Welcome to the CEE Construction Materials Laboratory.

This is a place where you will "put to the test" the theory you are learning in the classroom. The Construction Materials Laboratory Course (CE 431) is designed to complement the lecture portions of four construction/structures-oriented courses: Construction Methods and Procedures (CE 210), Construction Engineering (CE 414), Concrete Design (CE 333) and Steel Design (CE 432). The specific objectives of this course are to provide the student with an opportunity to:

1. Investigate the properties and behavior of materials and their assemblies;
2. Become familiar with ASTM specifications and testing procedures and with construction field monitoring and testing practices;
3. Develop skills for analyzing experimental data and working in teams;
4. Learn to design, conduct and analyze data of a custom student-designed laboratory experiment.
5. Research and cite reference standards.

Experiments are performed by student groups of four to five people or as a class demonstration. The experiments are interactive and involve: (1) setup; (2) operation; (3) measurement; (4) adjustment; (5) data gathering; and (6) data reduction. The group approach teaches the value of teamwork in problem-solving during the laboratory period and after class as data are exchanged and reduced. Some experiments are performed as class demonstrations in which each group is assigned a single data set to analyze. Later, towards the end of the period, each group reports their results to form a collective body of data, or research testing.

You will have the opportunity to design and conduct your own custom laboratory experiment of construction material or assembly. It will be both an interesting and challenging experience since you must translate a stated problem into a physical experiment, research and cite standards, testing procedures, and expected results, making decisions on set-up, experimental parameters, and analysis methods, and report and present your finding. This experiment will require you to apply the various experimental techniques that you have learned throughout the semester.

Written assignments must be submitted for each laboratory experiment. Most lab reports will be written and submitted individually by the student. In completing individual reports, students in the same group will share data, although all analyses and written text must be the student's own work. A few group-written reports will be assigned during the semester. For some experiments, an abbreviated lab format report will be submitted.

Your safety and the safety of those around you are of prime importance. Efforts have been made to reduce the hazard in the lab as much as possible. Students should follow the general safety rules included on the following page. If you should see anything that you consider to be a safety hazard report this condition to your lab instructor. If you have any questions about the safety of the lab you are going to conduct, consult the lab instructor. Take your experiments seriously. Forces into the thousands of pounds will be used throughout the course and if these forces are released in an uncontrolled manner injuries are possible.

Good luck with your experiments this semester, and work safe!

CEE 431 – 101: Construction Materials Lab

(1 credit)

Lectures Day(s): Mon, 6:00PM – 8:50PM
Lecture: CKB220, Lab: Colton 121

Instructor Stephen J. George
Colton Hall Room 251
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(973) 596-8528

Office Hours: By appointment

Prerequisite MECH237 (with a "C" or better), CE210

Required Textbook

N/A

Other Recommended Texts & Reading

Course Materials will be posted on Canvas.

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.

http://catalog.njit.edu/undergraduate/newark-college-engineering/civil-environmental/civil-engineering-bs/

Course Objectives (General)

By the end of this course, the student will be able to:

1. Investigate the properties and behavior of materials and assemblies;
2. Become familiar with ASTM specifications and testing procedures and with construction field monitoring and testing practices;
3. Develop skills for analyzing experimental data and working in teams;
4. Learning to design, conduct and analyze data of custom student designed laboratory experiments; and
5. Research and cite referenced standards.

POLICIES & PROCEDURES

Academic Integrity: It is expected that NJIT's University Code on Academic Integrity will be followed in all matters related to this course. Refer to NJIT's Dean of Students website to become familiar with the Code on Academic Integrity and how to avoid Code violations.

https://www.njit.edu/policies/sites/policies/files/academic-integrity-code.pdf

Communication: Canvas will be used to communicate outside of class time.

Lectures/Class: Lectures will be held in-person in Central King Building 207. Lab work will be conducted in the Concrete Laboratory, located in Colton Hall room 121.

Handouts: Handouts will be given to students during class hours and will also be posted to Canvas.

Lab Reports/Homework: Lab Reports and Homework will be assigned during class and will typically be due the following week. All work will be submitted to Canvas.

Late Work: One individual assignment can be submitted late without penalty. Late assignments one day late is 10% in penalty and two days late is 20% off. After two days not accepted, unless discussed with the professor due to an extenuating circumstance prior to the homework/report due date. Late submissions must be uploaded to Canvas and handed in in the next class as a paper copy.

