

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

CEE 421 – Construction Planning – Fall 2026

Instructor: Prof. Khaled El-Rayes

Office: 3112 Newmark Lab

Tel: 265-0557

E-mail: elrayes@illinois.edu

Class Hours: Tuesdays & Thursdays 8:00am to 9:20am (NCEB 1310)

Office Hours: By appointment

Course Websites: <https://canvas.illinois.edu/courses/73596> (Course Documents)

Illinois Media space: <https://mediaspace.illinois.edu/channel/channelid/414242182> (Lecture Recordings)

Prerequisites: Construction Engineering (CEE 320) or Graduate Student status

Textbook: Hinze, J.W., 2011 “**Construction Planning and Scheduling**” 4th edition, Pearson, New Jersey.

Optional Supplement References: R.S. Means Building Construction Cost Data.

Other References:

1. Gould, F.E. and Joyce, N.E., 2022 “**Construction Project Management**”, 5th edition, Pearson, New Jersey
2. Robertson, G., 2021 “**Essentials of Construction Planning and Scheduling**”, ICE Publishing
3. Mubarak, S.A., 2019 “**Construction Project Scheduling and Control**”, 4th edition, John Wiley & Sons, Inc. N.Y.
4. Baldwin, A. and Bordoli, D., 2014 “**A Handbook for Construction Planning and Scheduling**”, 1st edition, John Wiley & Sons, Inc. N.Y.

Course Description

Project definition; scheduling and control models; material, labor, and equipment allocation; optimal schedules; project organization; documentation and reporting systems; and management and control.

Topics:

1. Introduction

2. Construction Planning:

- Work Breakdown Structure and Activity List
- Estimating Activity Cost and Duration
- Job Logic and Precedence Relationships

3. Construction Scheduling:

- Bar Charts
- Network Scheduling Techniques
- Computer Scheduling (Primavera)
- Project Review Software (NAVISWORKS)
- Uncertainty in Scheduling (PERT)
- Limited Resource Scheduling
- Resource Leveling
- Scheduling of Repetitive Construction
- Line of Balance Scheduling
- Linear Scheduling Method
- Schedule Optimization & Time-Cost Tradeoff Analysis

4. Construction Control:

- Cash Flow Analysis
- Integrated Time and Cost Control

Grading:

Class Participation	5%	
Homework	10%	
Exam 1*	25%	(Tentative Date: Thursday, October 15 th , class time)
Exam 2*	30%	(Tentative Date: Thursday, November 12 th , class time)
Term Project (Team)	30%	
Term Paper:	Required as 4 th credit for students taking the course for 4 credits.	

*All on-campus students who registered for the ONC section of CEE421 due to a conflict with another class must take both exams with the rest of the on-campus students at the same time and location. You need to make the necessary arrangements with the other course to take these two exams with the rest of the class.