Programme Specification

Aerospace Engineering {Apprenticeship-UWE} [UCW]

Version: 2024-25, v3.0, 03 Sep 2024

Contents

Section 1: Key Programme Details

Part A: Programme Information

Programme title: Aerospace Engineering {Apprenticeship-UWE} [UCW]

Highest award: BEng (Hons) Aerospace Engineering

Interim award: BEng Aerospace Engineering

Interim award: DipHE Aerospace Engineering

Interim award: CertHE Aerospace Engineering

Awarding institution: UWE Bristol

Affiliated institutions: University Centre Weston

Teaching institutions: University Centre Weston, UWE Bristol

Study abroad: No

Year abroad: No

Sandwich year: No

Credit recognition: No

School responsible for the programme: CATE School of Engineering, College of Arts, Technology and Environment

Professional, statutory or regulatory bodies:

Royal Aeronautical Society (RAeS)

Apprenticeship: ST0010

Modes of delivery: Full-time

Entry requirements:

For implementation from: 01 September 2023

Programme code: H49212

Section 2: Programme Overview, Aims and Learning Outcomes

Part A: Programme Overview, Aims and Learning Outcomes

Overview: The curriculum is designed for students seeking an engineering education closely aligned to engineering practice. Technical knowledge, engineering practice, business awareness and sustainability are integrated through projects and revisited to produce confident graduates able to apply their skills to novel situations and create engineering solutions that benefit society.

Professional development is placed at the heart of the curriculum. From day one, students are taken on a journey from student engineer to graduate engineer, preparing them for life as an engineering professional. Students will identify, develop and demonstrate competencies expected of a professional engineer in the workplace. Projects and activities, embedded throughout the curriculum, are designed to develop the engineering habits of mind such as: Problem-finding, Problem-solving, Improving, Adapting, and Systems and Critical Thinking. Foundation principles of engineering science, skills and practice are integrated throughout all years of study.

Aerospace engineers are predominantly employed throughout the aerospace, aviation and the wider technical sector in the design, manufacture and improvement of aerospace vehicles, integrated systems, and associated operations. Consequently, aerospace engineering graduates need to be able to integrate engineering knowledge skills from across engineering and be able to be an effective member of a multidisciplinary team. Aerospace engineering topics including systems design, engineering analysis, materials, structures, stress analysis and manufacturing, aerodynamics, thermofluids, flight and propulsion are developed throughout the core modules and taken an advanced level in the optional modules. Approaches commonly found in the Aerospace industry such as flight simulation, systems engineering, safety management systems and have been included in the core programme of study.

The ability to work in multidisciplinary teams on projects that require a broader view of the role of engineering in industry and society is developed through the core programme using project weeks to bring students together in problem finding and solution spaces where students are able to interact with each other as a team, under the supervision of academics and external practitioners.

The integration of knowledge, skills and practice allows the tacking of real engineering challenges and encourage students to engage with the wider role that aerospace engineers and specifically engineering habits of mind can play in tackling global challenges. This is an accessible and modern engineering curriculum designed to attract students from diverse backgrounds able to see the future role of engineering in industry and society.

Features of the programme: Distinctive Features:

Immersive Project Weeks create student engineer community within curriculum and new building.

Integrated Learning Framework and use of problem-based and project-based learning.

Industry informed curriculum

Engineering Practice modules to scaffold the journey from student engineer to graduate engineer.

Professional and personal development embedded throughout all levels of the programme.

Interdisciplinary projects

Real engineering problems in core curriculum where students can explore industrial, environmental and societal impact of discipline.

Mathematics skills aligned taught in engineering context.

Educational Aims: As a result of successful completion of this programme, a student will

Be able to work as a graduate Aerospace engineer across the engineering sector as an effective member of a multidisciplinary team.

Have acquired the knowledge and understanding of scientific principles and methods necessary to underpin an education in engineering. The programme will provide insight into, and practical skills in, the design, operation manufacture and improvement of complex aerospace vehicles and will explore the environmental impact of engineering.

