<table>
<thead>
<tr>
<th>Module Code</th>
<th>MEU44B02-1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Module Name</td>
<td>Forensic Materials Engineering</td>
</tr>
<tr>
<td>ECTS Weighting(^1)</td>
<td>5 ECTS</td>
</tr>
<tr>
<td>Semester taught</td>
<td>Semester 2</td>
</tr>
<tr>
<td>Module Coordinator/s</td>
<td>David Taylor</td>
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</tbody>
</table>

**Module Learning Outcomes** with reference to the [Graduate Attributes](#) and how they are developed in discipline

On successful completion of this module, students should be able to:

LO1. List and describe the various types of mechanical failure which occur in components, explaining the appearance of fracture surfaces and other relevant evidence which allows the mechanism to be diagnosed.

LO2. List the various common causes of failure in engineering components and explain how components are designed so as to prevent failure.

LO3. Conduct a failure investigation, as part of a team, to determine the mechanism and cause of a failure; write an appropriate report with recommendations and give evidence in court.

LO4. Determine the stress intensity of a cracked body under load and use this information to predict brittle fracture and fatigue. Estimate the fatigue strength of a structure given results from stress analysis (such as finite element or photoelastic analysis) and other relevant information. Use damage mechanics to predict failure under creep and creep/fatigue situations.

LO5. Understand the importance of legal and ethical aspects of engineering failures, the significance of codes of practice and standards, the need for safe working practices and the responsibilities of the forensic engineer.

**Graduate Attributes: levels of attainment**

To act responsibly - Attained
To think independently - Attained
To develop continuously - Attained
To communicate effectively - **Attained**
### Module Content
This module aims to advance the student’s knowledge of the mechanical properties of materials, especially in respect of the principal modes of failure of engineering components, in the context of forensic investigations. The module will be taught through a series of real-life legal cases involving material failure, giving the student experience of failure analysis and of the related methods of design and material selection as well as legal and ethical aspects relating to the preparation of reports and the giving of evidence in court.

### Teaching and Learning Methods
This module is taught through a series of four case studies presented via the internet, each of which describes an industrial failure. The students are given a description of the failure and appropriate background information, including data on this particular case and background theory. They are asked to put themselves in the position of the engineer assigned to the failure analysis. There are no formal lectures, instead the lecturer meets with the class, either as a whole or in small groups, to monitor progress and give hints. Necessary theory is covered in an on-line textbook and via tutorial classes. Students write up one of the case studies as a report.
### Assessment Details

Please include the following:

- Assessment Component
- Assessment description
- Learning Outcome(s) addressed
- % of total
- Assessment due date

<table>
<thead>
<tr>
<th>Assessment Component</th>
<th>Assessment Description</th>
<th>LO Addressed</th>
<th>% of total</th>
<th>Week due</th>
</tr>
</thead>
<tbody>
<tr>
<td>Examination</td>
<td>End of Semester Exam</td>
<td>All</td>
<td>70%</td>
<td>Exam week</td>
</tr>
<tr>
<td>Assignment</td>
<td>Product liability</td>
<td>3,5</td>
<td>15%</td>
<td>Week 8</td>
</tr>
<tr>
<td>Laboratory</td>
<td>Failure Analysis</td>
<td>All</td>
<td>15%</td>
<td>Various</td>
</tr>
</tbody>
</table>

### Reassessment Requirements

Supplemental Examination

### Contact Hours and Indicative Student Workload

**Contact hours:** 36

- **Independent Study (preparation for course and review of materials):** 30
- **Independent Study (preparation for assessment, incl. completion of assessment):** 34

### Recommended Reading List


### Module Pre-requisite

- 3B4 Mechanical Engineering Materials or equivalent

### Module Co-requisite

- None

### Module Website

- [Module Website](#)

### Are other Schools/Departments involved in the delivery of this module?

- No

### Module Approval Date

- [Module Approval Date](#)

### Approved by

- [Approved by](#)

### Academic Start Year

- [Academic Start Year](#)

### Academic Year of Date

- [Academic Year of Date](#)