Module Code	MEU33B08
Module Name	3B8 Universal Design Innovation
ECTS Weighting[1]	10 ECTS
Semester taught	Semester 1 & 2
Module Coordinator/s	Associate Prof. Gareth J. Bennett
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. Value the differences in peoples' abilities through the participation in a Universal Design/User Centred Design project working with community groups, promoting social responsibility and civic awareness LO2. Apply a user centred design process to needfind, generate ideas and evaluate design concepts. LO3. Appreciate and be skilled at different additive and subtractive manufacturing processes as well as prototyping equipment. LO4. Develop code in the Arduino processing language to acquire and process data, and to output signals to actuate components for some useful purpose. LO5. Correctly use SOLIDWORKS to draw and to solid-model parts and assemblies. LO6. Apply engineering sciences and creativity through learning-by-doing project work to conceive, design, implement and operate tangible electromechanical prototypes including required associated electronic hardware, sensors, actuators and other mechanical components. LO7. Communicate and work effectively in teams, and be able to present their work orally through public presentation using posters and slide shows. **Graduate Attributes: levels of attainment** To act responsibly - Enhanced To think independently - Enhanced To develop continuously - Enhanced To communicate effectively – Enhanced

[1] TEP Glossary

Module Content	The student will develop skills to allow them to think creatively and critically, conduct research both independently and within a group, and will learn to analyse data and synthesize the findings to develop a solution. Presentations will be made regularly within groups and students will develop their digital, communication and group work skills. The module requires interaction with community groups, e.g. the elderly and so students will listen, interview and conduct themselves in a professional manner while developing a sense of social responsibility and civic awareness through community engagement and "Service Learning". The module provides an experiential learning environment, while applying academic knowledge and engineering science and provides a framework to encourage creativity and innovation. The students follow a "User Centred Design Process" enhanced with "Design Thinking". Each group is required to recruit their own user group of stakeholders and work with them for Semester I: observing, interviewing and recording them in their own environment. This empathy stage provides the students with insight into difficulties that the users encounter with respect to the particular theme of the year, e.g. "Successful Ageing", "Blind/Limited Vision", "Cycling" etc.. The students initially develop rudimentary design prototypes to address each group's perceived "need", and then seek feedback. They repeat this process many times in order to define their group's problem, and then iterate to a design concept to address the need. Semester II involves the embodiment design and development of the concept as a fully functioning tangible electro-mechanical prototype. The project culminates with a public showcase where the users and others are invited along to interact with the solutions. The students also design and create promotional and dissemination materials for their product such as videos, posters, logos, tri-fold leaflets, presentations etc. These will be uploaded to a dedicated public website. The module is assessed completely through continuous assessment with no written exam in the examination period.
Teaching and Learning Methods	Lectures primarily take place in semester I to introduce design, the design process, needfinding, universal design, machine components etc. These will be delivered onine with Blackboard Collaborate Ultra. These sessions will be recorded and available for viewing via Blackboard at a later time. Each week the student's present their work orally with a powerpoint/prezi presentation and receive feedback in front of the rest of the class. This allows the students to learn from each other. The presentations will take place face-2-face on a Monday. A number of labs accompany the module to provide skills to support the core objective of the module: to build a fully functioning electro-mechanical prototype to address a real user need. The labs teach: • Solid Modelling (SOLIDWORKS), (Delivered Online) • Arduino hardware and associated software and its interaction with sensors and actuators, (Face-2-Face on a Monday)

- Prototyping Lab to facilitate students to make their designs: will include a blue foam cutter, an acrylic bender and introduction to the workspace and tools (MakerSpace). (Delivered online or Face-2-Face in semester II Covid permitting).
- 3D Printing Lab for additive Manufacturing. (Delivered online or Face-2-Face in semester II Covid permitting).

The SOLIDWORKS content takes place in Semester I and requires the students to be enrolled in the 2MEMS10 module. From week 1 to week 11 students will read lecture notes, complete lab exercises (one exercise will give step by step instruction + video) and complete a MCQ during their own time on a weekly basis. Online TA clinics will be scheduled every week where students can ask TA questions or seek help. MCQ and exercises will be graded each week with feedback provided.

Semester II is focussed on the design and construction of the prototypes so there will be few lectures with the focus being on group based design feedback sessions and formative assessment. Students will conduct some design and build work in department in the "MakerSpace" according to a schedule.

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
Weekly Assignment and Presentation	Semester 1 Needfinding and Concept Definition Assignments	LO1, LO2, LO7	35	Weekly in Semester
Laboratories	Labs associated with the module to support the objectives.	LO3, LO4, LO5	25	Throughout Sem I and Sem II
Universal Design Project	Design and construction of a functioning electro-mechanical prototype to address a real user need. Dissemination materials which will be uploaded to a dedicated website.	LO1-LO7	40	Week 8 Sem II

Reassessment Requirements

Assignments.

[2] TEP Guidelines on Workload and Assessment

Contact Hours and Indicative Student Workload[2]	**Contact hours: 84** **(Lectures: 33** **Labs: 27** **Design Studios: 24)**
	Independent Study (preparation for course and review of materials): 20
	Independent Study (preparation for assessment, incl. completion of assessment): 119 **(10 Weekly Assignments X 4 = 40** **Labs:9** **Design Project: 70)**
Recommended Reading List	D. School Needfinding Materials
Module Pre-requisite	None
Module Co-requisite	None
Module Website	https://www.tcd.ie/mecheng/research/fluids-acoustics-vibration/Gar%20Bennett%20Assets/UDI%20Showcase/UDIhomepage.php
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	