

Construction Management Program
School of Planning, Design and Construction

CMP 311 – Construction Project Scheduling

Spring 2018

Part 1: Course Information

Instructor Information

Instructors: Sinem Mollaoglu, PhD, LEED® AP, CGP
Faizan Shafique, PhD Candidate, PMP®, LEED® AP
Office: 302A Human Ecology
Office Hours: Tuesdays 10:30 AM – 12:30 PM
Wednesdays 12:15 - 2:15 PM or by appointment
Office Telephone: 517-353-6477
E-mail: shafiqu2@msu.edu – preferred way of contact

Meeting Time and Location

Lecture: M W 3:00 PM – 3:50 PM
228 Erickson Hall

Lab: Section I: Thursdays 10:20 a.m. – 12:10 a.m.
Section II: Thursday 12:40 p.m. - 2:30 p.m.
Section III: Thursday 3:00 p.m. - 4:50 p.m.
106 Human Ecology Bldg for ALL sections

Course Description

Basic construction project scheduling procedures. Work breakdown structure. Critical path method and scheduling logic. Activity durations. Status reports. Resource allocation and control.

Prerequisites

1. Courses: STT 200 or STT 201 or STT 315 or STT 421) and (CMP 305 and CMP 322)
2. Skills: Proficiency with modern computer applications (e.g., Word, Excel, and Power Point). Primavera P6 software skills will be obtained in this course.

Textbook & Course Materials

1. Required Material: Course Pack uploaded on course website on D2L: www.d2l.msu.edu **PRINT AND BRING WITH YOU TO EACH CLASS.**
2. Required Material: “Construction Project Scheduling and Control”, 2nd edition, by Saleh Mubarak, Prentice Hall, ©2010.
3. Required Material: “Primavera P6 – Real World Scheduling” manual by John Wyatt Publishing. **Order online at: www.johnwyattpublishing.com (Allow two weeks for delivery and plan to bring to the lab starting on 3/1).**
4. Required Material: Class notes – Handouts – Assignments and additional material on course website on D2L: www.d2l.msu.edu
5. 2 Gig or greater, USB flash drive for your Primavera P6 scheduling files.

Relevant Associate Constructor Exam Material:

Associate Constructor Official Study Guide: Chapter 7 & Pages 93 to 101

https://c.ymcdn.com/sites/professionalconstructor.site-ym.com/resource/resmgr/docs/AC_Exam_Study_Guide_Revised_.pdf

Course Requirements

- Internet connection (DSL, LAN, or cable connection desirable)
- Access to Desire 2 Learn
- D2L will be used to post documents throughout the semester. Students are responsible for keeping track of the announcements, course material, etc. on the D2L course website. Enable e-mail forwarding option on your D2L settings.

Course Structure

This is a 2 hour lecture 2 hour lab per week format course. In-class questions and discussion are encouraged and will add to your experience in the class. I make significant use of D2L for the class to communicate calendar/schedule adjustments, assignment information, additional readings, relevant items, and supplemental learning resources; it is your responsibility to keep current with information posted to the site.

Written and Oral Communications Assistance

The School of Planning, Design and Construction Communication Center is available to SPDC students, and is located in Human Ecology Building, Room 102. The Communication Center can help with the following:

- Outlining, editing and proofreading papers;
- Resumes and cover letters;
- Thank you letters;
- Design concepts and descriptions;
- Writing research papers, literature reviews and thesis chapters;
- Memos, proposals and executive summaries; and

To take advantage of these opportunities, stop by the SPDC Student Services Office to make an appointment and request assistance with your need. The Communication Center is open 9:30am-4:30pm Monday-Thursday, closed for lunch 12- 1pm.

