

University of Macau
Undergraduate Civil Engineering Programme

Coordinating Unit:	Department of Civil and Environmental Engineering, Faculty of Science and Technology		
Supporting Unit(s):	Nil		
Course Code:	CIVL473	Year of Study:	4
Course Title:	Engineering Planning and Management		
Compulsory/Elective:	Compulsory		
Course Prerequisites:	Nil		
Prerequisite Knowledge:	Basic knowledge in construction procedures		
Duration:	One semester	Credit Units:	3
Class/Laboratory Schedule:	Three hours of lecture per week plus optional tutorials.		
Laboratory/Software Usage:	Use of scheduling software will be introduced.		
Course Description:	This course applies modern management methods to planning and scheduling for construction projects. Topics include: presentation of planning information, developing a network model, precedence/arrow diagrams, critical path method, time-cost trade-offs, resource allocation and leveling, PERT & Monte Carlo techniques, project monitoring, control and update, linear scheduling and computer scheduling.		
Course Objectives:	<ol style="list-style-type: none"> 1. To learn the basic concepts of planning and control processes of construction projects. 2. To learn scheduling methods for project management. 3. To obtain the knowledge of integrating time with cost. 4. To understand theories behind optimal resource allocation and leveling. 		
Learning Outcomes (LO):	<p>Upon completion of this course, students should be able to:</p> <ol style="list-style-type: none"> 1. understand various planning techniques to construction projects [POs: a,h,l]; 2. understand and generate bar chart, precedence (node)/arrow diagrams [POs: a,c,e,h,l]; 3. understand factors influencing duration estimates for project tasks [POs: a,e,h]; 4. can calculate early and late start/finish times for project tasks [POs: a,c,e,h,l]; 5. can identify critical construction activities through the application of critical path method [POs: a,c,e,h,l]; 6. can allocate and level resources for a project (resource management) [POs: a,c,e,h,l]; 7. can apply "crashing" techniques for project duration reduction (time-cost trade-offs) [POs: a,c,e,h,l]; 8. understand the concept of PERT and Monte Carlo techniques [POs: a,c,e,h]; 9. understand the impact of scheduling decisions on productivity [POs: a,c,e,h]; 10. understand methods for monitoring and updating the project schedule [POs: a,e,h,l]; 		

Texts & References: <i>* recommended textbook</i>	<ol style="list-style-type: none"> Hinze, Jimmie W. (2012), Construction Planning and Scheduling*, 4th ed., Pearson Education International. Cooke, Brian & Williams, Peter (2009), Construction Planning, Programming & Control, 2nd ed., Blackwell Publishing. Woodhead, Ronald W. & Antill James M. (1990), Critical Path Method in Construction Practice, 4th ed., John Wiley & Sons. Stevens, James D. (1990), Techniques for Construction Network Scheduling, McGraw-Hill. 																
Student Assessment:	<ul style="list-style-type: none"> Three tests: 65%; One final examination: 30% Use of software: 5% 																
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Pedagogical Methods:	<table border="0"> <tr> <td><input checked="" type="checkbox"/> Lecture</td> <td><input type="checkbox"/> Service learning</td> </tr> <tr> <td><input type="checkbox"/> Guest speakers</td> <td><input type="checkbox"/> Internship</td> </tr> <tr> <td><input type="checkbox"/> Case study</td> <td><input type="checkbox"/> Field study</td> </tr> <tr> <td><input type="checkbox"/> Role playing</td> <td><input type="checkbox"/> Company visits</td> </tr> <tr> <td><input type="checkbox"/> Student presentation</td> <td><input type="checkbox"/> e-learning</td> </tr> <tr> <td><input type="checkbox"/> Project</td> <td><input type="checkbox"/> Independent study</td> </tr> <tr> <td><input type="checkbox"/> Simulation game</td> <td><input checked="" type="checkbox"/> Others: <u>Computer software Lab.</u></td> </tr> <tr> <td><input checked="" type="checkbox"/> Exercises and problems</td> <td></td> </tr> </table>	<input checked="" type="checkbox"/> Lecture	<input type="checkbox"/> Service learning	<input type="checkbox"/> Guest speakers	<input type="checkbox"/> Internship	<input type="checkbox"/> Case study	<input type="checkbox"/> Field study	<input type="checkbox"/> Role playing	<input type="checkbox"/> Company visits	<input type="checkbox"/> Student presentation	<input type="checkbox"/> e-learning	<input type="checkbox"/> Project	<input type="checkbox"/> Independent study	<input type="checkbox"/> Simulation game	<input checked="" type="checkbox"/> Others: <u>Computer software Lab.</u>	<input checked="" type="checkbox"/> Exercises and problems	
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Major Assessment Methods:	Case Study	Role Playing	Student Presentation	Individual project/paper	Group project/paper	Simulation Game	Exercises & problems	Service learning	Internship	Field Study	Company visits	Written examination	Oral examination	Others (please specify)
Class Participation/ Discussion (0%)														
Assignment(s) (0%)							✓							
Test(s) (65%)												✓		
Examination (30%)												✓		
Others <i>Proficiency in using MS Project (5 %)</i>														✓
Course Web: (if any)	Course materials are available in UMMoodle (http://webcourse.umac.mo/).													

