

Module Details	
Module Title	Geotechnical and Civil Engineering Design
Module Code	CSE6009-B
Academic Year	2024/5
Credits	20
School	School of Built Environment, Architecture & Creative Industries
FHEQ Level	FHEQ Level 6

Contact Hours	
Type	Hours
Directed Study	160
Lectures	14
Tutorials	26

Availability	
Occurrence	Location / Period
BDA	University of Bradford / Academic Year

Module Aims
<p>To extend the application of the fundamental principles of soil behaviour introduced in Soil Mechanics, with particular emphasis on analysis and design of foundations and earth retaining structures in accordance with the principles of Limit State and Eurocode 7. To develop ground models and geotechnical risk register in order to design efficient foundations and structures; To develop and justify detailed solutions to civil engineering problems by a process of appraisal, analysis and validation using specialist software, codes of practice and other learned society guidance, as appropriate; To further develop presentation, team working and personal management skills.</p>

Outline Syllabus

Foundations: Design and analysis of shallow foundations (footings) and deep foundations (piles) in compliance with EC7; Types of foundations, design bearing capacity, effect of groundwater table, effect of eccentric and inclined loading; design capacity of piles, efficiency and settlement of pile group; Design and analysis of earth retaining structures (retaining wall etc.); Slope stability analysis and techniques to improve the stability of slopes and re-use of soils on site. The concepts of sustainability are considered in the design of different types of foundation and earth works. Development of detailed working solutions to civil and structural engineering problems from the conceptual solutions proposed by the end of the Feasibility Study module; The working solutions are to be presented in the form of a design report comprising working drawings with supporting calculations and the results of computer-based analysis, where appropriate. Initial improvement of the outline solutions is undertaken as a result of preliminary analysis and critical appraisal. The problems defined in the outline brief issued to the design teams at the start of the Feasibility Study module will vary from year to year but will include many of the following: materials selection and specification; re-use of soils; construction method statements and simple programming of work; geotechnical processes; earth retaining structures and foundations; slope stabilisation; structural analysis; design of structural elements (various materials); composite construction; structural and condition assessment of engineering works, repair and strengthening; hydraulic analysis and design (pipelines, pumping stations, effects of wave action); erosion and weathering problems; temporary works design; floating structures (marinas.); embodied carbon emissions. The concepts of sustainability are considered in the design of different types of foundations and structures and earth works, particularly UN SDGs 9, 11, 12 and 13. Commercially developed software is available as an analysis and drawing aid. All of the classes are conducted in a design studio environment and design teams are encouraged to discuss and develop their own ideas with the academic staff.

Learning Outcomes

Outcome Number	Description
01	Critically evaluate soil behaviour in analysis and design of geotechnical problems to EC7.
02	Use fundamental soil parameters in design and identify their significance.
03	Create detailed solutions to civil engineering problems that satisfy modern performance standards and sustainability requirements, in particular UN SDG's 9, 11, 12, and 13 through a process of appraisal, analysis and validation.
04	Apply engineering principles to analyse civil and structural engineering design problems.
05	Apply quantitative methods and, where appropriate, use computer software to solve civil and structural engineering problems.
06	Solve problems systematically.
07	Collect, manage, interpret and use design data obtained from a variety of sources; use IT skills to aid the presentation of technical solutions to a problem; demonstrate detail design communication skills (calculations and drawings).

Learning, Teaching and Assessment Strategy

Concepts and principles are introduced using formal lectures; Theory, application, critical analysis and design skills gained through design team-led project supervision sessions. The formal lectures include several worked examples in which students are exposed to apply the theory. Deeper understanding is then acquired during the tutorial classes in which students practice the application of concepts and theories to solve systematically geotechnical design problems and receive formative feedback.

Assessment is by formative assessment, a formal examination and a team-based project design report. The formative exam will provide students with feedback in order to improve their learning and understanding of geotechnical design methods. The formal examination will assess the learning outcomes concerning the geotechnical design (learning outcomes 1, 2 and 6) whereas the team-based project report will assess the application of practical skills and knowledge stated by all other learning outcomes.

Mode of Assessment

Type	Method	Description	Weighting
Summative	Examination - Closed Book	Closed Book Examination 2 hours	40%
Summative	Coursework - Written	1 report per design team (drawings and supporting calculations - approx equivalent to 4000 words/student)	60%

Reading List

To access the reading list for this module, please visit <https://bradford.rl.talis.com/index.html>

Please note:

This module descriptor has been published in advance of the academic year to which it applies. Every effort has been made to ensure that the information is accurate at the time of publication, but minor changes may occur given the interval between publishing and commencement of teaching. Upon commencement of the module, students will receive a handbook with further detail about the module and any changes will be discussed and/or communicated at this point.