Module Specification

Further Aerodynamics

Version: 2024-25, v4.0, 30 Jul 2024

Contents

Part 1: Information

Module title: Further Aerodynamics

Module code: UFMFXU-15-3

Level: Level 6

For implementation from: 2024-25

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: Fundamental Aerodynamics 2023-24

Excluded combinations: None

Co-requisites: None

Continuing professional development: No

Professional, statutory or regulatory body requirements: None

Part 2: Description

Overview: Advanced Aerodynamics aims to build on the fundamental aerodynamics and complete the undergraduate education in aerodynamics. Applications of the Navier-Stokes equations to boundary layers and compressible flow are investigated and low order numerical modelling of flows are considered.

Features: Not applicable

Educational aims: The module aims to provide a complete understanding of the principles of fundamental aerodynamics

Outline syllabus: Fundamentals of viscous flows: conservation laws, laminar boundary layer and turbulent boundary layer.

Pressure gradient and boundary layer separation.

Flow transition: boundary layer transition process, prediction of the onset of transition.

Compressible flow: governing equations for normal and oblique shock waves, expansion waves, shock interactions, and application to diffusers, nozzles and engine intakes.

Horseshoe vortex systems and panel codes.

Use of the wind tunnel for internal and external aerodynamics.

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, laboratory experiments and application in coursework.

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

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

MO1 Application of the theory for predicting boundary layer development, flow separation, transition and supersonic flow properties. (SM1b, SM2b)

MO2 Application of analytical/numerical models/methods to produce simulations of aerodynamic flows (SM1b, SM2b, EA3b)

MO3 Application of ground based experimental facilities to acquire and process suitable data, and analyse flow simulations (SM1b, SM2b, P3, P8)

MO4 Demonstrate key transferable skills in problem formulation and decision making, self-management and communication (P4)

Hours to be allocated: 150

Contact hours:

Independent study/self-guided study = 114 hours

Lectures = 24 hours

Total = 0

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/lists/08A7CA93-B6A4-AC26-C705-3B68E362FB4E.html?draft=true&lang=en&login=1&version=v1

Part 4: Assessment

Assessment strategy: The assessment for this module is as follows:

An examination that will test understanding of learning outcomes relating to analytical skills on aerodynamics

A written assignment that ensures that students are able to demonstrate their understanding of underpinning principles within a practical or simulated practical environment where a portfolio of practical skills are assessed for example wind tunnels and numerical codes. A group report will be submitted with details defined in cw briefing.

The resit assignment will be an individual report, again details to be defined in resit cw briefing.

Assessment tasks:

Examination (First Sit)
Description: Written Examination (3 hours)
Weighting: 50 %
Final assessment: Yes
Group work: No
Learning outcomes tested: MO1, MO3

Written Assignment (First Sit)
Description: Coursework (Max. 2500 words)
Weighting: 50 %
Final assessment: No
Group work: Yes
Learning outcomes tested: MO1, MO2, MO3, MO4

Examination (Resit)
Description: Written Examination (3 hours)
Weighting: 50 %
Final assessment: Yes
Group work: No
Learning outcomes tested: MO1, MO3

Written Assignment (Resit)
Description: Coursework (Max. 2500 words)
Weighting: 50 %
Final assessment: No
Group work: No
Learning outcomes tested: MO1, MO2, MO3, MO4

Part 5: Contributes towards

This module contributes towards the following programmes of study:

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

Aerospace Engineering [Sep][SW][Frenchay][4yrs] BEng (Hons) 2021-22

Aerospace Engineering [Sep][SW][Frenchay][5yrs] MEng 2021-22

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

Aerospace Engineering {Foundation} [Sep][SW][Frenchay][5yrs] BEng (Hons) 2020-21

Aerospace Engineering with Pilot Studies {Foundation} [Sep][SW][Frenchay][5yrs] BEng (Hons) 2020-21

Aerospace Engineering with Pilot Studies [Sep][SW][Frenchay][5yrs] MEng 2021-22

Aerospace Engineering with Pilot Studies [Sep][SW][Frenchay][4yrs] BEng (Hons) 2021-22

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

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

Aerospace Engineering [Frenchay] MEng 2022-23

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

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

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