

Annexe A: New/Revised Course Content in OBTL+ Format

Course Overview

The sections shown on this interface are based on the templates [UG OBTL+](#) or [PG OBTL+](#)

If you are revising/duplicating an existing course and do not see the pre-filled contents you expect in the subsequent sections e.g. Course Aims, Intended Learning Outcomes etc. please refer to [Data Transformation Status](#) for more information.

Expected Implementation in Academic Year	
Semester/Trimester/Others (specify approx. Start/End date)	
Course Author * Faculty proposing/revising the course	Lee-Chua Lee Hong
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Course Title	Engineering Geology & Soil Mechanics
Course Code	CV2013
Academic Units	3
Contact Hours	39
Research Experience Components	Not Applicable

Course Requisites (if applicable)

Pre-requisites	
Co-requisites	
Pre-requisite to	
Mutually exclusive to	
Replacement course to	
Remarks (if any)	

Course Aims

This course aims to provide you with a basic knowledge of engineering geology, the essential concepts of the physical properties of rocks and soils as a civil engineering material and the fundamental principles of rocks and soil mechanics. It is the first of a series of three courses that will help you build an understanding on geotechnical engineering and its applications in civil engineering works.

Course's Intended Learning Outcomes (ILOs)

Upon the successful completion of this course, you (student) would be able to:

ILO 1	Identify and explain basic concepts in earth science which are pertinent to civil engineering.
ILO 2	Extract 3-D information from geological maps, identify and describe geological structures and the geological processes related to the formation of different soils and rocks.
ILO 3	Explain the factors affecting rock masses and soil properties.
ILO 4	Identify and describe the physical and mechanical soil properties that control soil behavior.
ILO 5	State the effective stress principle and describe how pore water pressure and seepage affect soil response.
ILO 6	Apply basic modelling and analysis techniques used in soil engineering.

Course Content

S/N	Topic	Lecture Hrs	Tutorial Hrs
1	Plate tectonics, minerals and rocks	4	2
2	Geological time scale, Soil forming processes	2	1
3	Geological structures, rock mass properties. Geological maps and geology of Singapore	6	3
4	Particle size, soil indices and soil classification	3	2
5	Phase relationships and soil compaction	2	1
6	Flow of water in soils, flow nets and effective stress concept	4	2
7	Soil compressibility and consolidation	5	2
	Total:	26	13

Reading and References (if applicable)

1. Lecture slides and additional reading materials where needed.
2. Recommended text and reference materials.

Textbooks

1. Grotzinger, J.P. and Jordan, T.H., Understanding Earth, 7th edition, 2014.
2. Knappett, J.A. and Craig, R.F., Craig's Soil Mechanics, 9th edition, 2020.

Planned Schedule

Week or Session	Topics or Themes	ILO	Readings	Delivery Mode	Activities
1	Plate tectonics. Minerals.	1		In-person	Tutorials and Lectures
2	Rock types and rock cycle.	1, 2		In-person	Tutorials and Lectures
3	Geological time scale. Soil forming processes.	1, 2, 3		In-person	Tutorials and Lectures
4	Geological structures. Rock mass properties.	1, 2, 3		In-person	Tutorials and Lectures
5	Geological maps.	2		In-person	Tutorials and Lectures
6	Geology of Singapore and case studies.	2		In-person	Tutorials and Lectures
7	Particle size analysis. Plasticity and Atterberg limits. Soil classification.	3, 4		In-person	Tutorials and Lectures
8	Soil composition. Phase relationships and soil compaction	3, 4		In-person	Tutorials and Lectures
9	Seepage. Permeability tests.	4, 5		In-person	Tutorials and Lectures
10	Flow nets and effective stress principle.	5, 6		In-person	Tutorials and Lectures

Week or Session	Topics or Themes	ILO	Readings	Delivery Mode	Activities
11	Compressibility. Consolidation process. Oedometer test.	4, 5		In-person	Tutorials and Lectures
12	Settlement calculation.	4, 6		In-person	Tutorials and Lectures
13	Terzaghi's consolidation theory. Time-rate consolidation.	4, 5, 6		In-person	Tutorials and Lectures

Learning and Teaching Approach

Approach	How does this approach support you in achieving the learning outcomes?
Lectures	Formal lectures on topics which cover engineering geology, soil properties, and soil mechanics. The lectures will focus on the key concepts on how geology and soil characteristics affect the engineering properties and behaviour of geo-materials. The application of these concepts will be illustrated through analysis and problem solving.
Tutorials	Reinforces concepts of lectures with example problems. To promote peer discussion and group interaction in problem solving.

