

COURSE SYLLABUS
The University of Texas at Arlington
College of Engineering
Department of Civil Engineering
CE 5386 – Construction Planning and Scheduling
(3 Credit Hours)

Name of Instructor: Dr. Mohammad Najafi, P.E.

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Office Hours: Monday and Wednesday: 2:00 – 5:00 PM – Additional Office Hours by Appointment.

Teaching Assistant: Jwala Raj Sharma, Office: CELB, Phone: 817-272-9164, Office Hours: Tu & Th – 2:30 to 4:30 PM.

Course Number, Section Number, and Course Title: CE 5386 – Construction Planning and Scheduling – Section 001 (Lecture 80495).

Time and Place of Class Meetings: Monday and Wednesday, 7:00 – 8:20 PM, Room 203, Nedderman Hall and Room 143 (Computer Lab), CELB (lab sessions to be announced in class).

Description of Course Content: Construction productivity, planning and scheduling of operations, flow charts, linear programming, critical path method (CPM), program evaluation review techniques (PERT), precedence networks, and Computer methods. Co-requisite: CE 5379.

Student Learning Outcomes: Upon completion of the course, the student will have:

- an ability to apply knowledge of mathematics, science, and engineering
- an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
- an ability to identify, formulate, and solve engineering problems
- an understanding of professional and ethical responsibility
- an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice

Requirements: Graduate Standing and concurrent enrollment in CE 5379.

Reference Books:

- Mubarak, S. (2010). Construction Project Scheduling and Control, 2nd Edition, John Wiley & Sons, Inc., Hoboken, NJ.
- Instructors' Lecture Materials, Notes and Handouts.
- Primavera P6 Software.
- Blackboard (course management)
- Callahan, M.T., Quackenbush, D.G., Rowings, J.E. (1992). "Construction Project Scheduling," McGraw-Hill.
- Hinze, J.W. (2008). Construction Planning and Scheduling, 3rd Edition, Pearson Prentice Hall, Upper Saddle River, NJ.
- Mubarak, S. (2005). "Construction Project Scheduling and Control," Prentice Hall.
- Pierce, Jr., D.R. (1998). "Project Scheduling and Management for Construction," Second Edition, R.S. Means

Company, Inc.

- Clough R.H. and Sears, G.A. (1994). "Construction Contracting," Sixth Edition, Wiley.
- Oglesby, C.H., Parker, H.W., and Howell, G.A. (1989). "Productivity Improvement in Construction," McGraw-Hill, New York, NY.
- Halpin, D. W. and Riggs L. S. (1992). "Planning and Analysis of Construction Operations," John Wiley & Sons, Inc., New York.
- Naoum, S.G. (1999). "Dissertation Research and Writing for Construction Students," Butterworth Heinemann, Great Britain.
- Adrian, J. J. (2004). "Construction Productivity: Measurement and Improvement," Stipes Publishing L.L.C., Champaign, Illinois.
- Halpin, D. W. and Riggs L. S. (1992). "Planning and Analysis of Construction Operations," John Wiley & Sons, Inc., New York.
- Ayyub, B. M., McCuen, R.H. (1997). "Probability, Statistics, and Reliability for Engineers," CRC Press, Boca Raton, Florida.
- Devor, R.E., Chang, T., and Sutherland, J.W. (2007). "Statistical Quality Design and Control: Contemporary Concepts and Methods," Pearson/Prentice Hall, Upper Saddle River, N.J.
- Mincks, W. R. and Johnston, H. (2004). "Construction Jobsite Management," 2nd Edition, Thomson Delmar Learning, Clifton Park, New York.

Descriptions of major assignments and examinations with due dates: There will be two exams (one close to midterm and one final which will be comprehensive), one project, and several homework and lab assignments. See Course Outline for specific dates.

Grading Policy: Grades will be determined according to the following scale (the grading scale may be lowered at the discretion of the instructor, but will not be raised):

| Grade | % Required |
|-------|--------------|
| A | 90 -100 |
| B | 80-89 |
| C | 70-79 |
| D | 60-69 |
| F | Less than 60 |

Students will be required to accumulate points from the following:

| | |
|----------------------------------|------|
| Homework | 15% |
| Class Attendance & Participation | 10% |
| Midterm Exam | 20% |
| Lab Assignments | 15% |
| Term-Project & Presentation | 15% |
| Final Exam (Comprehensive) | 25% |
| <hr/> | |
| Total | 100% |

Attendance Policy: Students are expected to attend all classes. For total professional development, class participation and discussions are required. Everyone is asked to arrive and be seated promptly for the duration of class to minimize the disruption to others. All cell phones, computers and I-pods must be off during the class time.

