

<b>Module Code</b>	MEU33BM2
<b>Module Name</b>	Biomedical Design Project
<b>ECTS Weighting<sup>1</sup></b>	5 ECTS
<b>Semester taught</b>	Semester 2
<b>Module Coordinator/s</b>	Prof. Caitríona Lally
<b><a href="#">Module Learning Outcomes</a> with reference to the <a href="#">Graduate Attributes</a> and how they are developed in discipline</b>	<p>On successful completion of this module, students should be able to:</p> <p>LO1. Critically evaluate a number of different design processes and apply an appropriate design method to need find, generate ideas and evaluate design concepts  LO2. Correctly use CAD (Solidworks) to draw and model parts and assemblies and to create a 3D prototype.  LO3. Analytically analyse a designed component and optimise a product  LO4. Create a 3D printed prototype  LO5. Understand the patenting system for medical devices  LO6 Understand the importance of ethical aspects of medical device design  LO7 Be able to work effectively as part of a multidisciplinary project team  LO8. Write and present a technical report documenting the design process in a professional manner</p> <p><b>Graduate Attributes: levels of attainment</b>  To act responsibly - Enhanced  To think independently - Enhanced  To develop continuously - Enhanced  To communicate effectively - Enhanced</p>

**Module  
Content**

This module aims to develop design skills according to the Conceive-Design-Implement-Operate (CDIO) methodology. It provides students with the theory, methods and practise to develop safe, effective and efficient medical devices, optimised for specific functional requirements.

The theory of different design approaches, relevant to medical device design is reviewed and discussed. Focussing on the CDIO design methodology, students define the product/technology need and develop the design concept.

The student then focuses on creating the design, i.e., the plans, drawings and 3D model which will define what will be implemented.

The design is then transformed into a product prototype using 3D printing or other suitable 3D modelling capability.

In the final stage, Operate, the product is analytically evaluated and mechanically tested to determine if it has met its design objectives.

Within the module, students use 3D CAD (Solidworks) to design their prototype product.

The module provides students an introduction to multidisciplinary project teams and the opportunity to apply learned knowledge to a real-world problem within group project work.

The module structure is based on project-based learning. Each week students are introduced to new content, which they learn to apply by engaging in activities, practical implementation and discussion.

The design project is based on a real-world problem.

**Teaching and  
Learning  
Methods**

The module structure is based on project-based learning, with students having the opportunity to immediately apply learned theory in practice in their design project.

The module includes (i) podium-based lectures, where design methods are introduced, (ii) laboratory sessions for instruction in CAD and 3D printing, and (iii) design clinics for hands-on instruction and discussion of design prototypes.

The students are required to do background reading which is outlined and facilitated by the use of blackboard. Students also use discussion groups/forums for learning and assessment.

**COVID-19 contingency statement for Module Descriptors**

While the intention is to deliver all lectures and tutorials face-to-face in a classroom, there is uncertainty due to the Covid-19 situation and part or all of the module delivery may need to change to an online delivery if required by government restrictions. In the case of a possible new lockdown scenario during teaching term:

- All lectures and tutorials will be delivered online using Blackboard Collaborate. These sessions will be recorded and available for viewing via Blackboard at a later time.

<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
	Idea/design concept presentation	Report and short presentation	LO1	10%	Week 2
	Solidworks assignment	CAD model	LO2	25%	Week 6
	Continuous assessment which includes bimonthly project reviews between design teams and design process diary	Design diary and progress meetings	LO3 LO4 LO5	15%	Continuous
	Final project report	Report (20 pages approx.)	LO3- LO8	40%	Week 12
	Final project presentation	Presentation	LO3-LO8	10%	Week 12

**Reassessment Requirements** Any module element failed can be re-submitted over the summer provided the student has attended the module and taken part in the group design project.

<b>Contact Hours and Indicative Student Workload<sup>2</sup></b>	<b>Contact hours:</b> 44 hours
	<b>Independent Study (preparation for course and review of materials):</b> 10 hours
	<b>Independent Study (preparation for assessment, incl. completion of assessment):</b> 70 hours

**Recommended Reading List**

**Recommended or Core Text**

1. **Design of Biomedical Devices and Systems**  
by Paul H. King, Richard C. Fries and Arthur C. Johnson, 3rd Edition.  
CRC Press, 08/2014. VitalBook file.

**Supplemental Texts**

1. **Biodesign: The Process of Innovating Medical Technologies**

by Stefanos Zenios, Josh Makower and Paul Yock.

2. **Engineering Design: A Systematic Approach**  
by G. Pahl, W. Beitz, J. Feldhusen and K.- H Grote.

3. **Handbook of Human Factors in Medical Device Design**  
by Matthew Weinger  
([https://books.google.ie/books?id=jAemLm2zu\\_oC&printsec=frontcover#v=onepage&q&f=false](https://books.google.ie/books?id=jAemLm2zu_oC&printsec=frontcover#v=onepage&q&f=false))

**Module Pre-requisite** A basic knowledge of human anatomy and physiology and experience in CAD is required

**Module Co-requisite** None

**Module Website**

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

No

**Module Approval Date**

**Approved by**

**Academic Start Year**

**Academic Year of Date**