USC

Course Outline

Code: ENG312
Title: Soil Mechanics

School of: Science & Engineering
Teaching Session: Semester 2
Year: 2020
Course Coordinator: Dr Adrian McCallum Email: amccallu@usc.edu.au
Course Moderator: Dr Helen Fairweather

Please go to the USC website for up to date information on the teaching sessions and campuses where this course is usually offered.

1. What is this course about?

1.1 Description

All land-based structures are founded on soil or rock. This practical course provides a broad overview of the composition of soils and their behaviour when subjected to forces or displacements. It focuses on practical assessment of soil properties and behaviour, supplemented by relevant theory and application. You examine the identification and classification of rocks and soils, the stresses that exist within a soil mass, soil deformation under loading and peculiarities of local soils. It is a problem-based learning course where you work individually and in groups to self-direct your learning.

1.2 Course topics

◦ Significance of geomechanics
◦ Introduction to structural geology
◦ Site investigation process
◦ Rock and soil identification & classification
◦ Phase relations
◦ Peculiarities of clay
◦ Soil compaction
◦ Water flow in soil
◦ Stresses under loading
◦ Consolidation & settlement
◦ Regional soil composition & behaviour

2. What level is this course?

300 level Graduate - Independent application of graduate knowledge and skills. Meets AQF and professional requirements. May require pre-requisites and developing level knowledge/skills. Normally taken in the 3rd or 4th year of an undergraduate program

3. What is the unit value of this course?

12 units

4. How does this course contribute to my learning?

Specific Learning Outcomes On successful completion of this course you should be able to:	**Assessment Tasks** You will be assessed on the learning outcome in task/s:	**Graduate Qualities or Professional Standards mapping** Completing these tasks successfully will contribute to you becoming:
1.demonstrate and apply current practical and theoretical knowledge of the principles, key concepts and technologies that relate to soil composition and behaviour in regional and global engineering contexts	Task 1, 2 and 3	Creative and critical thinkers.
2. solve theoretical and technical geomechanical engineering problems by: • safely carrying out testing and experiments on soils, collecting data, and dealing with sources of error • interpreting and analysing laboratory soil test results to identify relationships between these and geomechanical engineering principles • selecting and using established formulae to present sequenced solutions based on given information	Task 1, 2 and 3	Knowledgeable.
3. communicate in writing (tutorial questions, group laboratory report, exam) and orally (presentation)	Task 1, 2 and 3	Empowered
4. act professionally by functioning autonomously and in teams	Task 2	Ethical

5. Am I eligible to enrol in this course?

Refer to the USC Glossary of terms for definitions of "pre-requisites, co-requisites and anti-requisites".

5.1 Enrolment restrictions

Nil

5.2 Pre-requisites

Nil

5.3 Co-requisites

Nil

5.4 Anti-requisites

USQ Code: CIV2403

5.5 Specific assumed prior knowledge and skills (where applicable)

No prior knowledge or skills are assumed.

6. How am I going to be assessed?

6.1 Grading scale

Standard – High Distinction (HD), Distinction (DN), Credit (CR), Pass (PS), Fail (FL)

6.2 Details of early feedback on progress

6.3 Assessment tasks

Task No.	Assessment Tasks	Individual or Group	Weighting %	What is the duration / length?	When should I submit?	Where should I submit it?
1	Field/laboratory reports	Group	40% (4x10% each)	Each report: 500 words or equivalent (e.g. diagrams)	Weeks 6, 7, 9 & 10.	Blackboard
2	Presentation	Individual	20%	10 minutes	Week 13	Oral to class, electronic via Blackboard
3	Technical Report	Individual	40%	15-20 typed A4 pages	By end of Week 15	Blackboard
			100%			

