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Fall 2020

CE 443-103: Foundation Design

Matthew Riegel

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DEPARTMENT OF CIVIL AND ENVIRONMENTAL ENGINEERING

CE 443-141 Foundation Design - Fall 2020

General Course Information

Instructors: **Matthew Riegel, PE, D GE**

Office - 261 Wednesday, 3pm to 6pm and 9pm – 10pm (following class) and by appointment

e-mail: mdriegel@hntb.com 973-632-7541 (Cell)

Outside office hours please contact me via e-mail or cell phone.

Text:

Principles of Foundation Engineering 9th Ed. Das and Nagaratnam, 2019 Cengage Learning
ISBN: 978-337-70502-8

6:00 pm – 8:50 pm Synchronous/Virtual - Wed. September 2, 2020- December 21, 2020 Prerequisites: CE 341, CE 341A.

Week	Date	Topic
1	9-2	Review –Shear Strength and Consolidation; Geotechnical Investigations
2	9-9	Shear Strength and Bearing Capacity Theory
3	9-16	Application of Bearing Capacity Theory
4	9-23	Bearing Stresses and Elastic Settlement
5	9-30	Consolidation Settlement
6	10-7	Design of Shallow Foundations
7	10-14	Exam 1 followed by Introduction to Deep Foundations
8	10-21	Pile Foundations- Types and Installations
	10-28	No Class
9	11-4	Pile Capacity and Settlements
10	11-11	Design/Construction of Pile Groups
11	11-18	Design/Construction of Drilled Shafts
12	11-25	Exam 2 followed by Introduction to Lateral Earth Pressure
13	12-2	Lateral Earth Pressure and Retaining Wall Design
14	12-9	Design of Retaining Walls
15	12-16	Exam 3



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Attendance:

Attendance: Attendance and class participation are mandatory. If you are unable to attend instructor should be informed prior to the class. It is your responsibility to obtain the materials presented and submit homework as assigned on the date due. It is suggested you contact a fellow student to provide you with the materials missed.

September 1 Tuesday First Day of Classes
September 5 Saturday Classes Begin
September 7 Monday Labor Day
September 8 Tuesday Monday Classes Meet
September 8 Tuesday Last Day to Add/Drop a Class
September 8 Tuesday Last Day for 100% Refund, Full or Partial Withdrawal
September 9 Wednesday W Grades Posted for Course Withdrawals
September 14 Monday Last Day for 90% Refund, Full or Partial Withdrawal
September 28 Monday Last Day for 50% Refund, Full Withdrawal
October 19 Monday Last Day for 25% Refund, Full Withdrawal
November 9 Monday Last Day to Withdraw
November 25 Wednesday Friday Classes Meet
November 26 Thursday Thanksgiving Recess Begins
November 29 Sunday Thanksgiving Recess Ends
December 10 Thursday Last Day of Classes
December 11 Friday Reading Day 1
December 12 Saturday Saturday Classes Meet
December 13 Sunday Sunday Classes Meet
December 14 Monday Reading Day 2
December 15 Tuesday Final Exams Begin
December 21 Monday Final Exams End

Activities:

Students will be provided insights into the following foundation design topics –

- Soil strength, consolidation, and site investigation
- Selection of foundation types and basis for design
- Foundation loading
- Permissible settlements (service state) of shallow and deep foundations
- Stability (strength state) of shallow and deep foundations
- Slope stability
- Computations of earth pressure and design of retaining walls.



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ing: Your overall grade will be based on the following:

- 20% Quizzes
- 10% Written Homework Assignments
- 70% 3 Exams (proctored by Respondus or Webex – Webcam needed)

The final grade will be as follows:

A	90-100
B+	86-89
B	80-85
C+	74-79
C	70-73
D	60-69
F	<59

y: All assignments will be collected on the due date prescribed; if you are absent it is your responsibility to submit the assignment on that date. Late homework will not be accepted. All work to be submitted at the start of class or in my mailbox, electronic uploads will not be accepted.

Mobile Phones must be turned off during class.

• **Electronic versions of homework must be a SCANNED PDF file with the file titled as follows:**

LAST NAME_Assignment No X.PDF

- 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 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, unless approved by the Dean
- **Switch off cell phones during quizzes and examinations.**
- No recording devices shall be used during class or examinations. Take notes.

A quiz will be given each class based on each material covered in the previous class from 6:00-6:20 PM. There will be two questions: the first will be conceptual to evaluate theory of the material covered in the previous week; the second will practical to apply theory and test comprehension. A missed quiz (due to absence or tardiness to class) will be assigned a grade of zero. A minimum passing grade of 70% for quizzes will be required to pass the course. Absence from 4 or more quizzes will result in a failing grade for the course.

All examinations open book, open notes.



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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

Outcomes Course Matrix – CE 443 – Foundation Design

Strategies, Actions and Assignments	ABET Student Outcomes (1-7)	Program Educational Objectives	Assessment Measures
Student Learning Outcome 1: Develop an understanding of physical geological processes of the planet earth and the dynamics of how it changes.			
Introduce the concept of investigation, testing and establishing foundation design parameters	1,3	1	Homework, exams
Introduce bearing capacity concepts	1, 3	1	Homework, exams
Introduce foundation settlement concepts	1, 3	1	Homework, exams
Introduce deep foundation design concepts	1, 3	1	Homework, exams
Introduce retaining wall design and slope stability concepts	1, 3	1	Homework, exams

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:

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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.*



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HOMEWORK

All homework assignments shall be submitted with a short Memorandum, generally of one to two (maximum) pages of text with accompanying figures, tables, drawings, calculations, etc. The memorandum should be typed (hand written submittals will not be accepted; however, handwritten calculations are acceptable). 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.
10. All sources cited

Also include any list of symbols, figures or tables that you think are appropriate but do not obscure the important results with excessive computer output or calculation worksheets.

All calculations are to be included, all work shown and presented on engineering graph paper, hand written calculations must be neat.