

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:	CIVL321	Year of Study:	3
Course Title:	Construction Methods, Procedure and Equipment		
Compulsory/Elective:	Compulsory		
Course Prerequisites:	Nil		
Prerequisite Knowledge:	Nil		
Duration:	One semester	Credit Units:	3
Class/Laboratory Schedule:	Three hours of lecture per week.		
Laboratory/Software Usage:	Nil		
Course Description:	This course addresses various aspects of contemporary construction methods and equipment. Topics include: equipment economics, engineering fundamentals of moving earth, excavating, loading & hauling equipment, foundation and basement construction, concrete construction practices and formwork design.		
Course Objectives:	<p>To provide the student knowledge in:</p> <ol style="list-style-type: none"> 1. elements of equipment cost and evaluating investment alternatives 2. mobile equipment power requirements 3. different types of excavating, loading and hauling equipment 4. different types of cranes and crane safety 5. concrete construction and formwork systems 6. the classification and construction process of foundations 7. different methods in basement construction 		
Learning Outcomes (LO):	<p>Upon completion of this course, students should be able to:</p> <ol style="list-style-type: none"> 1. calculate equipment costs and depreciation and make decisions related to replacement and evaluation of equipment [POs: a,e]; 2. determine required, available and usable power of mobile equipment [POs: a,e]; 3. understand the characteristics and functions of various excavating, loading and hauling equipment including the estimation of their productivities [POs: a,c,e]; 4. recognize different types of cranes including their characteristics [POs: j]; 5. understand concrete construction and the related equipment [POs: j]; 6. recognize the basic design philosophy of formwork systems [POs: a,c,e]; 7. recognize various methods in constructing basements [POs: j]; 8. recognize various types of foundations and their methods of construction [POs: j]. 		
Texts & References: <i>* recommended textbook</i>	<ol style="list-style-type: none"> 1. Peurifoy, Robert L., Schexnayder, Clifford J., Shapira, Aviad & Schmitt, Robert L., (2011), Construction Planning, Equipment, and Methods*, 8th ed., McGraw-Hill. 2. Chew, Yit Lin, (2009), Construction Technology for Tall Buildings, 2nd ed., World Scientific. 3. Nunnally, S.W., (2006), Construction Methods and Management, 3rd ed., Prentice Hall. 		
Student Assessment:	<ul style="list-style-type: none"> • Three tests: 50%; • One final examination: 50% 		
Learning Outcome Assessment:	<ul style="list-style-type: none"> • Tests and final examination. • Course evaluation 		

Pedagogical Methods:	<input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Guest speakers <input type="checkbox"/> Case study <input type="checkbox"/> Role playing <input type="checkbox"/> Student presentation <input type="checkbox"/> Project <input type="checkbox"/> Simulation game <input checked="" type="checkbox"/> Exercises and problems	<input type="checkbox"/> Service learning <input type="checkbox"/> Internship <input type="checkbox"/> Field study <input type="checkbox"/> Company visits <input type="checkbox"/> e-learning <input type="checkbox"/> Independent study <input type="checkbox"/> Others:
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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) (50%)												✓		
Examination (50%)												✓		
Others (please specify) _____ (0 %)														
Course Web: (if any)	Course materials are available in UMMoodle (http://webcourse.umac.mo/).													

* Note: 5 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 The history of construction equipment.		
	2, 3	Equipment Economics Cost of capital, evaluating investment alternatives, ownership and operating costs, depreciation, replacement decisions.	1	1
	4, 5	Engineering Fundamentals of Moving Earth Soil volume-change characteristics, required power, available power, usable power, performance charts.	2	2
	6, 7, 8	Excavating Equipment Excavators, loaders, draglines, clamshells	3	3
	8, 9, 10	Loading and Hauling Equipment Dozers, scrapers, trucks.	4	3
	11	Cranes Mobil cranes, tower cranes, crane safety.		4
	11, 12	Concrete Construction Concrete and concrete equipment, formwork design.	5	5, 6
	12, 13	Basement Construction Types of basement construction		7
	13, 14	Foundation Systems Classification of foundation system, types of foundation		8

Percentage Content of:	Math	Basic Science	Engineering Science	Engineering Design and Synthesis	Complementary Studies	Computer Studies	Total
	15	---	70	10	5	---	100
Timetabled work in hours per week:	Lecture	Tutorial	Laboratory	Other	Total		
	3	---	---	---	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						
# Note 5: Significant contribution; 4: Supporting contribution; 3: Moderate contribution; 2: Marginal support; 1: Least support							
Course Instructor(s):	Dr. Raymond Aoieong						