

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:	CIVL201	Year of Study:	1
Course Title:	Engineering Geology		
Compulsory/Elective:	Compulsory		
Course Prerequisites:	Nil		
Prerequisite Knowledge:	Nil		
Duration:	One semester	Credit Units:	3
Class/Laboratory Schedule:	Two hours of lecture and three hours of laboratory session per week		
Laboratory/Software Usage:	Laboratory sessions will be conducted in the geotechnical engineering laboratory		
Course Description:	The first part includes the major principles of physical geology covering the structure of the Earth, plate tectonics, volcanism and other mountain building processes, the surface erosion process, and the formation and properties of minerals and rocks. The second part concerns with the application of geological knowledge to civil engineering problems such as landslide, subsidence and earthquake etc.		
Course Objectives:	<ol style="list-style-type: none"> To introduce the basic geology to civil engineering students To inspire the students to think clearly and critically the solution of the civil engineering problems in the context of geological knowledge 		
Learning Outcomes (LO):	<p>Upon completion of this course, students should be able to:</p> <ol style="list-style-type: none"> Acquire the knowledge of the most important rocks and minerals [POs: a, b] Develop an appreciation of geologic processes as they influence civil engineering works [POs: e, h, k] 		
Texts & References: <i>(* recommended textbook(s))</i>	<ol style="list-style-type: none"> *Waltham T, Foundations of Engineering Geology, 3rd Edition, Taylor & Francis, 2009 Monroe and Wicander, The Changing Earth – Exploring Geology and Evolution, 5th Edition, Brooks Cole, 2009 Goodman R.E., Engineering Geology- Rock in Engineering Construction, John Wiley and Sons, USA, 1993. Geotechnical Engineering Office, Geoguide 3: Guide to Rock and Soil Descriptions, Hong Kong Government, 1988. 		
Student Assessment:	<ul style="list-style-type: none"> Quiz and assignments: 25% One midterm: 25% One final examination: 50% 		
Learning Outcome Assessment:	<ul style="list-style-type: none"> Quiz, midterm and final examination. Course evaluation 		
Pedagogical Methods:	<input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Guest speakers <input checked="" type="checkbox"/> Case study <input type="checkbox"/> Role playing	<input type="checkbox"/> Service learning <input type="checkbox"/> Internship <input type="checkbox"/> Field study <input type="checkbox"/> Company visits	

<input type="checkbox"/> Student presentation <input type="checkbox"/> Project <input type="checkbox"/> Simulation game <input checked="" type="checkbox"/> Exercises and problems	<input type="checkbox"/> e-learning <input checked="" type="checkbox"/> Independent study <input type="checkbox"/> Others: <u>Computer software Lab.</u>
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Major Assessment Methods: For each Major Assessment Method below, please indicate the specific pedagogical methods involved (by putting a ✓ in the relevant box(es) on the right-hand side).	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%)														
Quiz/Assignment/Report (25%)							✓							
Test(s) (25%)												✓		
Examination (50%)												✓		
Others (please specify) _____ (0 %)														
Course Web: (if any)	Course materials are available in UMMoodle (http://webcourse.umac.mo/).													

SYLLABUS

Topics	Weeks
<p>PART I: FUNDAMENTAL OF MINERALS, ROCKS AND SOILS</p> <p>Introduction of Engineering Geology</p> <ul style="list-style-type: none"> - Geology Vs. Engineering Geology - Civil Engineering and Engineering Geology <p>Mineralogy</p> <ul style="list-style-type: none"> - Principles of crystallography - Introduction to mineralogy - Rock-forming minerals <p>Rocks and their related activities</p> <ul style="list-style-type: none"> - Rock cycle - Igneous rocks and volcanic activities - Sedimentary rocks and sedimentation - Metamorphic rocks and metamorphism - Engineering concerns of rocks <p>Soils</p> <ul style="list-style-type: none"> - Formation of soils - Different types of soils - Sand Vs. Clay 	1-7
<p>PART II: GEOLOGICAL PROCESS</p> <p>Plate Tectonics and Crust Movement</p> <ul style="list-style-type: none"> - Earthquake - Fold - Fault <p>Weathering</p> <ul style="list-style-type: none"> - Mechanisms - Joints and Weathering - Weathered material transportation <p>Mass Movements</p> <ul style="list-style-type: none"> - Type of mass movements - Landslide and Factor of Safety - Slope Protection and Maintenance 	8-10
MID TERM EXAMINATION	11
<p>PART III: GEOLOGICAL MAP READING</p> <p>Geological Map</p> <ul style="list-style-type: none"> - Dip and strike - Symbols 	

<ul style="list-style-type: none"> - Basic map reading - Outcrop, inclination and thickness of layered rocks <p>PART IV ENGINEERING DESCRIPTION OF SOILS AND ROCKS</p> <p>Description of soils and rocks for engineering purposes</p> <ul style="list-style-type: none"> - Objectives - Concepts of material description and mass description - Soil material and soil mass description - Rock material and rock mass description - Soil drilling 	12-14
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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) Apply the computer/IT tools relevant to the discipline					
<p># Note 5: Significant contribution; 4: Supporting contribution; 3: Moderate contribution; 2: Marginal support; 1: Least support</p>						
Course Instructor(s):	Mr. I M Wan					