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
Course Author Email	clhlee@ntu.edu.sg
Course Title	Foundation Engineering
Course Code	CV3013
Academic Units	3
Contact Hours	39
Research Experience Components	Not Applicable

Course Requisites (if applicable)

Pre-requisites	CV2013 Engineering Geology & Soil Mechanics & CV2014 Geotechnical Engineering
Co-requisites	
Pre-requisite to	
Mutually exclusive to	
Replacement course to	
Remarks (if any)	

Course Aims

This course aims to provide students with a basic understanding of geotechnical principles in the design and analysis of shallow foundations, deep foundations and retaining structures

Course's Intended Learning Outcomes (ILOs)

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

ILO 1	Explain the purpose of site investigation and evaluate the design soil parameters
ILO 2	Describe the failure modes of retaining walls and foundation supports
ILO 3	Describe the design philosophy and sequence the process involved in a foundation project
ILO 4	Design simple foundation systems

Course Content

No	Topic	Lecture Hrs	Tutorial Hrs
1	Site investigation and evaluation of soil parameters	6	3
2	Bearing capacity and settlement of shallow foundations	6	3
3	Axial pile capacity, load tests and pile groups	6	3
4	Retaining structures	8	4
	Total:	26	13

Reading and References (if applicable)

Text

1. Knappett, J.A. and Craig, R.F., Craig's Soil Mechanics, 9th edition, CRC Press, 2020.
2. Coduto, D.P., Kitch, W.A., and Yeung, M.R. Foundation Design, Principles and Practices, 3rd edition, Prentice Hall, New Jersey, 2016.

Reference

1. Bond, A. and Harris, A., Decoding Eurocode 7, 1st edition; New York, Taylor & Francis, 2008
2. Bowles, J.E., Foundation Analysis and Design, 5th edition, McGraw-Hill, New York, 1996.
3. Das, B.M. and Sivakugan, N. Principles of Foundation Engineering, 9th edition, Cengage Learning, 2019
4. Tomlinson, M.J., Foundation Design and Construction, 7th edition, Prentice Hall, 2001

Planned Schedule

Week or Session	Topics or Themes	ILO	Readings	Delivery Mode	Activities
1	Ground investigation	1			Lecture and Tutorial
2	Design soil parameters	1			Lecture and Tutorial
3	Design soil parameters	1			Lecture and Tutorial
4	Overview of shallow and deep foundations	2, 3, 4			Lecture and Tutorial
5	Bearing capacity of shallow foundations	2, 3, 4			Lecture and Tutorial
6	Settlement of shallow foundations	2, 3, 4			Lecture and Tutorial
7	Pile types and axial capacity	2, 3, 4			Lecture and Tutorial
8	Pile under tensile load and load tests	2, 3			Lecture and Tutorial
9	Pile groups and negative skin friction	2, 3			Lecture and Tutorial
10	Overview of earth retaining structures and lateral earth pressures	4			Lecture and Tutorial
11	Gravity retaining walls	4			Lecture and Tutorial
12	Embedded walls	4			Lecture and Tutorial

Week or Session	Topics or Themes	ILO	Readings	Delivery Mode	Activities
13	Braced excavations	4			Lecture and Tutorial

Learning and Teaching Approach

Approach	How does this approach support you in achieving the learning outcomes?
Lecture	Provide materials to students and guidance in scope for reading of texts and references
Tutorials	Reinforce materials covered in lectures and further explain concepts, process and design philosophy in foundation design
LAMS	Online learning activities to provide students opportunities to solve more problems over and above the tutorial problems
CA1 & CA2	Provide feedback to students on their understanding of the course

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): Test/Quiz(CA1: Quiz 1)	2,3,4	a, c, h	20	Individual	Analytic	Multistructural
2	Continuous Assessment (CA): Test/Quiz(CA2: Quiz 2)	1,2,3,4	a, c, h	20	Individual	Analytic	Multistructural
3	Summative Assessment (EXAM): Final exam(Final Examination)	1,2,3,4	a, c, h	60	Individual	Holistic	Relational

Description of Assessment Components (if applicable)

EAB Graduate Attributes1

a) Engineering Knowledge

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

b) Problem Analysis

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

c) 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.

d) 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.

e) 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.

f) 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.

g) 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.

h) Ethics

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

i) Individual and Team Work

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

j) 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.

k) 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.

l) 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

The guideline is for the course to provide formative feedback for students through their CA as well as giving general feedback for students' performance as part of the end of course review

NTU Graduate Attributes/Competency Mapping

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

Attributes/Competency	Level
Critical Thinking	Basic

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, and course notes, and online materials. Students are expected to participate in all lectures, tutorials, and 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 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.

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)

Last Updated Date: 08-07-2024 02:18:03

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