Module Specification

Advanced Soil Mechanics and Foundation Design

Version: 2023-24, v6.0, 21 Mar 2023

Contents

Part 1: Information

Module title: Advanced Soil Mechanics and Foundation Design

Module code: UBGMTA-15-M

Level: Level 7

For implementation from: 2023-24

UWE credit rating: 15

ECTS credit rating: 7.5

Faculty: Faculty of Environment & Technology

Department: FET Dept of Geography & Envrnmental Mgmt

Partner institutions: None

Field: Geography and Environmental Management

Module type: Module

Pre-requisites: None

Excluded combinations: None

Co-requisites: None

Continuing professional development: No

Professional, statutory or regulatory body requirements: None

Part 2: Description

Overview: In this module, you will revise basic soil mechanics, focus on investigating deeper aspects of the soil behaviour and gain insight of parameters required to perform design of geotechnical structures, via (advanced) constitutive soil models.

Features: Not applicable

Educational aims: See Learning Outcomes

Outline syllabus: In this module you will cover:

Revision of basic soil mechanics (e.g., permeability, compressibility and consolidation, Mohr-Coulomb failure criteria, basic understanding of laboratory soil testing via shear box and triaxial tests, drained and undrained conditions).

Constitutive models of soils, including the critical state cam clay model, to interpret and predict the complex behaviour of different soil types under various loading conditions.

Effective and total stress analyses for drained and undrained conditions, respectively.

Undrained shear strength of clays and drained shear strength of clays and sands (peak, residual).

Stiffness characteristics of soils (drained and undrained moduli, Young's modulus, shear modulus, bulk modulus, strain levels).

Elastic-plastic soil behaviour and failure criteria for soils.

Analysis and interpretation of (advanced) triaxial laboratory tests for obtaining design parameters.

Part 3: Teaching and learning methods

Teaching and learning methods: See Assessment

Module Learning outcomes: On successful completion of this module students will achieve the following learning outcomes.

MO1 Interpret and predict soil behaviour under loading using theoretical models based on critical state soil mechanics

MO2 Identify the critical state parameters and how to obtain them from soil tests

MO3 Identify parameters which affect yielding and failure in soils

MO4 Evaluate stresses and strains of soils at failure

MO5 Evaluate stress states and stress paths

MO6 Select and plan soil testing, and interpret test data to obtain geotechnical parameters for the design of a spectrum of geotechnical structures such as earth retaining walls and foundations, showing how health and safety issues are addressed

MO7 Select and evaluate strength parameters to be used in geotechnical design taking into account a variety of soil types and loading conditions

Hours to be allocated: 150

Contact hours:

Independent study/self-guided study = 114 hours

Face-to-face learning = 36 hours

Total = 150

Reading list: The reading list for this module can be accessed at readinglists.uwe.ac.uk via the following link https://uwe.rl.talis.com/modules/ubgmta-15-m.html

Part 4: Assessment

Assessment strategy: Assessment Task 1: Written Online Examination (4 hours). Learning outcomes 1 to 5.

A 4 hour written examination (indicative completion time 2 hours) allows for the direct assessment of the students ability to apply the theory to technical and practical design problems. This part of the assessment is designed to offer students the opportunity to demonstrate their knowledge and understanding of advanced aspects of soil behaviour via constitutive models, appropriately select parameters for geotechnical design, and plan experimental testing for obtaining such parameters.

Assessment Task 2: Portfolio (2000 words excluding appendices and references). Learning outcomes 2, 6, 7.

A coursework submission of a 2000 word portfolio, which demonstrates the application of soil mechanics and geotechnics theory to non-trivial problems: process advanced soil test data to obtain geotechnical design parameters.

Resit will involve retaking an examination and/or the resubmission of a reworked portfolio.

Assessment tasks:

Examination (Online) (First Sit)
Description: Online Examination (4 hours)
Weighting: 70 %
Final assessment: Yes
Group work: No
Learning outcomes tested: MO1, MO2, MO3, MO4, MO5

Portfolio (First Sit)
Description: Portfolio (2000 words report) excluding appendices and references
Weighting: 30 %
Final assessment: No
Group work: No
Learning outcomes tested: MO2, MO6, MO7

Examination (Online) (Resit)
Description: Online Examination (4 hours)
Weighting: 70 %
Final assessment: Yes
Group work: No
Learning outcomes tested: MO1, MO2, MO3, MO4, MO5

Portfolio (Resit)

Description: Portfolio (2000 words report) excluding appendices and references
Weighting: 30 %
Final assessment: No
Group work: No
Learning outcomes tested: MO2, MO6, MO7

Part 5: Contributes towards

This module contributes towards the following programmes of study:

Civil Engineering [Frenchay] MSc 2023-24

Civil Engineering [Frenchay] MSc 2023-24

Civil and Environmental Engineering [Sep][FT][Frenchay][4yrs] - Not Running MEng 2020-21

Civil Engineering [Sep][FT][Frenchay][4yrs] MEng 2020-21

Civil and Environmental Engineering [Sep][SW][Frenchay][5yrs] MEng 2019-20

Civil and Environmental Engineering [Sep][PT][Frenchay][7yrs] MEng 2018-19