

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	<p>On successful completion of this module, students should be able to:</p> <p>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 including design optimisation 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</p> <p>Graduate Attributes: levels of attainment To act responsibly - Enhanced To think independently - Enhanced To develop continuously - Enhanced To communicate effectively - Enhanced</p>
Module Content	<p>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.</p> <p>Module Syllabus</p> <ul style="list-style-type: none"> • Geometry Input/CAD interface • Stress Analysis • Contact Analysis • O-ring/Gasket Sealing • Heat Transfer Analysis • Thermal Stress Problems • Parametric Studies • Mesh Refinement and Grid Convergence • Shape/Topology Design Optimisation
Teaching and Learning Methods	<p>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.</p>

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, CREO, ANSYS, etc) and a basic understanding of finite element analysis (e.g., 2E11, 23B10, 3B9)

Module Co-requisite	N/A
Module Website	https://www.tcd.ie/Engineering/undergraduate/baiyear4/
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	