Have demonstrated an ability to integrate their knowledge and understanding of core subject material in order to solve a substantial range of engineering problems, including ones of a complex nature either individually or as part of a team.

Have developed and demonstrated understanding of the competencies and social responsibilities required by a professional engineer in the workplace and society. Activities to scaffold this development are embedded throughout the core curriculum to develop the engineering habits of mind. As a consequence, students will be able to critically appraise the value and effectiveness of future engineering innovations in the field in terms of business improvement and environmental sustainability.

Have the requisite academic knowledge, skills and preparation for progression to study for higher degrees in appropriate engineering disciplines.

Programme Learning Outcomes:
On successful completion of this programme graduates will achieve the following learning outcomes.

Programme Learning Outcomes

PO1. Understand, identify and demonstrate the role and professional values of the engineer in industry, including upholding legal, ethical, health and safety requirements

PO2. Apply mathematical and scientific principles, concepts and theories appropriate to aerospace engineering, as a method for formulating, assessing and communicating solutions for complex problems

PO3. Model aerospace vehicles, components and systems using analytical, numerical and experimental techniques, compatible with industrial practice

PO4. Evaluate the manufacturing, financial, marketing implications of design proposals developed

PO5. Apply an integrated or systems approach, and established and novel engineering analysis concepts to solve complex aerospace engineering problems

PO6. Communicate and operate effectively either as members of inter-disciplinary or multi-disciplinary teams; managing time and resources to given constraints

PO7. Pursue independent study, undertake enquiry into novel and unfamiliar concepts and implement change in an engineering environment

PO8. Make considered judgements and decisions on complex engineering issues in which not all facts and consequences are accurately known

Assessment strategy: The assessment strategy for this apprenticeship programme is designed to connect topics and levels within the curriculum and to enable apprentices to reflect upon their development. The assessment methods on the programme are aligned to the requirements the ST0010 Standard, and for accreditation, of the Royal Aeronautical Society (RAeS) who place high importance on the demonstration of authentic and verifiable learning outcomes for each individual apprentice. This can lead to a reliance on written examinations and limit the scope for project or group work activities. Therefore, we have widened the range of activities within our examinations to include more open book examinations, questions based on pre-seen scenarios, questions that build on practical laboratory-based activities and computer-based examinations where apprentices demonstrate the use of software to solve engineering problems.

The above factors influence and inform the design of this programme's assessment strategy.

In year 1 the Engineering Practice 1 module develops professional attributes and engineering habits of mind through activities and assessments that encourage reflections through a structured portfolio and presentations. As part of the portfolio we have the concept of a "passport" where apprentices demonstrate key professional skills such as workshop skills, library skills and health and safety awareness. This aligns with the required apprenticeship portfolio development.

The assessment strategies of the other core level 4 modules each designed to make sure that the content covered is connected. Solid Mechanics, Materials and Manufacturing and Dynamics Modelling and Simulation are strong examples of the design as apprentices are assessed on key technical material during or at the end of the first semester, then moving to an exercise where the knowledge and skill is assessed in the context of an engineering design problem and then with a controlled assessment at the end of the module. The written examination references and builds upon design activities undertaken during the module and provides an efficient vehicle for integrating the different module elements and assessing individual knowledge. The assessment strategy is programmatic and connects the two immersive project weeks with the task from the first informing the second where a more technical treatment is considered bringing the content from these two modules together.

The level 4 module Aerospace Thermofluids has an examination where questions are based around previously completed laboratory sessions, an activity that should mean that they are fully engaged and aware of how to prepare for that assessment. The level 4 module aerospace engineering uses a mixture of online DEWIS assessment to assess knowledge and understanding and a group presentation for apprentices to communicate their wing design project findings and analysis. The assessment at level 4 should create the culture required for apprentices to embrace active learning styles.

At level 5 Structural Mechanics, Fundamental Aerodynamics and Flight modules all provide examples of how content and assessment is developed from level 4 to level 5. The immersive project weeks are used by the project- and professionalism-orientated modules Engineering Practice 2 and Engineering Research.

