Module Code	MEU33BM2
Module Name	Biomedical Design Project
ECTS Weighting[1]	5 ECTS
Semester taught	Semester 2
Module Coordinator/s	Prof. Caitríona Lally
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. 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 **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 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.

Assessment Details[2] Please include the following:

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

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 or Week 13

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.

Contact Hours and Indicative Student Workload[2]

Contact hours: 44 hours
Independent Study (preparation for course and review of materials): 10 hours
Independent Study (preparation for assessment, incl. completion of assessment): 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. John son, 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)
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	