

Spring 2022

## **CE 614-102: Underground Construction**

Alan R. Slaughter

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**DEPARTMENT OF CIVIL AND ENVIRONMENTAL ENGINEERING**

**CE 614    Underground Construction    Spring 2022**

**Course Description:** This course covers the various aspects of underground construction, including rock and soft ground tunnel construction, shaft construction, inspection and rehabilitation of existing structures, open cut construction, blasting and immersed tube tunnel construction.

**Pre-requisite:** It is recommended that students have taken either a Soils course or a geology course or both.

**Canvas:** Will be used for assignments, quizzes and additional communication.

**Instructor:**            Alan R. Slaughter, P.E., P.P.  
                                  Email: slaughte@njit.edu

**Suggested Text: Introduction to Tunnel Construction, 2<sup>nd</sup> Edition**

**Authors:** Chapman, Metje and Stark

**Publisher:** CRC Press; Paperback

**ISBN-13:** 978-1-4987-6624-1

**Course Sections: CE 614-102**

Meeting	Section Dates		Topic/Assignment
1	1/20/2022		Introduction Chapter 1
2	1/27/2022		Geotechnical and Shafts Chapter 2.2 to 2.3
3	2/3/2022		Geotechnical and Shafts Chapter 2.4 to 2.5
4	2/10/2022		Tunnel Analyses Chapter 3
5	2/17/2022		Groundwater Control & Open Cut Chapter 4

6	2/24/2022			Inspection of Tunnels
7	3/3/2022			Rock Excavation -Blasting Chapter 5.6
<b>8</b>	<b>3/8/2022</b>			<b>MIDTERM</b>
	<b>3/14/2022</b>			<b>School Vacation</b>
9	3/24/2022			Tunnel Boring Machine Chapter 5.5
10	3/31/2022			Earth Tunneling Shield Tunneling Methods Chapter 5.1 thru 5.4
11	4/7/2022			Tunnel Linings
12	4/14/2022			Immersed Tube Tunnels Microtunneling Chapter 5.7 thru 5.12
13	4/21/2022			Safety Chapter 6
14	4/28/2022			Ground Movements and Monitoring Chapter 7 <b>Term Paper Due 4/26</b>

<b>15</b>	<b>TO BE DETERMINED</b>	<b>FINAL</b>
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**Grading Policy:** Homework and Attendance 15%  
Midterm 25%  
Project 30%  
Final 30%

**Grading Scale:**

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

**Attendance Policy:** You are expected to attend classes either in person or on-line. If you can't make it, please leave an email for me.

**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.

**NJIT Honor Code:**

The NJIT Honor Code will be upheld; any violations will be brought to the immediate attention of the Dean of Students. The Honor Code can be found at (<http://www5.njit.edu/doss/policies/honorcode/index.php>).

**Assignment Policy:** When homework is assigned, it will be due the following Monday. Any late homework may be subject to a reduction in grade for that homework

**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:** Please send to [slaughte@njit.edu](mailto:slaughte@njit.edu)

**Items Required for this Course:** Book, calculator and computer materials.

**Dress Policy:** The dress policy is simple, when you are on line wear what you would wear when you are in class. Please no beach wear. Men keep your shirts on. Thank you

**Outcomes Course Matrix –**

Strategies, Actions and Assignments	ABET Student Outcomes (1-7)	Program Educational Objectives	Assessment Measures
Student Learning Outcome 1:			
	1	3	Tests
Student Learning Outcome 2:			
	7	1	Term Paper
Student Learning Outcome 3:			
	4	2	Homework

**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 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: 12/18//2020