

CE 431 ADVANCED CONSTRUCTION MANAGEMENT

2026-27 Fall Semester

Instructor:

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Time and Location:

Monday 09.45 - 12.30 CZ16

Course description:

This course equips students with the essential skills to navigate the complete construction project life cycle, from initial procurement and contracting to final delivery with real-world examples. The curriculum covers foundational project management principles, including planning, scheduling, cost control mechanisms, and risk mitigation strategies. To bridge traditional practices with modern innovation, students will also be introduced to management mathematics and the application of machine learning within construction management. Beyond technical scheduling and financial tracking, the course emphasizes the human and ethical dimensions of project leadership by exploring quality management, occupational health and safety, effective communication, and human resource management. By integrating emerging industry technologies and a strong focus on professional engineering ethics, this course prepares students to deliver complex construction projects efficiently, safely, and responsibly.

Prerequisite(s): CE 231 Engineering Economy, CE 232 Construction Management

References:

Halpin, D.W., Senior B.A. Construction Management. John Wiley & Sons, Inc., 4th ed., 2011.
PMI, The standard for project management and a guide to the project management body of knowledge. 7th ed., Project Management Institute, Inc., 2021.
METU Department of Civil Engineering, Construction Eng. & Man. Dep., Construction Engineering and Management Lecture Notes. METU, 2014.
Blank, L. and Tarquin, A. (2012). Engineering Economy. Seventh Edition, McGraw-Hill, USA.
Halpin D. W.

Course Website:

All announcements and course material will be posted online.

Grading:

The final grades will be computed according to the following scheme:

Assessment	Weight	Date
Midterm I	30%	07.12.2026 (Tentatively)
Presentations	30%	14 th week or weekly
Final Exam	40%	11.12.2026 (Tentatively)

Tentative Course Outline

WEEK	SUBJECT COVERED
1	Project Life Cycle, Project Participants: Roles and Responsibilities, Project Delivery Methods
2	Main & Subcontractor Contracts, Procurement & Tendering Processes, Payment Certificates, Approvals
3	Introduction to Management Mathematics
4	General Introduction to Machine Learning Methods in Construction Management
5	Planning and Scheduling-I
6	Planning and Scheduling-II
7	Cost Control Mechanisms, Earned Value Analysis
8	Midterm-I
9	Risk Management & Arbitration in Construction Projects
10	Quality Management and Occupational Health & Safety
11	Communication and Human Resource Management
12	Emerging Trends and Technologies in Construction Project Management
13	Professional Responsibility and Engineering Ethics
14	Presentations
15	Final