# MODULE SPECIFICATION

| Part 1: Information | | | |
|---|---|---|---|
| Module Title | Thermoflduid Systems and Computational Flow Dynamics | | |
| Module Code | UFMFAQ-30-3 | Level | Level 6 |
| For implementation from | 2019-20 | | |
| UWE Credit Rating | 30 | ECTS Credit Rating | 15 |
| Faculty | Faculty of Environment & Technology | Field | Engineering, Design and Mathematics |
| Department | FET Dept of Engin Design & Mathematics | | |
| Module type: | Standard | | |
| Pre-requisites | None | | |
| Excluded Combinations | None | | |
| Co- requisites | None | | |
| Module Entry requirements | None | | |

## Part 2: Description

**Overview**: The Thermofluid Systems and Computational Flow Dynamics module focusses on thermofluid systems, the types and designs of typical plant found in nuclear industries, such as fans, compressors and HVAC systems. Key areas for study are understanding fluid flow theory and applying CFD modelling.

**Educational Aims:** Learners will develop the theoretical understanding of fluid flow principles, by investigating hot and cold fluids in fluid flow machines. Learners will study Computational Flow Dynamics (CFD) theory and carry out CFD modelling, which would be used in industry.

**Outline Syllabus:** The topics covered in this unit are:

Thermofluids:
Compressible flow machines design (fans, compressors)
Compressible flow machines (pumps)
Refrigeration and heat pumps
Air conditioning, mixing of air-streams and psychrometry
HVAC systems, combined heat and power (CHP), energy recovery.

CFD:
CFD theory and applications

CFD modelling software
Laminar and turbulent flow conditions
Modelling with Hex geometries
Mesh and mesh characteristics
Boundary flow conditions
Navier-Stokes flow transport equations

**Teaching and Learning Methods:** See Outline Syllabus and Assessment.

**Part 3: Assessment**

Component A – Data Interpretation: Analysing a Case Study – The learner will be given a set of fluids data as a case study and will be asked to perform flow analysis calculations, for example viscosity and flow velocity vectors in a constricted pipe.

Component B – CFD Model – The learners will create a CFD model of fluid flow in a section of nuclear plant and present their results, along with explanations of operating principles, energy use and design of fluid machinery in presentation slides.

The resit assessment tasks for this module will involve a rework and reflective evaluation of the work carried out in the original task.

| First Sit Components | **Final Assessment** | **Element weighting** | **Description** |
|---|---|---|---|
| Set Exercise - Component B | | 45 % | Presentation slides |
| Practical Skills Assessment - Component B | | 30 % | CFD model |
| Case Study - Component A | ✓ | 25 % | Data interpretation - analysing a case study |
| Resit Components | **Final Assessment** | **Element weighting** | **Description** |
| Set Exercise - Component B | | 45 % | Presentation slides |
| Practical Skills Assessment - Component B | | 30 % | CFD model |
| Case Study - Component A | ✓ | 25 % | Data interpretation - analysing a case study |

**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 |
|---|---|
| Conduct thermofluid and flow analysis calculations | MO1 |
| Explain and analyse the operating principles of HVAC and fluid machinery | MO2 |
| Explain and evaluate energy use, design and cost drivers of fluid machinery | MO3 |
| Design and create computational fluid dynamics (CFD) models | MO4 |

Contact Hours

| | |
|---|---|
| **Independent Study Hours:** | |
| Independent study/self-guided study | 228 |
| **Total Independent Study Hours:** | 228 |
| **Scheduled Learning and Teaching Hours:** | |
| Face-to-face learning | 72 |
| **Total Scheduled Learning and Teaching Hours:** | 72 |
| **Hours to be allocated** | 300 |
| **Allocated Hours** | 300 |

Reading List

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

https://uwe.rl.talis.com/index.html

**Part 5: Contributes Towards**

This module contributes towards the following programmes of study: