

<b>Module Code</b>	MEU11E12
<b>Module Name</b>	Engineering Materials and Their Applications
<b>ECTS Weighting<sup>1</sup></b>	10 ECTS
<b>Semester taught</b>	Semester 1
<b>Module Coordinator/s</b>	<p>Professor Roger West (<a href="mailto:rwest@tcd.ie">rwest@tcd.ie</a>) : Module Coordinator</p> <p>Professor Declan O’Loughlin (<a href="mailto:doloughlin@tcd.ie">doloughlin@tcd.ie</a>)</p> <p>Dr Amir Pakdel (<a href="mailto:pakdela@tcd.ie">pakdela@tcd.ie</a>)</p> <p>Mr Peter Flynn (<a href="mailto:peter@flynnemail.com.ie">peter@flynnemail.com.ie</a>)</p>
<b><u>Module Learning Outcomes</u> with reference to the <u>Graduate Attributes</u> and how they are developed in discipline</b>	<p>Upon completion of this module, students will be able to:</p> <p>LO1.Describe the fundamentals of material behaviour.  LO2.List the major types of materials and explain how their properties can be determined and exploited.  LO3.Design and carry out experiments to measure material properties.  LO4. Manufacture and use a data logging device  LO5.Work in a team to design, make and test a new material/structure.</p> <p><b>Graduate Attributes: levels of attainment</b>  To act responsibly - Introduced  To think independently - Introduced  To develop continuously - Introduced  To communicate effectively - Introduced</p>

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<sup>1</sup> [TEP Glossary](#)

## Module Content

- Mechanical properties including strength, stiffness, ductility, toughness, creep, fatigue, shrinkage and thermal movement.
- Atomic structure, microstructure and phase diagrams.
- Measurement of material properties.
- Fabrication of materials (structural, mechanical, electrical).
- Introduction to concrete technology, reinforced and prestressed concrete
- Introduction to semiconductor technology.
- Transducers (strain gauges, thermocouples, displacement sensors, pressure transducers, Hall sensors ).
- Design, manufacture and testing of new materials, structures and devices (structural, mechanical, electronic)

## Teaching and Learning Methods

The module will be divided proportionately into three sections to be delivered by the Civil, Mechanical and Electronic disciplines within the School of Engineering. There will be a taught component of the course involving three podium lectures and a tutorial session each week, and which will be examined at the end of the semester.

A similar division will apply to the practical work. Students will work in teams to design, make and test their own novel sustainable material/structure and associated sensors. This will involve one briefing session and up to a 2-hour laboratory each week for each student. The work will be group-based and project oriented and will involve defined experiments as well as design, construction and testing work on a multi-disciplinary novel sustainable element as a final goal.

<b>Assessment Details<sup>2</sup></b> Please include the following: <ul style="list-style-type: none"> <li>• <b>Assessment Component</b></li> <li>• <b>Assessment description</b></li> <li>• <b>Learning Outcome(s) addressed</b></li> <li>• <b>% of total</b></li> <li>• <b>Assessment due date</b></li> </ul>	Assessment Component	Assessment Description	LO Addressed	% of total	Week due			
	Examination	Examination	1,2	50	Examination Week			
	Continuous Assessment	Reports on experiments and the design challenge	3,4, 5	50	Various times throughout the semester			
<b>Reassessment Requirements</b>	Reassessment will be by examination only. Students must pass the examination element of the module and pass overall to avoid the possibility of reassessment.							
<b>Contact Hours and Indicative Student Workload<sup>2</sup></b>	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td data-bbox="646 930 1419 1010"> <b>Contact hours: 66 per student</b> </td> </tr> <tr> <td data-bbox="646 1014 1419 1131"> <b>Independent Study (preparation for course and review of materials): 60</b> </td> </tr> <tr> <td data-bbox="646 1136 1419 1304"> <b>Independent Study (preparation for assessment, incl. completion of assessment): 50</b> </td> </tr> </table>					<b>Contact hours: 66 per student</b>	<b>Independent Study (preparation for course and review of materials): 60</b>	<b>Independent Study (preparation for assessment, incl. completion of assessment): 50</b>
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<b>Recommended Reading List</b>	<p><i>Engineering Materials</i>, Ashby and Jones</p> <p><i>The New Science of Strong Materials: Or Why You Don't Fall Through the Floor</i>, J.E. Gordon</p> <p><i>Introduction to Engineering Materials</i>, VB John</p> <p><i>Concrete Practice</i>, BCA, provided free-of-charge by Irish Cement Ltd.</p> <p><i>Solid State Electronic Devices</i>, Streetman B.G. &amp; Banerjee S., 7th ed., Prentice-Hall, 2015.</p>							

<sup>2</sup> [TEP Guidelines on Workload and Assessment](#)

<b>Module Pre-requisite</b>	None
<b>Module Co-requisite</b>	Not applicable
<b>Module Website</b>	None
<b>Are other Schools/Departments involved in the delivery of this module? If yes, please provide details.</b>	No other schools, three Engineering departments, in equal amounts
<b>Module Approval Date</b>	
<b>Approved by</b>	
<b>Academic Start Year</b>	September 27 <sup>th</sup> 2021
<b>Academic Year of Date</b>	2021/22