| | |
|---|---|
| **Module Code** | **MEU44B07** |
| **Module Name** | **COMPUTER AIDED DESIGN** |
| **ECTS Weighting** | 5 ECTS |
| **Semester taught** | Semester 1 |
| **Module Coordinator/s** | Associate Professor Tim Persoons |
| **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:<br><br>LO1. Complete an analysis cycle from drawing to calculation of a component<br>LO2. Interface a finite element analysis with a CAD package<br>LO3. Perform various types of mechanical engineering analysis<br>LO4. Implement a design cycle including design optimisation<br>LO5. Operate a commercial finite element package<br>LO6. Understand and interpret results of finite element analysis and know how to verify and optimise the calculation procedures<br><br>**Graduate Attributes: levels of attainment**<br>To act responsibly - Enhanced<br>To think independently - Enhanced<br>To develop continuously - Enhanced<br>To communicate effectively - Enhanced |
| **Module Content** | The module is centred on the application of a complex commercial finite element programme to address a number of design problems in engineering. These may include stress analysis, heat transfer, fluid mechanics, vibration, sealing and contact problems.<br><br>Module Syllabus<br>• Geometry Input/CAD interface<br>• Stress Analysis<br>• Contact Analysis<br>• O-ring/Gasket Sealing<br>• Heat Transfer Analysis<br>• Thermal Stress Problems<br>• Parametric Studies<br>• Mesh Refinement and Grid Convergence<br>• Shape/Topology Design Optimisation |
| **Teaching and Learning Methods** | This module is taught primarily through assignments with supporting lectures and tutorials. Students are strongly encouraged to take self-directed learning approach to the module. An initial tutorial will be presented to students to enable problem formulation followed by a linear stress analysis. The function of this will be to establish working familiarity with the package. Further problems will be performed to build understanding of different analysis methods. Three distinct design challenges will be presented relating to different areas of engineering. |

| | |
|---|---|
| | The group assignments will be assessed based primarily on the delivered report. Additionally, to ensure that students contribute equally to the work, randomly selected team members may be interviewed about aspects of the work in the weeks following submission. These students can have individual marks added or subtracted depending on their performance at the interview, which will consist of a 10-min conversation with the module coordinator. |

**Assessment Details**

| Assessment Component | Assessment Description | LO Addressed | % of total | Week Due |
|---|---|---|---|---|
| Test 1 | Individual test in a computer lab or online environment where a simple assignment should be completed within a timed period | 1-4,6 | 1/8 (12.5%) | Week 8 |
| Test 2 | Individual test in a computer lab or online environment where a more advanced assignment should be completed within a timed period | 1-4,6 | 1/8 (12.5%) | Week 12 |
| Assignment 1 | Report generated on engineering design problem #1, carried out in small group | 1-6 | 1/4 (25%) | Week 6 |
| Assignment 2 | Report generated on engineering design problem #2, carried out in small group | 1-6 | 1/4 (25%) | Week 10 |
| Assignment 3 | Report generated on engineering design problem #3, carried out in small group | 1-6 | 1/4 (25%) | Week 14 |

| | |
|---|---|
| **Reassessment Requirements** | Assignment |

**Contact Hours and Indicative Student Workload**

| |
|---|
| **Contact hours: 33 (2 lectures slots and 1 tutorial per week)** |
| **Independent Study (preparation for course and review of materials): 33** |
| **Independent Study (preparation for assessment, incl. completion of assessment): 44** |

| | |
|---|---|
| **Recommended Reading List** | Software training materials, available in electronic format on Blackboard. |
| **Module Pre-requisite** | Some experience with CAD drawing using a professional software package (e.g., SolidWorks, AutoCAD, ANSYS, etc) and the basics of numerical analysis for engineers, as covered in modules such as EEU22E12 |

| | |
|---|---|
| | Computational Science & Engineering I and MEU23B10 3D Computer Aided Design. |
| **Module Co-requisite** | N/A |
| **Module Website** | See Blackboard |
| **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** | |