Assessment Task 1: Field/laboratory Reports

Goal:	Apply current practical and theoretical soil mechanics knowledge to solve complex technical engineering problems by conducting and interpreting field and laboratory tests and communicating these results to your course coordinator.
Product:	Typed field/laboratory reports.
Format:	These reports are done in groups of 3-5 (depending on class size). Each is 500 words or equivalent and completed using the template provided. The reports detail the rationale for, conduct of and results from any field and laboratory testing either conducted or observed/investigated. Implications of the results should be discussed. The reports will be graded and feedback provided.
Criteria:	1. apply current geomechanical knowledge to solve complex engineering problems by: • safely carrying out testing and experiments on soils, collecting data, and dealing with sources of error • interpreting and analysing laboratory soil test results to identify relationships between these and geomechanical engineering principles 2. communicate in the form of written field/laboratory reports: • adhere to prescribed report structure and word count • English expression and conventions • terminology, nomenclature and units • adhere to established conventions for presentation of raw and processed data and instrumental results • referencing conventions 3. act professionally by: • functioning in teams • adhering to the engineering code of ethics in reporting and interpreting results You are awarded an individual grade according to an algorithm that uses the grade assigned for the whole task plus a rating of your contribution by the other students in the group (a peer assessment)- refer to Blackboard for more information. Peer ratings are submitted when you submit each report.

Assessment Task 2: Presentation

Goal:	To communicate in the form of a technical briefing thus demonstrating how you applied soil mechanics knowledge to solve problems.
Product:	Technical briefing to your peers
Format:	This task is an individual 10 minute presentation in the form of a briefing of your understanding of a key concept/theory/practice/problem in soil mechanics. This is in front of an audience of your engineering peers, either in person or via Zoom (or equivalent). It includes a question and answer session. You choose visual media to suit the way you wish to communicate, e.g. film, poster, power point, etc. This will be uploaded to Blackboard on completion of the presentation.
Criteria:	1. apply current practical and theoretical soil mechanics knowledge to present a briefing in the form of an explanation of the selected concept/theory/practice/problem • content quality – accuracy, relevance • explanation of essential terminology • interpretation of data & diagrams 2. communicate in the form of an oral briefing with visual media • structure of presentation (introduction, body, conclusion) • delivery – English expression to suit audience & purpose – vocal quality- voice, pace, tone, time limit – visual media to support presentation • interaction with audience – use of notes & non verbals – responding to questions

Assessment Task 3: Individual Technical Report

Goal:	Write an individual technical report encompassing the application of current practical and theoretical soil mechanics knowledge to solve complex technical engineering problems.
Product:	20 A4 page individual typed written report.
Format:	Report will address questions based on material presented via lectures, practicals, tutorials and assigned external readings covering the whole course. Questions will be about real life scenarios or case studies that include the types of practical activities you did involving testing and experiments on soils, collecting data, and dealing with sources of error. The scenarios present information in different forms, e.g. graphs, tables of data, instrument readings, diagrams, images, descriptions of experiments and results, literature extract. You interpret and analyse these scenarios and answer the associated questions by applying both practical and theoretical knowledge. These answers may involve calculations, sequenced solutions to problems, drawing diagrams, or explanations. See Blackboard for further information.
Criteria:	Apply current current practical and theoretical soil mechanics knowledge to solve complex engineering problems by: • interpreting and analysing given information • selecting and using established formulae • supporting solutions where required by explanations and/or diagrams Communicate sequenced solutions to problems by: • using conventions of nomenclature and units • showing all working and calculations

7. What are the course activities?

7.1 Directed study hours

The directed study hours listed here are a portion of the workload for this course. A 12 unit course will have total of 150 learning hours which will include directed study hours (including online if required), self-directed learning and completion of assessable tasks. Directed study hours may vary by location. Student workload is calculated at 12.5 learning hours per one unit.

This course will be delivered via technology-enabled learning and teaching. All lectures will remain in this mode for Semester 2 2020. When government guidelines allow, students that elected on-campus study via the class selection process will be advised when on campus tutorials and practical sessions will resume.

Location: Specific Campus(es) or online:	**Directed study hours for location:**
USC Sunshine Coast	Lecture (online) – 1 hr per week, Lab (or virtual lab) – 2 hrs per week, Field Trip (or Virtual Field Trip) – 2 hrs (week 1)

7.2 Course content

Week # / Module #	**What key concepts/content will I learn?**
1	What is geomechanics & why is it useful to know about?
2	Investigation of site geology.
3	The site investigation process.
4	Rock types and classification.
5	Soil classification.
6	Phase (air, water & solid) relations in soil.
7	Behaviour of clays.
8	Why and how do we compact soil?
9	What's the effect of water movement in soil?
10	What stresses exist within the soil?
11	Stresses in soils under surface loading.
12	Soil consolidation and settlement.
13	Sunshine coast specifics and revision

Please note course content is subject to variation.

8. What resources do I need to undertake this course?

Please note that course information, including specific information of recommended readings, learning activities, resources, weekly readings, etc. are available on the course Blackboard site. Please log in as soon as possible.

