Description: Engineering Statics

<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>2, 2004</td>
<td>EXT</td>
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Academic group: FOENS
Academic org: FOES03
Student contribution band: 2
ASCED code: 030903

STAFFING
Examiner: Amar Khennane
Moderator: David Wood

REQUISITES
Pre-requisite: MAT1100

SYNOPSIS
Fundamental to engineering work is the ability to make predictions about how things will behave when they are subject to some actions. For example when the Sydney Harbour Bridge was designed by engineers, they needed to be able to predict how it would behave so that they could be confident that it would not fail when loaded by cars, trucks and trains. Making such predictions is never easy. There are however a range of mathematically based analytical techniques which can be used to make reliable and accurate predictions. In this Course you will be introduced to one such analytical tool called Engineering Statics which can be used to make predictions about how forces affect structures such as the Sydney Harbour Bridge. You will use the technique to predict how forces cause beams, columns and machine parts to bend, stretch and possibly break. In later design courses you will make extensive use of Engineering Statics.

OBJECTIVES
On completion of this course, students should be able to:

1. explain what a vector is, express it in vector and scalar notation and use vector algebra to solve problems involving static equilibrium in 2 and 3 dimensions;
2. distinguish between a concentrated force, a distributed force, the moment of a force and a couple;
3. determine the centroid of an area and the first and second moments of area of plane shapes;
4. analyse the forces in pin-jointed trusses;
5. construct and evaluate shear force and bending moment diagrams for beams with a variety of loads and types of support;
6. apply Hooke's Law to problems of simple direct stress;
7. apply the Engineers' Theory of Bending;
8. apply principles of equilibrium, compatibility and constitutive relationships to the solution of statically indeterminate structures;
9. apply the principles of superposition to simple structures;
10. evaluate deflections in simple structures using the method of successive integration.

### TOPICS

<table>
<thead>
<tr>
<th>Description</th>
<th>Weighting (%)</th>
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<tbody>
<tr>
<td>1. Introduction - Fundamental Concepts of Force and Moment</td>
<td>10.00</td>
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<td>2. Static Equilibrium</td>
<td>12.00</td>
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<tr>
<td>3. Analysis of Pin-jointed Trusses</td>
<td>10.00</td>
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<td>4. Friction and Stability</td>
<td>6.00</td>
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<td>5. Direct Stress and Strain, Elasticity, Energy</td>
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<td>6. Deflection of Simple Trusses using Energy Methods</td>
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<td>7. Properties of Sections</td>
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<tr>
<td>8. Engineers Theory of Bending</td>
<td>10.00</td>
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<tr>
<td>9. Analysis and Design of Simple Beams</td>
<td>10.00</td>
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<tr>
<td>10. Deflection of Beams using Successive Integration</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.

There are many similar books which are every bit as useful as Meriam or Beer and Johnston. Check with the examiner if you are uncertain about a suitable reference book.
STUDENT WORKLOAD REQUIREMENTS:

<table>
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<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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<td>ASSIGNMENT 1</td>
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<td>15.00</td>
<td>03 Sep 2004</td>
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<tr>
<td>ASSIGNMENT 2</td>
<td>150.00</td>
<td>15.00</td>
<td>29 Oct 2004</td>
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<tr>
<td>3 HOUR RESTRICTED EXAMINATION</td>
<td>700.00</td>
<td>70.00</td>
<td>END S2 (see note 1)</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 5% 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 a passing grade, students must demonstrate, via the summative assessment items, that they have achieved the required minimum standards in
relation to the objectives of the course by: (i) satisfactorily completing the examination and assignments; and (ii) obtaining at least 50% of the total weighted marks available for all 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 a Restricted Examination, candidates are allowed access to specific materials during the examination. The only materials that candidates may use in the restricted examination for this course are: writing materials (non-electronic and free from material which could give the student an unfair advantage in the examination); calculators which cannot hold textual information (students must indicate on their examination paper the make and model of any calculator(s) they use during the examination); Formula sheets will be provided with the exam paper.

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 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.

8 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.

9 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.

10 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).

OTHER REQUIREMENTS

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