COURSE OUTLINE

ENG432 Advanced Soil Mechanics

Course Coordinator: Adrian McCallum (amccallu@usc.edu.au) **School:** School of Science, Technology and Engineering

2021 | Semester 2

USC Sunshine Coast	ON CAMPUS	Most of your course is on campus but you may be able to do some components of this course online.

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

Without solid foundations, all built structures are in danger of collapse. This practical course uses a systems design cycle approach to initially inspect and test soil properties. Based on these results, you learn how to design, construct, test and assess the performance of structures within and upon the soil. It is a problem-based learning course where you work individually and in groups to self-direct your learning. Over a semester you conduct a field-based geotechnical project for a 'client' to whom you report progress. The project is complemented by laboratory testing and theory.

1.2. How will this course be delivered?

ACTIVITY	HOURS	BEGINNING WEEK	FREQUENCY
ON CAMPUS			
Laboratory 1	2hrs	Week 1	13 times
Lecture	1hr	Week 1	13 times

1.3. Course Topics

Significance of geotechnical engineering

Determining soil strength

Lateral earth pressures

Retaining walls

Shallow & deep foundations

Slope failure

Ground improvement

Earthquakes & liquefaction

Critical State Soil Mechanics

Other methods

2. What level is this course?

400 Level (Graduate)

Demonstrating coherence and breadth or depth of knowledge and skills. Independent application of knowledge and skills in unfamiliar contexts. Meeting professional requirements and AQF descriptors for the degree. May require pre-requisites where discipline specific introductory or developing knowledge or skills is necessary. Normally undertaken in the third or fourth full-time study 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?

COURSE LEARNING OUTCOMES	GRADUATE QUALITIES MAPPING	PROFESSIONAL STANDARD MAPPING
On successful completion of this course, you should be able to...	Completing these tasks successfully will contribute to you becoming...	Engineers Australia
1 Apply current practical and theoretical knowledge of fundamental geotechnical engineering principles, concepts and technologies that relate to building structures on soil in regional contexts	Knowledgeable	1.1 - Comprehensive, theory based understanding of the underpinning natural and physical sciences and the engineering fundamentals applicable to the engineering discipline. 1.3 - In-depth understanding of specialist bodies of knowledge within the engineering discipline. 2.1 - Application of established engineering methods to complex engineering problem solving.
2 Solve complex theoretical and technical engineering problems by taking a whole systems design cycle approach to: *select and use established engineering methods, techniques, tools and resources, *determine inherent parameters of materials, components and systems by safely carrying out testing and experiments, collecting data, and dealing with sources of error, *interpret, critically analyse, evaluate and synthesise current and emerging information to inform decision-making, *develop and/or model and justify solutions, taking into account potential outcomes, constraints, risks and research-based evidence	Creative and critical thinker Engaged	2.1 - Application of established engineering methods to complex engineering problem solving. 2.2 - Fluent application of engineering techniques, tools and resources. 2.3 - Application of systematic engineering synthesis and design processes.
3 Plan, design, construct, test and assess an engineering structure on soil under supervision.	Creative and critical thinker	2.4 - Application of systematic approaches to the conduct and management of engineering projects. 3.1 - Ethical conduct and professional accountability. 3.3 - Creative, innovative and pro-active demeanour. 3.4 - Professional use and management of information. 3.5 - Orderly management of self, and professional conduct. 3.6 - Effective team membership and team leadership.

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On successful completion of this course, you should be able to...	Completing these tasks successfully will contribute to you becoming...	Engineers Australia
4 Communicate to a Project Manager in different modes (written, oral and visual) and specified industry formats (e.g. reports, diagrams, client presentations)	Empowered	3.2 - Effective oral and written communication in professional and lay domains. 3.4 - Professional use and management of information. 3.5 - Orderly management of self, and professional conduct. 3.6 - Effective team membership and team leadership.
5 Act professionally by: functioning autonomously and in teams, adhering to the engineering code of ethics, demonstrating fundamental management skills	Ethical	3.1 - Ethical conduct and professional accountability. 3.3 - Creative, innovative and pro-active demeanour. 3.4 - Professional use and management of information. 3.5 - Orderly management of self, and professional conduct. 3.6 - Effective team membership and team leadership.

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. Pre-requisites

ENG312 and enrolled in Program SC410, SC425

5.2. Co-requisites

Not applicable

5.3. Anti-requisites

CIV3403 (USQ equivalent Course)

5.4. Specific assumed prior knowledge and skills (where applicable)

Not applicable

6. How am I going to be assessed?

6.1. Grading Scale

Standard Grading (GRD)

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

6.2. Details of early feedback on progress

Formative feedback is delivered on a weekly basis after weekly in-class presentations. Both verbal and written feedback is also provided upon the receipt of each weekly submission.

6.3. Assessment tasks

DELIVERY MODE	TASK NO.	ASSESSMENT PRODUCT	INDIVIDUAL OR GROUP	WEIGHTING %	WHAT IS THE DURATION / LENGTH?	WHEN SHOULD I SUBMIT?	WHERE SHOULD I SUBMIT IT?
All	1	Quiz/zes	Individual	40%	4 short answer / calculation questions (500 words or equivalent) issued from weeks 2 through 11; best 4 from 10 will be counted	Throughout teaching period (refer to Format)	Online Assignment Submission
All	2	Plan	Individual	20%	15 minutes with visual media	Week 7	In Class
All	3	Report	Group	40%	5000 words or equivalent (e.g. diagrams) +/- 10%	Refer to Format	Online Assignment Submission

All - Assessment Task 1: Weekly individual tutorial questions contained within a report format.

GOAL:	Preparation of technical reports is an essential skill for competent Engineers. This assessment is designed for you to develop and receive summative feedback on your current practical and theoretical geotechnical knowledge to solve complex technical engineering problems related to the project. This task directly assists you to be successful in Task 3.
PRODUCT:	Quiz/zes
FORMAT:	Submit: Before the lecture of the following week Individually you will prepare a short weekly Technical Report that presents solutions and analyses of questions posed to address the key themes of each week. Implications of the results for the project should be discussed. The PM examines these reports and provides feedback. You are to act on any feedback and incorporate necessary changes into future submissions.
CRITERIA:	**No.** — **Learning Outcome assessed** 1 — Apply current geotechnical knowledge to solve complex engineering problems by taking a whole systems design cycle approach to test and assess an engineering structure on soil according to your project plan — 1 2 2 — Select and use established engineering methods, techniques, tools and resources — 1 2 3 — determine inherent parameters of materials, components and systems by safely carrying out testing and experiments, collecting data, and dealing with sources of error — 3 4 — interpret, critically analyse, evaluate and synthesise current and emerging information to inform decision-making — 1 2 5 — Communicate to a 'Project Manager' in the form of written technical reports — 4 6 — Act professionally by adhering to the engineering code of ethics in reporting and interpreting results and by demonstrating fundamental management skills. — 5

All - Assessment Task 2: Verbal 'Client' briefing - Project Plan

GOAL:	Individually apply current practical and theoretical geotechnical knowledge to follow the necessary steps to plan and design an achievable project for a 'client'.
PRODUCT:	Plan
FORMAT:	This task is an individual 15 minute presentation in the form of a briefing to the 'client' for whom you are carrying out the project, in front of an audience of your engineering peers. 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. Assume the 'client' has limited engineering knowledge, so you will need to restrict the use of terms to the essential ones and define them, as well as interpret data and diagrams for the 'client'. You will present the project plan that you developed in groups of 3-5 (depending on the class size). Outline how you propose to achieve all assessment and practical goals by the end of week 13. Your Project Plan includes the standard industry requirements: scope definition, aim and proposed outputs, work and reporting schedules, resources, budget, milestones, risk assessment, organisational structure. Additionally, you will briefly focus on one particular aspect of the envisaged investigation.
CRITERIA:	

No.		Learning Outcome assessed
1	Apply current practical and theoretical geotechnical knowledge to follow the necessary steps in planning and designing an achievable project for a 'client':	1 2
2	Communicate to the 'Project Manager' in the form of a written project plan:	4
3	Act professionally by: functioning in teams to plan the project, adhering to the engineering code of ethics in making realistic estimates of budget and risk and demonstrating how you propose to manage the project.	5

