Description: Geomechanics

<table>
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<tr>
<th>Subject</th>
<th>Cat_nbr</th>
<th>Class</th>
<th>Term</th>
<th>Mode</th>
<th>Units</th>
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<td>2401</td>
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<td>1, 2004</td>
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Academic group: FOENS
Academic org: FOES03
Student contribution band: 2
ASCED code: 030911

STAFFING
Examiner: Jim Shiau
Moderator: Richard Merifield

RATIONALE
Civil Engineering Associates and Technologists in all areas of employment (eg drafting, materials testing, construction etc) need to have a basic understanding of the properties of soils from an engineering viewpoint. They need to know some standard soil sampling and testing procedures and the basic design methods for soil structures and soil supported structures.

SYNOPSIS
In this course the student will be introduced to soil as an engineering material and to the various testing techniques and classification procedures. Studies will also be made of such structures as Retaining Walls, Embankments and Shallow Foundations. The emphasis throughout the course is placed on a practical understanding of these topics appropriate for a paraprofessional.

OBJECTIVES
The main objective of this course is to give students a basic understanding of soil mechanics and its engineering applications. On completion of this course, students should be able to:

- explain the nature of soils, physical and plastic properties, compaction and laboratory measurement techniques;
- apply Darcy's Law to simple soil structures and find permeability characteristics from the provided test data;
- describe the procedures involved in constructing flow nets;
- describe the concept of effective and total stresses in saturated soils;
- explain the elastic behaviour of soils; calculate the stress distribution due to external loads, and employ influence charts for calculating vertical pressures;
• calculate the consolidation settlement under a single footing using the concept of one dimensional consolidation theory;
• calculate elastic settlement under a variety of external loading systems;
• describe the general concept of shear in soil; discuss the Mohr-Coulomb failure criteria and determine the shear strength parameters via laboratory test results;
• discuss the methods involved in the stability analysis of soil structures; explain the steps in calculating a limit equilibrium solution;
• calculate the lateral earth pressure behind gravity and cantilever retaining walls;
• determine the factor of safety of earth slopes;
• determine the ultimate bearing capacity of shallow foundations.

TOPICS

<table>
<thead>
<tr>
<th>Description</th>
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<tbody>
<tr>
<td>1. Introduction and Physical Properties of Soils</td>
<td>10.00</td>
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<tr>
<td>2. Permeability</td>
<td>7.50</td>
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<tr>
<td>3. Flow Nets</td>
<td>7.50</td>
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<tr>
<td>4. Effective Stress Concept</td>
<td>5.00</td>
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<td>5. Stress Distribution in Soil</td>
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<td>6. Consolidation of Soil</td>
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<td>7. Settlement of Structures</td>
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<td>8. Shear Strength of Soil</td>
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<tr>
<td>9. Stability Analysis and Limit Equilibrium Method</td>
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<td>10. Lateral Earth Pressure</td>
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<td>11. Stability of Slopes</td>
<td>10.00</td>
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<tr>
<td>12. Bearing Capacity of Shallow Foundation</td>
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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).
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.

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STUDENT WORKLOAD REQUIREMENTS:

<table>
<thead>
<tr>
<th>ACTIVITY</th>
<th>HOURS</th>
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<tbody>
<tr>
<td>Assessment</td>
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<tr>
<td>Directed Study</td>
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<td>Examinations</td>
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<td>Private Study</td>
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ASSESSMENT DETAILS

<table>
<thead>
<tr>
<th>Description</th>
<th>Marks out of</th>
<th>Wtg(%)</th>
<th>Due date</th>
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<tr>
<td>ASSIGNMENT 1</td>
<td>150.00</td>
<td>15.00</td>
<td>08 Apr 2004</td>
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<tr>
<td>ASSIGNMENT 2</td>
<td>150.00</td>
<td>15.00</td>
<td>28 May 2004</td>
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<tr>
<td>3 HOUR OPEN EXAMINATION</td>
<td>700.00</td>
<td>70.00</td>
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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 complete each of the assessment items satisfactorily, students must obtain at least 50% of the marks available (or at least a grade of C-) for each assessment item.

3 Penalties for late submission of required work:
If students submit assignments after the due date without prior approval then a penalty of 20% of the total marks available for the assignment will apply for each working day late.

4 Requirements for student to be awarded a passing grade in the course:
To be assured of receiving a passing grade a student must attempt all of the summative assessment items, achieve at least 50% in the examination, achieve an aggregated mark of at least 40% in the total marks allocated for the assignments, and at least 50% of the available weighted marks for the summative assessment items.

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 produced within five days 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).