UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN
DEPARTMENT OF CIVIL AND ENVIRONMENTAL ENGINEERING

CEE320 CONSTRUCTION ENGINEERING AND MANAGEMENT
FALL 2025

SYLLABUS

Instructor:
Prof. Mani Golparvar (Newmark 3129D)

Teaching Assistants:
Amir Ghodrati
Shun-Hsiang Hsu

Lectures: Tue & Thu, 3:30 PM – 4:50 PM
1310 Newmark Civil Engineering Lab

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Table of Contents

I. Contact Information 4
Instructors 4
Teaching Assistants 4
Class Website 4
Class Social Media 4

II. Course Description 4
Instructional Approach 5
Character of the Course 5

III. Course Organization 5
Lectures 5
On-Line Quizzes and Late Submission Policy 5
Required and Supplemental Readings 5
Textbook 6

IV. Course Evaluation 6
Grading Policy 6
Electronic submission of Assignments 6
Participation Grade 6
Attendance in Exam Sessions 6
Evaluation of Assignments 6

V. Honor System 7
Assignments 7

VI. Entrepreneurship in Construction Case Study 7

VII. Special Needs 7

VIII. Supplemental Readings 8
Required Readings 8
Recommended Readings [Not-Required] 8

IX. Course Schedule 10

I. Contact Information

Instructors

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Office Hours: Tue 2:00 pm – 3:00 pm.
Thu 2:00 pm – 3:00 pm.
At all other times; only by appointment.
Office hour Zoom:
https://illinois.zoom.us/j/86588327134?pwd=ozpcHb2iRG1LyQhMMH54wInw4PdtLr.1

Teaching Assistants

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TA office hours through Zoom
https://illinois.zoom.us/j/88034371688?pwd=x4aO3KjhZ9J1daKx5UmtpHUaBYoDVu.1
(*Password: 32025)*
Office Hours: Mon 12:30 pm – 2:00 pm.
Wed 12:30 pm – 2:00 pm.
At all other times only by appointment.

Class Website

[CEE320: Construction Engineering and Management]
https://canvas.illinois.edu/
https://campuswire.com/p/G6546D366 (code: 0583)

Class Social Media

Twitter	UofICEE320
LinkedIn	UofI CEE 320 Construction Eng & Management
Facebook	UofI CEE 320 Construction Eng & Management

II. Course Description

The following sections detail the objectives of the course, instructional approach as well as the character of this course and how it differentiates from many other engineering courses.

Course Objective

The course is designed to allow students to develop an understanding of the construction **"Project lifecycle"** process from the initial conception phase of a project through the completion of construction. Emphasis is placed upon the construction and management aspects of the lifecycle. Upon completion of the course, students will be able to:

1. Enumerate the **total lifecycle project process** from the early conceptual phase through final project review.
2. Trace the steps needed to **prepare the documentation used to call for bids** and enter a construction contract.
3. Determine the **productivity** of relatively simple cyclical field operations and understand the techniques that are used to analyze and improve them.
4. Prepare a **construction cost estimate** for a relatively simple operation and understand how this estimate is carried forward into the bidding and cost control processes.
5. Construct a simple **project schedule** using appropriate methodologies and understand how this is used as a basis for short term planning and control.

Instructional Approach

Learning is expected to occur by four processes:

1. Lectures/exercises in the classroom and/or online,
2. Assignments from an integrated case study about a project's lifecycle,
3. Industry-speaker seminars in the classroom, and
4. Reading assignments from the text and supplementary materials.
5. Entrepreneurial assessment

You should attempt to complete the reading materials assigned for a particular class session prior to that session. Please note whether an on-line quiz is administered for a particular reading assignment as indicated in the Schedule (Section VII). Assignments reinforce all the material covered and are required to be submitted by the due date indicated on the Schedule of Sessions.

Self-formed teams of **two (2) students** will be responsible for executing the integrated case study about "The Rockford project's lifecycle" as well as the field trip report. Teams **must avoid** splitting the assignments in pieces whereby each student is responsible for only one aspect of the assignment and then cut-and-paste all the pieces for a single submission. When teams operate like this, team members are placed at a serious disadvantage during the mid-term and final exams.

