Module Specification

Principles of Aerodynamics

Version: 2025-26, v1.0, 29 Jul 2024

Contents

Part 1: Information

Module title: Principles of Aerodynamics

Module code: UFMEAN-15-2

Level: Level 5

For implementation from: 2025-26

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: Aeronautical Principles 2024-25

Excluded combinations: None

Co-requisites: None

Continuing professional development: No

Professional, statutory or regulatory body requirements: None

Part 2: Description

Overview: Advancing knowledge of the principles of aerodynamics is pivotal in design aerodynamic components, from structures to systems, ensuring peak performance. In this module, apprentices build on foundational knowledge gained at level 4 and continue to develop and apply their knowledge in scenarios related to real-world challenges faced by aerospace engineers.

Features: Not applicable

Educational aims: The aim of this module is to introduce fundamental concepts in aerodynamics for subsonic and supersonic flight principles and to show their practical significance for aircraft.
Apprentices will be able to develop skills required for work placement related projects and build on fundamental principles as a necessary skill for future modules.

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

- 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 will combine 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.

MO2 Analyse and reflect on numerical models, including CFD, when producing validated simulations of aerodynamic flows for basic geometries and different flow regimes.

Hours to be allocated: 150

Contact hours:

Independent study/self-guided study = 114 hours

Face-to-face learning = 36 hours

Total = 0

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/259DDDD8-5343-FA12-00D8-C6674B311CC8.html?lang=en-GB&login=1

Part 4: Assessment

Assessment strategy: The assessment strategy is designed to ensure that apprentices 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. The apprentices will require to also reflect on numerical simulation software constrains and demonstrate their understanding of how a software computes those analysis.

A three hour end-of-term invigilated controlled condition examination.

The resit assessment will replicate the first sit.

Assessment tasks:

Examination (First Sit)
Description: In person exam (3 hours)
Weighting: 100 %
Final assessment: Yes
Group work: No
Learning outcomes tested: MO1, MO2

Examination (Resit)
Description: In person exam (3 hours)

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:

Aeronautical Engineering {Apprenticeship-UCW}[UCW] BEng (Hons) 2024-25