Technical Assistance

If you need technical assistance at any time during the course or to report a problem:

- Visit the [Distance Learning Services Support Site](https://www.lib.msu.edu/dls/) (<https://www.lib.msu.edu/dls/>)
- Visit the [Desire2Learn Help Site](http://help.d2l.msu.edu/) (Desire to learn help) (<http://help.d2l.msu.edu/>)
- Or call Distance Learning Services: (800) 500-1554 or (517) 355-2345

Resource Center for Persons with Disabilities (RCPD)

- To make an appointment with a specialist, contact: (517) 353-9642 or TTY: (517) 355-1293
- Web site for RCPD: [RCPD My Profile](http://myprofile.rcpd.msu.edu/) (<http://myprofile.rcpd.msu.edu/>)

Part 2 Learning Outcomes

The following learning outcomes are planned for this class and support our overall CM program learning outcomes. You will be assessed to see if you have accomplished them. At the end of this class you should be able to do the following:

1. Describe the general sequencing of construction operations and projects.
2. Describe activities of a construction project and determine their durations.
3. Examine contemporary critical path methods and scheduling techniques.
4. Master analytical techniques to determine attributes of construction schedules.
5. Construct and manipulate computer-based construction project schedules including tracing and controlling progress, recourses, and costs.
6. Describe what construction project scheduling is.
7. Explain the steps involved in scheduling construction projects.
8. Describe how to use the Work Breakdown Structure to organize a project.
9. Determine the effects of schedule compression on productivity.
10. Construct an activity-on-arrow and activity-on-node network.
11. Construct a precedence diagram with complex logic.
12. Describe the concept of Total Float and Free Float.
13. Calculate Total Float and Free Float for an activity.
14. Understand the concept of and determine the critical path construction project.
15. Understand the Earned Value concept in the context of project controls.
16. Evaluate the performance of a project using Earned Value metrics.
17. Determine least-cost schedules using time/cost tradeoff techniques.
18. Recognize Scheduling pitfalls.
19. Describe Scheduling ethics.
20. Recognize Scheduling specifications.
21. Use computer-based scheduling software to develop and communicate a schedule for a construction project.

Upon completion of the course, students will be able to:

Create construction project schedules. (SLO-05)

You will meet the objectives listed above through a combination of the following activities:

- Homeworks
- Quizzes
- Lab Assignments
- Course Examinations
- Group and Individual Project Assignment

Part 3: Course Outline/Schedule

This is the tentative class schedule. It may be changed, but your instructor will try to keep on schedule, however, certain topics may require more or less time than allocated considering varying student backgrounds. Each student will be responsible for keeping abreast of all changes that will be announced during class periods on an as needed basis. The table below describes the weekly activities including week, topic, readings, and key dates. The first two columns describe the week and date respectively. The third column describes the topic. The fourth column describes the readings. The fifth column describes the key dates and important notes.

Week / Date	Topic	Readings (Book chapters/Course package [CP] page #s/P6 manual Lab #s)	Key Dates
January			
#1	(1/ 8) Mon (1/10) Wed (1/11) Th	Introduction to Scheduling Bar charts/ Gantt charts Lab: Residential Sequencing – Exercise Bar Charts	CH 1-2/ CP pg 3-6
#2	(1/15) Mon (1/17) Wed (1/18) Th	Martin Luther King Day – No class Developing Schedules Lab: Residential Construction - WBS	CH 3/ CP pg 7-17 HW-1 Assigned (1/17)
#3	(1/22) Mon (1/24) Wed (1/25) Th	Duration Calculations Developing schedules (continued) Mayberry Homes Site Visit Student Presentations on Residential Constr. Schedules	CH 3/ CP pg 18-24 Presentations + HW-1 due (1/25)
February			
#4	(1/ 29) Mon (1/ 31) Wed (2/ 1) Th	Activity on Arrow (AOA) Basic Networks (AON) & CPM Network Calculations Commercial Const.- Steel Sequencing - WBS	CH 3-4/ CP pg 19-24 HW-2 Assigned (1/29)
#5	(2/5) Mon (2/7) Wed (2/8) Th	CPM & Network Calculations <i>Introduction to the Semester Project</i> Lab: Lecture applied – <i>WBS Semester Project</i>	CH 3-4/ CP pg 25-32 HW-2 Due – (2/5) Project Assigned – Part I
#6	(2/12) Mon (2/14) Wed (2/15) Th	EXAM I @ Kedzie Hall, South - Classroom - S105 Interior Sequencing - WBS Lab – Work on Project Part 1	EXAM I – (2/12) Indv. Assign. Given (2/14)
#7	(2/19) Mon (2/21) Wed	Precedence Networks Precedence Networks	CH 5 Individual Assignment Due – (2/21)

