Module Specification

Introduction To Aerospace Engineering

Version: 2026-27, v2.0, Approved

Contents

Part 1: Information

Module title: Introduction To Aerospace Engineering

Module code: UFMFRU-15-1

Level: Level 4

For implementation from: 2026-27

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: This module introduces students to the fundamental principles of aerodynamics with a focus on aerofoil theory and aircraft performance. It begins with the basics of fluid mechanics and atmospheric properties, progressing through the analysis of aerofoils and finite wings, and culminating in the study of aircraft performance across various flight phases including take-off, climb, cruise, and glide. Students will develop a solid understanding of how aerodynamic forces are generated and how they influence aircraft behaviour. The module also covers

essential concepts in weight and balance, providing insight into aircraft stability and control.
Through theoretical exploration and applied problem-solving, students will gain the analytical skills necessary to evaluate and predict aircraft performance in real-world scenarios.

Students also undertake a model aircraft design and build project where they apply this aerospace knowledge and the engineering design process to define, select the most promising solution and manufacture and evaluate the prototype solution. Students communicate their model aircraft design and build project findings and analysis through a group presentation.

Features: Not applicable

Educational aims: The aim of this module is to introduce the field of aerospace engineering, the aerospace product life cycle and core aerospace knowledge and principles which are consolidated through an assessed model aircraft design and build activity.

Outline syllabus: Topics are likely to include but are not limited to:

Atmosphere and Fluid Mechanics
Introduction to the International Standard Atmosphere (ISA); variation of pressure, temperature, and density with altitude; fundamentals of fluid flow, including continuity, momentum, and energy equations; Bernoulli’s principle; basic concepts of viscosity and compressibility.

Aerofoil Theory
Aerofoil geometry and terminology (chord, camber, thickness); pressure distribution and lift generation; modelling aerofoil behaviour.

Basic Aerodynamics
Overview of aerodynamic forces: lift, drag, thrust, and weight; circulation theory; aerodynamic coefficients and their applications.
Finite Wing Theory and 3D Effects
Limitations of 2D aerofoil analysis; introduction to finite wing theory; induced drag

and spanwise flow; transition from 2D to 3D modelling.

Aircraft Flight Performance
Analysis of take-off roll using basic integration; climb performance including rate and angle; cruise performance using the Breguet range equation; fuel efficiency and optimal cruise conditions.
Flight Planning and Operations
Application of performance data to flight planning; operational considerations across different flight phases.

Weight and Balance
Centre of gravity and moment calculations; stability implications; aircraft loading diagrams and CG limits.

Data and Design Foundations
Introduction to sampling methods and basic statistical techniques for aerodynamic data; overview of the engineering design process in an aerospace context.

Part 3: Teaching and learning methods

Teaching and learning methods: This module uses a blend of traditional lectures to introduce and convey concepts and core aerospace knowledge and principles, which are consolidated through tutorials and self-paced sessions.

Students will have the opportunity to further consolidate their learning and apply their knowledge and understanding to the hands-on model aircraft design and build activity.

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

MO1 Apply the engineering design process to design and evaluate a prototype solution within the aerospace product life cycle.

MO2 Apply mathematical and statistical methods within simulation tools in the visualisation, analysis and solution of engineering problems.

MO3 Demonstrate knowledge and understanding of aircraft composition and mechanical, hydraulic and electrical systems as well as performance and the underlying scientific and engineering principles of their operation.

Hours to be allocated: 150

Contact hours:

Independent study/self-guided study = 112 hours

Staff-guided learning = 38 hours

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: This module is assessed as following:

In-person examination:
The exam is designed to assess students' understanding of core aerodynamic principles, their ability to apply theoretical knowledge to practical aircraft performance scenarios, and their analytical skills in interpreting aerofoil and flight data.

The exam will cover:
Fundamental aerodynamic theory and aerofoil characteristics
Atmospheric properties and fluid mechanics relevant to flight
Finite wing effects and 2D to 3D transitions
Aircraft performance phases: climb, take-off, cruise, glide
Weight and balance calculations and implications

The resit assessment strategy is the same as the first sit.

Assessment tasks:

Examination (First Sit)
Description: Examination 3 hours. Assess students' understanding of core principles taught on the module
Weighting: 100 %
Final assessment: Yes
Group work: No
Learning outcomes tested: MO1, MO2, MO3

Examination (Resit)
Description: Examination 3 hours. Assess students' understanding of core principles taught on the module
Weighting: 100 %
Final assessment: Yes
Group work: No
Learning outcomes tested: MO1, MO2, MO3

Part 5: Contributes towards

This module contributes towards the following programmes of study:

Aerospace Engineering {Foundation} [Frenchay] BEng (Hons) 2025-26

Aerospace Engineering [Frenchay] BEng (Hons) 2026-27

Aerospace Engineering {Apprenticeship-UWE} [UCW] BEng (Hons) 2026-27

Aerospace Engineering [Frenchay] BEng (Hons) 2026-27

Aerospace Engineering [Frenchay] MEng 2026-27

Aerospace Engineering {Apprenticeship-UWE} [UCW] BEng (Hons) 2026-27

Aerospace Engineering [Frenchay] MEng 2026-27

Aerospace Engineering {Foundation} [Frenchay] BEng (Hons) 2025-26