COURSE TITLE: **Manufacturing Engineering Design** **Lecturer: Prof. Kevin Kelly, Prof. Daniel Trimble**		CODE: **2MEMS10**
LEVEL: **Senior Freshman (2nd year)**	CREDITS: **10**	PREREQUISITES: **1MEMS1**
SEMESTER: **1 & 2** DURATION (WEEKS): **24**	HOURS/WEEK: **4** TOTAL: **88**	

AIM

Project:

The 2MEMS10 Manufacturing Engineering Design IV introduces the challenge of group based manufacturing and design. The project involves the design and construction of a metal-bodied resonator acoustic guitar. Each group is responsible for the design, part-sourcing and manufacture of their own guitar. Some of the parts of the guitar will be purchased, while the remainder will be manufactured in-house. Each group will be responsible for the full conceptual design, specification and construction of the guitar – including bill of materials, design drawings, assembly information, jigs and fixtures and manufacturing process specification.

CAD:

Building upon previous skills developed in Engineering Drawing in year one, students will now transfer their design skills from paper to computer using Computer Aided Design (CAD) software. Students will learn the importance of CAD in the context of mechanical and manufacturing engineering and the integration of CAD software into other types of Computer Aided Engineering (CAE) software such as Finite Element Analysis (FEA) and Computer Aided Manufacturing (CAM). The emphasis will be focused on student development of detailed engineering design skills such as 3D modelling of complex engineering components and assemblies, the production and understanding of manufacturing engineering drawings and an introduction to simulations and engineering analysis

Objectives

- to apply basic principles of science and engineering to conceive, design, implement and operate a metal bodied resonator guitar.
- to introduce group working and project planning.
- to introduce the principles of metal and wood processing and the health and safety issues associated with these processes.
- to introduce the principles of engineering design including fixture and jig design.
- to analyse the design and optimise it with respect to manufacturability.
- to introduce the requirements of project documentation, part drawings and assembly documentation.
- to introduce project reporting and presentation in multiple formats
- to appreciate the importance of and best practice in modern manufacturing engineering CAD/CAM/CAE

RECOMMENDED TEXT(S)

- No prescribed texts – class notes and instruction should suffice.

- The following texts may provide useful additional information:
  - *SolidWorks 2013 Bible, Matt Lombard, 1st Edition, ISBN-13: 978-1118508404*
  - *Introduction to Solid Modelling Using SolidWorks, William Howard, Joseph Musto, 10th Edition, ISBN-13: 978-0078021244.*
  - *Introduction to Finite Element Analysis Using SolidWorks Simulation 2014, 1st Edition, ISBN-13: 978-1-58503-857-2*

LEARNING OUTCOMES

On successful completion of this course, students will (be able to):

Project:

1. have a knowledge of the engineering process of problem solving

2. to design a consumer product (guitar) to meet a well-defined specification

3. have acquired knowledge of group working including task sub-division and coordinated meeting of interim deliverables

4. have acquired a knowledge of the health and safety requirements of manufacturing processes

5. have developed skills in the areas of quantitative analysis, scientific reasoning and communication

6. have developed practical experimental skills in manufacturing processes

7. have developed practical skills in project costing

8. have a knowledge of the requirements of report writing and project documentation

CAD:

9. create 3D models of complex engineering components using CAD software

10. build engineering assemblies of components using CAD software

11. interpret manufacturing engineering drawings

12. construct manufacturing drawings of components and assemblies using CAD software

13. analyse engineering components using simulations techniques

TEACHING STRATEGIES

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

ASSESSMENT MODE(S)

Continuous Assessment (100%).

NB: As this course is 100% continuous assessment and involves substantial groupwork, supplemental examination will not be possible.