Character of the Course

Unlike many engineering courses, you will likely find the quantitative aspects of this course to be only marginally challenging. In fact, most of the quantitative work requires only the use of algebra and geometry. However, the instructors believe that you will find that this course will present several new and interesting concepts, so most of the challenge associated with the course will be in grasping the concepts presented. Moreover, the course has a very practical nature to it. You will likely find that much of the material is directly related to the "**practice**" of engineering and construction as opposed to the "**science**" of engineering. In essence, in this course you will learn the vocabulary of the A/E/C industry.

III. Course Organization

The following paragraphs detail the organization of the lectures, readings as well as the evaluation of the students' work and involvement in the class.

Lectures

The course materials will be taught through a series of lectures and discussions. Lectures are scheduled for Tuesdays and Thursdays from 3:30 to 4:50 PM. Lectures are in Newmark Civil Engineering Lab, Room 1310 and online. Please refer to the Course Schedule (Section VIII) for more information. Lecture time will be used for teaching course materials and class discussions.

On-Line Quizzes and Late Submission Policy

On-line quizzes will be administered through Canvas @ Illinois and will relate to the reading assignments. On-line quizzes occur for readings with an "X" in the "On-line Quiz" column of the Schedule of Sessions. These quizzes will be available from 3:30PM the day prior to the scheduled session and due at 11:59PM on the day of the scheduled session. For example, an on-line quiz is associated with the readings for Session 3, which is on Tuesday, February 11th. The on-line quiz will be available starting at 3:30PM on Monday February 10th and will remain available until midnight on Tuesday, February 11th. These quizzes should take no more than 5-10 minutes to complete if you have done the assigned readings. **Late submission of quizzes will result in automatic 0% for that quiz.**

Required and Supplemental Readings

For most lectures, there will be a set of **required** readings. All required reading materials are listed in Section VII (Course Schedule) of this document. Additional readings may be assigned during class.

You should read the reading materials assigned thoughtfully and carefully. The instructors may not discuss all aspects of the text directly during the course, but the readings reinforce the discussions in class. On-line quizzes related to the readings will be given periodically during the semester.

Textbook

One of the primary reading materials will be the book Construction Management, by Daniel W. Halpin, Bolivar A. Senior and Gunnar Lucko published by John Wiley & Sons, 5th Edition. There is a downloadable electronic version of this textbook. E-book can be downloaded from the following link:
https://www.wiley.com/en-us/Construction+Management%2C+5th+Edition-p-9781119256809

A copy of the textbook can also be rented from other sources like Chegg and Amazon. The textbook can be rented from the following link:
https://www.amazon.com/Construction-Management-5th-Daniel-Halpin/dp/1119425735

IV. Course Evaluation

All work will be evaluated and assigned a grade on the "A" to "F" scale.

Grading Policy

The final course grade will be a weighted aggregation based on the following:

4%	Participation grade for • Class participation (Class involvement in-person and online, interpretations & suggestion to questions posted on Campuswire)
10%	Reading comprehension grade that is the average of several on-line quizzes
30%	Assignment grade i.e. the average of grade for written assignments
32%	Mid-term exam grade for two mid-term exams at 16% each
4%	Entrepreneurship in Construction Case Study
20%	Final exam grade

Electronic submission of Assignments

You should electronically turn-in assignments when they are due. We will use Canvas @ Illinois (https://canvas.illinois.edu/) for submission of assignments. Late assignments will be penalized according to the following system:

- 0-24 hours late – deduct 50%.
- More than 24 hours late – deduct 100%.

Participation Grade

Participation grade will constitute 4% of your grade and it mainly falls into two categories:

a. Involvement
We may take attendance in the class and/or online. There may be a signup sheet which will be circulated in the class and online in some specific sessions or we may take attendance in-class & online polls. Involvement in class is highly encouraged and is considered towards the grade for attendance.

b. Campuswire & online polls
There will be several polls conducted in class using Campuswire or online poll apps. These polls are designed to stimulate in-class and online discussions. We will use these responses as one of the indicators of in-class participation.