Drop Policy: Students need to consult UTA Web site for information on the university drop policy.

Americans with Disabilities Act: The University of Texas at Arlington is on record as being committed to both the spirit and letter of federal equal opportunity legislation; reference Public Law 92-112 - The Rehabilitation Act of 1973 as amended. With the passage of federal legislation entitled *Americans with Disabilities Act (ADA)*, pursuant to section 504 of the Rehabilitation Act, there is renewed focus on providing this population with the same opportunities enjoyed by all citizens.

As a faculty member, I am required by law to provide "reasonable accommodations" to students with disabilities, so as not to discriminate on the basis of that disability. Student responsibility primarily rests with informing faculty of their need for accommodation and in providing authorized documentation through designated administrative channels. Information regarding specific diagnostic criteria and policies for obtaining academic accommodations can be found at www.uta.edu/disability. Also, you may visit the Office for Students with Disabilities in Room 102 of University Hall or call them at (817) 272-3364.

Academic Integrity: It is the philosophy of The University of Texas at Arlington that academic dishonesty is a completely unacceptable mode of conduct and will not be tolerated in any form. All persons involved in academic dishonesty will be disciplined in accordance with University regulations and procedures. Discipline may include suspension or expulsion from the University.

"Scholastic dishonesty includes but is not limited to cheating, plagiarism, collusion, submission for credit of any work or materials that are attributable in whole or in part to another person, taking an examination for another person, any act designed to give unfair advantage to a student or the attempt to commit such acts." (Regents' Rules and Regulations, Series 50101, Section 2.2)

Student Support Services Available: The University of Texas at Arlington supports a variety of student success programs to help you connect with the University and achieve academic success. These programs include learning assistance, developmental education, advising and mentoring, admission and transition, and federally funded programs. Students requiring assistance academically, personally, or socially should contact the Office of Student Success Programs at 817-272-6107 for more information and appropriate referrals.

Final Review Week: A period of five class days prior to the first day of final examinations in the long sessions shall be designated as Final Review Week. The purpose of this week is to allow students sufficient time to prepare for final examinations. During this week, there shall be no scheduled activities such as required field trips or performances; and no instructor shall assign any themes, research problems or exercises of similar scope that have a completion date during or following this week unless specified in the class syllabi. During Final Review Week, an instructor shall not give any examinations constituting 10% or more of the final grade, except makeup tests and laboratory examinations. In addition, no instructor shall give any portion of the final examination during Final Review Week. Classes are held as scheduled during this week and lectures and presentations may be given.

Engineering Librarian:

Sylvia George-Williams, Engineering Librarian

UT Arlington Science & Engineering Library

Mailing address: B03D Nedderman Hall, Arlington, TX 76019. Phone: (817) 272 7519, Email: sylvia@uta.edu

E-Culture Policy: The University of Texas at Arlington has adopted the University email address as an official means of communication with students. Through the use of email, UT-Arlington is able to provide students with relevant and timely information, designed to facilitate student success. In particular, important information concerning registration, financial aid, payment of bills, and graduation may be sent to students through email.

All students are assigned an email account and information about activating and using it is available at www.uta.edu/email. New students (first semester at UTA) are able to activate their email account 24 hours after registering for courses. There is no additional charge to students for using this account, and it remains active as long as a student is enrolled at UT-Arlington. Students are responsible for checking their email regularly.

Laptop use in the classroom: In order to minimize distraction, the use of laptop and/or any other digital device (except standard scientific calculators) in the classroom is NOT allowed.

Make-up Exam Policy: All students must take the exams. Only extenuating circumstances will be accepted as excuse for missing the exam. Health related excuses require medical reports and the signature of a physician that provided treatment.

Grade Grievance Policy: Refer to UTA Catalog for more information.

