



The University of Southern Queensland

## Course specification

The current and official versions of the course specifications are available on the web at <http://www.usq.edu.au/coursespecification/current>.  
Please consult the web for updates that may occur during the year.

### Description: Geotechnical Engineering

Subject	Cat-nbr	Class	Term	Mode	Units	Campus
CIV	3403	90309	2, 2009	EXT	1.00	Toowoomba

<b>Academic group:</b>	FOENS
<b>Academic org:</b>	FOES03
<b>Student contribution band:</b>	2
<b>ASCED code:</b>	030911

### STAFFING

Examiner: Jim Shiau  
Moderator: Guangnan Chen

### REQUISITES

Pre-requisite: CIV2401 or Students must be enrolled in one of the following Programs: GCEN or GDET or METC or MEPR

### SYNOPSIS

Geotechnical Engineering is concerned with applying the principles learnt in CIV2401 Geomechanics to analyse the stability of geotechnical structures. Topics covered include soil shear strength, slope stability analysis, retaining and sheet pile wall analysis, shallow foundations and deep pile foundations. An introduction to the topic of rock mechanics is also presented. Analytic and numerical solution procedures and methods for these topics are presented. The course material is illustrated by numerous example problems and an integrated set of assignments.

### OBJECTIVES

The course objectives define the student learning outcomes for a course. The assessment item(s) that may be used to assess student achievement of an objective are shown in parenthesis. On completion of this course, students should be able to:

1. understand what is meant by the shear strength of a soil and the implication of loading duration on the measured shear strength of a soil and become familiar with the terminology of "drained" and "undrained" loading; (Assignment 1; 2 Hour Open Examination)
2. determine the ultimate bearing capacity of shallow foundations; (Assignment 1; 2 Hour Open Examination)
3. analyse the stability of retaining walls and sheet pile retaining structures and use this knowledge for the basis of designing earth retaining structures; (Assignment 2; 2 Hour Open Examination)
4. analyse drained and undrained slope stability problems using the method of slices and available design charts; (Assignment 2; 2 Hour Open Examination)

5. determine the axial capacity and settlement of pile foundations; (Assignment 2; 2 Hour Open Examination)
6. understand the general characteristics and engineering strength behaviour of rocks and apply this knowledge to several stability problems in rock mechanics; (Assignment 2; 2 Hour Open Examination)

## TOPICS

	Description	Weighting (%)
1.	<b>SHEAR STRENGTH OF SOILS AND FAILURE CRITERIA</b> The Mohr circle of stresses, Coulomb's failure criterion, Mohr Coulomb failure criteria, review of strength tests	5.00
2.	<b>RETAINING STRUCTURES</b> Stability of gravity and cantilever retaining walls. Design of cantilever sheet piles, design of anchored sheet piles, design of anchors	25.00
3.	<b>STABILITY OF SLOPES</b> Method of slices, total stress analysis, effective stress analysis	15.00
4.	<b>SHALLOW FOUNDATIONS</b> Ultimate bearing capacity of shallow foundations	20.00
5.	<b>PILE FOUNDATIONS</b> Static capacity of single piles and pile groups, settlement of single piles and pile groups.	25.00
6.	<b>BASIC CHARACTERISTICS OF ROCKS</b> Nature of rocks, rock classification, physical properties of rocks, discontinuities in rocks. Rock strength criterion, failure criterion, and common laboratory and insitu strength tests.	5.00
7.	<b>STABILITY PROBLEMS IN ROCK MECHANICS.</b>	5.00

## TEXT and MATERIALS required to be PURCHASED or ACCESSED

ALL textbooks and materials are available for purchase from USQ BOOKSHOP (unless otherwise stated). Orders may be placed via secure internet, free fax 1800642453, phone 07 46312742 (within Australia), or mail. Overseas students should fax +61 7 46311743, or phone +61 7 46312742. For costs, further details, and internet ordering, use the 'Textbook Search' facility at <http://bookshop.usq.edu.au> click 'Semester', then enter your 'Course Code' (no spaces).

Das, BM 2004, *Principles of foundation engineering*, 5th edn, Brookes Cole, Pacific Grove, CA.

## REFERENCE MATERIALS

Reference materials are materials that, if accessed by students, may improve their knowledge and understanding of the material in the course and enrich their learning experience.

Bowles, J 1996, *Foundation analysis and design*, 5th edn, McGraw Hill, New York.

Das, BM 2006, *Principles of geotechnical engineering*, 6th edn, Brookes Cole, Nelson, Canada.

Goodman, RE 1989, *Introduction to rock mechanics*, 2nd edn, John Wiley and Sons, New York.