Attendance in Exam Sessions

You must attend exam sessions; if you have a conflict with an exam session or miss an exam session, then you must provide me with an official document indicating why you have a conflict or why you missed the session. Missing the session without a valid reason will result in a "0" for the exam. An advance notice of one week is also needed for makeup exams.

Evaluation of Assignments

The instructors will endeavor to return assignments and exams within one week. Depending on the class size or special circumstances (i.e. conflict exams), the return of assignments or exams may be delayed in those instances.
If you have questions about assignments, you should consult the course's TA first; if you still need assistance, then you should contact the instructors. However, you should not consult either one of us until you have made a reasonable effort to address the assignment, and **you have already checked Campuswire Class Feed for interpretation and suggestions on how to address the assignment**. By doing so, the interactions between us will be more efficient and productive.

V. Honor System

To foster and promote integrity among students, the CEE Honor Code was developed with input from several CEE undergraduate organizations, the CEE Graduate Student Advisory Committee, and the CEE Graduate Affairs Committee. You (the student) commit to honor the code each time you sign an exam, and implicitly whenever you sign homework or other class assignments.

The CEE Honor Code pledge is the following:

I pledge to uphold the highest levels of professional and personal integrity in all my actions, including 1) never assisting or receiving unfair assistance during exams, 2) never assisting or receiving assistance on class assignments beyond that specified by an instructor, and 3) always fully contributing to group activities that are part of a course activity.

Assignments

Assignments serve the following two purposes:

- Assignments are seen as educational devices to help students master the course material. This includes the concepts, theories, methodologies, and tools presented in class and recitation as well as such skills as working in teams.
- Assignments help the faculty evaluate how well each student has mastered the course material.

Thus, the Honor System is intended to balance these two purposes and, unless otherwise stated, apply to all assignments.

Students currently taking this class can work together to conceptualize general approaches to assignments. However, unless otherwise specified for a particular assignment (e.g., for group assignments), the work you submit must be done completely on your own. This includes text, numerical calculations, mathematical derivations, diagrams, graphs, computer programs and output. You are also expected to properly reference the source of any information used in a submission that is not your own. This includes any book, article, web page, MS PowerPoint presentation or personal correspondence from someone else that you used to create your work.

It is also **inappropriate to use assignments, problem sets, examinations or projects submitted in previous years** (e.g., Koofers, Coursehero) as a source, unless otherwise authorized.

Usage of ChatGPT or any other Generative AI tool for solving assignment or drafting memos is strictly forbidden.

If you have any questions about how these policies relate to a specific situation, please speak to the teaching staff of this course for clarification. Just remember, when you have doubts, ask the teaching staff for assistance.

VI. Entrepreneurship in Construction Case Study

The goal is to introduce and deepen your understanding of entrepreneurship and its various disciplines in Construction from an academic perspective. To do so, we plan to actively conduct research, as well as study and reflect upon a practical case study around a successful construction technology/process/organizational business, either as an individual startup or as part of a corporate initiative. Students will work in groups of 6 (six) students to conduct this research and will deliver a copy of a lean canvas (http://theleanstartup.com/book) overview of the conducted case study as well as an online video that describes their business model.

VII. Special Needs

If you need adaptations or accommodations because of a disability (e.g., learning, attention deficit disorder, psychological, physical, etc.), if you have emergency medical information to share, or if you need special arrangements in case the building must be evacuated, you must identify this need to the teaching staff by the end of the first week of classes.

VIII. Supplemental Readings

Below is a list of supplemental readings according to lecture subjects:

Required Readings

- **H1 –** Hendrickson, Chris, Project Management for Construction, 2nd Edition, 2008, WWW publication.
- **H2 –** ENR Historical Indices (2024). Least-improved Efficiency in Construction. The Economist.
- **H3-** Realizing the Benefits of BIM, Autodesk, & The Construction Productivity Imperative, McKinsey & Company, 2015.
- **H4 –** Commonwealth of Virginia Department of Transportation's Form C-7/A. Examples of bid forms that might be included in a unit price contract between an owner and a builder/contractor.
- **H5 –** Notice of Invitation for Prequalification of Bids. Sample document showing general conditions, supplementary conditions and two technical specifications. The general conditions shown are those used on all projects that the State of Virginia funds.
- **H6 –** Equipment Costs.
- **H7** – Contractor EDGE Development Goes Over Financial Cliff.

