CA4665: GEOTECHNICAL ANALYSIS AND DESIGN

Effective Term
Semester A 2025/26

Part I Course Overview

Course Title
Geotechnical Analysis and Design

Subject Code
CA - Civil and Architectural Engineering
Course Number
4665

Academic Unit
Architecture and Civil Engineering (CA)

College/School
College of Engineering (EG)

Course Duration
One Semester

Credit Units
3

Level
B1, B2, B3, B4 - Bachelor's Degree

Medium of Instruction
English

Medium of Assessment
English

Prerequisites
Nil

Precursors
CA3687 Soil Mechanics

Students must have attempted (including class attendance, coursework submission, and examination) the precursor course(s) so identified.

Equivalent Courses
BC4665/BC4665P Geotechnical Analysis and Design

Exclusive Courses
Nil

Part II Course Details

Abstract

The course aims to introduce analysis and design methods of geotechnical structures through integration and consolidation of students' knowledge in soil mechanics.

Course Intended Learning Outcomes (CILOs)

	CILOs	Weighting (if app.)	DEC-A1	DEC-A2	DEC-A3
1	Carry out simple analysis to discover the critical mechanism that governs geotechnical design			x	
2	Justify the stability of different types of geotechnical structures			x	
3	Quantify the deformation of a geotechnical structure under working loads			x	
4	Propose schemes and measures to enhance stability of different types of 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	Lecture	Explain the key concept, fundamental theories and tools in geotechnical analysis and design	1, 2, 3, 4	2 hours/week
2	Tutorial	Require the students to discuss the concepts and solve the problems in geotechnical engineering and design individually or in a group basis in the tutorial class	1, 2, 3, 4	1 hour/week

Assessment Tasks / Activities (ATs)

	ATs	CILO No.	Weighting (%)	Remarks ("-" for nil entry)	Allow Use of GenAI?
1	Assignments	1, 2, 3, 4	30		No
2	Mid-term quiz	1, 2, 3, 4	20		No

Continuous Assessment (%)

50

Examination (%)

50

Examination Duration (Hours)

3

Minimum Continuous Assessment Passing Requirement (%)

30

Minimum Examination Passing Requirement (%)

30

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

Assignments

Criterion

Ability to understand and apply analysis and design methods of geotechnical structures

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

Criterion

Ability to understand and apply analysis and design methods of geotechnical structures

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
Examination

Criterion
Ability to understand and apply analysis and design methods of geotechnical structures

Excellent (A+, A, A-)
High

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Significant

Fair (C+, C, C-)
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Marginal (D)
Basic

Failure (F)
Not even reaching marginal levels

Part III Other Information

Keyword Syllabus
Theories of elasticity and plasticity in geotechnical engineering, bearing capacity and foundation design, limit equilibrium methods, earth pressure and retaining wall design, design of deep excavations with lateral support system, slope stability analysis and stabilization measures.

Reading List

Compulsory Readings

	Title
1	Nil

Additional Readings

	Title
1	Craig, R.F. 2004. Craig's Soil Mechanics. 7th Ed. Spon Press.
2	Geotechnical Control Office (GCO) 1984. Geotechnical Manual for Slopes. The Government of Hong Kong Special Administration Region, 2nd Edition, Hong Kong.
3	Geotechnical Control Office (GCO) 1987. Geoguide 2: Guide to Site Investigation. The Government of Hong Kong Special Administration Region. Hong Kong.
4	Geotechnical Control Office (GCO) 1987. Geoguide 3: Guide to Soil and Rock Descriptions. The Government of Hong Kong Special Administration Region. Hong Kong.
5	Muir Wood, D. 1990. Soil Behaviour and Critical State Soil Mechanics. Cambridge University Press.
6	Powrie, W. 2004. Soil Mechanics: Concepts and Applications. 2nd Ed. Spon Press.