Unit Outline (Higher Education)

Institute / School:	Institute of Innovation, Science & Sustainability
Unit Title:	Geotechnical Engineering 3
Unit ID:	ENGPG9109
Credit Points:	15.00
Prerequisite(s):	(ENGPG9104)
Co-requisite(s):	Nil
Exclusion(s):	(ENGRG9105)
ASCED:	030900

Description of the Unit:

This unit provides a contextualized learning experience on the significance and application of advanced geotechnical engineering topics, including unsaturated soil mechanics, ground improvement and soil stabilization, and environmental geotechnics, in fostering resilient and sustainable civil infrastructure. Through a variety of learning and teaching activities students will gain the knowledge and skills required to address some of the novel challenges facing our built environment through the lens of geotechnical engineering.

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

Work Experience:

No work experience

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:

Knowledge:

K1. Recognize the importance of unsaturated soil mechanics in developing more efficient and sustainable civil geotechnical engineering designs

K2. Describe and Differentiate between the nature, formation and properties of common problematic soils

K3. Appreciate the importance of contemporary geotechnical research in the fields of ground improvement, soil stabilization and environmental geotechnics in fostering resilient and sustainable civil infrastructure

Skills:

S1. Measure basic unsaturated soil properties by laboratory-based testing techniques

S2. Recommend suitable ground improvement techniques for common problematic soils

S3. Formulate hypotheses about the mechanisms that govern the behavior of stabilized and non-stabilized geomaterials under different environmental conditions

Application of knowledge and skills:

A1. Produce unsaturated soil functions, particularly for shear strength, based on laboratory measurements.

A2. Apply the AS2870 framework to produce suitable designs for residential slabs and footings on expansive soils at a professional level

Unit Content:

Topics may include:
1. Unsaturated Soil Mechanics
2. Problematic Soils; Identification, Classification and Characterization
3. Bespoke Ground Improvement and Soil Stabilization Technologies
4. Design of Residential Slabs and Footings on Expansive Soils (AS2870)
5. Environmental Geotechnics

FEDTASKS

Federation University Federation recognises that students require key transferable employability skills to prepare them for their future workplace and society. FEDTASKS (**T**ransferable **A**ttributes **S**kills and **K**nowledge) provide a targeted focus on five key transferable Attributes, Skills, and Knowledge that are be embedded within curriculum, developed gradually towards successful measures and interlinked with cross-discipline and Co-operative Learning opportunities. *One or more FEDTASK, transferable Attributes, Skills or Knowledge must be evident in the specified learning outcomes and assessment for each FedUni Unit, and all must be directly assessed in each Course.*

FEDTASK attribute and descriptor		Development and acquisition of FEDTASKS in the Unit	
		Learning Outcomes (KSA)	Assessment task (AT#)
FEDTASK 1 Interpersonal	Students at this level will demonstrate an advanced ability in a range of contexts to effectively communicate, interact and work with others both individually and in groups. Students will be required to display high level skills in-person and/or online in: • Using and demonstrating a high level of verbal and non-verbal communication • Demonstrating a mastery of listening for meaning and influencing via active listening • Demonstrating and showing empathy for others • High order skills in negotiating and conflict resolution skills\\ • Demonstrating mastery of working respectfully in cross-cultural and diverse teams.	Not applicable	Not applicable
FEDTASK 2 Leadership	Students at this level will demonstrate a mastery in professional skills and behaviours in leading others. • Creating and sustaining a collegial environment • Demonstrating a high level of self -awareness and the ability to self-reflect and justify decisions • Inspiring and initiating opportunities to lead others • Making informed professional decisions • Demonstrating initiative in new professional situations.	Not applicable	Not applicable
FEDTASK 3 Critical Thinking and Creativity	Students at this level will demonstrate high level skills in working in complexity and ambiguity using the imagination to create new ideas. Students will be required to display skills in: • Reflecting critically to generate and consider complex ideas and concepts at an abstract level • Analysing complex and abstract ideas, concepts and information • Communicate alternative perspectives to justify complex ideas • Demonstrate a mastery of challenging conventional thinking to clarify complex concepts • Forming creative solutions in problem solving to new situations for further learning.	Not applicable	Not applicable
FEDTASK 4 Digital Literacy	Students at this level will demonstrate the ability to work competently across a wide range of tools, platforms and applications to achieve a range of tasks. Students will be required to display skills in: • Mastering, exploring, evaluating, managing, curating, organising and sharing digital information professionally • Collating, managing complex data, accessing and using digital data securely • Receiving and responding professionally to messages in a range of professional digital media • Contributing competently and professionally to digital teams and working groups • Participating at a high level in digital learning opportunities.	Not applicable	Not applicable
FEDTASK 5 sustainable and Ethical Mindset	Students at this level will demonstrate a mastery of considering and assessing the consequences and impact of ideas and actions in enacting professional ethical and sustainable decisions. Students will be required to display skills in: • Demonstrate informed judgment making that considers the impact of devising complex solutions in ambiguous global economic environmental and societal contexts • Professionally committing to the promulgation of social responsibility • Demonstrate the ability to evaluate ethical, socially responsible and/or sustainable challenges and generating and articulating responses • Communicating lifelong, life-wide and life-deep learning to be open to the diverse professional others • Generating, leading and implementing required actions to foster sustainability in their professional and personal life	Not applicable	Not applicable

Learning Task and Assessment:

Learning Outcomes Assessed	Assessment Tasks	Assessment Type	Weighting
K1, K2, K3, S2, S3, A1, A2	(A) Participation in all learning activities, including attendance and participation in lectures and tutorials, exercises, recommended and supplementary readings, and/or other activities. (B) Undertake problem-solving of engineering problems relevant to traffic and road engineering in both invigilated and non-invigilated settings.	Quizzes and/or Tests	40 - 60%
K1, K2, S1, S2, S3, A1, A2	Relates fundamental knowledge of geotechnical engineering to observations in a controlled environment and/or to solve design-based problems.	Reports; Presentation	40 - 60%

Adopted Reference Style:

IEEE ()

Refer to the library website for more information

Fed Cite - referencing tool