All - Assessment Task 3: Project completion report

GOAL:	To report on the completion of the project in relation to the plan for the design, construction, testing and assessment of an engineering structure on soil under supervision.
PRODUCT:	Report
FORMAT:	Submit: Friday Week 16 The individual report of 2000 words or equivalent +/- 10% (including diagrams) is to the PM. It is weighted 40% and encapsulates the aims, progression and outcomes of the project in relation to the project plan. It comprises: *A synopsis of the project that follows typical industry requirements: project aims investigations and testing carried-out on the soil and built structure results of any investigations discussion & implications of results conclusions in relation to aims, and recommendations. *Appendix 1: the Project plan showing, via track changes, that you have amended it following feedback from, and grading, by the PM *Appendix 2: the five field/laboratory reports each incorporating any amendments following feedback from, and review by, the PM

CRITERIA:	No.		Learning Outcome assessed
	1	Apply current practical and theoretical geotechnical knowledge and the whole systems design cycle approach to report on: project aims, how you solved the complex problems related to constructing, testing and assessing a structure & conclusions.	1
	2	Communicate to a 'Project Manager' in the form of a written report: adhere to prescribed synopsis format and word count.	4
	3	Act professionally to complete the report by: functioning autonomously and adhering to the engineering code of ethics.	5

7. Directed study hours

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.

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

Please note: 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) or course reader

Please note that you need to have regular access to the resource(s) listed below. Resources may be required or recommended.

REQUIRED?	AUTHOR	YEAR	TITLE	PUBLISHER
Recommended	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-visibility vest, hat and sunscreen are required for any field work on or off campus.

Background to the assessment tasks

This course involves your management of a semester-long practical field-based geotechnical engineering construction project. This will simulate the challenges of being a Project Engineer (PE) working with others to meet the expectations of your Project Manager (PM) (lecturer) and ultimately the client. You are given the client's broad specifications for the project, requiring you to design, construct, test and assess a structure built on soil. Your group of PEs will manage the scope of the project and your first task is to produce a Project Plan outlining how you will successfully manage the project to completion. On a weekly basis you will report to the PM with: a progress update (tasks achieved in the week), future-works (tasks for the following week), results of any field/laboratory testing, and any impediments to progress with suggested solutions. As the project nears completion, you brief the 'client' on a selected technical aspect of the project and prepare your Final Project Report. The PM will give you regular feedback on your progress and assess your work on behalf of the 'client' (additional task information is below). This course fosters your independence and ability to work in a team and nurtures your project management, communication and problem-solving skills. Through successful completion of these tasks and effective management of your project, you should pass the course thus preparing you for your 4th year Honours engineering project.

9. How are risks managed in this course?

Risk assessments have been performed for all laboratory classes and a low level of health and safety risk exists. Some risk concerns may include equipment, instruments, and tools; as well as manual handling items within the laboratory. It is your responsibility to review course material, search online, discuss with lecturers and peers and understand the risks associated with your specific course of study and to familiarise yourself with the University's general health and safety principles by reviewing the online induction training 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:

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

10.3. Assessment: Submission penalties

Late submission of assessment tasks may 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 to negotiate an outcome.

10.4. Study help

For help with course-specific advice, for example what information to include in your assessment, you should first contact your tutor, then your course coordinator, if needed.

If you require additional assistance, the Learning Advisers are trained professionals who are ready to help you develop a wide range of academic skills. Visit the Learning Advisers web page for more information, or contact Student Central for further assistance: +61 7 5430 2890 or studentcentral@usc.edu.au.

10.5. Wellbeing Services

Student Wellbeing provide free and confidential counselling on a wide range of personal, academic, social and psychological matters, to foster positive mental health and wellbeing for your academic success.

To book a confidential appointment go to Student Hub, email studentwellbeing@usc.edu.au or call 07 5430 1226.

10.6. AccessAbility Services

Ability Advisers ensure equal access to all aspects of university life. If your studies are affected by a disability, learning disorder mental health issue, , injury or illness, or you are a primary carer for someone with a disability or who is considered frail and aged, AccessAbility Services can provide access to appropriate reasonable adjustments and practical advice about the support and facilities available to you throughout the University.

To book a confidential appointment go to Student Hub, email AccessAbility@usc.edu.au or call 07 5430 2890.

10.7. 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

10.8. General Enquiries

In person:

- **USC Sunshine Coast** - Student Central, Ground Floor, Building C, 90 Sippy Downs Drive, Sippy Downs
- **USC Moreton Bay** - Service Centre, Ground Floor, Foundation Building, Gympie Road, Petrie
- **USC SouthBank** - Student Central, Building A4 (SW1), 52 Merivale Street, South Brisbane
- **USC Gympie** - Student Central, 71 Cartwright Road, Gympie
- **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