John A. Reif, Jr. Department of Civil & Environmental Engineering

CE 210-101: Construction Materials and Procedures
(Thursdays from 6:00 PM to 8:50 PM)

Course Description and Objectives:
This course is a general comprehensive course on construction management and engineering in the Civil and Environmental Engineering Department at NJIT. It provides a broad understanding of the construction environment, the engineering and construction project management process and development process, with particular emphasis on planning, scheduling and cost management, which are key pillars of successful construction management. Also, the various tools and techniques and their interactions in the cost-effective development of constructed facilities, will be covered with practical illustrations and complemented by hands-on exercises and case studies.

Course Pre-requisites:
ENGL 101.

Course Lecture Hours and Credits:
This is a three-lecture hours and three-credits course.

Course Learning Outcomes:
This course covers the environment, planning and management issues related to the modern approach of construction management. Using the cases and background materials, and methodologies covered, you should be able to:

- Analyze the feasibility of a construction project within resource constraints.
- Understand the basic structure of the construction industry, its environment, its various sectors and its overall relationship to the US and global economy.
- Devise the best organizational structure capable of carrying out the project.
- Understand engineering economic principles and apply the concepts of life-cycle management of a constructed project from the owner's perspective (feasibility, financing, rate of return, contract management, quality control).
- Define the role of the general contractor, and understand the perspective of the GC as a business (estimating, bidding, project financing, cash flow management, materials and operations management).
- Understand the components of modern Professional Construction Management, and its relationships to other project participants as a form of project delivery.

Course Instructor:
Rayan H. Assaad, PhD, A.M.ASCE (Website: https://sciis.njit.edu)
Office: Room 207 Colton Hall

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Office Hours: Thursdays 4:00 PM to 5:30 PM or by e-mail or appointment. Feel free to stop by my office at any time of your convenience. I will try to meet you immediately unless I have a conflicting scheduled meeting or a very pressing deadline.

Course Textbook:

There is a required textbook for this course.

- Halpin, Daniel W. and Senior, Bolivar A., Construction Management, 5th Edition Wiley, and ISBN: 9781119256809.
    - This textbook is referred to as DH in the lecture readings and other references below.

Canvas and Technology Requirement:

All course materials will be available on Canvas. It is the student's responsibility to check the course page on Canvas regularly.

Course Grade Breakdown:

Homework	20%
Reports	20%
Mid-Term Exam (In-Class)	25%
Final Exam	25%
Class Attendance and Participation	10%

Course Grading:

Cumulative points in all course requirements will be rounded to the next highest whole number (for example 84.1 will be rounded to 85 and 95.7 will be rounded to 96). Afterwards, the student's final grade will be determined according to the following scale:

≥90	A
≥85 and ≤89	B^+
≥80 and ≤84	B
≥75 and ≤79	C^+
≥71 and ≤74	C
≥68 and ≤70	D
<68	F

Withdrawals:

To ensure 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.

Course Specific Policies:

- Eating and use of cell phones are strictly prohibited during class time.

- Professional conduct in all matters related to class activities (i.e., sitting, talking, and discussing matters) is required at all times.
- The specific nature of this class demands active participation during class discussions. The objective of these discussion is to enrich the course environment, enhance student learning experience, foster critical thinking, and strengthen your communication skills. Thus, please get engaged and know that you are NOT being evaluated at all on the answers you provide in class. Also, please realize that there is no reason to take a back seat and be shy as there is no embarrassment whatsoever from any reasonable attempt to provide an answer.
- Students are required to attend all lectures to maximize their benefit and are required to arrive on time to minimize disturbance to the learning environment. Unexcused absence will result in a zero being assigned for any required in-class course task (including exams and midterms), and no make-up will be given. Bearing the aforementioned in mind, some absences can be excused due to reasons beyond a student control (i.e., a surgery or accident for example). In such an unlikely event, immediate communication with the instructor may help generate some timely solutions that cannot work out afterwards.
- You need to complete ALL course requirements in order to earn a passing grade.
- Homework is due at 11:59 PM. Late submissions will be penalized 10% of the points for each day late, up to 48 hours; after which the assignment will be recorded as a zero with no exceptions. Having a prior excused absence from attending a specific class does not warrant missing a submission date. Post excused absence – if any – will be handed on case-by-case basis.
- Poor performance in the class (for example, not submitting two assignments or recording less than 50% in two assignments or obtaining a grade less than the average grade of the class minus twice the standard deviation, etc.) automatically warrants an academic alert. If your performance deems you under two academic alerts, you should automatically provide an improvement plan that is accepted by the instructor.
- The most reasonable human attention is provided in grading all course requirements but in the unlikely event that something is overlooked one way or the other, there will be no problem whatsoever to revise your grade on such submission.