The module Engineering Practice 2 takes over from the level 4 version and relies on the importance and creation of the team with key roles allocated and the dynamics of the team monitored through a regular peer assessment process. The problem to be tackled and forms the vehicle for the assessment is designed to be motivational and accessible and is assessed through group presentation.

Optional modules provide the opportunity to pursue specialist areas and a variety of assessment approaches are used for these modules.

Also at Level 5, Engineering Research is designed to have a significant impact on research skills development. Apprentices work in groups to scope out research ideas. They then work with technical and academic staff to investigate potential engineering topics for their EPA projects that will be pitched as an individual presentation that will feed forward to an individual written proposal to be developed further in the Level 6 Professionalism for Engineering Apprentices module. Apprentices will commence their EPA project later in Year 4, after they successfully complete the Apprenticeship Gateway.

In Year 4 before Gateway, apprentices will complete the other requirements for Professionalism for Engineering Apprentices to showcase their understanding and skill as engineering practitioners. The connection between the Engineering Research and Professionalism for Engineering Apprentices modules strengthens performance, management and consistency of the EPA Project.

The Aerospace Design Project module provides apprentices with a unique opportunity to work on an complex aerospace design problem set by industry during the course of their studies. The department has strong links with industry and previous aerospace group projects embedded within the curriculum include the Aircraft design project developed by Airbus and the landing gear design project

developed by Safran. The assessment for this module replicates a professional environment with apprentices from a range of organisations conducting group design review meetings that form part of the assessment, extending their networks and broadening their understanding of the engineering sector's advanced organisational integration requirements.

The portfolio developed as part of the apprenticeship and the individual engineering project both feature in the End Point Assessment (EPA) process. Apprentices are only able to progress to Gateway on successful completion of 330 credits and submission of their portfolio, at which point they commence the individual EPA project activity towards the EPA module “Aerospace Engineer Apprenticeship (Integrated) End Point Assessment”.

This activity is the final stage of the apprenticeship, once all taught modules are completed. Apprentices must pass both the project activity assessment requirements, and the professional discussion required from the module assessment profile to meet the ST0010 Standard’s EPA requirements.

Student support: Student Support:

Espresso Engineering and Espresso Maths drop-in support stations

Personality and professional strengths finding activity at start of programme.

Mathematics diagnostic testing and follow-up interventions early in year 1.

Development of group work skills and attributes.

Academic mentors to provide continuity of support to SpLD students

Academic personal tutors

Video capture of course content delivery

E-assessments for rapid feedback

Part B: Programme Structure

Manufacturing pathway

Year 1
Year 1 is delivered at UCW.

Year 1 Compulsory Modules
The student must take 120 credits from the modules in Compulsory Modules.

Module Code	Module Title	Credit
UFMFRU-15-1	Aerospace Engineering 2024-25	15
UFMFQU-15-1	Aerospace Thermofluids 2024-25	15
UFMFMS-30-1	Dynamics Modelling and Simulation 2024-25	30
UFMFKS-30-1	Engineering Practice 1 2024-25	30
UFMFLS-30-1	Solid Mechanics, Materials and Manufacturing 2024-25	30

Year 2
Year 2 is delivered at UWE.

Year 2 Compulsory Modules
The student must take 90 credits from the modules in Compulsory modules.

Module Code	Module Title	Credit
UFMFQS-15-2	Engineering Practice 2 2025-26	15
UFMFFK-15-2	Flight 2025-26	15
UFMFTU-15-2	Fundamental Aero-Propulsion 2025-26	15

UFMFRK-15-2	Fundamental Aerodynamics 2025-26	15
UFMFSS-30-2	Structural Mechanics 2025-26	30

Year 3
Year 3 is delivered at UWE.

Year 3 Compulsory Modules
The student must take 60 credits from the modules in Compulsory Modules.

