Module Code	**MEU33EM3**
Module Name	**Design II**
ECTS Weighting[1]	10 ECTS
Semester taught	Semester 1 & 2
Module Coordinator/s	Assistant Professor Conor McGinn (c.mcginn@tcd.ie)
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: 1. Carry out detailed engineering design, to include the selection and use of standard components where appropriate. 2. Communicate their design through presentations, written reports, and engineering drawings. 3. Carry out a prototyping process to assess their designs for functionality, form, and fit, as appropriate. 4. Manufacture prototype components using additive manufacturing. 5. Read sensors and control actuators using a micro-controller. 6. Incorporate single board computers, micro-controllers and sensors into their designs, and program the microcontroller to control the behaviour of a system. 7. Write software to control various elements of a mechatronic system. 8. Know how to solder, and best principles for wiring DC mechatronic systems. 9. Create manufacturing drawings for components, including manufacturing tolerances. 10. Learn to critically think about how things are designed and fabricated. Develop skills in ideation and early-stage concept development.

[1] TEP Glossary

	11. Reflect upon their own performance and that of their group, and use this reflection to enhance their own learning. **Graduate Attributes: levels of attainment** To act responsibly - Introduced To think independently - Introduced To develop continuously - Introduced To communicate effectively- Enhanced
Module Content	◦ Microprocessor programming ◦ Actuators and sensors ◦ Introduction to control ◦ Batteries and power systems ◦ Actuators and sensors ◦ Standard components (bearings, gears, springs, fasteners etc.) ◦ Intro to UI Design ◦ Geometrical dimensioning and tolerancing ◦ Additive manufacturing for prototyping ◦ Group design project This module presents an integrated approach to mechanical system design. Building upon theoretical knowledge developed in Manufacturing Engineering Design I (MEU22EM3), the primary aim of the module is to develop expertise and experience in applying systematic design principles towards a real design project involving mechanical, electronics, and software components. The core element of the module focuses on a group-based design project. Using a problem-based learning approach, groups are presented with a challenge which they must develop a solution to address. Each group will be responsible for the development of their design from concept through embodiment design resulting in a high-resolution prototype.

Teaching and Learning Methods	The module is taught using a combination of lectures, structured labs, and project feedback sessions at which teaching team members and/or teaching assistants interact with the project teams. Lectures will be made available through pre-recorded videos which will be shared at the beginning of each week. Weekly scheduled video conferences will provide the opportunity for one-on-one and group feedback to be provided. Students are also expected to engage in self-directed learning throughout the module, with appropriate guidance and feedback from the teaching team. Elements of self-assessment and peer assessment will be incorporated into assessment to support group-based learning outcomes.

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
Assignment	Monthly Assignments	1-11	50%	W1-22
Assignment	Concept design project	1-3, 9-11	15%	W18
Lab	In-class lab (x2)	4-8	10%	W1-12
Assignment	Final Design Assignment	1-3, 9-12	20%	W23
Presentation	Design presentation	2, 12	5%	W23

Reassessment Requirements

1. An individual design project, carried out over the summer months.
2. Submission of a design diary on a bi-monthly basis over the summer months.

Contact Hours and Indicative Student Workload[2]

Contact hours: 66 Hours
Independent Study (preparation for course and review of materials): 10 hours
Independent Study (preparation for assessment, incl. completion of assessment): 72 hours

Recommended Reading List

There is currently no recommended textbook for the course. Lecture notes are provided electronically and all recommended reading lists are given out where appropriate in advance of classes.

Covid-19 contingencies

Most of the module delivery will take place on-line. If in-person labs cannot take place due to COVID, an on-line alternative will be proposed.

Module Pre-requisite

MEU22EM3

Module Co-requisite

N/A

Module Website

N/A

[2] TEP Guidelines on Workload and Assessment

Are other Schools/Departments involved in the delivery of this module? If yes, please provide details.
Module Approval Date
Approved by
Academic Start Year
Academic Year of Date