Recommended Readings [Not-Required]

Session(s) on Preliminary Estimating & Project Approval

- RS Means Square Foot Costs, 2024. pp. 1-505.
- Clough, R., Sears, G., and Sears, S., Construction Contracting-A Practical Guide to Company Management, 2005, 7th ed., John Wiley and Sons, Chapter 5, pp. 76-132
- Staub-French, S., Fischer, M., Kunz, J. and Paulson, B. 2003. An Ontology for Relating Features with Activities to Calculate Costs. Journal of Computing in Civil Engineering, ASCE, 17(4), pp. 243-254.
- Staub-French, S., Fischer, M., Kunz, J. and Paulson, B. 2003. A Generic Feature-Driven Activity-Based Cost Estimation Process. Advanced Engineering Informatics, 17(1), pp. 23-39.
- Shtub, A., Bard, J., and Globerson, S., Project Management – Eng, Technology & Implementation, 1994, Prentice-Hall, pp. 433 – 457.
- Barrie, D., and Paulsen, B., Professional Construction Management, 3rd Ed., 1992, Mc-Graw Hill, pp. 198 – 251.
- Peña-Mora, F., and Li, M., Dynamic Planning and Control Methodology for Design/Build Fast-Track Construction Projects, Journal of Construction Engineering & Management, 2001.

Session(s) on Engineer's Estimate

- RS Means Square Foot Costs, 2022. pp. 1-505.
- Clough, R., Sears, G., Sears, S., Construction Contracting-A Practical Guide to Company Management, 2005, Wiley, Chapter 5, 76-132
- Staub-French, S., Fischer, M., Kunz, J. and Paulson, B. 2003. An Ontology for Relating Features with Activities to Calculate Costs. Journal of Computing in Civil Engineering, ASCE, 17(4), pp. 243-254.
- Staub-French, S., Fischer, M., Kunz, J. and Paulson, B. 2003. A Generic Feature-Driven Activity-Based Cost Estimation Process. Advanced Engineering Informatics, 17(1), pp. 23-39.
- Shtub, A., Bard, J., and Globerson, S., Project Management – Eng, Technology & Implementation, 1994, Prentice-Hall, pp. 433 – 457.

- Barrie, D., and Paulsen, B., Professional Construction Management, 3rd Ed., 1992, Mc-Graw Hill, pp. 198 – 251.
- Peña-Mora, F., and Li, M., Dynamic Planning and Control Methodology for Design/Build Fast-Track Construction Projects, Journal of Construction Engineering & Management, 2001.

Session(s) on Scheduling

- Badiru, A., Pulat, S., Comprehensive Project Management: Integrating Optimization Models, Management Principles, and Computers, 1995, Prentice-Hall, pp. 103 – 115.
- Callahan, M., Quackenbush, D., and Rowings, G., Construction Project Scheduling, 1992, McGraw-Hill, New York, pp. 86 - 123.
- Hendrickson, Chris, and Au, Tung, Project Management for Construction, 1989, Prentice Hall, 297 – 326, 10.1-10.7
- Moder, J., Phillips, C., and Davis, E., Project Management with CPM, PERT and Precedence Diagramming, 3rd Edition, 1983, Van Nostrand Reinhold, pp. 100 – 115.
- Hegazy, T., computer Based Construction Management, 2002, Prentice Hall, New Jersey, pp. 115-126.