Module Code	Module Title	Credit
UFMFSU-15-2	Aerospace Systems Design 2026-27	15
UFMF7V-15-3	Digital Manufacturing in Aerospace 2026-27	15
UFMFRS-15-2	Engineering Research 2026-27	15
UFMFSL-15-3	Integrated Electro-Mechanical Systems 2026-27	15

Year 3 Optional Modules
The student must take 30 credits from the Optional Modules, consisting of EITHER both modules in Group A OR both modules in Group B. Modules from Groups A and B cannot be mixed.

Year 3 Optional Modules Group A
The student can either take both modules in Group A, or both modules in Group B; modules from the two groups cannot be mixed.

Module Code	Module Title	Credit
UFMFVU-15-3	Aero Structures 2026-27	15
UFMFU6-15-3	Composite Engineering 2026-27	15

Year 3 Optional Modules Group B
The student can either take both modules in Group A, or both modules in Group B; modules from the two groups cannot be mixed.

Module Code	Module Title	Credit

UFMFYU-15-3	Further Aero-Propulsion 2026-27	15
UFMFXU-15-3	Further Aerodynamics 2026-27	15

Year 4
The End-Point Assessment module UFME7T-30-3 will begin in year 4 but it will be completed beyond the end of year 4. The duration of the programme will be 4 years 4 months.

Year 4 is delivered at UWE.

Year 4 Compulsory Modules
The student must take 60 credits from the modules in Compulsory Modules.

Students must have achieved 330 credits before they can pass through gateway and take the End-Point Assessment module UFME7T-30-3.

Module Code	Module Title	Credit
UFME7T-30-3	Aerospace Engineer Apprenticeship (Integrated) End Point Assessment 2027-28	30
UFMFUU-15-3	Aerospace Group Design Project 2027-28	15
UFMEAR-15-3	Professionalism for Engineering Apprentices 2027-28	15

Part C: Higher Education Achievement Record (HEAR) Synopsis
Graduates of this programme will be equipped with a broad understanding of systems design, engineering analysis, materials, structures, stress analysis and manufacturing, aerodynamics, thermofluids, flight and aero-propulsion.

The programme produces graduates with an integrated or systems engineering approach to engineering problem solving. Graduates from this programme will also be equipped to work in multi-disciplinary teams, able to critically appraise existing ideas and practice and produce creative solutions to engineering problems.

Part D: External Reference Points and Benchmarks

IfATE Standard ST0010 Aerospace Engineer

QAA UK Quality Code for HE

Framework for higher education qualifications (FHEQ)

Subject benchmark statement for Higher Education qualifications in engineering (Oct 2019)

Strategy 2030

University policies

Staff research projects

Relevant PSRB requirements: AHEP4

Industrial Advisory Board

Part E: Regulations

Approved to variant University Academic Regulations and Procedures.

The following variant regulation for compensation applies to learners on this award which is accredited by a PSRB that comes under the auspices of Engineering Council UK.

- The permitted maximum compensated credit is 30 credits for a Bachelors degree .

- The awarding of compensated credit may be considered for an overall module mark in the range 30% to 39% for Levels 4-6.

The following variant regulations apply to the module UFME7T-30-3 Aerospace

Engineer Apprenticeship End Point Assessment only:

Regulation D5 (Requirements to pass a module):

This module has two assessment tasks, each with a mark expressed as a grade (e.g. Distinction/Pass/ Fail), not as a percentage.

Task 1: Project Report and Presentation with Questions is graded Distinction/Pass/Fail.

Task 2: Professional Discussion underpinned by Portfolio is graded Pass/Fail.

The overall module is graded Distinction/Pass/Fail in line with the Aerospace Engineer assessment plan (see left for details).

Regulations D6 (Failure of a Module) and D7 (Failure of a Module Resit):

IfATE regulations state that the apprentice's employer will need to agree that a resit or retake is an appropriate course of action. UWE Bristol's regulations need to align with this.

A resit or retake will be capped at Pass, unless the University determines there are personal or exceptional circumstances outside the control of the apprentice and/or employer which warrant an uncapped resit or retake.

Regulation D11 (Requirements for the Award of an Undergraduate Degree):

The End-Point Assessment module grade will count towards the overall degree classification.