

# Unit Outline (Higher Education)

**Institute / School:** Institute of Innovation, Science & Sustainability

**Unit Title:** GEOTECHNICAL ENGINEERING

**Unit ID:** ENGIN3202

**Credit Points:** 15.00

**Prerequisite(s):** Nil

**Co-requisite(s):** Nil

**Exclusion(s):** Nil

**ASCED:** 030911

**Description of the Unit:**

This is an intermediate level unit in geotechnical engineering where more in depth knowledge in this field is introduced and excelled. Topics include geotechnical site investigation practices, Introduction to AS2870 Residential Slabs & footings, analysis and design of shallow foundations, analysis and design of deep foundations, analysis of slope stability and design of retaining structures and introduction to environmental geotechniques. Upon completing this unit, students should be able to prepare a small scale site investigation program, Classify residential building sites and propose suitable footing systems for residential buildings, draw geological cross sections for geotechnical engineering design purpose using information obtained from geological map and site investigation, design basic shallow & deep foundations subjected to simple loading conditions, analyse stability of soil slopes & design retaining structures and describe fundamental geoenvironmental considerations applicable in the design of waste containment systems.

**Grade Scheme:** Graded (HD, D, C, P, MF, F, XF)

**Work Experience:**

No work experience: Student is not undertaking work experience in industry.

**Placement Component:** No

**Supplementary Assessment:** Yes

Where supplementary assessment is available a student must have failed overall in the Unit but gained a final mark of 45 per cent or above, has completed all major assessment tasks (including all sub-components where a task has multiple parts) as specified in the Unit Description and is not eligible for any other form of supplementary assessment

**Course Level:**

Level of Unit in Course	AQF Level of Course					
	5	6	7	8	9	10
Introductory	■	■	■	■	■	■
Intermediate	■	■	■	✓	■	■
Advanced	■	■	■	■	■	■

### Learning Outcomes:

To develop and broaden an understanding of the geotechnical engineering design & practice principles and their application in the investigation, modelling, analysis and design of some common geoenvironmental systems (shallow foundations, deep foundations, residential footings, retaining structures and landfill systems).

### Knowledge:

- K1.** Identify and explain the range of important issues in the planning of a detailed geotechnical site investigation including reactivity characteristics of soils
- K2.** identify and evaluate reactivity characteristics of soils and classification of building sites based on AS2870 : Residential Slabs & Footing
- K3.** Describe and apply design principles of Shallow foundations, Deep foundations and Retaining walls subjected to different loading conditions & soil conditions
- K4.** Explain and analyse soil slope stability
- K5.** Elaborate on modern approaches to landfill, including environmental considerations and current trends in research and development.
- K6.** Analyse and model effective laboratory techniques for soil strength & compressibility assessment

### Skills:

- S1.** Propose and plan a site investigation for a small to medium scale geotechnical engineering project and produce a technical report to an acceptable professional standard
- S2.** Analyse soil-foundation systems, estimate allowable bearing capacity of soils based on established engineering methods and design of simple foundation systems for given loading conditions and soil properties
- S3.** Evaluate and justify complex information in classifying residential building sites based on soil reactivity
- S4.** Evaluate stability of sloping embankments and design of basic earth retaining structures
- S5.** Reflect on and synthesise information and concepts in the selection of landfill liner construction materials and methods
- S6.** Conduct basic lab tests to assess soil strength & compressibility characteristics and interpret test data

### Application of knowledge and skills:

- A1.** Apply the knowledge, technical and analytical skills to independently analyse and design various geotechnical engineering systems and communicate the achieved outcome
- A2.** Apply the advanced technical knowledge and skills in research based problem solving exercises in geotechnical engineering and demonstrate expert judgement required in such assignments

### Unit Content:

Topics may include:

- Geotechnical Site investigation Practices and planning for soil exploration
- Site Classification and design of Residential building foundations based on AS2870

- Bearing Capacity Analysis and Design of Shallow Foundations
- Design of Deep Foundations
- Soil Slope Stability Analysis
- Design of Retaining Structures
- Introduction to Environmental Geotechniques

**Learning Task and Assessment:**

Learning Outcomes Assessed	Assessment Tasks	Assessment Type	Weighting
K1, K2, K6, S1, S6, A1, A2	Field / Laboratory tests and report on various geotechnical properties	Field/ Laboratory tests and reports	10-20%
K1, K2, K3, K4, S1, S2, S3, S4, A1, A2	Design of foundations & retaining structures	Written assignments and design reports	25%-40%
K1, K2, K3, K4, K5, K6, S1, S2, S3, S4, S5, A1, A2	Assessment of all or part of the unit by test/ examination.	Test/ Examination	40% - 60%

**Alignment to the Minimum Co-Operative Standards (MiCS)**

The Minimum Co-Operative Standards (MiCS) are an integral part of the Co-Operative University Model. Seven criteria inform the MiCS alignment at a Course level. Although Units must undertake MiCS mapping, there is NO expectation that Units will meet all seven criteria. The criteria are as follows:

1. Co-design with industry and students
2. Co-develop with industry and students
3. Co-deliver with industry
4. FedTASK alignment
5. Workplace learning and career preparation
6. Authentic assessment
7. Industry-link/Industry facing experience

MiCS Course level reporting highlights how each Course embraces the principles and practices associated with the Co-Operative Model. Evidence of Course alignment with the MiCS, can be captured in the Course Modification Form.

**MICS Mapping has been undertaken for this Unit**                      No

Date:

**Adopted Reference Style:**

Other (IEEE: Refer to the library website for more information)

Refer to the [library website](#) for more information

Fed Cite - [referencing tool](#)