COMP H4602: Computer Integrated Eng 4

Module Title:	Computer Integrated Engineering 4
Language of Instruction:	English

Credits:	10

NFQ Level:	8

Module Delivered In	No Programmes

Teaching & Learning Strategies:	The module will be delivered using lectures and tutorials with a mixture of presentations, example exercises, question and answer sessions, group discussions and online resources. Laboratory classes will be delivered to students working in groups to obtain experimental data with subsequent individual reporting/assessment.

Module Aim:	The aim of this module is to provide students with an in-depth understanding and best practice of advanced design processes including CFD & FEA and the application of computer technologies to these areas.

Learning Outcomes	
On successful completion of this module the learner should be able to:	
LO1	Instrumentation and experimental Methods
LO2	Mesh generation strategy for two and three dimensional geometrical arrangements using mesh generation software;
LO3	Application of advanced F.E.A. & C.F.D. to typical design problems;
LO4	Perform parameter based DOE and design optimisation
LO5	Write a technical reports in the style of a journal paper

Pre-requisite learning		
Module Recommendations *This is prior learning (or a practical skill) that is recommended before enrolment in this module.*		
6419	GRAP H1601	Technical Graphics 1
6426	TECH H2609	Technical Graphics 2
6433	COMP H3613	Computer Integrated Eng 3
Incompatible Modules *These are modules which have learning outcomes that are too similar to the learning outcomes of this module.*		
No incompatible modules listed		
Co-requisite Modules		
No Co-requisite modules listed		
Requirements *This is prior learning (or a practical skill) that is mandatory before enrolment in this module is allowed.*		
No requirements listed		

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Module Content & Assessment

Indicative Content
Instrumentation and experimental Methods • Application and use of strain gauges • Application and use of thermocouples for thermal analysis • Aerodynamics and wind tunnel testing • Data capture
Meshing • ANSYS Meshing Basics • Meshing Methods • Global Mesh Controls • Local Mesh Control • Assembly Meshing • Mesh Quality
Mechanical Nonlinear Connections and Contact • Interface Treatments • Bolt Pretension • Modeling Gaskets • Accessing Advanced Contact Features via MAPDL • General Contact Technology • Best Practices
Mechanical Dynamics • General understanding of the different types of dynamic analyses. • Procedure for performing FEA simulations, including modal, harmonic, random vibration, response spectrum, and transient structural analyses • Best Practices
Introduction to Computational Fluid Dynamics • Introduction to the CFD Methodology • Cell Zone and Boundary Conditions • Post-Processing with Fluent and CFD-Post • Solver Settings • Turbulence Modelling • Heat Transfer • Transient Flows • Moving Zones • Multiphase Flows • HPC • Best Practices
Heat Transfer Modelling • Introduction • Conduction Heat Transfer • Forced Convection • Natural Convection • Radiation Heat Transfer • Solar Load Model • Heat Exchangers • Heat Transfer in Porous Media • Best Practices
CFD Dynamic Meshing • Dynamic Mesh Zones with UDF's and Profiles • Layering Mesh Method • Smoothing Mesh Method • Remeshing • Coupled 6DOF • Convergence • Best Practices

Assessment Breakdown	%
Continuous Assessment	50.00%
Project	50.00%

Continuous Assessment

Assessment Type	*Assessment Description*	*Outcome addressed*	*% of total*	*Assessment Date*
Other	Written, online and Computer applications examinations	1,2,3,4	50.00	n/a

Project

Assessment Type	*Assessment Description*	*Outcome addressed*	*% of total*	*Assessment Date*
Project	Group and individual projects including presentations	1,2,3,4,5	50.00	n/a

No Practical

No End of Module Formal Examination

SETU Carlow Campus reserves the right to alter the nature and timings of assessment

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Module Workload

Workload: Full Time		
Workload Type	*Frequency*	*Average Weekly Learner Workload*
Lecture	Every Week	1.00
Laboratory	Every Week	2.00
Estimated Learner Hours	Every Week	4.50
	Total Hours	7.50