	(2/22) Th	Lab: Lecture Applied – <i>Work on Semester Project</i>		
March				
#8	(2/26) Mon (2/28) Wed (3/1) Th	GUEST SPEAKER Precedence Networks Practice Lab: Getting Started with P6 – Creating the project, WBS, and listing activities, Layouts	CH 4-5 P6 Manual 1, and 4	Project Part I – DUE (3/1) Project Assigned – Part II
3/5 - 3/9		SPRING BREAK		
#9	(3/12) Mon (3/14) Wed (3/15) Th	Resource Allocation & Leveling Resource Leveling – Practice Lab: P6 - Relationships, Scheduling, Calendars, Layouts	CH 4-6/ CP pg 33-34 P6 Manual 1 and 3	HW-3 Assigned (3/12)
#10	(3/19) Mon (3/21) Wed (3/22) Th	Resource Driven Schedules Time Cost Trade-off Lab: P6 – Imposed Finish Date, Fast Track, Trace Logic	CH 6 P6 Manual 6	HW-3 Due 3/22
#11	(3/26) Mon (3/28) Wed (3/29) Th	Time Cost Trade-off / Practice & and Take Home Practice Time Cost Trade-off / Case Study Lab: P6 Activity Codes and Summary Schedules	CH 8/ CP pg 35-37 P6 Manual 4	
April				
#12	(4/2) Mon (4/4) Wed (4/5) Th	EXAM II @ Kedzie Hall, South - Classroom - S105 Work sessions on Project in the Labs Lab: P6 - Working with Resources	P6 Manual 5	EXAM II – (4/2) Project Part II – DUE (4/5) Project Assigned –Part III
#13	(4/9) Mon (4/11) Wed (4/12) Th	Project Controls Earned Value Practice Lab: P6 - Updating the Schedule	CH 7/ CP pg 38-52 P6 Manual 6	HW-4 Assigned (4/12)
#14	(4/16) Mon (4/18) Wed (4/19) Th	<i>Case Study – Video</i> Scheduling as Part of the PM Effort + delays and risks Lab: P6 Filters, Look Ahead Schedules, Reports	CH 10, 13 & 14/ CP pg 53-57 P6 Manual 7	HW-4 Due (4/18)
#15	(4/23) Mon (4/25) Wed (4/26) Th	Scheduling Ethics Other Types of Scheduling Methods Ethics > <i>Class Discussion</i> Lab: Exam Review	CP pg 58-59 CH 11/ CP pg 60-61	Project Part III – DUE (4/20) Student Discussions
May				
(5/2/2018) Wed		FINAL EXAM / 5:45– 7:45 p.m. / Wells Hall B122		

Part 4: Grading Policy

Assessment Methods:

Homework and Individual Assignments:

1. Assignments are required to be completed and turned in for grading, **on the due date, at the beginning of class**, unless otherwise stated in class.
2. Late assignments will not be accepted.
3. The due date for all assignments will be firm. You should plan ahead to avoid conflicts with submittal dates. You must inform the instructor of such conflicts and, if requested, present appropriate substantiation.
4. Copying or rephrasing of someone else's written work is unacceptable and unethical. Students who copy work from others and/or plagiarize, will receive no credit for that assignment. A second violation will result in failing the class.
5. You are not allowed to possess, look at, use, or in anyway derive advantage from the existence of papers/work prepared by students in prior years.
6. If you have any questions about this policy, please contact your instructor.

Quizzes:

Unannounced quizzes will be frequently given. The lowest quiz score will be dropped. The quizzes represent 10% of your grade, so you are encouraged to not miss any quizzes.

Lab Assignments:

1. Attendance of the labs is required.
2. Attending the P6 Labs in 311 are critical for your success in this course. If you miss a P6 lab for A LEGITIMATE reason, you will have one week to submit the lab. No points will be deducted. If you miss a P6 lab for NO LEGITIMATE reason, your lab will receive a score of zero ('0').
3. Note that, whenever possible, you MUST send a prior notice to me at korkmaz@msu.edu regarding your inability to attend the lab.
4. The policy of allowing late P6 lab assignments, as described above, does not apply to non-P6 labs in which regular assignments are given.