* Note: 4 assignments will be given to students as a way to evaluate their understanding of the subject. Feedback to the solution submitted by students will be provided.

Course Content: (topic outline)	Week no.	Topics	Assignment no.	LO no.
	1	Introduction Project management; Project planning	--	1
	1,2	Presentation of Planning Information Bar chart, space-time diagrams, target-completion-time diagrams, linear scheduling, resource profiles, financial graphs.	--	1
	3,4	Developing a network model Steps in building a network model: defining/ordering activities, drawing network diagrams, assigning durations, cost and durations to activities.	1	2
	4,5	Precedence and Arrow diagrams Drawing network diagrams, activity relationship, calculating early and late start/finish times, understanding float values, identify the critical path, scheduling activity start/finish times.	1	2,3
	6,7	Determining activity durations Types of estimates, estimating durations, factors influencing choice of activity schedules.	--	4
	6,7	Procurement schedule Procurement cycle, procurement schedule.	--	4
	8,9	Time-cost trade-offs Cash flow, direct & overhead costs, network compression	2	4
	9,10	Management of Resources Resource scheduling, resource allocation, resource leveling	3	4
	11,12	Program Evaluation and Review Technique (PERT) & Monte Carlo Technique Uncertainty in activity duration estimates	4	1,5
	12,13	Project monitoring and control Monitoring project status, updating schedules, controlling projects, as-built schedules	4	7
	13	Impact of scheduling decisions on productivity	4	6
	14	Contractual claims using CPM Introduction to computerized CPM scheduling	4	7

Percentage Content of:	Math	Basic Science	Engineering Science	Engineering Design and Synthesis	Complementary Studies	Computer Studies	Total
	20	---	60	---	20	---	100
Timetabled work in hours per week:	Lecture	Tutorial	Laboratory	Other	Total		
	3	Optional	---	---	3		

Contribution to Program Outcomes:	Program Outcomes					Contribution to POs# 5 -----> 1 Significant Least					
		5	4	3	2	1					
	(a) apply knowledge of mathematics, science, and engineering	✓									
	(b) design and conduct experiments, and analyze data										
	(c) design components, systems or processes in presence of constraints					✓					
	(d) Function in a multi-disciplinary team										
	(e) Engineering problem solving	✓									
	(f) Understand professional and ethical responsibility										
	(g) Communicate effectively										
	(h) Understand the impact of engineering solutions to the society		✓								
	(i) Recognize the need and have the ability for lifelong learning										
	(j) Have knowledge of contemporary issues										
	(k) Apply the skills, techniques, modern engineering tools										
	(l) Use the computer/IT tools relevant to the discipline										✓
<i># Note</i> 5: Significant contribution; 4: Supporting contribution; 3: Moderate contribution; 2: Marginal support; 1: Least support											
Course Instructor(s):	Dr. Tai Man <u>Ao leong</u>										