CE 5386 – Construction Planning and Scheduling
TENTATIVE COURSE OUTLINE

| Day | Date | Topic | Description | Assignments Due |
|---------|---------|---|---|-----------------|
| Week 1 | | | | |
| Mon | Aug 29 | Introduction to the Course and Planning & Scheduling | Introduction to planning & scheduling, importance of scheduling, and scheduling & project management | |
| Wed | Aug 31 | Bar Charts | Definitions, advantages and disadvantages of bar charts | |
| Week 2 | | | | |
| Mon | Sept 5 | Labor Day Holiday | | |
| Wed | Sept 7 | Basic Networks | Definitions, types of networks, and basic terminology | Assignment 1 |
| Week 3 | | | | |
| Mon | Sept 12 | Lab Assignment – 1 | | |
| Wed | Sept 14 | Precedence Networks | Introduction, types of relationships, percent complete approach, fast track projects, CPM calculations for precedence diagram, and summary | Assignment 2 |
| Week 4 | | | | |
| Mon | Sept 19 | Arrow Diagrams | Arrow diagrams, logic of network, notation, dummy activities, node networks, comparison of arrow & node diagrams, network versus bar chart, and time-scale logic diagrams | Assignment 3 |
| Wed | Sept 21 | Guest Speaker Presentation | | |
| Week 5 | | | | |
| Mon | Sept 26 | The Critical Path Method (CPM) | Definitions, steps required for scheduling, resource allocation & leveling, the critical path, network logic and constraints | Assignment 4 |
| Wed | Sept 28 | Resource Allocation and Leveling | Categories of resources, definitions, resource leveling for a project, and material management | |
| Week 6 | | | | |
| Mon | Oct 3 | Schedule Updating and Project Control | Need for schedule updating, updated schedule, steps for updating a schedule | Assignment 5 |
| Wed | Oct 5 | Lab Assignment – 2 | | |
| Week 7 | | | | |
| Mon | Oct 10 | Schedule Updating and Project Control | Project control, methods for project controls, percent complete, earned value analysis, and S Curves | Assignment 6 |
| Wed | Oct 12 | Schedule Compression and Time-Cost Trade-off – Linear Scheduling and PERT | Introduction, accelerating a project, direct and indirect costs, recovery schedules, and optimum project scheduling --Linear scheduling method (LSM), and Relationship -- PERT | Assignment 7 |
| Week 8 | | | | |
| Mon | Oct 17 | Lab Assignment – 3 | | |
| Wed | Oct 19 | Midterm Exam | | |
| Week 9 | | | | |
| Mon | Oct 24 | Lab Assignment – 4 | | |
| Wed | Oct 26 | Lab Assignment – 5 | | |
| Week 10 | | | | |
| Mon | Oct 31 | Introduction to Construction Productivity | Defining productivity, effects & reasons of low productivity in construction industry, performance vs. productivity, characteristics of construction industry. | Assignment 8 |
| Wed | Nov 2 | Responsibilities & Roles of Project Participants to Improve Productivity | Current practices for developing work methods, needs to improve construction productivity, off-site and onsite project activities, effects of preplanning on productivity, monitoring construction project. | |
| Week 11 | | | | |

| Day | Date | Topic | Description | Assignments Due |
|---|--------|---|--|------------------|
| Mon | Nov 7 | Data Gathering for Productivity Improvement | Statistical aspects of data gathering, definition and objectives of productivity study, various scientific and shortcut methods used in data gathering and productivity study, Method Productivity Delay Model (MPDM). | Assignment 9 |
| Wed | Nov 9 | Presenting and Implementing Productivity Improvement Findings | Techniques for data analysis and presentation, using new technologies to improve productivity, impact factors affecting productivity (human factors, company organization, motivation theories and so on). | |
| Week 12 | | | | |
| Mon | Nov 14 | Building Models | Defining flow units, cycle times, resource flow patterns, cyclic structures of work tasks. | |
| Wed | Nov 16 | Construction Process Simulation | Simulation of Construction Process Using MicroCyclone | Assignment 10 |
| Week 13 | | | | |
| Mon | Nov 21 | Construction Delay and Other Claims | Introduction, claims due to delay, reasons for delay, importance of CPM schedule in delay claims, methods of schedule analysis, and conclusion on delay & float | |
| Wed | Nov 24 | Schedule Risk Management | Introduction, types of risks in construction, schedule risk type, definition of risk terms, risk shifting in contracts, schedule risk management steps, and application in scheduling | Assignment 11 |
| Week 14 | | | | |
| Mon | Nov 28 | Select Topics | | |
| Wed | Nov 30 | Project Presentations | | Term Project Due |
| Week 15 – Project Presentations | | | | |
| Mon | Dec 5 | Project Presentations | | |
| Wed | Dec 7 | Project Presentations | | |
| Week 16 – Final Exam | | | | |
| Wednesday, December 14, 8:15 – 10:45 PM | | | Final Exam (Comprehensive) | |