



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

CEE 526 CONSTRUCTION OPTIMIZATION

Fall 2026

Instructor: Prof. Khaled El-Rayes

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Class Hours: Wednesday 3:30 PM to 6:20 PM (NCEB 1310)

Office Hours: Wednesdays 2 to 3 PM, (other times by appointment)

Course Website: <https://canvas.illinois.edu/courses/73594> (Course Documents)

Illinois Media Space: <https://mediaspace.illinois.edu/channel/channelid/414244362> (Recorded Lectures)

Course Description:

The course will focus on the latest research developments in optimizing construction project decisions during the planning and construction phases including the optimization of bid decisions; contractor and material supplier selection; site layout planning; tradeoffs among construction time, cost and quality; repetitive construction scheduling; resource allocation and leveling; and building sustainability.

Grading:

Class Participation	5%	
Exam	45%	(Tentative Date: Wednesday November 4 th , class time)
Term Paper	50%	(Final Report Due Date: Wednesday December 10 th) (Presentations: Wednesdays November 11 th , 18 th , and December 2 nd , 9 th)

CEE 526 Construction Optimization

Credit: 4 graduate hours

Topical Outline:

Lecture Topic	Utilized Optimization/Decision Analysis Tools
Introduction	-
Construction investment decisions.	Decision-Making with no Probabilities: Maximax, Maximin, Hurwicz, Laplace, Minimax Regret Criterion
Bid/No-Bid decision for construction projects.	Decision trees, expected monetary value, utility value
Optimizing the selection of contractors, subcontractors, and material suppliers.	Multi attribute utility theory, analytic hierarchy process
Optimizing the utilization of construction resources	Calculus methods; Linear and non-linear programming
Optimizing the scheduling of repetitive construction projects and construction site layout	Dynamic programming
Optimizing resource allocation and leveling.	Genetic Algorithms
Optimizing building sustainability decisions.	Multi-objective Genetic Algorithms