Module Specification

Computational Fluid Dynamics

Version: 2026-27, v5.0, Approved

Contents

Part 1: Information

Module title: Computational Fluid Dynamics

Module code: UFMFWL-15-M

Level: Level 7

For implementation from: 2026-27

UWE credit rating: 15

ECTS credit rating: 7.5

College: College of Arts, Technology and Environment

School: CATE School of Engineering

Partner institutions: None

Field: Engineering, Design and Mathematics

Module type: Module

Pre-requisites: Applied Thermofluids 2024-25

Excluded combinations: None

Co-requisites: None

Continuing professional development: No

Professional, statutory or regulatory body requirements: None

Part 2: Description

Overview: Complex flow problems that arise in a variety of industrial settings generally can only be solved using computational methods. These flows can involve complex geometries and flow properties and uncertain flow conditions. In this module students learn how to set-up and implement a CFD method using industry standard software applied to a variety of engineering flow problems. The module builds upon the fluid dynamics material that has been developed throughout the

module from level 4 through to level 6 and represents and advanced application of the fundamental scientific and the mathematical principles.

Features: Not applicable

Educational aims: This module equips students with specialist knowledge to develop, implement, and interpret Computational Fluid Dynamics (CFD) methods for solving industrial fluid flow and heat transfer problems.

Outline syllabus: Topics covered likely to include but not limited to:

Introduction to Computational Fluid Dynamics and an industry standard CFD package

Engineering flow problems and underlying physics

Governing equations and numerical techniques

CAD and grid generation

Domains, boundary and initial conditions

Turbulent flow and modelling turbulence

Steady, non- steady and transient flow analysis

Data analysis and handling: Data formats, interchange formats, parallel computing, graphical representation and limitations.

Analysis and comparison of results: Uncertainty, measurements and theoretical solutions

CFD Modelling practice: problem formulation, domain analysis, grid generation, establishing initial conditions and inputs, numerical solution, post processing of results

Part 3: Teaching and learning methods

Teaching and learning methods: This module is delivered through a series of lectorials, combining lecture content and small group tutorial work to ensure that students are able to consolidate understanding of the theoretical and practical material through examples and application. Computational aspects of the module are supported by sessions in the computer simulation lab.

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

MO1 Create Computational Fluid Dynamics (CFD) systems to solve complex thermofluids problems, critically interpret results, and investigate to provide evidence-based conclusions.

MO2 Design and implement advanced numerical frameworks and methodologies to solve practice-based engineering problems, resulting in a detailed, critically evaluated report supported by professional knowledge and literature.

Hours to be allocated: 150

Contact hours:

Independent study/self-guided study = 114 hours

Staff-guided learning = 36 hours

Reading list: The reading list for this module can be accessed at readinglists.uwe.ac.uk via the following link https://rl.talis.com/3/uwe/lists/B0E675E6-B71C-516A-3BF2-C7C3EAB2E015.html?lang=en-GB&login=1

Part 4: Assessment

Assessment strategy: The assessment comprises an individual presentation with an associated oral examination (viva), designed to assess students' knowledge and understanding of Computational Fluid Dynamics (CFD) principles, methods, and

their application to a real industrial problem.

The resit assessment will follow the same format and learning outcomes as the first sit.

Assessment tasks:

Presentation (First Sit)
Description: Presentation/Individual oral examination (30 minutes)
Weighting: 100 %
Final assessment: Yes
Group work: No
Learning outcomes tested: MO1, MO2

Presentation (Resit)
Description: Presentation/Individual oral examination (30 minutes)
Weighting: 100 %
Final assessment: Yes
Group work: No
Learning outcomes tested: MO1, MO2

Part 5: Contributes towards

This module contributes towards the following programmes of study:

Mechanical Engineering [Frenchay] MEng 2023-24

Automotive Engineering [Frenchay] MEng 2023-24

Mechanical Engineering [Sep][PT][Frenchay][7yrs] MEng 2021-22

Automotive Engineering [Frenchay] MEng 2023-24

Mechanical Engineering [Frenchay] MEng 2022-23

Mechanical Engineering [Frenchay] MEng 2023-24

Mechanical Engineering [Frenchay] MEng 2022-23