

The Hong Kong Polytechnic University

Subject Description Form

Subject Code	CSE290
Subject Title	INTRODUCTION TO GEOTECHNOLOGY
Credit Value	3
Level	2
Pre-requisite / Co-requisite/ Exclusion	Nil
Objectives	<ol style="list-style-type: none"> 1. Provide students with instruction on the fundamentals of geotechnology. 2. Provide an essential background for studies in soil mechanics, rock mechanics, foundation engineering and geotechnical designs.
Intended Learning Outcomes	<p>Upon completion of the subject, students will be able to:</p> <ol style="list-style-type: none"> a. Understand and classify the different nature and properties of different types of rocks. b. Understand basic soil and rock mechanics. c. Apply the knowledge to foundation designs and construction. d. Interpret the test results of the soil samplings.
Subject Synopsis/ Indicative Syllabus	<p><i>Mineralogy and Petrology</i> Minerals, Crystals; physical properties of silicate and non-silicate minerals and their identification. Igneous, sedimentary and metamorphic rock, composition, rock classification and their identification. Hong Kong Rocks.</p> <p><i>Surface processes and weathering</i> Weathering of rock, erosion and deposition; hydrological cycle (River, Marine, Wind, Glacial).</p> <p><i>Structural geology</i> Fold, Fault and joints, stereographic projection of joint; map reading and mapping, section of geological structures.</p> <p><i>Site investigation</i> Plan for site investigation; direct and indirect methods for site investigation and sampling, logging of boreholes in situ test (e.g. SPT, CPT, PMT, DMT, DMT, VST); interpretation of test results. Methods of geophysical exploration.</p> <p><i>Geology for engineering</i> Geological application to tunnels. Transportation links, dams, reservoirs and catchments, coastline protection, slope and foundation.</p> <p><i>Soil mechanics</i> Soil classification, 3 phase model, mass –volume relationship, void ratio, porosity, moisture content, specific gravity, unit weight, degree of saturation, soil consistency and Atterberg limits; soil hydraulics; basic concept of shear strength.</p> <p><i>Rock Mechanics</i></p>

	<p>Index properties of rock for engineering, classification of rock masses; rock strength and failure criteria; rock slope stability.</p> <p><i>Laboratory and Fieldwork</i> Identification of common minerals and rocks. Field and site visits to illustrate course topics, Mapping.</p>																																																									
Teaching/Learning Methodology	<p>Fundamental knowledge will be covered in lectures. Laboratory work will provide opportunities for identification of minerals & rocks, learning the mapping skill and bore log skill, the students need to complete the work sheets. Field studies will help student appreciate the basic principles and familiarize themselves with basic instruments.</p>																																																									
Assessment Methods in Alignment with Intended Learning Outcomes	<table border="1" data-bbox="517 714 1469 1124"> <thead> <tr> <th rowspan="2">Specific assessment methods/tasks</th> <th rowspan="2">% weighting</th> <th colspan="8">Intended subject learning outcomes to be assessed (Please tick as appropriate)</th> </tr> <tr> <th>a</th> <th>b</th> <th>c</th> <th>d</th> <th></th> <th></th> <th></th> <th></th> </tr> </thead> <tbody> <tr> <td>1.Continuous Assessment</td> <td>30%</td> <td>√</td> <td>√</td> <td>√</td> <td>√</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>2. Examination</td> <td>70%</td> <td>√</td> <td>√</td> <td>√</td> <td>√</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Total</td> <td>100 %</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table> <p>Students must attain at least grade D in both coursework and final examination (whenever applicable) in order to attain a passing grade in the overall result.</p> <p>Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:</p> <p>The students will be assessed with three components: the laboratory session, field trip session and assignment. Minerals test and rocks test will arrange after about one month of the laboratory session of identification of minerals and rocks, an examination at the end of the semester. The student will be required to attend laboratory sessions and submit individual laboratory reports. The laboratory session will strengthen geotechnology knowledge of students include identify minerals & rocks, mapping skill and bore log. The student will be required to attend field trip session and submit individual field trip report. These field trip sessions will be acquired the creative thinking. Students will have to exert engineering judgement to complete the laboratory and field trip sessions. The assignment, laboratory session and field trip session to together with the report writing are best to achieve intended learning outcomes a), b), c) and d). Minerals test, rocks test will emphasize on assessing student basic concept and current practices of minerals and rocks identification. It is appropriate to achieve intended learning outcome a). The examination will consolidate students learning in lectures. It is appropriate to achieve the intended learning a), b), c) and d).</p>										Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed (Please tick as appropriate)								a	b	c	d					1.Continuous Assessment	30%	√	√	√	√					2. Examination	70%	√	√	√	√					Total	100 %								
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Effort Expected	▪ Lecture	21 Hrs.
	▪ Tutorial	14 Hrs.
	▪ Field work	7 Hrs
	Other student study effort:	
	▪ Reading and studying	44Hrs.
	▪ Completion of Assignments	30Hrs.
	Total student study effort	120Hrs.
Reading List and References	<p>Glyth F.G.H. and de Freitas M.H., <i>A Geology for Engineers</i>, 7th Edition, ELBS, 1984</p> <p>Allen P.M. and Stephens E.A., <i>Report on the Geological Survey of Hong Kong</i>, Government Press, Hong Kong (1971)</p> <p>Bell F.G., <i>Engineering Geology and Geotechnics</i>, Butterworths, 1980</p> <p>Bell F.G., <i>Fundamentals of Engineering Geology</i>, Butterworths, 1983</p> <p>GEO, <i>Guide to Rock and Soil Descriptions</i>, GeoGuide 3, GCO, Civil Engineering Services Department, Hong Kong, 1988</p> <p>GEO, <i>Guide to Site Investigation</i>, GeoGuide 2, GEO, Geotechnical Engineering Office, Civil Engineering Department, 1987</p> <p>Hoek E. and Bray J., <i>Rock Slope Engineering</i>, 3rd Edition, The Institution of Mining and Metallurgy: London, 1980</p> <p>Holmes A., <i>Principles of Physical Geology</i>, 3rd Edition, Nelson, 1978</p> <p>Langford R.L., Hans A. and Shaw R., <i>Karst Geology in Hong Kong</i>, Geological Society of Hong Kong Bulletin, No. 4, 1990</p> <p>Legget and Karrow, <i>Handbook of Geology in Civil Engineering</i>, McGraw-Hill, 1982</p> <p>Smith M.J. (1986) <i>Concise Soil Mechanics</i>, 4th Edition, McDonald and Evons</p> <p>Rahn P. H. (1996) <i>Engineering Geology, An Environmental Approach</i>, Prentice Hall..</p> <p>West T. R. (1995) <i>Geology Applied to Engineering</i>, Prentice Hall.</p>	