Students with Disabilities:

NJIT is fully 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 Office of Accessibility Resources and Services (https://www.njit.edu/studentsuccess/node/5).

Copyright:

All course content (including this syllabus, lecture materials, homework assignments, and exams) is protected content. Students should not make copies of any course materials or distribute these materials in the public domain.

Academic Integrity:

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*

Tentative Course Outline/Schedule:**

**The Instructor reserves the full right to amend or change this tentative schedule, according to class progress, with consultation with the students

Week	Date	Textbook/Reading	Topic
1	Thursday, September 5, 2024	DH Chapters 1, 2	History and Basic Concepts + Preparing the Bid Package
2	Thursday, September 12, 2024	DH Chapters 3, 4	Issues During Construction + Contracts
3	Thursday, September 19, 2024	DH Chapters 5	Legal Structure
4	Thursday, September 26, 2024	DH Chapters 7, 8	Project Planning and Project Scheduling
5	Thursday, October 3, 2024	DH Chapter 8 (continued)	Project Scheduling
6	Thursday, October 10, 2024	DH Chapter 9	Scheduling: Program Evaluation and Review Technique Networks and Linear Operations
7	Thursday, October 17, 2024	DH Chapter 11	The Mathematics of Money
8	Thursday, October 24, 2024	DH Chapter 12, 13	Project Cash Flow + Project Funding
9	Thursday, October 31, 2024	Midterm + Field Report #1 Due	
10	Thursday, November 7, 2024	DH Chapter 14, 15	Equipment Ownership + Equipment Productivity
11	Thursday, November 14, 2024	DH Chapter 16	Construction Labor
12	Thursday, November 21, 2024	DH Chapter 17, 18	Estimation Process + Cost Control
13	Tuesday, November 26, 2024	DH Chapter 19	Materials Management
13	Thursday, November 28, 2024	Thanksgiving Break – No Class	
14	Thursday, December 5, 2024	DH Chapters 19, 20 + Handout + Field Report #2 Due	Materials Management + Safety + Engineering Ethics
15	December 15-21	Final Exam	

Field Trip Reports:

Each student will submit two (2) reports, which can be 2 Parts of the same project, on **self-conducted** field trips according to the following schedule:

- 1. Project Administration: In this first part, you will establish a construction project of your choice, or a section of the class field trip project:
    - a- The project background, scope, budget, staging and key milestones.
    - b- Understanding of the contract and project delivery system, relationships between parties, progress measurement/payment, change-order management.
    - c- Description of the Construction Methods and Materials, and an engineering evaluation of a key project component (e.g., foundation design, etc.)
    - d- A Preliminary Work Breakdown Structure.

Part #1 is due on October 31, 2024.

- 2. Project Planning, including:
    - a- A detailed Work Breakdown Structure for all building systems and work elements or a building code evaluation used on site.
    - b- An MS Project CPM Schedule integrated with a cost estimate to enable cost/schedule integration.

Part #2 is due on December 5, 2024.

