CA5693: GEOTECHNICAL AND FOUNDATION ENGINEERING

Effective Term
Semester B 2024/25

Part I Course Overview

Course Title
Geotechnical and Foundation Engineering

Subject Code
CA - Civil and Architectural Engineering
Course Number
5693

Academic Unit
Architecture and Civil Engineering (CA)

College/School
College of Engineering (EG)

Course Duration
One Semester

Credit Units
3

Level
P5, P6 - Postgraduate Degree

Medium of Instruction
English

Medium of Assessment
English

Part II Course Details

Abstract
The course introduces advanced concepts and theories in geotechnical and foundation engineering. Numerical methods will also be introduced to solve geotechnical design problems.

Course Intended Learning Outcomes (CILOs)

	CILOs	Weighting (if app.)	DEC-A1	DEC-A2	DEC-A3
1	explain the importance of advanced concepts and theories in geotechnical and foundation engineering;			x	
2	solve geotechnical and foundation problems using commercial computer software;			x	

3	carry design for geotechnical structures, such as slopes, retaining walls and foundations;			x	
4	select appropriate theories to analyze various geotechnical structures.			x	

A1: Attitude
Develop an attitude of discovery/innovation/creativity, as demonstrated by students possessing a strong sense of curiosity, asking questions actively, challenging assumptions or engaging in inquiry together with teachers.

A2: Ability
Develop the ability/skill needed to discover/innovate/create, as demonstrated by students possessing critical thinking skills to assess ideas, acquiring research skills, synthesizing knowledge across disciplines or applying academic knowledge to real-life problems.

A3: Accomplishments
Demonstrate accomplishment of discovery/innovation/creativity through producing /constructing creative works/new artefacts, effective solutions to real-life problems or new processes.

Learning and Teaching Activities (LTAs)

	LTAs	Brief Description	CILO No.	Hours/week (if applicable)
1	Lectures	Cover various aspects of geotechnical and foundation engineering	1, 2, 3, 4	
2	Tutorials	Cover various aspects of geotechnical and foundation engineering	2, 3	

Additional Information for LTAs

Semester Hours: 3 hours per week

Lecture/Tutorial/Laboratory Mix: Lecture (2); Tutorial (1); Laboratory (0)

Assessment Tasks / Activities (ATs)

	ATs	CILO No.	Weighting (%)	Remarks (e.g. Parameter for GenAI use)
1	Assignment and in-class exercises	1, 2, 3, 4	30	
2	Mid-term quiz	1, 2, 3, 4	20	

Continuous Assessment (%)

50

Examination (%)

50

Examination Duration (Hours)

3

Additional Information for ATs

To pass a course, a student must obtain minimum marks of 30% in both coursework and examination components, and an overall mark of at least 40%

Assessment Rubrics (AR)

Assessment Task
Assignment and in-class exercises (Applicable to students admitted before Semester A 2022/23 and in Semester A 2024/25 & thereafter)

Criterion
Ability to understand and apply analysis and design methods in geotechnical and foundation engineering

Excellent
(A+, A, A-) High

Good
(B+, B, B-) Significant

Fair
(C+, C, C-) Moderate

Marginal
(D) Basic

Failure
(F) Not even reaching marginal levels

Assessment Task
Mid-term quiz (Applicable to students admitted before Semester A 2022/23 and in Semester A 2024/25 & thereafter)

Criterion
Ability to understand and apply analysis and design methods in geotechnical and foundation engineering

Excellent
(A+, A, A-) High

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Assessment Task
Examination (Applicable to students admitted before Semester A 2022/23 and in Semester A 2024/25 & thereafter)

Criterion
Ability to understand and apply analysis and design methods in geotechnical and foundation engineering

Excellent
(A+, A, A-) High

Good
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(C+, C, C-) Moderate

Marginal
(D) Basic

Failure
(F) Not even reaching marginal levels

Assessment Task
Assignment and in-class exercises (Applicable to students admitted from Semester A 2022/23 to Summer Term 2024)

Criterion
Ability to understand and apply analysis and design methods in geotechnical and foundation engineering

Excellent
(A+, A, A-) High

Good
(B+, B) Significant

Marginal
(B-, C+, C) Basic

Failure
(F) Not even reaching marginal levels

Assessment Task
Mid-term quiz (Applicable to students admitted from Semester A 2022/23 to Summer Term 2024)

Criterion
Ability to understand and apply analysis and design methods in geotechnical and foundation engineering

Excellent
(A+, A, A-) High

Good
(B+, B) Significant

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(B-, C+, C) Basic

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Assessment Task

Examination (Applicable to students admitted from Semester A 2022/23 to Summer Term 2024)

Criterion

Ability to understand and apply analysis and design methods in geotechnical and foundation engineering

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(A+, A, A-) High

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(B+, B) Significant

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(B-, C+, C) Basic

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Part III Other Information

Keyword Syllabus

Advanced designs of deep excavation, shallow and deep foundations, ground Settlement due to Tunneling, Ground Improvement, Geotechnical construction techniques, Land reclamation, Geotechnical risk and reliability, Numerical Analysis, Use of computer software to solve common geotechnical problems associated with empirical relationships, seepage, consolidation, pile applications, excavations, and general soil behavior.

Reading List

Compulsory Readings

	Title
1	Nil

Additional Readings

	Title
1	Coduto, D.P. 2001. Foundation Design: Principles and Practices. 2nd Ed. Prentice-Hall.
2	Craig, R.F. 2004. Craig's Soil Mechanics. 7th Ed. Spon Press.
3	Das B.M. 1999. Principles of Foundation Engineering. 4th Ed. PWS Publishing.
4	Geotechnical Control Office (GCO) 1984. Geotechnical Manual for Slopes. The Government of Hong Kong Special Administration Region, 2nd Edition, Hong Kong.
5	Geotechnical Control Office (GCO) 1987. Geoguide 2: Guide to Site Investigation. The Government of Hong Kong Special Administration Region. Hong Kong.
6	Geotechnical Control Office (GCO) 1987. Geoguide 3: Guide to Soil and Rock Descriptions. The Government of Hong Kong Special Administration Region. Hong Kong.
7	Geotechnical Engineering Office (GEO) 1993. Geoguide 1: Guide to Retaining Wall Design. 2nd Edition, The Government of Hong Kong Special Administration Region, Hong Kong.
8	Muir Wood, D. 1990. Soil Behaviour and Critical State Soil Mechanics. Cambridge University Press.
9	Powrie, W. 2004. Soil Mechanics: Concepts and Applications. 2nd Ed. Spon Press.
10	Atkinson & Bransby 1978. The Mechanics of Soils. McGraw-Hill

11	Atkinson 1993. An Introduction to the Mechanics of Soils and Foundations. Mc-Graw-Hill.
12	Mitchell, J. K. and Soga, K. 2005. Fundamentals of Soil Behavior. Wiley.