Holtz, RD & Kovacs, WD 1981, *An introduction to geotechnical engineering*, Prentice Hall, Upper Saddle River, NJ.

## STUDENT WORKLOAD REQUIREMENTS

ACTIVITY	HOURS
Assessments	30.00
Directed Study	40.00
Examinations	2.00
Private Study	83.00

## ASSESSMENT DETAILS

Description	Marks out of	Wtg (%)	Due date
ASSIGNMENT 1	200.00	20.00	02 Sep 2009
ASSIGNMENT 2	100.00	10.00	07 Oct 2009
2 HOUR OPEN EXAMINATION	700.00	70.00	END S2 (see note 1)

### NOTES

1. Student Administration will advise students of the dates of their examinations during the semester.

## IMPORTANT ASSESSMENT INFORMATION

- 1 Attendance requirements:  
There are no attendance requirements for this course. However, it is the students' responsibility to study all material provided to them or required to be accessed by them to maximise their chance of meeting the objectives of the course and to be informed of course-related activities and administration.
- 2 Requirements for students to complete each assessment item satisfactorily:  
To satisfactorily complete an individual assessment item a student must achieve at least 50% of the marks or a grade of at least C-. (Depending upon the requirements in Statement 4 below, students may not have to satisfactorily complete each assessment item to receive a passing grade in this course.)
- 3 Penalties for late submission of required work:  
If students submit assignments after the due date without extenuating circumstances then a penalty of 5% of the assigned mark may apply for each working day late up to a maximum of ten working days at which time a mark of zero can be recorded for that assignment.
- 4 Requirements for student to be awarded a passing grade in the course:  
To be assured of receiving a passing grade in a course a student must obtain at least 50% of the total weighted marks for the course.
- 5 Method used to combine assessment results to attain final grade:  
The final grades for students will be assigned on the basis of the weighted aggregate of the marks (or grades) obtained for each of the summative assessment items in the course.
- 6 Examination information:

In an Open Examination, candidates may have access to any material during the examination except the following: electronic communication devices, bulky materials, devices requiring mains power and material likely to disturb other students.

- 7 Examination period when Deferred/Supplementary examinations will be held:  
Any Deferred or Supplementary examinations for this course will be held during the examination period at the end of the semester of the next offering of this course.
- 8 University Regulations:  
Students should read USQ Regulations 5.1 Definitions, 5.6. Assessment, and 5.10 Academic Misconduct for further information and to avoid actions which might contravene University Regulations. These regulations can be found at the URL <http://www.usq.edu.au/corporateservices/calendar/part5.htm> or in the current USQ Handbook.

## ASSESSMENT NOTES

- 1 The due date for an assignment is the date by which a student must despatch the assignment to the USQ. The onus is on the student to provide proof of the despatch date, if requested by the Examiner.
- 2 Students must retain a copy of each item submitted for assessment. This must be despatched to USQ within 24 hours if required by the Examiner.
- 3 In accordance with University's Assignment Extension Policy (Regulation 5.6.1), the examiner of a course may grant an extension of the due date of an assignment in extenuating circumstances.
- 4 The Faculty will normally only accept assessments that have been written, typed or printed on paper-based media.
- 5 The Faculty will NOT accept submission of assignments by facsimile.
- 6 Students who do not have regular access to postal services or who are otherwise disadvantaged by these regulations may be given special consideration. They should contact the examiner of the course to negotiate such special arrangements.
- 7 In the event that a due date for an assignment falls on a local public holiday in their area, such as a Show holiday, the due date for the assignment will be the next day. Students are to note on the assignment cover the date of the public holiday for the Examiner's convenience.
- 8 Students who have undertaken all of the required assessments in a course but who have failed to meet some of the specified objectives of a course within the normally prescribed time may be awarded one of the temporary grades: IM (Incomplete - Make up), IS (Incomplete - Supplementary Examination) or ISM (Incomplete -Supplementary Examination and Make up). A temporary grade will only be awarded when, in the opinion of the examiner, a student will be able to achieve the remaining objectives of the course after a period of non directed personal study.
- 9 Students who, for medical, family/personal, or employment-related reasons, are unable to complete an assignment or to sit for an examination at the scheduled time may apply to defer an assessment in a course. Such a request must be accompanied by appropriate supporting documentation. One of the following temporary grades may be awarded IDS (Incomplete - Deferred Examination; IDM (Incomplete Deferred Make-up); IDB (Incomplete - Both Deferred Examination and Deferred Make-up).
- 10 This is a communication benchmark course and a major component of the assessment of this course will be associated with the demonstration of communication skills.

## **OTHER REQUIREMENTS**

- 1 Students will require access to e-mail and internet access to UConnect for this course.
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