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	Geotechnical Engineering
Course Code	CV2014
Academic Units	3
Contact Hours	39
Research Experience Components	Not Applicable

Course Requisites (if applicable)

Pre-requisites	CV2013
Co-requisites	
Pre-requisite to	
Mutually exclusive to	
Replacement course to	
Remarks (if any)	

Course Aims

This course aims to complete the fundamental principles of soil mechanics and extend your understanding of it to geotechnical engineering. It is the second series of three courses that will help you reinforce your understanding of soil mechanics principles and their applications to geotechnical design.

Course's Intended Learning Outcomes (ILOs)

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

ILO 1	Describe the stress-strain behaviour of soil and use Mohr circle to analyse stresses acting on a soil element.
ILO 2	Determine the friction angle of soil and the typical soil behaviour in direct shear tests.
ILO 3	Explain the purposes of triaxial tests and the need to have different types of tests and to determine the shear strength parameters (c' and ') using triaxial CD or CU tests, and explain the " =0" concept for the undrained shear strength of saturated clays.
ILO 4	Identify the 3 types of lateral earth pressures: at-rest, active, and passive and determine the limiting lateral earth pressure for each type; determine the lateral stresses induced on a retaining wall, plot the earth pressure distribution behind a retaining wall and calculate the thrust.
ILO 5	Identify and explain the assumptions, limitations and applications of Rankine's and Coulomb's earth pressure theories.
ILO 6	Calculate the vertical stress distribution in soil under: 1) Point load; 2) Strip area carrying uniform pressure; and 3) Rectangular area carrying uniform pressure.
ILO 7	Identify and determine different types of slope failure and their mechanisms, such as: circular and non-circular rotational slips as well as translational slip and compound slip.
ILO 8	Calculate the factor of safety for fully saturated clay slopes under undrained conditions.
ILO 9	Describe the slope stability analyses based on method of slices (Fellenius, Bishop, Spencer) and their assumptions
ILO 10	Explain the fundamental principles of slope stabilization measures (buttress fills, retaining walls, soil nailing, horizontal drains, vegetative covers) to ensure the stability of the slopes
ILO 11	Study the limitations and applications of different instruments for slope monitoring with respect to deformations (inclinometers) and pore-water pressure changes (piezometers)
ILO 12	Explain the importance of compaction and soil improvement in earthwork construction and determine the suitability and applicability of different types of soil improvement (compaction, temporary surcharge fills, vertical drains, in-situ densifications, soil reinforcement).

Course Content

1. Soil as a Continuum

2. Shear Strength of Soil

3. Lateral Earth Pressure

4. Elastic Stress Distribution

5. Slope stability

6. Compaction

7. Soil Improvement

Reading and References (if applicable)

Text

1. Knappett, J.A. and Craig, R.F., Craig's Soil Mechanics, 8th edition, Spon Press, 2012

References

1. Holtz, R.D. Kovacs, W.D. and Sheahan, T.C., An Introduction to Geotechnical Engineering, 2nd edition, Pearson, 2011.

2. Coduto, D.P., "Geotechnical Engineering, Principles and Practices", Prentice Hall, N. J., 1999.

Planned Schedule

Week or Session	Topics or Themes	ILO	Readings	Delivery Mode	Activities
1	Review of Soil Mechanics	1		In-person	Lectures
2	Soil as a Continuum	1, 2		In-person	
3	Shear Strength of Soil 1	2, 3		In-person	
4	Shear Strength of Soil 2	2, 3		In-person	
5	Shear Strength of Soil 3 / Lateral Earth Pressure	3, 4		In-person	
6	Lateral Earth Pressure	4, 5		In-person	
7	Elastic Stress Distribution	6		In-person	
8	Slope Stability 1	7		In-person	
9	Slope Stability 2	8		In-person	
10	Slope Stability 3	9		In-person	
11	Compaction & Soil Improvement 1	10, 11		In-person	
12	Soil Improvement 2	10, 11		In-person	
13	Soil Improvement 3	12		In-person	

Learning and Teaching Approach

Approach	How does this approach support you in achieving the learning outcomes?
Lectures	Formal lectures on topics which cover fundamental of soil mechanics and selected topics of geotechnical engineering. The lectures will focus on the fundamentals of shear strength of soil and the application of shear strength concept to practical problems such as lateral earth pressure on retaining walls, slope stability and soil improvements. 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	Summative Assessment (EXAM): Others([final examination])	1,2,3,4,5,6, 7, 8, 9, 10, 11, 12	EAB SLOs (a), (b), (c), (d), (f), (g)	60	Team	Holistic	Relational
2	Continuous Assessment (CA): Others([quiz/test])	1, 2, 3, 4, 5, 6	EAB SLOs (a), (b)	20	Team	Analytic	Multistructural
3	Continuous Assessment (CA): Others([quiz/test])	7, 8, 9, 10, 11, 12	EAB SLOs (a), (b), (d), (g)	20	Team	Analytic	Multistructural

Description of Assessment Components (if applicable)

Formative Feedback

Feedback will be through the dissemination of your performance in quizzes as well as review of the quiz questions in class.
Additional channel will be through individual consultation initiated by you on your 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
Care for Society	Basic
Problem Solving	Intermediate
Critical Thinking	Intermediate
Design Thinking	Intermediate
Systems Thinking	Intermediate

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)

Students are expected to attempt all assigned tutorials before the tutorial classes. Students are expected to take responsibility to follow up with lectures, course notes, and online materials. Students are expected to participate in all lectures, tutorials, quizzes and online exercises.

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 coordinator 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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Last Updated Date: 05-12-2024 10:31:46

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