MODULE DESCRIPTION FORM

16565 ENGINEERING COMPOSITES

Module Registrar: Prof J Thomason  
[james.thomason@strath.ac.uk](mailto:james.thomason@strath.ac.uk)

Taught To (Course): Cohorts for whom class is optional / elective

Other Lecturers Involved: Prof M Stack

Credit Weighting: 10 (ECTS 5)

Assumed Prerequisites: Background knowledge of Engineering Materials, Advanced Mechanics of Materials.

Optional / elective class

Semester: 2

Academic Level: 5

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>24</td>
<td>18</td>
<td>0</td>
<td>0</td>
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<td>0</td>
<td>0</td>
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Educational Aim

The promise claimed for new materials in engineering is most likely to be realised through the use of composites and ceramics. This class aims to give a basic understanding of modern composite materials and an appreciation of predictive modelling and design implications when composites are applied to engineering structures. The main composite manufacturing processes will be outlined.

Learning Outcomes

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

LO1 be able to evaluate structure/property relations through predictive modelling

LO2 understand some of the complexities of laminated systems

LO3 have a knowledge of the variety of fibres and matrices used generally in composite structures

LO4 understand the tribology and corrosion of metal matrix composites

Syllabus

The module will teach the following:

Classification and definition of composites; properties of fibres and matrices; micromechanics – elastic properties of lamina with unidirectional and random long fibre reinforcement; short fibre composites; macromechanics – constitutive relations for lamina and laminates; strength concepts and prediction; failure criteria; applications to load bearing structures; – tribology of composites; exposure to aggressive environments e.g. high temperatures.

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 Exam questions : demonstrate understanding through calculations and description of fundamental principles.

C1 the ability to express values for mechanical performance of composites from the given properties of the base constituents

LO2 Exam questions : demonstrate understanding through calculations and description of fundamental principles.

C2 provide the ability to describe the response of composite laminae and laminates to external loading via laminate theory involving matrix construction and manipulation.

LO3 Exam questions : demonstrate understanding through calculations and description of fundamental principles.

C3 the ability to select appropriate fibre and matrix types, along with appropriate manufacturing techniques, to provide suitable composite materials (using LO1 and LO2) for load bearing engineering applications.

LO4 Exam questions : demonstrate understanding through calculations and description of fundamental principles.

C4 The ability to understand the tribology and tribo-corrosion of metal matrix composites.
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/learnteach/teaching/staff/assessfeedback/12principles/])

Formal feedback will be provided by the return of examination marks to students after assessment (note:- exam scripts will not be returned to students and no individual or collective discussion of exam performance will be facilitated).

Informal feedback will be provided at regular tutorial sessions primarily through verbal discussion with individuals or groups on tutorial exercises attempted in advance by students (note:- to receive this feedback students should participate in these tutorials but attendance is not mandatory).

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

<table>
<thead>
<tr>
<th>Examinations</th>
<th>Courseworks</th>
<th>Projects</th>
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<tbody>
<tr>
<td>Number</td>
<td>Month(s)</td>
<td>Duration</td>
</tr>
<tr>
<td>L/Outcomes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>May/June</td>
<td>2hrs</td>
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</tbody>
</table>

Indicate which learning outcomes (LO1, LO2 etc) are to be assessed by exam/coursework/project as required.

Coursework / Submissions deadlines:

Resit Assessment Procedures:
3 hour examination in August.

PLEASE NOTE:
Students need to gain a summative mark of 50% 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 exam.

Recommended Reading

***Purchase recommended; **Highly recommended reading; *Simply for reference (do NOT purchase)

*** “Composite Materials: Engineering and Science” by F L Matthews & R D Rawlings, Woodhead Publishing

** “An Introduction to Composite Materials” by D Hull, CUP

** “Engineering Materials 2” by H F Ashby & D R H Jones, Pergamon


** “Plastics Engineering” by R J Crawford, 2nd Edition, Pergamon

** “Engineering with Fibre-Polymer Laminates” by P C Powell, Woodhead Publishing


* “Materials Science & Engineering” by W D Callister Jr, John Wiley & Sons

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

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<th>Time</th>
<th>Room No</th>
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Session: 2014/15

Approved:

Course Director Signature: [Signature]

Date of Last Modifications: 23 September 2014
**MODULE TIMETABLE**

<table>
<thead>
<tr>
<th>Module Code:</th>
<th>16565</th>
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<tbody>
<tr>
<td>Module Title:</td>
<td>ENGINEERING COMPOSITES</td>
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**Brief Description of Assessment:**

Examination (70% of overall mark)
2 Courseworks (30% of overall mark – 15% for each coursework).

**Assessment Timing:-**

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

<table>
<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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<table>
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<tr>
<th>Semester Two</th>
<th>WK1</th>
<th>WK2</th>
<th>WK3</th>
<th>WK4</th>
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<th>WK9</th>
<th>WK10</th>
<th>WK11</th>
<th>WK12</th>
<th>Exam Period</th>
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</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>CW1 released</td>
<td>CW1 Hand in</td>
<td></td>
<td>CW2 released</td>
<td>CW2 Hand in</td>
<td></td>
<td>CW 1&amp;2 Feedback</td>
<td></td>
<td>May/June examination</td>
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Note: The table above shows the schedule for assignment/project deadlines and exam/assessment timing for the two semesters.