



CE 461 – Construction Engineering and Management

Code and Name: CE 461 – Construction Engineering and Management

Credit Hours: 3 (Lecture: 3, Tutorial: 1)

Textbook:

- Construction Management: Daniel W. Halpin and Bolivar A. Senior, 5th Edition, Wiley, 2017

Other References:

- *Construction Project Management*, Frederick Gould, Nancy Joyce, 4th Edition, Pearson, 2014.

- *Construction Project Administration*. Fisk, E.R. and Reynolds, W.D. 10th Edition, Pearson, 2013.

Course Description:

Introduction to construction industry, project participants, legal structure of organizations, and managing construction resources including money, materials, labor force, and construction equipment. The emphasis is on construction processes: planning and scheduling, estimating and cost control, quality control, construction safety, sustainable construction practices, and construction econometrics.

Pre-requisites: GE303 Engineering Economy, MATH345 Numerical Methods

Co-requisites: None

Course Learning Outcomes:

With relation to ABET Student Outcomes (From Fall 2019-SOs: 1-7)

1. To recognize ethical and professional responsibilities in construction engineering and management situations related to engineering standards, the semester project, and response to issues in the course (4)
2. To identify, formulate, and solve complex engineering problems in construction engineering and management related construction planning and scheduling, PERT, estimation, project cash flows, s-curve, construction labor, owning and operating of construction equipment (1)
3. To apply engineering design related to construction engineering and management with emphasis on work breakdown structure (WBS), creating scheduling, and applying earned value method (2)
4. Demonstrate communication skills in both oral and written during the semester project presentation (3)
5. To acquire and apply new knowledge with emphasis on bid package, contracts, and issues during the construction phase, in material management, legal organizations and in safety issues (7)

Topics to be covered:

- Structure of the construction industry, Construction ethics, Construction technology, Construction management, Project participants, Building Information Modeling (BIM)
- Bid package, General conditions, Supplementary condition, Technical specifications, Bid bonds
- Organizing and leading the construction project, Legal forms of organizations, Leadership
- Types of contracts, Project delivery methods, Public/private partnerships, Contract changes
- Issues during construction phase, Award of contract, Time extension, Change orders, Suspension and Delay
- Project planning, Work Breakdown Structure, Preconstruction planning, Construction scheduling, Planning and scheduling process, Scheduling methods, Creating a schedule, Monitoring a schedule
- Program evaluation and review technique networks, Linear construction operations, Production curves
- Project funding, Direct and indirect project costs, Project cash flow, Progress payments
- Equipment owning and operating cost, Depreciation of equipment, operating cost of equipment, Overheads
- Construction labor, Labor agreements, Labor costs, Average hourly cost calculations
- Material management process, Purchase order, Approval process, Fabrication and Installation processes
- Estimating and cost control, Estimating construction costs, Earned value method, Project completion
- Construction Safety and Health, Cost of accidents, Safety program, Sustainability in construction.

Grading Policy:

The grading for the course is: 60% coursework and 40% Final Exam. The course work consists of two Midterm Exams, where each midterm exam is worth 20%. It also includes quizzes, and projects for the remaining 20% that is modified by the course instructor.

