MODULE SPECIFICATION

Part 1: Information			
Module Title	Computational Methods		
Module Code	UFMFU7-15-3	Level	Level 6
For implementation from	2019-20		
UWE Credit Rating	15	ECTS Credit Rating	7.5
Faculty	Faculty of Environment & Technology	Field	Engineering, Design and Mathematics
Department	FET Dept of Engin Design & Mathematics		
Module type:	Standard		
Pre-requisites	Stress Analysis 2019-20		
Excluded Combinations	None		
Co- requisites	None		
Module Entry requirements	None		

Part 2: Description

Overview: Two of the main modern mechanical engineering tools are introduced in this module which is supported by lectures and practical computer practice.

Educational Aims: See Learning Outcomes.

Outline Syllabus: FEA:

Introduction to Finite Element Analysis: overview of FEA applications, nodes, elements, meshes, stiffness matrix, and boundary conditions - loads and restraints.

Practical modelling techniques: e.g: techniques, planning, pre-processing, model solution, post processing, symmetry, convergence tests, boundary conditions, element types/selection, co-ordinate systems, mesh creation.

Elementary elastic plastic analysis.

CFD:

Introduction to CFD and meshing theories including discretisation from the fluid theory, turbulence models, mesh generation and error analysis.

Practical modelling using an industry standard CFD package exploring mesh independency, the use of different turbulence models and the importance of convergence and validation of results.

Teaching and Learning Methods: This module is supported by small computer practical sessions. Study time outside of contact hours will be spent on going through FEA and CFD exercises and example problems.

Scheduled learning includes lectures and computer practical sessions. Around half of the practical sessions are spent working through CFD/FEA exercises. The other half are spent working on the coursework assignments.

Independent learning includes hours engaged with the software, assignment preparation and completion.

Contact: 36 hours
Assimilation and skill development: 60 hours
Coursework: 36 hours
Exam preparation: 18 hours
Total: 150 hours

Part 3: Assessment

Component A: Exam
Assessed via end of semester Exam to assess the students understanding of concepts and techniques: part 1 CFD, and part 2 FEA.

Component B: Coursework
Assessed via end of semester through two pieces of coursework, the first in CFD and the second in FEA. Each coursework assignment is based on simulating a simple fluid dynamics/solid mechanics problem and writing a brief report detailing the modelling process and analysing the results. Both elements are max 8 pages.

First Sit Components	**Final Assessment**	**Element weighting**	**Description**
Report - Component B		38 %	Coursework 1 CFD (max 8 pages)
Report - Component B		37 %	Coursework 2 FEA (max 8 pages)
Examination - Component A	✓	25 %	Exam (2 hours)
Resit Components	**Final Assessment**	**Element weighting**	**Description**
Report - Component B		75 %	Coursework CFD/FEA (max 8 pages)
Examination - Component A	✓	25 %	Examination 2 hours

Part 4: Teaching and Learning Methods

Learning Outcomes

On successful completion of this module students will achieve the following learning outcomes:

Module Learning Outcomes	Reference
Show a detailed knowledge and understanding of the theoretical background on which Finite Element Analysis (FEA) and Computational Fluid Dynamics (CFD) are based and the iterative nature of the design/analysis process	MO1
Show a detailed knowledge of how FEA and CFD modelling techniques can be used to analyse engineering components	MO2
Demonstrate subject specific skills with respect to undertake analysis in an integrated CAD environment with an understanding of the underlying principles and their computing implementations	MO3
Demonstrate usage of the pre-processing, solve and post-processing stages of industrial standard CFD and FEA codes, including mesh generation and results validation	MO4

Contact Hours

Independent Study Hours:	
Independent study/self-guided study	114
Total Independent Study Hours:	114
Scheduled Learning and Teaching Hours:	
Face-to-face learning	36
Total Scheduled Learning and Teaching Hours:	36
Hours to be allocated	150
Allocated Hours	150

Reading List

The reading list for this module can be accessed via the following link:

https://uwe.rl.talis.com/modules/ufmfu7-15-3.html

Part 5: Contributes Towards

This module contributes towards the following programmes of study: