ES3B6-30 Geotechnical Engineering

20/21

Department
School of Engineering
Level
Undergraduate Level 3
Module leader
Mohaddeseh Mousavi Nezhad
Credit value
30
Module duration
20 weeks
Assessment
65% coursework, 35% exam
Study location
University of Warwick main campus, Coventry

Description

Introductory description

ES3B6-30 Geotechnical Engineering

Module web page

Module aims

All Civil Engineers require a sound understanding of geotechnical engineering. This module gives a basic geological and geotechnical knowledge base and introduces a number of fundamental principles and key applications appropriate to the level of the module and the framework of the Warwick courses.

Outline syllabus

This is an indicative module outline only to give an indication of the sort of topics that may be covered. Actual sessions held may differ.

Introduction to Geotechnical Engineering, origin and types of soil
Soil & rock description and classification,
Index testing,
Soil phase relationships,

Permeability and groundwater flow,
Soil mechanics,
Principle of effective stress,
Compaction and consolidation,
Bearing capacity of shallow and deep foundations,
Settlement of structures,
Lateral pressures on retaining structures, design of retaining structures,
Stability of earth-retaining structures and reinforced soil,
Design of anchors and anchorages.

Learning outcomes

By the end of the module, students should be able to:

- Construct and interpret geological maps, extending their skills of graphical and spatial interpretation.
- Compare a range of soil and rock types, adopting professionally recognised systems for categorisation and description.
- Apply the Principle of Effective Stress to a range of typical geotechnical problems in order to predict the ground response under different conditions of loading, soil type and groundwater states.
- Design simple earth retaining structures.
- Select appropriate tests and strength criteria for rocks and soils. Use these to predict their behaviour under loading. Explain the processes active within these materials when loaded.
- Analyse problems of enclosed and open groundwater seepage to predict the performance of structures and associated risks.
- Assess the type of foundation required and design in terms of bearing capacity and settlement.
- Communicate in a professional and scientific manner.

Indicative reading list

Barnes G., Soil Mechanics: Principles and Practice, Palgrave, 3rd ed. 2010
Blyth, F.G.H. & de Freitas, M.H., Geology for Engineers, Butterworth-Heinemann, 2004
Craig, R.F., Soil Mechanics, 8th Ed., Spon Press, 2012
Smith, G.N. & Smith I.N., Elements of Soil Mechanics, 9th Ed., Wiley Blackwell, 2014
Waltham (2009), Foundation of Engineering Geology, 3rd Ed, Spon

Subject specific skills

1. Ability to apply relevant practical and laboratory skills
2. Ability to conceive, make and realise a component, product, system or process
3. Ability to develop economically viable and ethically sound sustainable solutions
4. Ability to be pragmatic, taking a systematic approach and the logical and practical steps necessary for, often complex, concepts to become reality
5. Ability to seek to achieve sustainable solutions to problems and have strategies for being creative and innovative

6. Ability to be risk, cost and value-conscious, and aware of their ethical, social, cultural, environmental, health and safety, and wider professional engineering responsibilities

Transferable skills

1. Numeracy: apply mathematical and computational methods to communicate parameters, model and optimize solutions
2. Apply problem solving skills, information retrieval, and the effective use of general IT facilities
3. Communicate (written and oral; to technical and non-technical audiences) and work with others
4. Plan self-learning and improve performance, as the foundation for lifelong learning/CPD
5. Awareness of the nature of business and enterprise in the creation of economic and social value
6. Overcome difficulties by employing skills, knowledge and understanding in a flexible manner

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Study

Study time

Type	Required
Lectures	32 sessions of 1 hour (11%)
Tutorials	8 sessions of 1 hour (3%)
Practical classes	5 sessions of 1 hour (2%)
Fieldwork	32 sessions of 1 hour (11%)
Private study	223 hours (74%)
Total	300 hours

Private study description

223 hours of guided independent learning

Costs

No further costs have been identified for this module.

Assessment

You must pass all assessment components to pass the module.

Students can register for this module without taking any assessment.

Assessment group D1

	Weighting	Study time
Coursework; Engineering geology report	30%	
Coursework; Engineering geology report (20 pages)		
Earth Structure Report	35%	
Online Examination	35%	
QMP		
~Platforms - QMP		

- Students may use a calculator
- Engineering Data Book 8th Edition
- Graph paper

Feedback on assessment

Coursework: individual feedback returned.
Feedback in class after submission deadline.
Model solutions to recent past papers.
Cohort level feedback on examinations.

Past exam papers for ES3B6

Availability

Post-requisite modules

If you pass this module, you can take:

- ES4F4-15 Advanced Structural Engineering

Courses

This module is Core for:

- Year 3 of UESA-H216 BEng Civil Engineering
- Year 4 of UESA-H215 BEng Civil Engineering with Intercalated Year
- Year 3 of UESA-H217 MEng Civil Engineering
- Year 4 of UESA-H218 MEng Civil Engineering with Intercalated Year

This module is Core optional for:

- Year 3 of UESA-H218 MEng Civil Engineering with Intercalated Year
- Year 3 of UESA-H115 MEng Engineering with Intercalated Year

This module is Optional for:

- Year 3 of UESA-H113 BEng Engineering
- Year 3 of UESA-H114 MEng Engineering
- Year 4 of UESA-H115 MEng Engineering with Intercalated Year

This module is Option list A for:

- Year 4 of UESA-H111 BEng Engineering with Intercalated Year
- UESA-H112 BSc Engineering
    - Year 3 of H112 Engineering
    - Year 3 of H112 Engineering