

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:	CIVL110	Year of Study:	1		
Course Title:	Mechanics I				
Compulsory/Elective:	Compulsory				
Course Prerequisites:	Nil				
Prerequisite Knowledge:	Fundamental knowledge of calculus and vectors				
Duration:	One semester	Credit Units:	4		
Class/Laboratory Schedule:	Three hours of lecture and two hours of tutorial per week.				
Laboratory/Software Usage:	Nil				
Course Description:	It is a beginning level course for the preparation of other intermediate courses in solid and fluid mechanics. It introduces the basic concepts, tools and methods for rigid bodies, such as forces, moments, free body diagram, equilibrium, supports, reactions, internal forces and moments, truss, frame, shear force and bending moment diagram, etc.				
Course Objectives:	<ol style="list-style-type: none"> 1. To introduce the basic theory of rigid bodies. 2. To introduce some basic methods analyzing statically determined structures. 3. To prepare students for other advanced courses in structural analysis and engineering. 				
Learning Outcomes (LO):	<p>Upon completion of this course, students are expected to:</p> <ol style="list-style-type: none"> 1. have good command of free body diagram [POs: a,e,h]; 2. be able to analyze simple statically determined structures [POs: a,e]; 3. be able to compute internal forces and moments of a statically determined structure and to draw shear force and bending moment diagram [POs: a,e,h]. 				
Texts & References: <i>(* recommended textbook(s))</i>	<ol style="list-style-type: none"> 1. Beer, F.P., Johnston, E.R., and Eisenberg, E.R. (2010)*, Vector Mechanics for Engineers, 9th ed. in SI Units, McGraw Hill. 2. Hibbeler, R.C. (2010), Engineering Mechanics: Statics, 12th ed., Pearson/Prentice Hall. 				
Student Assessment:	<ul style="list-style-type: none"> • Four quizzes: 15%; • Midterm examination: 35% • Final examination: 50% 				
Learning Outcome Assessment:	<ul style="list-style-type: none"> • Quizzes, midterm and final examination. • Course evaluation 				
Pedagogical Methods:	<table style="width: 100%; border: none;"> <tr> <td style="width: 50%; vertical-align: top;"> <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 </td> <td style="width: 50%; vertical-align: top;"> <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: _____ </td> </tr> </table>			<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%)														
Quizzes (15%)												✓		
Midterm Exam (35%)												✓		
Final Exam (50%)												✓		
Others (<i>please specify</i>) _____														
Course Web: (if any)	Course materials are available in UMMoodle (http://webcourse.umac.mo/).													

Course Content: (topic outline)	Week no.	Topics	Assignment no.	LO no.
	1	Introduction Fundamental concepts; fundamental principles; system of units	--	1
	1,2	Statics of Particles Resultant; vectors; component form; equilibrium of a particle; free body diagram	1	1,2
	3,4,5	Rigid Bodies: Equivalent System of Forces External and internal forces; vector products; moment; components of moment; moment of a force about an axis; moment of a couple; addition of couples; equivalency of a force and a force with a couple; system of forces, reduction of a system of force	2	1,2
	5	Quiz 1		
	6,7	Equilibrium of Rigid Bodies Free body diagram; reactions at supports and connections; equilibrium of a rigid body; statically indeterminate reactions; equilibrium of a two-force body; equilibrium of a three-force body; equilibrium of a rigid body in three dimensions; reactions for a three-dimensional structure	3	1,2
	7	Quiz 2		
	8,9	Distributed Forces: Centroid and Center of Gravity Center of gravity of a 2D body; centroid and first moment of area and line; some specific examples; composite of plates and areas; centroid by integration; Pappus-Guldinus Theorems; distributed loads on beams	4	1,2
	9	Midterm Examination		
	10,11	Analysis of Structures Truss; simple truss; analysis of truss by method of joints; method of sections; analysis of frames	5	1,2,3
	12	Quiz 3		
	12,13 14	Forces in Beams and Cables Internal forces in member; various types of beam loading and support; shear force and bending moment diagram; relations among load, shear force and bending moment; cables with concentrated loads; cables with distributed loads	6	2,3
	14	Quiz 4		

Percentage Content of:	Math	Basic Science	Engineering Science	Engineering Design and Synthesis	Complementary Studies	Computer Studies	Total
	20	---	80	---	---	---	100
Timetabled work in hours per week:	Lecture	Tutorial	Laboratory	Other	Total		
	3	2	---	---	5		

Contribution to Program Outcomes:	Program Outcomes	Contribution to POs [#]				
		5 -----> 1				
		5 Significant	4	3	2	1 Least
	(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. Zhou Wanhuan					