Module Code: MEU44B07
Module Name: 4B7 COMPUTER AIDED DESIGN
ECTS Weighting: 5 ECTS
Semester taught: Semester 1
Module Coordinator/s: Assistant 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:

- LO1. Complete an analysis cycle from drawing to calculation of a component
- LO2. Interface a finite element analysis with a CAD package
- LO3. Perform various types of mechanical engineering analysis
- LO4. Implement a design cycle
- LO5. Operate a commercial finite element package
- LO6. Understand and interpret results of finite element analysis and know how to verify and optimise the calculation procedures

Graduate Attributes: levels of attainment
- To act responsibly - Enhanced
- To think independently - Enhanced
- To develop continuously - Enhanced
- 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.

Module Syllabus:

- Geometry Input/CAD interface
- Stress Analysis
- Contact Analysis
- Non-Linear and iterative calculation procedures with time step control
- Vibration Analysis
- Heat Transfer (Static and Dynamic)
- Thermal stress problems

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 in-lab problems will be performed to build understanding of different analysis methods. Three distinct design challenges will then be presented relating to different areas of engineering.
### Assessment Details

Please include the following:

- **Assessment Component**
- **Assessment Description**
- **Learning Outcome(s) addressed**
- **% of total**
- **Assessment due date**

<table>
<thead>
<tr>
<th>Assessment Component</th>
<th>Assessment Description</th>
<th>LO Addressed</th>
<th>% of total</th>
<th>Week due</th>
</tr>
</thead>
<tbody>
<tr>
<td>In-class test</td>
<td>Individual test in a computer lab environment where a simplified assignment should be completed within a timed period</td>
<td>1-4,6</td>
<td>1/7 (14%)</td>
<td>Week 8</td>
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<tr>
<td>Assignment 1</td>
<td>Report generated on engineering design problem #1, carried out in small group</td>
<td>1-6</td>
<td>2/7 (29%)</td>
<td>Week 6</td>
</tr>
<tr>
<td>Assignment 2</td>
<td>Report generated on engineering design problem #2, carried out in small group</td>
<td>1-6</td>
<td>2/7 (29%)</td>
<td>Week 11</td>
</tr>
<tr>
<td>Assignment 3</td>
<td>Report generated on engineering design problem #3, carried out in small group</td>
<td>1-6</td>
<td>2/7 (29%)</td>
<td>Week 14</td>
</tr>
</tbody>
</table>

### Reassessment Requirements

**Assignment**

### Contact Hours and Indicative Student Workload

- **Contact hours:** 44 (1 lecture slot and 3 tutorials per week)
- **Independent Study (preparation for course and review of materials):** 32
- **Independent Study (preparation for assessment, incl. completion of assessment):** 44

### Recommended Reading List

- ANSYS Training materials (available in electronic format on Blackboard)

### Module Pre-requisite

- Not applicable

### Module Co-requisite

- Not applicable

### Module Website


### Are other Schools/Departments involved in the delivery of this module? If yes, please provide details.

- No