Subject Description Form

Subject Code	CSE20290
Subject Title	Introduction to Geotechnology
Credit Value	3
Level	2
Pre-requisite / Co-requisite / Exclusion	Nil
Objectives	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 *(Note 1)*	Upon completion of the subject, students will be able to: 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 *(Note 2)*	Mineralogy and Petrology (2 week) Physical properties of silicate and non-silicate minerals and their identification; classification of igneous, metamorphic and sedimentary rock and their identification. Hong Kong Rock. Surface processes and Ground-water geology (2 weeks) Weathering; erosion and deposition including river, marine, desert, glacier, karst; formation of engineering soil; hydrological cycle, aquifers and ground water table. Structural geology (1 weeks) Unconformities, fold, fault, joint, map reading and mapping skill. Site investigations (2 weeks) Plan for site investigation; direct and indirect methods for site investigation and sampling, logging of boreholes; insitu tests (e.g. SPT, CPT, PMT, DMT, VST); interpretation of test results. Methods of geophysical exploration. Geology for engineering (2 weeks) Geological applications to tunnels, transportation links, dams, reservoirs, catchments, coastline protection, slopes and foundation. Soil mechanics (2 weeks) Soil formation, Classification of soil, weight–volume relationship, void ratio, porosity, moisture content, specific gravity, unit weight, degree of saturation, consistency of soil and Atterberg limits; compressibility of soil; Darcy's law, permeability; basic concept of shear strength of soil.

Rock Mechanics (2 weeks)
Rock Mass Classification, Uniaxial and triaxial compressive strength, Brazilian test, Point load index, Mohr-Coulomb model with tensile cutoff, and Hoek-and-Brown failure model.

Laboratory and Fieldwork
Identification of common minerals and rocks, Field and site visits to illustrate course topics, Mapping, Borehole logging.

Teaching/Learning Methodology

(Note 3)

Fundamental knowledge will be covered in lectures. Tutorial sessions will provide opportunities for identification of minerals & rocks, learning the mapping skill and bore log skill. The students need to complete the work sheets in tutorial sessions. Field studies will help students appreciate the basic principles and familiarize themselves with basic instruments.

Assessment Methods in Alignment with Intended Learning Outcomes

(Note 4)

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%								

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.

Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:

The students will be assessed with three components: the tutorial session, field trip session and assignment. Minerals test and rocks test will arrange after about one month of the tutorial session of identification of minerals and rocks, an examination at the end of the semester. The student will be required to attend tutorial sessions and submit individual reports. The tutorial 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 field trip report. These field trip sessions will be acquired the creative thinking. Students will have to exert engineering judgement to complete the tutorial and field trip sessions. The assignment, tutorial 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).

Student Study Effort Expected	Class contact:	
	▪ Lectures	26 Hrs.
	▪ Tutorials	8 Hrs.
	▪ Field work	5 Hrs
	Other student study effort:	
	▪ Reading and Studying	39 Hrs.
	▪ Completion of Assignments	39 Hrs.
	Total student study effort	117 Hrs.

Reading List and References

Atherton, M.J. and Burnett, A.D., Hong Kong Rocks, Urban Council, 1986.

Bell, F.G., Engineering Geology, Second Edition, Butterworth-Heinemann, 2007.

Davis, G.H. and Reynolds, S.J., Structural Geology of Rocks and Regions, Second Edition, Wiley, 1996.

Das, B.M., Principles of Geotechnical Engineering, Seventh Edition, International Thomson Publishing, 2010.

Fletcher, C.J.N., Geology of Site Investigation Boreholes from Hong Kong, C. Fletcher, 2004.

Goodman, R.E., Rock Mechanics, Second Edition, Wiley, 1989.

Lisle, R.J., Geological Structures and Maps, Third Edition, Butterworth-Heinemann, 2004.

Lutgens, F.K. and Tarbuck, E.J., Essentials of Geology, Eleventh Edition, Pearson Prentice Hall, 2012.

Mottana, A., Crespi, R. and Liborio, G., Simon & Schuster's guide to Rocks and Minerals, Simon & Schuster, 1978.

Raymond, L.A., Petrology: The Study of Igneous, Sedimentary & Metamorphic Rocks, Second Edition, McGraw Hill, 2002.

Sewell, R.J., Campbell, S.D.G., Fletcher, C.J.N., Lai, K.W. and Kirk, P.A., The Pre-Quaternary Geology of Hong Kong, Printing Dept., 2000.

West, T.R., Geology: Applied to Engineering, Prentice Hall, 1995.

Note 1: Intended Learning Outcomes

Intended learning outcomes should state what students should be able to do or attain upon completion of the subject. Subject outcomes are expected to contribute to the attainment of the overall programme outcomes.

Note 2: Subject Synopsis/ Indicative Syllabus

The syllabus should adequately address the intended learning outcomes. At the same time over-crowding of the syllabus should be avoided.

Note 3: Teaching/Learning Methodology

This section should include a brief description of the teaching and learning methods to be employed to facilitate learning, and a justification of how the methods are aligned with the intended learning outcomes of the subject.

Note 4: Assessment Method

This section should include the assessment method(s) to be used and its relative weighting, and indicate which of the subject intended learning outcomes that each method purports to assess. It should also provide a brief explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes.