

Spring 2019

# CE 431-104: Construction Materials Laboratory

Walter Konon

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JOHN A. REIF, JR. DEPARTMENT OF  
**CIVIL AND ENVIRONMENTAL  
 ENGINEERING**



**CE 431 – Construction Materials Laboratory**  
**Section: 002, 102, 104 & 106**

**Spring 2019**

<b>Text:</b> No Text
<b>Instructor:</b> Professor Walter Konon, Room 223 Colton Hall, Phone#: 973-596-2476, <a href="mailto:konon@njit.edu">konon@njit.edu</a> , Office Hours: Wednesday 10-11:30 AM and Thursday 11:30-1 PM or by appointment
<b>Prerequisite:</b> Mech 237, CE 210.

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

Week	Topic	Reference
1	Introduction, Safety, Lab Report Format	
2	Portland Cement Concrete (PCC) Mix Design	ACI 211
3	PCC Batch and Test Mix, Slump, Air Cylinder Preparation	ASTM C192, ASTM C31, ASTM C143, ASTM C231 ASTM C173 ASTM 172
4	Concrete Cylinder Testing (7 Day)	ASTM C39, ASTM C496, ASTM C805
5	Welding & Weld Testing	Handout
6	Welding and Weld Testing –Epoxy Sample Prep	ANSI/AWSP1.1
7	Concrete Cylinder Testing (28 day), Windsor Probe, Concrete Hammer, Ec, Indirect Tension	ASTM C31, ASTM C805 ASTM C803, ASTM C496, C469
8	Strain Gauges	Handout
9	Student Designed Lab-Topic, Research and Testing Proposal	
10	Asphalt Pavements; Epoxy Strength Testing-Tension, Shear	Handout
11	Student Designed Lab	
12	Construction Vibrations, Noise Measurement, Moisture, Light, Gas	Handout
13	Student Designed Lab	
14	Presentation of Results of Student Testing	

Note: Students will be consulted on any substantial changes to the course syllabus. Changes will be discussed and announced in advance.

**Course Objectives Matrix – CE 431 Construction Materials Laboratory**

<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>			
Conduct experiments that measure the physical properties of materials and assemblies	6	1	Class participation, lab reports
<b>Student Learning Outcome 2: Incorporate and use ASTM specifications and testing procedures in testing, reports and presentations.</b>			
Perform material testing and identification as per ASTM and ACI standards and procedures	6	1, 2	Class participation, Lab reports
<b>Student Learning Outcome 3: Develop skills for analyzing experimental data and working in teams.</b>			
Conduct fully interactive physical testing	5, 6	1	Class participation, Lab reports
Perform experiments in students groups that require exchange and analysis of data during the laboratory period, as well as after class	5, 6	1, 2	Class participation, lab reports
Prepare written laboratory reports	3	1, 2	Lab reports
<b>Student Learning Outcome 4: 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.	3, 5, 6	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 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