<table>
<thead>
<tr>
<th>Module Code</th>
<th>MEU44B04</th>
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</thead>
<tbody>
<tr>
<td>Module Name</td>
<td>Heat Transfer</td>
</tr>
<tr>
<td>ECTS Weighting</td>
<td>5 ECTS</td>
</tr>
<tr>
<td>Semester taught</td>
<td>Semester 1</td>
</tr>
<tr>
<td>Module Coordinator/s</td>
<td>Professor Darina Murray</td>
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</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 be able to:

LO1. Classify and explain the parameters affecting radiative heat exchange between two surfaces and solve practical heat transfer problems involving radiation.

LO2. Explain the fundamental scientific principles underlying the conduction equation and determine the thermal resistance for both conduction and convection processes.

LO3. Explain the fundamental scientific principles underlying the governing equations (continuity, momentum, energy) for convective heat transfer.

LO4. Analyse and solve practical problems related to conduction, forced convection (internal and external flows), natural convection and convection with phase change.

LO5. Analyse the thermal performance of heat exchangers and recognise and evaluate the conflicting requirements of heat transfer optimisation and pressure drop minimisation.

LO6. Conduct laboratory experiments as a group and acquire, tabulate and analyse useful data in the laboratory.

LO7. Communicate information and provide physical interpretation of measurements in technical laboratory reports.

**Graduate Attributes: levels of attainment**

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

This module aims to enhance the students’ understanding of heat transfer principles by applying them to a range of thermal systems and processes. Concepts in conductive, radiative and convective heat transfer are introduced; various techniques are explained for the solution of heat transfer problems, emphasizing real life problems such as practical heat exchangers. The aim is also to instil within the students an awareness of the environmental and social implications of engineering technology, especially regarding energy efficiency and safety. Students also gain experience of the use of practical measurement techniques and modern computer-based presentation and analysis.

The module content is structured as follows:

- Conduction
- Radiation
- Forced Convection Fundamentals
- Forced Convection for External Flows
- Forced Convection for Internal Flows
- Free Convection
- Boiling and Condensation
- Heat Exchanger Performance and Design

Teaching and Learning Methods

This module uses Blackboard, podium lectures, a self-directed assignment, and tutorials to help students achieve the required learning outcomes. There are 3 lectures and one tutorial per week.

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>
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</thead>
<tbody>
<tr>
<td>Laboratory</td>
<td>Heat exchanger lab preparation, conduct and report</td>
<td>6,7</td>
<td>20</td>
<td>2 weeks following lab session</td>
</tr>
<tr>
<td>Written examination</td>
<td>End of semester examination</td>
<td>1-5</td>
<td>80</td>
<td>Exam period</td>
</tr>
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</table>

Reassessment Requirements

100% written examination
### Contact Hours and Indicative Student Workload

<table>
<thead>
<tr>
<th>Contact hours:</th>
<th>46</th>
</tr>
</thead>
<tbody>
<tr>
<td>Independent Study (preparation for course and review of materials):</td>
<td>45</td>
</tr>
<tr>
<td>Independent Study (preparation for assessment, incl. completion of assessment):</td>
<td>20</td>
</tr>
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### Recommended Reading List

- *Heat Transfer*, A Bejan, Wiley

### Module Pre-requisite

3B2 Fluid mechanics

### Module Co-requisite

NA

### Module Website


### Are other Schools/Departments involved in the delivery of this module? If yes, please provide details.

No