MODULE DESCRIPTION FORM

16232  Engineering Mechanics 2

<table>
<thead>
<tr>
<th>Module Registrar: Dr R Hamilton</th>
<th>Taught To (Course): Cohorts for whom class is compulsory</th>
</tr>
</thead>
<tbody>
<tr>
<td><a href="mailto:r.hamilton@strath.ac.uk">r.hamilton@strath.ac.uk</a></td>
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</tr>
<tr>
<td>Other Lecturers Involved: Dr L Yang</td>
<td>Credit Weighting: 20 (ECTS 10)</td>
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<tr>
<td>Assumed Prerequisites: 16132</td>
<td>Semester: 1 and 2</td>
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<tr>
<td>Compulsory class</td>
<td>Academic Level: 2</td>
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Module Format and Delivery (HOURS i.e. 1 credit = 10hrs of study):

<table>
<thead>
<tr>
<th>Lecture</th>
<th>Tutorial</th>
<th>Laboratory</th>
<th>Groupwork</th>
<th>External</th>
<th>Online</th>
<th>Project</th>
<th>Assignments</th>
<th>Private Study</th>
<th>Total</th>
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<tbody>
<tr>
<td>48</td>
<td>24</td>
<td>4</td>
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Educational Aim

1st Semester
The module aims to provide students with the basic skills to analyse dynamics problems, associated with bodies and simple mechanisms, from first principles.

2nd Semester
To develop skills, knowledge and understanding in the areas of structural analysis and elementary stress analysis. The work is divided into 4 parts i) statics revision including shear force and bending moment diagrams ii) beams in bending iii) shear and torsion iv) 2D stress and strain.

Learning Outcomes

On completion of the module the student is expected to be able to

LO1 understand the principles of dynamical analysis and be able to apply this understanding to the analysis of simple mechanical systems

LO2 understand and apply linear vibration theory.

LO3 have a basic understanding of elementary strength of materials with applications to simple determinate and indeterminate systems

LO4 have an understanding of equilibrium and compatibility in relation to 2-dimensional stress and strain and be able to apply this knowledge to problems involving the analysis of stress and strain in the context of elementary design of engineering components.

Syllabus

The module will teach the following:

1st Semester
Rectilinear and angular motion where acceleration is a function of time, displacement and velocity. Centre of mass and moment of inertia of a composite object. Dynamic equivalence and connected systems. Free vibration analysis of an undamped single degree of freedom system – Simple Harmonic Motion.

2nd Semester
Tensile test – uniaxial systems, temperature and pre-load effects. Engineers’ theory of bending. Direct and bending effects. Shear stress due to torsion and bending. Two dimensional stress and strain including Mohrs circle for stress and Von Mises and Tresca yield criterion.

Assessment of Learning Outcomes

Criteria
For each of the Module Learning Outcomes the following criteria will be used to make judgements on student learning

LO1
C1 participation in the use of classroom communication system, classroom questions and discussions
C2 able to answer concept questions in the class
C3 in examinations and tutorials identify key aspects of the problem, identify relevant assumptions, draw correct free body diagrams, schematic diagrams and apply relevant mechanical principles including the use of calculus or conservation of energy to solve engineering problems.

LO2
C1 participation in the use of classroom communication system, classroom questions and discussions
C2 able to answer concept questions in the class
C3 in examinations and tutorials identify key aspects of the problem, identify relevant assumptions, draw correct free body diagrams and apply relevant mechanical principles leading to the generation of relevant differential equations of motion and the solution thereof.
C4 undertake lab experiments in an proficient manner and produce a clear readable lab report.

LO3
C1 in examinations and tutorials identify key aspects of the problem, identify relevant assumptions, draw correct free body diagrams and apply relevant mechanical principles leading to the generation of relevant differential equations of motion and the solution thereof.
C2 undertake lab experiments in an proficient manner and produce a clear readable lab report.

LO4
C1 in examinations and tutorials identify key aspects of the problem, identify relevant assumptions, and apply relevant mechanical principles

The standards set for each criterion per Module Learning Outcome to achieve a pass grade are indicated on the assessment sheet for all assessment.

12 Principles of Assessment and Feedback
(on Learning & Teaching web pages: www.strath.ac.uk/learteach/informationforstaff/staff/assessfeedback/12principles/)

Summative feedback will be provided by the return of examination marks to students after assessment. January exam scripts and lab reports will be returned to students with some minimal written feedback.

Formative feedback will be provided at tutorial and laboratory sessions primarily through individual or group discussion of work prepared in advance by students (note:- to receive this feedback students should participate in these tutorials but attendance is not mandatory).

Immediate self-directed feedback through in-class polling systems.

Assessment Method(s) Including Percentage Breakdown and Duration of Exams

<table>
<thead>
<tr>
<th>Examinations</th>
<th>Courseworks (lab reports)</th>
<th>Projects</th>
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<tbody>
<tr>
<td>Number</td>
<td>Month(s)</td>
<td>Duration</td>
</tr>
<tr>
<td>2</td>
<td>Jan &amp; May/June</td>
<td>2hrs each</td>
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Indicate which learning outcomes (LO1, LO2 etc) are to be assessed by exam/coursework/project as required.

Coursework / Submissions deadlines:
Two weeks after laboratory

Resit Assessment Procedures:
3hr resit examination in August diet.

PLEASE NOTE:
Students need to gain a summative mark of 40% to pass the module. Students who fail the module at the first attempt will be re-examined during the August diet. This re-examination will consist entirely of an exam.

Recommended Reading

1st Semester
"Vector Mechanics for Engineers - Dynamics" by F P Beer, E R Johnston and W E Clausen, McGraw Hill. 10th Edition in SI Units **** Purchase Essential
2nd Semester
"Mechanics of Engineering Materials" by Benham, Crawford and Armstrong. **Highly recommended reading

Additional Student Feedback
(Please specify details of when additional feedback will be provided)

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<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>Room No</th>
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<tbody>
<tr>
<td>Thurs</td>
<td>2-3 PM</td>
<td>TBC</td>
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Session: 2014/15

Approved:

<table>
<thead>
<tr>
<th>Course Director Signature:</th>
<th>Taylor</th>
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Date of Last Modifications: 28 August 2014
**Module Code:** 16232

**Module Title:** Engineering Mechanics 2

**Brief Description of Assessment:**

2hr exam Jan (45%), 2hr Exam May (45%), 2 lab reports (10% total). Resit 3hr exam in August. Submission of lab reports is two weeks after laboratory, date depends on the group that student is allocated.

**Assessment Timing:**

Indicate on the table below the start/submission dates for each assignment/project and the timing of each exam/assessment(s).

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<thead>
<tr>
<th>Semester One</th>
<th>WK1</th>
<th>WK2</th>
<th>WK3</th>
<th>WK4</th>
<th>WK5</th>
<th>WK6</th>
<th>WK7</th>
<th>WK8</th>
<th>WK9</th>
<th>WK10</th>
<th>WK11</th>
<th>WK12</th>
<th>Exam Period</th>
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<td>Lab Sub</td>
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<td>Jan 2hrs</td>
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<table>
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<th>Semester Two</th>
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<th>WK2</th>
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<th>WK4</th>
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<th>WK6</th>
<th>WK7</th>
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<th>WK9</th>
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<th>WK11</th>
<th>WK12</th>
<th>Exam Period</th>
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<td>May 2hrs</td>
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