8.1 Prescribed text(s)

Please note that it is desirable to have regular access to the resource(s) listed below:

Author	**Year**	**Title**	**Publisher**
Sivakugan, N. & Das, B.	2010	Geotechnical Engineering – A practical problem solving approach.	J. Ross Publishing, USA

8.2 Specific requirements

Enclosed footwear is required whenever working within the engineering laboratory. Enclosed footwear, high-vis vest, hat and sunscreen are required for any field work on or off campus.

9. Risk management

Health and safety risks for this course have been assessed as low. Risk assessments will be carried out as necessary for any laboratory or field experiments.

It is your responsibility as a student to review course material, search online, discuss with lecturers and peers, and understand the health and safety risks associated with your specific course of study. It is also your responsibility to familiarise yourself with the University's general health and safety principles by reviewing the online Health Safety and Wellbeing training module for students, and following the instructions of the University staff.

10. What administrative information is relevant to this course?

10.1 Assessment: Academic Integrity

Academic integrity is the ethical standard of university participation. It ensures that students graduate as a result of proving they are competent in their discipline. This is integral in maintaining the value of academic qualifications. Each industry has expectations and standards of the skills and knowledge within that discipline and these are reflected in assessment.

Academic integrity means that you do not engage in any activity that is considered to be academic fraud; including plagiarism, collusion or outsourcing any part of any assessment item to any other person. You are expected to be honest and ethical by completing all work yourself and indicating in your work which ideas and information were developed by you and which were taken from others. You cannot provide your assessment work to others. You are also expected to provide evidence of wide and critical reading, usually by using appropriate academic references.

In order to minimise incidents of academic fraud, this course may require that some of its assessment tasks, when submitted to Blackboard, are electronically checked through SafeAssign. This software allows for text comparisons to be made between your submitted assessment item and all other work that SafeAssign has access to.

10.2 Assessment: Additional requirements

Eligibility for Supplementary Assessment

Your eligibility for supplementary assessment in a course is dependent of the following conditions applying:

a) The final mark is in the percentage range 47% to 49.4%
b) The course is graded using the Standard Grading scale
c) You have not failed an assessment task in the course due to academic misconduct

10.3 Assessment: Submission penalties

Late submission of assessment tasks will be penalised at the following maximum rate:

- 5% (of the assessment task's identified value) per day for the first two days from the date identified as the due date for the assessment task.
- 10% (of the assessment task's identified value) for the third day
- 20% (of the assessment task's identified value) for the fourth day and subsequent days up to and including seven days from the date identified as the due date for the assessment task.
- A result of zero is awarded for an assessment task submitted after seven days from the date identified as the due date for the assessment task.

Weekdays and weekends are included in the calculation of days late.
To request an extension, you must contact your Course Coordinator and supply the required documentation to negotiate an outcome.

10.4 Study help

In the first instance, you should contact your tutor, then the Course Coordinator. Additional assistance is provided to all students through Academic Skills Advisers. To book an appointment or find a drop-in session go to Student Hub.

Contact Student Central for further assistance: +61 7 5430 2890 or studentcentral@usc.edu.au

10.5 Links to relevant University policy and procedures

For more information on Academic Learning & Teaching categories including:

- Assessment: Courses and Coursework Programs
- Review of Assessment and Final Grades
- Supplementary Assessment
- Administration of Central Examinations
- Deferred Examinations
- Student Academic Misconduct
- Students with a Disability

Visit the USC website:
http://www.usc.edu.au/explore/policies-and-procedures#academic-learning-and-teaching

10.6 General Enquiries

In person:

- **USC Sunshine Coast** - Student Central, Ground Floor, Building C, 90 Sippy Downs Drive, Sippy Downs
- **USC South Bank** - Student Central, Building A4 (SW1), 52 Merivale Street, South Brisbane
- **USC Gympie** - Student Central, 71 Cartwright Road, Gympie
- USC Moreton Bay - Service Centre, Building A – Ground Floor, 1 Moreton Bay Parade, Petrie
- **USC Fraser Coast -** Student Central, Student Central, Building A, 161 Old Maryborough Rd, Hervey Bay
- **USC Caboolture -** Student Central, Level 1 Building J, Cnr Manley and Tallon Street, Caboolture

Tel: +61 7 5430 2890
Email: studentcentral@usc.edu.au