Calculation of Course Grade: A weighted average grade will be calculated as follows:

Homework	15%
Lab Reports	50%
Final Project	30%
Participation	5%

The minimum requirements for final letter grades are as follows:

A = 90.0%, B+ = 85.0%, B = 80.0%, C+ = 75.0%, C = 70.0%, D = 60.0%, F < 59.9%

Instructor Commitment: You can expect the Instructor to be courteous, punctual, organized, and prepared for lecture and other class activities; to answer questions clearly; to be available during office hours or to notify you beforehand if office hours are moved; to provide a suitable guest lecturer or pre-recorded lecture when they are traveling or unavailable; and to grade uniformly and consistently.

Students with Documented Disabilities: NJIT is committed to providing students with documented disabilities equal access to programs and activities. If you have, or believe that you may have, a physical, medical, psychological, or learning disability that may require accommodations, please contact the Coordinator of Student Disability Services located in the Center for Counseling and Psychological Services, in Campbell Hall, Room 205, (973) 596-3414. Further information on disability services related to the self-identification, documentation and accommodation processes can be found on the webpage at: (http://www.njit.edu/counseling/services/disabilities.php)

Course Schedule:

Week	Topic	Assignment Due	Reference
1	Introduction, Lab Safety Review, Lab Visit		Handouts
2	Portland Cement Concrete (PCC) Mix Design	Add name to group on Canvas	ACI 211, ASTM C125
3	PCC Batch and Test Mix, Slump, Air, Cylinder Preparation	Concrete Mix Design	ASTM C192, ASTM C31, ASTM C143, ASTM C231, ASTM C173, ASTM 172, ASTM 94, ASTM C138
4	Concrete Cylinder Testing (7 Day Test)	Concrete Mix Laboratory Sheet	ASTM C39, ASTM C496, ASTM C805
5	Introduction to Welding & Epoxy Testing	Concrete 7 Day Lab Sheet	Handout
6	Welding & Epoxy Preparation	7 Day Concrete Laboratory Report	Handout
7	Concrete Cylinder Testing (28 Day), Windsor Probe, Concrete Hammer, Indirect Tension	Welding Assignment	ASTM C39, ASTM C805, ASTM C803, ASTM C496, ASTM C469
8	Welding & Epoxy Testing	28-day Concrete Lab Report (Group)	ANSI/AWS D1.1
9	Construction Vibrations, Noise Measurements, Moisture, Light, Gas	Welding and Epoxy Lab Report (Group)	
10	Student Design Lab – Topic, Research and Testing Proposal		
11	Student Design Lab	Student Design lab Topic	Handout, ASTM D897
12	Student Design Lab		
13	Student Design Lab		Handout
14	Presentation of Results of Student Testing	Student Design Lab Report & Presentation (Group)	

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

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, resilient, 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

Course Objectives Matrix: CE431– 101

Strategies and Actions	Course Student Learning Outcomes	ABET Student Outcomes (1-7)	Program Educational Objectives	Assessment Methods/Metrics
Course Objective 1: Investigate the properties and behavior of engineering materials and assemblies				
Conduct experiments that measure the physical properties of materials and assemblies	Conduct testing, analyze data results, compare results to expected values	6	1	Class participation, lab reports
Course Objective 2: Incorporate and use ASTM specifications and testing procedures in testing, reports, and presentations.				
Perform material testing and identification as per ASTM and ACI standards and procedures	Follow ASTM testing requirements	6	1,2	Class participation, Lab reports
Course Objective 3: Develop skills for analyzing experimental data and working in teams.				
Conduct fully interactive physical testing	Work in teams doing the lab, analyze data results	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	Work in groups in the lab and analyze the data results	5,6	1,2	Class participation, lab reports
Prepare written laboratory reports	Wright a clear report	3	1,2	Lab reports
Course Objective 4: Develop skills for analyzing experimental data and working in teams.				
Students identify a unique laboratory testing topic, design and conduct their own experiment, analyze the results and present their findings.	Identify a construction material lab test, perform the test as a team, present the results of the testing as a team presentation	3,5,6	1,2	Class participation lab report, oral presentation