Module Specification

Fundamental Aerodynamics

Version: 2023-24, v6.0, 07 Jun 2023

Contents

Part 1: Information

Module title: Fundamental Aerodynamics

Module code: UFMFRK-15-2

Level: Level 5

For implementation from: 2023-24

UWE credit rating: 15

ECTS credit rating: 7.5

Faculty: Faculty of Environment & Technology

Department: FET Dept of Engineering Design & Mathematics

Partner institutions: None

Field: Engineering, Design and Mathematics

Module type: Module

Pre-requisites: Aerospace Thermofluids 2022-23

Excluded combinations: None

Co-requisites: None

Continuing professional development: No

Professional, statutory or regulatory body requirements: None

Part 2: Description

Overview: A thorough knowledge of the principles of aerodynamics is essential for the design of aerodynamic structures, components and systems and to optimise performance. In this module students will continue building on their knowledge gained at level 4 and apply their knowledge to realistic situations that would be encountered by an aerospace engineer.

The core aerodynamic knowledge and principles are consolidated through an assessed group activity based on numerical simulations.

Features: Not applicable

Educational aims: The aim of this module is to introduce fundamental concepts in aerodynamics and to show their practical significance for aircraft.

Outline syllabus: In this module you will cover fundamental concepts in aerodynamics relevant to aerospace engineering, including:

Basic concepts on potential flow theory ; 2D aerofoils and 3D wing theory.

Subsonic flow over aerofoils and wings

Transonic and supersonic flows over aerofoils

High lift devices and associated technologies

Introduction to numerical simulation using Computational Fluid Dynamics (CFD): relevant equations; principles of discretisation; turbulence models; mesh generation; boundary conditions; accuracy and convergence; post-processing; validation and assessment of results.

Part 3: Teaching and learning methods

Teaching and learning methods: This module combines lectures and tutorials to introduce and convey keys concepts of aerodynamic theory and aerodynamic flows consolidated by worked examples, supervised computer simulations, and self-paced tutorial questions.

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

MO1 Apply aerodynamic theory to calculate and describe subsonic, transonic and supersonic flows (SM2b, SM6m, EA2).

MO2 Implement numerical models, including CFD, to produce validated simulations of aerodynamic flows for basic geometries in different flow regimes (SM5m, EA3b, D3b, P4).

MO3 Demonstrate key transferable skills in problem formulation, self-management and communication (SM3b, EA3b, EA6m, D4, EL3).

MO4 Research and analyse a range of literature to make sound judgements (P4, SM6m, EA5m).

Hours to be allocated: 150

Contact hours:

Independent study/self-guided study = 114 hours

Face-to-face learning = 36 hours

Total = 150

Reading list: The reading list for this module can be accessed at readinglists.uwe.ac.uk via the following link https://uwe.rl.talis.com/index.html

Part 4: Assessment

Assessment strategy: The assessment strategy is designed to ensure that students have secure knowledge in apply mathematical methods to the analysis of aerodynamic problems and are able to apply aerodynamic theory to real engineering problems in an aerospace context.

Two hour end of module examination in invigilated controlled conditions (50%).

An assignment on aerodynamics assessed by a Group Presentation and Viva (50%).

The assignment tests the students on the use of numerical simulation software in which students are required to demonstrate, individually and as a group, detailed understanding and analysis. Through this exercise, students will also be expected to demonstrate awareness of professional literature on aerodynamics theory as well as

demonstrating decision making and communication skills as a member of a group.

When necessary, peer review may be incorporated within the assessment process to ensure that the group work aspect is a positive experience for students and staff.

The resit assessment will replicate the first sit for both components.

Assessment tasks:

Examination (Online) (First Sit)
Description: Online Examination in controlled conditions (invigilated)
Weighting: 50 %
Final assessment: Yes
Group work: No
Learning outcomes tested: MO1, MO2, MO3, MO4

Presentation (First Sit)
Description: Group Presentation and Viva
Weighting: 50 %
Final assessment: No
Group work: Yes
Learning outcomes tested: MO1, MO2, MO3, MO4

Examination (Online) (Resit)
Description: Online Examination in controlled conditions (invigilated)
Weighting: 50 %
Final assessment: Yes
Group work: No
Learning outcomes tested:

Presentation (Resit)
Description: Group Presentation / Viva
Weighting: 50 %
Final assessment: No

Group work: Yes

Learning outcomes tested:

Part 5: Contributes towards

This module contributes towards the following programmes of study:

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

Aerospace Engineering {Apprenticeship-UCW} [UCW] BEng (Hons) 2022-23

Aerospace Engineering with Pilot Studies [Frenchay] MEng 2022-23

Aerospace Engineering {Apprenticeship-UCW} [UCW] BEng (Hons) 2022-23

Aerospace Engineering [Frenchay] MEng 2022-23

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

Aerospace Engineering {Apprenticeship-UWE} [UCW] BEng (Hons) 2022-23

Aerospace Engineering {Foundation} [Sep][FT][Frenchay][4yrs] BEng (Hons) 2021-22

Aerospace Engineering {Foundation} [Sep][SW][Frenchay][5yrs] BEng (Hons) 2021-22

Aerospace Engineering with Pilot Studies {Foundation} [Sep][SW][Frenchay][5yrs] BEng (Hons) 2021-22

Aerospace Engineering with Pilot Studies {Foundation} [Sep][FT][Frenchay][4yrs] BEng (Hons) 2021-22

Aerospace Engineering Manufacturing [Sep][PT][UCW][3yrs] - Withdrawn FdSc 2021-22

Aerospace Engineering [Sep][PT][Frenchay][8yrs] - Not Running MEng 2020-21

Aerospace Engineering (Systems) [Sep][PT][Frenchay][8yrs] - Not Running MEng 2020-21

Aerospace Engineering (Design) [Sep][PT][Frenchay][8yrs] - Not Running MEng 2020-21

Aerospace Engineering (Manufacturing) [Sep][PT][Frenchay][8yrs] - Not Running MEng 2020-21

Aerospace Engineering with Pilot Studies (Manufacturing) [Sep][PT][Frenchay][6yrs] - Not Running BEng (Hons) 2020-21

Aerospace Engineering with Pilot Studies (Design) [Sep][PT][Frenchay][6yrs] - Not Running BEng (Hons) 2020-21

Aerospace Engineering with Pilot Studies (Systems) [Sep][PT][Frenchay][6yrs] - Not Running BEng (Hons) 2020-21

Aerospace Engineering with Pilot Studies [Sep][PT][Frenchay][6yrs] - Not Running BEng (Hons) 2020-21