Other related readings

- Yang, J., Park, M.W., Vela, P.A. and Golparvar-Fard, M., (2015). Construction performance monitoring via still images, time-lapse photos, and video streams: Now, tomorrow, and the future. Advanced Engineering Informatics, 29(2), pp.211-224.
- Golparvar-Fard, M., Peña-Mora, F., and Savarese, S. (2012). "Automated model-based progress monitoring using unordered daily construction photographs and IFC as-planned models." ASCE Journal of Computing in Civil Engineering.
- Golparvar-Fard M., Peña-Mora F., and Savarese S. (2011). Integrated sequential as-built and as-planned representation with D4AR – 4-dimensional augmented reality - tools in support of decision-enabling tasks in the AEC/FM industry. ASCE Journal of Construction Engineering and Management.
- Golparvar-Fard M., Peña-Mora F., and Savarese S. D4AR- A 4-Dimensional augmented reality model for automating construction progress data collection, processing and communication. Journal of Information Technology in Construction (ITcon), Special Issue Next Generation Construction IT: Technology Foresight, Future Studies, Roadmapping, and Scenario Planning, 14, 2009, pp.129-153.
- Shtub, A., Bard, J., and Globerson, S., Project Management – Engineering, Tech & Implementation, 1994, Prentice-Hall, 458 – 487.
- Meredith, J., Mantel, S., Project Management – A Managerial Approach, 5th Edition, 2003, John Wiley & Sons, pp. 523 – 534.
- Peña-Mora, F., Anumba, C., Lyneis, J., Soibelman, L., Park, M., Samii, M., and Kalligeros, K., System & Project Management, to be published under the MIT/Prentice Hall Textbook Series on Civil, Environmental and Systems Engineering. Chapter 24.
- Peña-Mora, F., Anumba, C., Lyneis, J., Soibelman, L., Park, M., Samii, M., and Kalligeros, K., System & Project Management, to be published under the MIT/Prentice Hall Textbook Series on Civil, Environmental and Systems Engineering. Chapter 25.

IX. Course Schedule

CEE 320 Construction Engineering and Management –Fall 2025									
				Reading		Online	Assignment	
#	Day	Date	Topic	Chapter	Supp.	Quiz	Out	Due
1	Tue	26-Aug	Course Introduction & Administration				A0	
2	Thu	28-Aug	The Project Lifecycle	1				A0
3	Tue	2-Sep	Conceptual Design & Project Planning	2.1 - 2.4	H1	X		
4	Thu	4-Sep	Estimating Overview	17.1, 17.2				
5	Tue	9-Sep	Preliminary Estimating & Project Approval		H2	X	A1	
6	Thu	11-Sep	Design Evolution & Building Information Models		H3			
7	Tue	16-Sep	Contract Types & Parameter Estimates	4.1 - 4.7	H4	X	A2	A1
8	Thu	18-Sep	Project Delivery Methods	4.8 - 4.13		X		
9	Tue	23-Sep	Project Financing I	12,13			A3	A2
10	Thu	25-Sep	Project Financing II	11		X		
11	Tue	30-Sep	Review for Mid-Term I				A4	A3
12	Thu	2-Oct	**Mid-Term I**					
13	Tue	7-Oct	Engineering Drawings and Estimates	2	H5		A5	A4
14	Thu	9-Oct	Contract Documents & Call for Bids					
15	Tue	14-Oct	Equipment I	14			A6	
16	Thu	16-Oct	Equipment II	15	H6	X		A5
17	Tue	21-Oct	Bid Schedules, Estimates, and Bid Submissions	17.3 - 17.10	H7	X	A7	A6
18	Thu	23-Oct	Guest Lecture					
19	Tue	28-Oct	Review for Mid-Term II					A7
20	Thu	30-Oct	**Mid-Term II**					
21	Tue	4-Nov	Scheduling I & Entrepreneurship Case Study	7,8		X	A8	
22	Thu	6-Nov	Scheduling II					
23	Tue	11-Nov	Pre-Construction Budgeting, Issues during Construction	3,19				
24	Thu	13-Nov	Project Monitoring & Control I	18		X		
25	Tue	18-Nov	Guest Lecture					
26	Thu	20-Nov	Project Monitoring & Control II				A9	A8
27	Tue	25-Nov	Thanksgiving break					
28	Thu	27-Nov	**Thanksgiving break**					
29	Tue	2-Dec	Construction Comissioning/Decomissioning and Safety	20		X		A9
30	Tue	6-May	Course Recap (Final Exam Review)					

Remarks	
	10 online quizzes throughout the semester.
Chapter	Chapter in text to be studied BEFORE session in preparation for discussion. (Based on 5th edition of text book)
Supp	Supplemental reading to be studied BEFORE session in preparation for discussion.
Out	Assignments to be discussed and work to start.
Due	Assignments due at the start of this session. To be submitted via Canvas.