Assessment Structure

Assessment Components (includes both continuous and summative assessment)

No.	Component	ILO	Related PLO or Accreditation	Weightage	Team/Individual	Rubrics	Level of Understanding
1	Continuous Assessment (CA): Test/Quiz(CA1: Quiz 1)	1,2,3	EAB SLOs (a), (b)	20	Individual	Analytic	Multistructural
2	Continuous Assessment (CA): Test/Quiz(CA2: Quiz 2)	3,4,5	EAB SLOs (a), (b)	20	Individual	Analytic	Multistructural
3	Summative Assessment (EXAM): Final exam(Final Examination)	1,2,3,4,5 & 6	EAB SLOs (a), (b)	60	Individual	Holistic	Relational

Description of Assessment Components (if applicable)

EAB Graduate Attributes

Engineering Knowledge

Apply the knowledge of mathematics, natural science, engineering fundamentals, and an engineering specialisation to the solution of complex engineering problems.

Problem Analysis

Identify, formulate, research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

Design / Development of Solutions

Design solutions for complex engineering problems and design systems, components or processes that meet the specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations.

Investigation

Conduct investigations of complex problems using research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

Modern Tool Usage

Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

The Engineer and Society

Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

Environment and Sustainability

Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for the sustainable development.

Ethics

Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

Individual and Team Work

Function effectively as an individual, and as a member or leader in diverse teams and in multidisciplinary settings.

Communication

Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

Project Management and Finance

Demonstrate knowledge and understanding of the engineering management principles and economic decision-making, and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

Life-long Learning

Recognise the need for, and have the preparation and ability to engage in independent and life-long learning in

the broadest context of technological change.

Formative Feedback

Feedback will be through the dissemination of the student's performance in quizzes as well as review of the quiz questions in class.

Additional channel will be through individual consultation initiated by students on their particular learning needs.

NTU Graduate Attributes/Competency Mapping

This course intends to develop the following graduate attributes and competencies (maximum 5 most relevant)

Attributes/Competency	Level
Building Inclusivity	Basic
Digital Fluency	Basic
Global Perspective	Intermediate
Design Thinking	Advanced

Course Policy

Policy (Academic Integrity)

Good academic work depends on honesty and ethical behaviour. The quality of your work as a student relies on adhering to the principles of academic integrity and to the NTU Honour Code, a set of values shared by the whole university community. Truth, Trust and Justice are at the core of NTU's shared values. As a student, it is important that you recognize your responsibilities in understanding and applying the principles of academic integrity in all the work you do at NTU. Not knowing what is involved in maintaining academic integrity does not excuse academic dishonesty. You need to actively equip yourself with strategies to avoid all forms of academic dishonesty, including plagiarism, academic fraud, collusion and cheating. If you are uncertain of the definitions of any of these terms, you should go to the academic integrity website for more information. On the use of technological tools (such as Generative AI tools), different courses / assignments have different intended learning outcomes. Students should refer to the specific assignment instructions on their use and requirements and/or consult your instructors on how you can use these tools to help your learning. Consult your instructor(s) if you need any clarification about the requirements of academic integrity in the course.

Policy (General)

The standing university policy governing student responsibilities shall apply.
No special policy for this course.

Policy (Absenteeism)

The quizzes make up a significant portion of your course grade. Absence from quizzes without a valid reason will affect your overall course grade. Valid reasons include falling sick supported by a medical certificate and participation in NTU's approved activities supported by an excuse letter from the relevant bodies. There will be no make-up opportunities for quizzes.

If you miss a quiz, you must inform your course lecturer and me via email. Students who miss quizzes with valid reasons will have to provide the CEE Undergraduate Office with medical certificates or excuse letter from the relevant bodies.

Policy (Others, if applicable)

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