

Course Outline (Higher Education)

Institute / School: Institute of Innovation, Science & Sustainability

Course Title: GEOTECHNICAL ENGINEERING

Course ID: ENGIN3202

Credit Points: 15.00

Prerequisite(s): (ENGIN2204)

Co-requisite(s): Nil

Exclusion(s): Nil

ASCED: 030911

Description of the Course:

This is an intermediate level course 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 course, 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 course but gained a final mark of 45 per cent or above and submitted all major assessment tasks.

Program Level:

Level of course in Program	AQF Level of Program					
	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

Course 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

Values:

- V1.** Recognise the importance of sound understanding of fundamental principles in order to apply theory appropriately in practice
- V2.** Appreciate the importance of careful planning and execution of site investigations in order to minimise economical risks and occupational hazards
- V3.** Recognise the challenges associated with the design of geotechnical engineering systems
- V4.** Appreciate the variation of ground conditions on the selection and design of geotechnical structures

Graduate Attributes

The Federation University Federation graduate attributes (GA) are entrenched in the [Higher Education Graduate Attributes Policy](#) (LT1228). FedUni graduates develop these graduate attributes through their engagement in explicit learning and teaching and assessment tasks that are embedded in all FedUni programs. Graduate attribute attainment typically follows an incremental development process mapped through program progression. **One or more graduate attributes must be evident in the specified learning outcomes and assessment for each FedUni course, and all attributes must be directly assessed in each program**

Graduate attribute and descriptor		Development and acquisition of GAs in the course	
		Learning Outcomes (KSA)	Assessment task (AT#)
GA 1 Thinkers	Our graduates are curious, reflective and critical. Able to analyse the world in a way that generates valued insights, they are change makers seeking and creating new solutions.	K1-K6, S1-S6, A1, A2	1-3
GA 2 Innovators	Our graduates have ideas and are able to realise their dreams. They think and act creatively to achieve and inspire positive change.	K1-K4, S1-S4, A1, A2	2
GA 3 Citizens	Our graduates engage in socially and culturally appropriate ways to advance individual, community and global well-being. They are socially and environmentally aware, acting ethically, equitably and compassionately.	K1-K6, S1-S6, A1, A2	1,2,3
GA 4 Communicators	Our graduates create, exchange, impart and convey information, ideas, and concepts effectively. They are respectful, inclusive and empathetic towards their audience, and express thoughts, feelings and information in ways that help others to understand.	K1-K6, S1-S6, A1, A2	1, 2
GA 5 Leaders	Our graduates display and promote positive behaviours, and aspire to make a difference. They act with integrity, are receptive to alternatives and foster sustainable and resilient practices.	Not applicable	Not applicable

Learning Task and Assessment:

Learning Outcomes Assessed	Learning 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%

Learning Outcomes Assessed	Learning Tasks	Assessment Type	Weighting
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 course by test/ examination.	Test/ Examination	40% - 60%

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](#)