handed out, posted, 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.
- 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 no later than 1 hour before the beginning of each class. Late homework will incur a 50% deduction if handed in late the same day and 100% deduction after that. Online submissions are via Canvas**
- 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.
- No recording devices shall be used during class or examinations. Take notes.

Withdrawals:

In order to insure consistency and fairness in application of the NJIT policy on withdrawals, student requests for withdrawals after the deadline will not be permitted unless extenuating circumstances (e.g., major family emergency or substantial medical difficulty) are documented. The course Professors and the Dean of Students are the principal points of contact for students considering withdrawals.

Academic Integrity

"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".*

Assignment Policy:

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.

There will be no extra credit available for this course.

HOMEWORK: Written assignments are to be submitted in class via Canvas ON OR BEFORE the due date. Late homework on the due date will incur a 50% deduction, after the due date a 100% deduction will apply. All homework assignments shall be submitted via Canvas with accompanying figures, tables, drawings, calculations, etc. The following information shall be included:

1. Your name
2. Date
3. Course Title and Number
4. Person to whom it is being submitted.
5. A brief statement of the assignment purpose (what was requested, who authorized it and what you did).
6. Reference to any drawings, figures, charts etc. – identify and important information that they contain.
7. Description of what information was obtained and used to solve the problem.
8. Important results clearly identified.
9. Appropriate conclusions and recommendations, if required.
10. All sources cited
11. If you assume soil property value you need provide a justification and cite your source.
12. Homework/projects must be done on 8 ½" × 11" engineering calculation paper, in a manner consistent with professional engineering calculation in practice.

Syllabus Information:

The dates and topics of the syllabus are subject to change; however, students will be consulted with and must agree to any modifications or deviations from the syllabus throughout the course of the semester.

Email Policy: all e-mails via Canvas

Items Required for this Course:

A. Bring your textbook, writing paper, and a calculator to each WebEx class.
B. Students should read the chapter and power point slides related to the topic that will be covered in the class before the class
C. Students are encourage to ask questions about the material covered in the class. This will be used as feedback and can be on a topic that was not clearly comprehended.
D. Zero points if engineering and graph papers are not used for your homework and exam.

Outcomes Course Matrix

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 geotechnical design 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 geotechnical 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.			
Apply basic concepts of effective stress and seepage	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 geotechnical engineering problems.	2	1	Class discussions and problem solving. Quizzes and exams.
Student Learning Outcome 3: Apply principles of consolidation and shear strength.			
Consolidation theory and shear strength principles	1	1	Homework, quizzes, and exams.
Discuss analytical methods to solve different types of foundation capacity and settlement problems.	2	1	Homework, quizzes, and problem solving in class.
Discuss professional design practice.(retaining systems)	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 safe, practical, 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 technical and interpersonal skills through professional growth and development activities such a 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