Module Specification

Aerospace Thermofluids

Version: 2023-24, v2.0, 23 Mar 2023

Contents

Part 1: Information

Module title: Aerospace Thermofluids

Module code: UFMFQU-15-1

Level: Level 4

For implementation from: 2023-24

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: None

Excluded combinations: None

Co-requisites: None

Continuing professional development: No

Professional, statutory or regulatory body requirements: None

Part 2: Description

Overview: Fluid dynamics and thermodynamics are fundamental to the understanding of aerospace vehicle design, structure and performance. Understanding aerodynamics, propulsion, structural integrity, hydraulics all require a sound understanding of the principles of thermofluids.

The module is designed to provide a solid foundation of knowledge, with practical exercises that reinforce theory and will enable the extension to specialist knowledge

in future years. Theory is underpinned by experiment and observation so that students can properly understand the mechanisms at work.

Features: Not applicable

Educational aims: The aim of this module is to introduce the fundamental concepts in fluid dynamics, thermodynamics and heat transfer for aerospace scientific methods and applications.

Outline syllabus: Conservation principles of mass, momentum and energy including continuity, fluid momentum, Bernoulli's principle, work, heat and energy
Key Concepts and laws of thermodynamics
Phase Change and Steam
Non-Flow Energy Equation (NFEE) and Steady Flow Energy Equation (SFEE)
Gas Processes and Gas Laws
Hydrostatics
Dimensional Analysis
Incompressible and viscous flow including laminar and turbulent flow
Flow measurements including measurement systems and uncertainty analysis
Heat Engines and Thermodynamic Cycles
Introduction to heat transfer including conduction, convection, radiation, two-phase heat transfer and heat exchangers

Part 3: Teaching and learning methods

Teaching and learning methods: The method of teaching and learning is designed so that students can quickly consolidate theoretical principles through exercises and laboratory experiments.

Lectures and lectorial sessions are used to convey concepts and principles which are then backed up by tutorials, self-paced sessions and hands-on laboratory experiments.

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

MO1 Provide an accurate explanation of thermofluid properties and principles in fluid mechanics in introductory aerospace design scenarios (SM1b, SM2b)

MO2 Describe and perform a basic analysis of the thermodynamics cycle (SM2b)

MO3 Accurately assess simple flows and their behaviours (SM2b)

MO4 Apply practical and laboratory skills relevant to thermofluid processes (P3, P8).

Hours to be allocated: 150

Contact hours:

Independent study/self-guided study = 108 hours

Laboratory work = 4 hours

Total = 148

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/7B96BB76-EEF8-B0EA-00B1-1EFCA6F7212F.html?lang=en-US&login=1

Part 4: Assessment

Assessment strategy: The assessment strategy is designed to encourage regular engagement with the acquisition of skills and knowledge which is motivated through observation and experiment and assessed through a laboratory report.

The end of module examination assesses that students have a sound understanding of concepts and principles that are required for studies in aerodynamics, aerospace structures and propulsion systems encountered later in the programme. The examination will include analysis and reflection of experimental data from laboratory sessions.

The resit assessment will have the same format as the first sit assessment.

Assessment tasks:

Examination (Online) (First Sit)
Description: Online examination (2 hours)
Weighting: 75 %
Final assessment: Yes
Group work: No
Learning outcomes tested: MO1, MO2, MO3

Laboratory Report (First Sit)
Description: Laboratory report (2500 words)
Weighting: 25 %
Final assessment: No
Group work: No
Learning outcomes tested: MO1, MO3, MO4

Examination (Online) (Resit)
Description: Online examination (2 hours)
Weighting: 75 %
Final assessment: Yes
Group work: No
Learning outcomes tested: MO1, MO2, MO3

Laboratory Report (Resit)
Description: Laboratory report (2500 words)
Weighting: 25 %
Final assessment: No
Group work: No
Learning outcomes tested: MO1, MO3, MO4

Part 5: Contributes towards

This module contributes towards the following programmes of study:

Aerospace Engineering {Apprenticeship-UWE} [UCW] BEng (Hons) 2023-24

Aerospace Engineering {Apprenticeship-UCW} [UCW] BEng (Hons) 2023-24

Aerospace Engineering {Apprenticeship-UCW} [UCW] BEng (Hons) 2023-24

Aerospace Engineering [Frenchay] BEng (Hons) 2023-24

Aerospace Engineering [Frenchay] MEng 2023-24

Aerospace Engineering with Pilot Studies [Frenchay] MEng 2023-24

Aerospace Engineering {Apprenticeship-UWE} [UCW] BEng (Hons) 2023-24

Aerospace Engineering with Pilot Studies [Frenchay] BEng (Hons) 2023-24

Aerospace Engineering with Pilot Studies [Frenchay] MEng 2023-24

Aerospace Engineering {Apprenticeship-UCW} [UCW] BEng (Hons) 2023-24

Aerospace Engineering {Apprenticeship-UCW} [UCW] BEng (Hons) 2023-24

Aerospace Engineering [Frenchay] BEng (Hons) 2023-24

Aerospace Engineering [Frenchay] MEng 2023-24

Aerospace Engineering with Pilot Studies [Frenchay] BEng (Hons) 2023-24

Aerospace Engineering with Pilot Studies {Foundation} [Frenchay] BEng (Hons) 2022-23

Aerospace Engineering {Foundation} [Frenchay] BEng (Hons) 2022-23