Group Project: There will be three (3) parts to the group project (also called term project in this syllabus). The first part will be devoted to manual development of the project schedule. The second and third parts will be mainly developed in Primavera P6. Groups will be made of two-three students (three preferred). Students will form their own groups. Groups must be formed of students from THE SAME LAB SECTION.

Exams: There will be two (2) exams during this semester as shown in the course schedule.

Grading: Grades will be based upon the total accumulation of points over the semester based on the assignments listed below. Each assignment will be graded as objectively as possible, evaluating the student's knowledge of the material and the quality of the work performed.

<u>Assignment</u>	<u>Weights</u>
Homeworks	10%
Quizzes	10%
Lab Assignments	10%
Group Project	10%
Individual Project	10%
Exam I	15%
Exam II	15%
Final Exam	20%
Total	100%

Grading Scale (Cutoffs)	
4.0	≥92.5%
3.5	87.5%
3.0	80%
2.5	77.5%
2.0	75%
1.5	70%
1.0	65%
0.0	< 65%

Late Work Policy

Late assignments will be discounted by 10% per each day late. Any submission on D2L or in person past the deadline is considered late.

Viewing Grades

Exams, assignments, lab assignments, and final project elements will generally be returned within one week. You may see all of your grades at any time by meeting with me; all grades will also be posted in D2L. Grade appeals should be addressed by making an appointment to see me in my office – all appeals must be initiated within one week of the returned exam or assignment. I encourage you to visit with me, at any time, to ask questions regarding grades or any other topic.

Part 5: Course Policies

Complete Assignments

Assignments for this course will be submitted in hard copy unless otherwise instructed. Assignments must be submitted by the beginning of the class period for a given due date, unless another deadline is specified; otherwise, special permission must be requested from instructor before the due date. Extensions will generally not be given, unless under extreme circumstances.

Inform Your Instructor of Any Accommodations Needed

From the Resource Center for Persons with Disabilities (RCPD): Michigan State University is committed to providing equal opportunity for participation in all programs, services and activities. Requests for accommodations by persons with disabilities may be made by contacting the Resource Center for Persons with Disabilities at 517-884-RCPD or on the web at rcpd.msu.edu. Once your eligibility for an accommodation has been determined, you will be issued a Verified Individual Services Accommodation ("VISA") form. Please present this form to me at the start of the term and/or two weeks prior to the accommodation date (test, project, etc.). Requests received after this date may not be honored.

Commit to Integrity: Academic Honesty

Article 2.3.3 of the [Academic Freedom Report](#) states that "The student shares with the faculty the responsibility for maintaining the integrity of scholarship, grades, and professional standards." In addition, the School of Planning Design and Construction adheres to the policies on academic honesty as specified in General Student Regulations 1.0, Protection of Scholarship and Grades; the all-University Policy on Integrity of Scholarship and Grades; and Ordinance 17.00, Examinations. (See [Spartan Life: Student Handbook and Resource Guide](#) and/or the MSU Web site: [MSU Home Page](#).)

Therefore, unless authorized by your instructor, you are expected to complete all course assignments, including homework, lab work, quizzes, tests and exams, without assistance from any source. You are expected to develop original work for this course; therefore, you may not submit course work you completed for another course to satisfy the requirements for this course. Also, you are not authorized to use the www.allmsu.com Web site to complete any course work in this course. Students who violate MSU academic integrity rules may receive a penalty grade, including a failing grade on the assignment or in the course. Contact your instructor if you are unsure about the appropriateness of your course work. (See also the [Academic Integrity](#) webpage.)

Attendance

1. Students whose names do not appear on the official class list for this course may not attend this class.
2. Punctual arrival to class is a must. Arriving late to class is disrupting to your classmates and to the instructor. In general, if you expect to be delayed in coming

to class, you must inform the instructor beforehand of your particular need and situation.

3. Attendance of all classes and lab sections is necessary to master the material in this course and perform successfully on examinations and term project assignments. You are responsible for learning any material covered while you were absent. In cases of excused absence, you must present appropriate university- approved substantiation to the instructor.
4. No make-up assignments will be given.
5. All students are expected to take exams when scheduled. There will be no make-up exams.
6. Missing class to participate in a required activity. To be excused from this class to participate in a required activity for another course or university-sanctioned event, you must provide the instructor with adequate advanced notice (a minimum of one week) and a written authorization from the faculty member of the other course or from a university administrator.
7. You are encouraged to participate in the class discussion and ask questions.

Participation

Students are expected to participate in all activities as listed on the course calendar. Regular attendance is an expectation of this class. Students are expected to attend all classes and be prepared ahead of class to discuss the material. For the group project and in some other assignments you will be working in teams. Each member is responsible for his/her part so as to not delay the team's progress. You are expected to act in a professional and courteous manner with your fellow team members at all times. If you have an issue with a team member please see me.

Build Rapport

If you find that you have any trouble keeping up with assignments or other aspects of the course, make sure you let your instructor know as early as possible. As you will find, building rapport and effective relationships are key to becoming an effective professional. Make sure that you are proactive in informing your instructor when difficulties arise during the semester so that we can help you find a solution.

Understand When You May Drop This Course - Drops and Adds

It is the student's responsibility to understand when they need to consider un-enrolling from a course. Refer to the [Michigan State University Office of the Registrar](#) for important dates and deadlines.

The last day to add this course is the end of the 5th day of classes. The last day to drop this course with a 100 percent refund and no grade reported is 1/4th through the semester. The last day to drop this course with no refund and no grade reported is the middle of the semester. You should immediately make a copy of your amended schedule to verify you have added or dropped this course.

Limits to Confidentiality

Essays, journals, and other materials submitted for this class are generally considered confidential pursuant to the University's student record policies. However, students should be aware that

University employees, including instructors, may not be able to maintain confidentiality when it conflicts with their responsibility to report certain issues to protect the health and safety of MSU community members and others. As the instructors, we must report the following information to other University offices (including the Department of Police and Public Safety) if you share it with us:

- Suspected child abuse/neglect, even if this maltreatment happened when you were a child,
- Allegations of sexual assault or sexual harassment when they involve MSU students, faculty, or staff, and
- Credible threats of harm to oneself or to others.

These reports may trigger contact from a campus official who will want to talk with you about the incident that you have shared. In almost all cases, it will be your decision whether you wish to speak with that individual. If you would like to talk about these events in a more confidential setting you are encouraged to make an appointment with the MSU Counseling Center.

Commercialized Lecture Notes

Commercialization of lecture notes and university-provided course materials is not permitted in this course.*

*Note: The Code of Teaching Responsibility requires instructors who permit students to commercialize their class lecture notes to include a statement in their course syllabi that gives such permission. Absent such permission, students may not do so.

Disruptive Behavior

Article 2.III.B.4 of the [Academic Freedom Report \(AFR\)](#) for students at Michigan State University states: "The student's behavior in the classroom shall be conducive to the teaching and learning process for all concerned." Article 2.III.B.10 of the [AFR](#) states that "The student has a right to scholarly relationships with faculty based on mutual trust and civility." [General Student Regulation 5.02](#) states: "No student shall . . . interfere with the functions and services of the University (for example, but not limited to, classes . . .) such that the function or service is obstructed or disrupted. Students whose conduct adversely affects the learning environment in this classroom may be subject to disciplinary action through the Student Judicial Affairs office.

SIRS FORMS

Michigan State University takes seriously the opinion of students in the evaluation of the effectiveness of instruction, and has implemented the SIRS (Student Instructional Rating System) process to gather student feedback. This course utilizes the online SIRS system. You will receive an e-mail sometime during the last two weeks of class asking you to fill out the SIRS online form at your convenience.

Please note the final grade for this course will not be accessible on STUINFO for seven days following the University grade submission deadline published by the Office of the Registrar unless the SIRS online form has been filled out. You will have the option in the online SIRS form to decline to participate in the evaluation of the course we hope, however, that you will be willing to give us your frank and constructive feedback so that we may instruct students even better in the future.

Religious Observance

If a student wishes to be absent from class to observe a religious holiday, the student must make arrangements with the instructor at least one full week in advance of the class to be missed.

Social Media Policy

Any video or audio recording must be approved in advance.

Classroom Use of Technology

Cell phones should be put into the “silent” mode during class. If you receive a call or a text message that you must answer during class, quietly leave the room to do so, and return quietly upon completing your call.

Laptops are not allowed in lecture. If you have a legitimate need to use them during lectures, please see us during my office hours and we can discuss your needs.

We may periodically make use of smart phones/tablets in class for learning activities, so feel free to bring those devices and operate them when called to do so. Any non-learning use and/or disruption of the classroom environment resulting from misuse of technology will result in the loss of the entire class' ability to use such during class.

Approval to use Classroom Photographs

The School of Planning Design and Construction wishes to use classroom photos on the SPDC website. An approval form has been provided at the end of this syllabus, for you to indicate approval or lack of approval for SPDC to use or not use any photos taken in this class.

Consent Form for Students in the School of Planning, Design and Construction

The purpose of this form is to provide some examples of current student achievements to an audience outside of the Michigan State University campus. For the purposes of both publicity and accreditation, we need to illustrate examples of work of our students in their various years of study. In order to use information pertaining to you and/or your academic endeavors, your consent is being requested allowing us to share information as determined by the School of Planning, Design and Construction. The information we are interested in possibly sharing is your name, your major, your actual or potential graduation date, your focus area and abstract, photographs and/or work produced in an SPDC course, such as a document, project, etc. Examples of this include individual research papers, class projects, Practicum Reports, scholarly articles and all or part of a thesis in which you were the sole author or part of a team that produced the document

Please indicate below whether or not you are willing to allow us to utilize some or all of the items mentioned above for university development, publicity, advertising, communication or marketing purposes. There is no penalty for you if you decide not to give your consent or withdraw all or part of it at a later date.

If you grant consent, this will remain in effect until withdrawn by contacting SPDC's Student Services, Pat Daughenbaugh at daughenb@msu.edu or call (517) 432-3393.

YES, I give consent for you to use some or all of the following data elements in your university development, publicity, advertising, communication or marketing pieces. Data elements include Name, major, graduation date, focus area and abstract, photographs and work produced in an SPDC course.

No, I do NOT give consent for you to use some or all of the following data elements in your university development, publicity, advertising, communication or marketing pieces. Data elements include Name, major, graduation date, focus area and abstract, photographs and work produced in an SPDC course.

Print Name

SPDC Major

Signature

Date

Code of Teaching Responsibility

This class will meet the University's Code of Teaching Responsibilities. This document can be found at: [Code of Teaching Responsibilities](#)

Collection of student work

For the purposes of accreditation of the Construction Management Program, some student work will be retained for future use without any personal identification or information on the material.

Construction Management Program Requirements -Effective Fall 2017-

(<https://reg.msu.edu/academicprograms/ProgramDetail.aspx?Program=5257>)

CM Upper Division Admission:

Enrollment in the Construction Management major is limited. Those seeking admission must *at least* meet the below criteria:

1. Completed at least 56 credit hours
2. Completed the following with a minimum grade of a 2.0 in *each* course:
 - a. EC 201 or 202
 - b. MTH 124
 - c. PHY 231
 - d. STT 200 or 201, or 315, or 421

 - e. CMP 101
 - f. CMP 124
 - g. CMP 210
 - h. CMP 211
 - i. CMP 222
 - j. CMP 230
3. Have *either* a cumulative MSU GPA of 3.00 *or* a CMP GPA of 3.00 in the courses noted in items 2e-2j

*NOTE: While meeting all of the criteria is necessary to be considered for admission, it does not guarantee admission.

Following admission notification, admitted CM students will be provided overrides in the 300 level CMP core courses. **The maximum available seats in 300 level CMP core courses are 60 each.** When seat shortages occur, *admitted* students will be provided overrides based on their cumulative GPA in CMP core courses.

Degree Completion:

Upon admission to CM Upper Division, students must successfully complete the following with a minimum grade of 2.0 in *each* course:

CMP 305, 311, 315, 322, 325, 328, 385, 401, 415, and 423