<table>
<thead>
<tr>
<th><strong>Module Code</strong></th>
<th>ME7B16</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Module Name</strong></td>
<td>Laboratory Techniques in Cell and Tissue Engineering</td>
</tr>
<tr>
<td><strong>ECTS Weighting(^1)</strong></td>
<td>5 ECTS</td>
</tr>
<tr>
<td><strong>Semester taught</strong></td>
<td>Semester 1</td>
</tr>
<tr>
<td><strong>Module Coordinator/s</strong></td>
<td>Prof. Conor Buckley</td>
</tr>
</tbody>
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**Module Learning Outcomes with reference to the Graduate Attributes and how they are developed in discipline**

On successful completion of this module, students should have developed:

- **LO1.** An understanding of biosafety aspects in cell tissue culture
- **LO2.** An understanding of animal/human cell culture processes
- **LO3.** An ability to apply their acquired laboratory skills and experimental design skills to cell and tissue engineering experiments
- **LO4.** An ability to identify the engineering and biological issues relevant to cell and tissue engineering
- **LO5.** An understanding of the critical issues and choices needed in developing a tissue engineered construct
- **LO6.** Knowledge and understanding of the principles and use of state-of-the-art techniques of cell and tissue engineering through comparison of what is physically performed in the laboratory with what is presented in the corresponding lecture component
- **LO7.** Experience in data generation, analysis (including statistical analysis) and data presentation

**Graduate Attributes: levels of attainment**

- To act responsibly - Enhanced
- To think independently - Enhanced
- To develop continuously - Enhanced
- To communicate effectively - Enhanced

\(^1\) TEP Glossary
This module is meant to serve as an introduction to cell culture and tissue engineering both for students who have little or no experience of cell culture and for scientists who do have some experience with sterile technique and mammalian cell culture and wish to advance their skill-set in the art of tissue engineering. The primary aim of this module is to familiarise students with the fundamentals and basics of cell and tissue culture and analysis of engineered cells and tissues. This module will consist of lectures on a number of key topics with an active learning laboratory approach. Students will be introduced to a multitude of techniques and topics that are essential to the “tissue engineer” including lab biosafety, primary/mesenchymal stem cell isolation from various tissues, cell culturing and characterisation, hydrogel encapsulation and scaffold seeding, biochemical assays (cell viability, DNA, sGAG, collagen) and histological techniques. The principles of cell and tissue engineering will be presented through hands on laboratory experience. Topics covered include inter alia:

- Health & safety aspects of tissue engineering and cell culture
- Harvesting and Isolation of Primary cells
- Isolation and culture of Mesenchymal Stem Cells
- Preparation of Culture Media & Supplements
- Cell Freezing/Thawing
- Scaffold seeding and Preparation of Cell Loaded Hydrogels
- Live/Dead Staining for the Assessment of Cell Viability
- Colony-Forming Unit Fibroblast (CFU-F) Assay
- Mechanical Testing of Hydrogel Constructs
- Histological techniques and Microscopy
- Biochemical analysis of tissue engineered constructs
- Data analysis and presentation
Teaching and Learning Methods

The module is taught using a combination of lectures and associated demonstration laboratories.
## 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>Laboratory attendance and participation</td>
<td>Each week the Teaching Assistants will grade your performance and participation at the laboratory session</td>
<td>1-3</td>
<td>20</td>
<td>Assessed Weekly</td>
</tr>
<tr>
<td>Health &amp; Safety Project Assessment</td>
<td>You are required to complete a project Health &amp; Safety assessment to be submitted on blackboard</td>
<td>1</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Mid-term in-class test</td>
<td>A short-written examination to assess learning of previous 5 teaching weeks</td>
<td>1-5</td>
<td>15</td>
<td>8</td>
</tr>
<tr>
<td>Written Examination</td>
<td>Timetabled semester 1 examination</td>
<td>1-7</td>
<td>60</td>
<td>End of Semester 1</td>
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### Reassessment Requirements

There is no reassessment for MSc

### Contact Hours and Indicative Student Workload

**Contact hours:** 2 hours of lectures per week, 3 hours of laboratory demonstration per week

**Independent Study (preparation for course and review of materials):** 40 hours

**Independent Study (preparation for assessment, incl. completion of assessment):** 40 hours

### Recommended Reading List


### Module Pre-requisite

Not applicable

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2 [TEP Guidelines on Workload and Assessment](#)
<table>
<thead>
<tr>
<th>Module Co-requisite</th>
<th>Not applicable</th>
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<tbody>
<tr>
<td>Module Website</td>
<td></td>
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<tr>
<td>Are other Schools/Departments involved in the delivery of this module? If yes, please provide details.</td>
<td>No</td>
</tr>
<tr>
<td>Module Approval Date</td>
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<td>Approved by</td>
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<td>Academic Start Year</td>
<td></td>
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<td>Academic Year of Date</td>
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