Liverpool John Moores University

Title:	COMPUTATIONAL ENGINEERING
Status:	Definitive
Code:	**5515NCCG** (129449)
Version Start Date:	01-08-2021
Owning School/Faculty:	Engineering
Teaching School/Faculty:	Nelson Campus

Team	Leader
Christian Matthews	Y

Academic Level:	FHEQ5	**Credit Value:**	20	**Total Delivered Hours:**	60
Total Learning Hours:	200	**Private Study:**	140		

Delivery Options
Course typically offered: S1, S2, Sum, NS2 (S2 for Jan)

Component	Contact Hours
Lecture	36
Workshop	24

Grading Basis: 40 %

Assessment Details

Category	Short Description	Description	Weighting (%)	Exam Duration
Report	Assignment	FEA Assignment	60	
Report	Assignment	CFD Assignment	40	

Aims

This module aims to demonstrate an understanding of where Finite Element Analysis (FEA) and Computational Fluid Dynamics (CFD) can be used in the product development process. The student will be required to deal with complex issues, both systematically and creatively, to construct numerical models of physical systems, and critically evaluate the results of that analysis. The module will also provide a conceptual understanding of the principles of FEA and CFD, including introductory mathematical fundamentals as required.

Learning Outcomes

After completing the module the student should be able to:

1 Explore the capabilities and limitations of computer-based models in meeting design fundamentals and their use in solving problems in engineering.
2 Construct an appropriate finite element model of a physical system, and critically evaluate the results of that analysis.
3 Construct an appropriate computation fluid dynamics model of a physical system, and critically evaluate the results of that analysis.
4 Determine faults in the application of simulation techniques to evaluate the modelling method and data accuracy.

Learning Outcomes of Assessments

The assessment item list is assessed via the learning outcomes listed:

FEA Assignment	1	2	4
CFD Assignment	3		

Outline Syllabus

The FEA component covers: Introduction to FEA including applications; The Finite Element Formulation 1D and 2D; Practical Modelling Technique; Use of symmetry; Plane stress and plane strain elements; Convergence, and Error estimation.
The CFD component covers: Introduction to CFD including applications; Overview of CFD Flow Solvers; The Finite volume method; Turbulence; Practical Modelling Technique; Boundary conditions; Grid generation; Sources of error, and Interpretation of results.

Learning Activities

Lectures
These will not normally be traditional didactic lectures in which the student plays little active part, but will be delivered in small groups of up to 20 students in which their interaction with their tutor is a key ingredient of their learning experience.
Students will receive approximately 30 hours of taught material, supported by in-class exercises and discussions designed to help student assimilate learning and to provide early informal feedback on their progress.

Seminars (inc workshops)
Student will have the opportunity to test theoretical learning through practical work.

Independent Study
Students are expected to undertake personal reading and research into topic areas that have been stimulated from the lectures and seminars. This reading will enhance

their academic work and enable valid contribution to lectures and seminars.

VLE support
This will provide links to academic web-sites and on-line journals, facilitate group discussion outside of the classroom, access to outline lecture notes, and provide students with assessment details.

Notes

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