MEU33EM3 Design II [10 credits]

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Module organisation
Semester 1 & 2

Start week	End week	Lecture hours per week	Lectures total
1	24	3	66

Module description, aims and contribution to programme
Building upon previously skills and knowledge developed in Manufacturing Engineering Design I (2MEMS10), students will progress from conceptual design to detailed engineering design. This module presents an integrated approach to mechanical system design. In addition to developing fundamental skills in mechanical design, students will also learn about the state-of-the-art in electronics and digital technology. The core element of the module focuses on a group based project. Students are tasked with working in groups towards the design and manufacture of a product of their own choosing, given a general theme such as a user group or application. Each group will be responsible for the development of their design from a concept through prototyping to a final design stage.

Learning outcomes
On successful completion of this module, students will (be able to):

1. Carry out detailed engineering design, to include the selection and use of standard components where appropriate.
2. Work as a productive member of a group, with an appreciation for the need for leadership and management.
3. Communicate their design through presentations, written reports, and engineering drawings.
4. Carry out a prototyping process to assess their designs for functionality, form, and fit, as appropriate.
5. Manufacture prototype components using additive manufacturing machines such as Ultimakers.
6. Incorporate microcontrollers and sensors into their designs, and program the microcontroller to control the behaviour of a system.
7. Give and receive appropriate feedback to and from their peers, and use this feedback to improve their designs.
8. Reflect upon their own performance and that of their group, and use this reflection to enhance their own learning.
9. Create manufacturing drawings for components, including manufacturing tolerances.

Module content

- Communication skills
- Reflection and feedback skills
- Microcontrollers and GUI (graphical user interface)
- Actuators and sensors
- Standard components (bearings, gears, springs, fasteners etc.)
- International standards
- Introduction to geometrical dimensioning and tolerancing
- Additive manufacturing for prototyping
- Group design project

Teaching strategies

The module is taught using a combination of lectures, laboratory demonstration and project feedback sessions at which teaching team members and/or teaching assistants interact with the project teams. The groups are also expected to undertake independent research and development work on their project, 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

Continuous assessment through group and individual work (100%)

As this course involves a substantial amount of group work, students are expected to attend all lectures, and to additionally carry out both individual and group work outside of lecture hours. Final marks will be based upon both group and individual work, and will be scaled based upon the participation level of the student. Students whose attendance rate drops below 75% may be reported as non-satisfactory, as they will be unable to properly participate in group work, and thus will be unable to achieve the group-based learning outcomes.

Supplemental assessment will be through:

1. An individual design project, carried out over the summer months.
2. A reflective essay on teamwork and leadership, based upon the experience of the student during the course.

In order to avoid plagiarism, the supplemental design project cannot be based upon any group work carried out or submitted during the course. A pass mark of 40% must be achieved in both elements of the supplemental assessment.

Suggested textbook

Shigley's Mechanical Engineering Design (or equivalent textbook on design).
Machinery's Handbook – as a reference text.

Further information

Course Blackboard - https://tcd.blackboard.com/