Outline and Content Elements for Each (Part of) the Field Trip Reports:

- 1. Introduction: Identify the project, its location and the type of construction. Give the dates of your visit. Identify the Owner, Contractor, and Architect- Engineer.
- 2. Field Investigation: Describe the project in detail based on your field visitation. Report on the present stage of construction. Report on the labor, equipment, and materials on the job. Report on production rates. Report any discussions with personnel (see note below).
- 3. Engineering Evaluation: Present your own evaluation of the equipment, materials, and procedures being used on the project based on your knowledge from CE 210. Suggest alternatives that might improve job progress and efficiency. Discuss any environmental and safety aspects of the project.
- 4. Appendix: (If any) Present applicable codes, manufacturer's literature, news articles, web links, etc.
- 5. Figures and Photographs*:* These or sketches are strongly recommended. Refer to all figures and photos in the body of the report.

Note: Make certain that you do not disrupt the ongoing construction activities during your visit. Always check first with the person-in-charge, usually the project superintendent, upon your arrival. Be courteous and remember, construction managers are busy people.

Report Format and Grading:

The report should be word processed on 8.5 x 11 in. bond paper submitted in class. Correct grammar and spelling are required. Grading will be based on (1) Technical content, (2) Communication effectiveness including organization, grammar, spelling, clarity, and neatness. Suggested length of the text portion of each of the 2 Parts of the report is at least 4 pages.

Outcomes Course Matrix – CE 210-003 Construction Materials & Procedures

Strategies, Actions, and Assignments	ABET Student Outcomes (1-7)	Program Educational Objectives	Assessment Measures
Student Learning Outcome 1: Explain terms used to describe construction materials, methods and procedures used in heavy building construction management and construction management and organization.			
Introduce the United States system of delivery of engineering and construction services	4	1, 2, 3	Homework, quizzes and exams
Introduce equipment labor and methods used in heavy and building construction	7	1	Homework, quizzes and exams
Student Learning Outcome 2: Apply the process of job site planning, scheduling and construction productivity estimating.			
Introduce critical path method scheduling	1, 2	1	Homework, quizzes and exams
Introduce methods used to calculate and estimate excavation equipment productivity	1, 2	1	Homework, quizzes and exams
Student Learning Outcome 3: Discuss construction contracts in the context of the United Sates legal system.			
Introduce the United States legal system and contracts	4	1, 3	Homework, quizzes and exams
Present the NCEES model rules of professional conduct	4	1, 3	Homework, quizzes and exams
Introduce the role of OSHA and construction site safety	4	1, 2, 3	Homework, quizzes and exams
Student Learning Outcome 4: Observe and report on construction project site visits.			
Visit construction sites and observe the project status and operations at the site.	3	1, 2	Field reports
Introduce engineering economics and its role in selection of alternatives.	7	1, 2	Homework, quizzes and exams

CEE Mission, Program Educational Objectives, and Student Outcomes

The mission of the Department of Civil and Environmental Engineering (CEE) 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

Revised: 2/13/18

Fall 2024 University Calendar

Sept	2	Labor Day. University Closed
Sept	3	First Day of Classes
Sept	9	Last Day to Add/Drop a Class
Sept	9	Last Day for 100% Refund, Full or Partial Withdrawal
Sept	10	W Grades Posted for Course Withdrawals
Sept	16	Last Day for 90% Refund, Full or Partial Withdrawal - No Refund for Partial Withdrawal after this date
Sept	30	Last Day for 50% Refund, Full Withdrawal
Oct	21	Last Day for 25% Refund, Full Withdrawal
Nov	11	Last Day to Withdraw from Classes
Nov	26	Thursday Classes Meet
Nov	27	Friday Classes Meet
Nov	28	Thanksgiving Recess Begins. No Classes
Dec	1	Thanksgiving Recess Ends
Dec	11	Last Day of Classes
Dec	12	Reading Day 1
Dec	13	Reading Day 2
Dec	14	Saturday Classes Meet
Dec	15	Final Exams Begin
Dec	21	Final Exams End
Dec	23	Final Grades Due