

Spring 2021

## **CE 431-108: Construction Materials Laboratory**

Giri Venkateela

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**DEPARTMENT OF CIVIL AND ENVIRONMENTAL ENGINEERING**

**CE 431 Construction Material Lab Spring 2021**

**Course Description:**

This course provides an understanding of the basic properties of construction materials, and presents current field, laboratory standards and requirements for these materials. Students select a material or component assembly for testing, design a testing procedure, and present their results.

Co-requisite or Pre-requisite: Mech 237, CE 210

**Canvas: CE 431108**

**Instructor:** Giri Venkateela, PhD

Office: NJIT

Office Hours: Saturday 9 AM to 12 PM

Email: venkitee@njit.edu

**Suggested Text: None**

**Course Sections:**

Below is the section topics and related class/lab dates for the semester.

<b>Meeting</b>	<b>Section Topic and Class/Lab Dates</b>			<b>Assignment</b>
	<b>Topic</b>	<b>Date</b>	<b>Reference</b>	
1	Introduction, Safety, Laboratory Report Format	1/23/21		

2	Portland Cement Concrete (PCC) Mix Design	1/30/21	ACI 211, ASTM C125	
3	PCC Batch and Test Mix, Slump, Air, Cylinder Preparation	2/6/21	Handout	Group Mix design
4	PCC Batch and Test Mix, Slump, Air, Cylinder Preparation	2/13/21	ASTM C192, ASTM C31, ASTM C143, ASTM C231, ASTM C173, ASTM 172, ASTM 94	Labreport#1
5	Concrete Cylinder Testing (7 Day Test)	2/20/21	ASTM C39, ASTM C496, ASTM C805	Labreport#2
6	Welding & Welding Testing	2/27/21	Handout	
7	Welding & Welding Testing / Epoxy Lab Preparation	3/6/21	ANSI/AWS D1.1	Labreport#3
8	Concrete Cylinder Testing (28 Day), Windsor Probe, Concrete Hammer, Ec, Indirect Tension	3/13/21	ASTM C39, ASTM C805, ASTM C803, ASTM C496, ASTM C469	Labreport#4
9	Strain Gauge, Student Design Lab – Topic, Research and Testing Proposal	3/27/21	Handout	Labreport#5
10	Asphalt pavements: Epoxy Strength Testing – Tension and Shear	4/3/21	Handout, ASTM D897	Labreport#6
11	Student Design Lab	4/10/21		
12	Construction Vibrations, Noise Measurements, Moisture, Light, Gas	4/17/21	Handout	Labreport#7
13	Student Design Lab	4/24/21		

14	Presentation of Results of Student Testing	5/1/21		Student designed research report
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**Grading Policy:**

Laboratory Reports = 50%, Final Project = 25%, Presentation 10%; Class Participation = 10%, Homework =5%.

**Grading Scale:**

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

**Attendance Policy:** Attendance required to participate in the lab ad class meetings

**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:** Check the class instructions provided by the professor

**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:** Check the class instructions provided by the professor

**Items Required for this Course:**

Check the class instructions provided by the professor

**Dress Policy:** Check the class instructions provided by the professor

**Outcomes Course Matrix –**

<b>Strategies, Actions and Assignments</b>	<b>ABET Student Outcomes (1-7)</b>	<b>Program Educational Objectives</b>	<b>Assessment Measures</b>
<b>Student Learning Outcome 1: Investigate the properties and behavior of engineering materials and assemblies.</b>			

Perform material testing and identification as per ASTM and ACI standards and procedures.	1,2	1	Class participation, lab reports.
<b>Student Learning Outcome 2: Become familiar with ASTM specifications and testing procedures and with construction field monitoring and testing practices.</b>			
Conduct fully interactive physical testing.	1,2,7	1,2	Class participation, lab reports.
<b>Student Learning Outcome 3: Design and conduct a custom laboratory experiment, analyze and interpret the data, and make a presentation on the results of the testing.</b>			
Students identify a unique laboratory testing topic, design and conduct their own experiment, analyze the results and present their findings	1,2,3,4,5	1,2	Class participation lab report, oral presentation.

### 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 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