Programme Specification

Aeronautical Engineering {Apprenticeship-UCW}[UCW]

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Section 1: Key Programme Details

Part A: Programme Information

Programme title: Aeronautical Engineering {Apprenticeship-UCW}[UCW]

Highest award: BEng (Hons) Aeronautical Engineering

Interim award: BEng Aeronautical Engineering

Interim award: DipHE Aeronautical Engineering

Interim award: CertHE Aeronautical 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: Not applicable

Apprenticeship: ST0010

Modes of delivery: Full-time

Entry requirements:

For implementation from: 01 September 2024

Programme code: H49813

Section 2: Programme Overview, Aims and Learning Outcomes

Part A: Programme Overview, Aims and Learning Outcomes

Overview: The curriculum is designed for apprentices seeking an engineering education closely aligned to engineering practice used in the engineering industry. 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 and the business needs.

Professional development is placed at the heart of the curriculum. From day one, apprentices are taken on a journey from studying in an educational environment, learning further and applying this learning in their work placements to preparing and gaining experience for life as an engineering professional. Apprentices will identify, develop and demonstrate competencies expected of a professional engineer in the workplace whilst complying with Engineering Council requirements. Projects and activities, embedded throughout the curriculum, are designed to develop the engineering habits of mind such as: Problem-finding, Problem-solving, Visualising, Systems Thinking, Improving, and Adapting. Foundation principles of engineering science, skills and practice are integrated throughout all years of study.

Aeronautical engineers are employed throughout the engineering sector in the creation, maintenance and improvement of engineering operations. Consequently, apprentices in aerospace, aviation or aeronautical engineering need to be able to integrate engineering knowledge and skills from across engineering and be able to be an effective member of a multidisciplinary team. Topics of engineering analysis, design, aerospace and aeronautics, integrated systems and manufacturing are developed and taken to an advanced level. Sufficient aeronautical engineering content has been included in the programme for the study of engineering problems involving the aerospace industry and its sub-systems.

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, supported by projects to bring apprentices together in problem finding

and solution spaces where apprentices are able to interact with each other, academics and external practitioners, along with their placement experts.

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

Upon successful completion of this programme, the apprentice is prepared for a future occupation that directly links with the duties and responsibilities directly linked to the IfATE's Standard ST0010 Aerospace Engineer:

Plan, lead and support the delivery of aerospace projects ensuring integration with key stakeholders, company objectives and strategies.

Communicate key performance indicators, progress, risks (including security risks) and issues at all levels of the business, throughout the product lifecycle and through design reviews and technical reports.

Identify, evaluate, derive and maintain technical requirements for aerospace projects in line with regulatory and certification requirements.

Design or redesign aerospace products, systems and services to fulfil defined project requirements.

Generate, utilise, validate and verify technical analyses models and simulations to predict the performance of aerospace products and systems.

Oversee and project manage the production of prototype systems and components to validate and verify functionality and performance of aerospace products.

Develop, define, execute testing of aerospace products or systems for certification

and stakeholder acceptance.

Analyse test and in-service data to review the suitability and performance of aerospace products and systems, utilising data analytics techniques.

Verify that aerospace processes, products and systems comply with local, national and international regulatory, legislative, customer and company standards throughout the life cycle. For example, quality, environmental, anti-bribery and corruption, Official Secrets Act, export control, health and safety standards.

Review performance of aerospace products, processes and systems, assess the cause of any faults or problems and propose modifications.

Implement and coordinate the continuous improvement of aerospace products, processes and systems.

Features of the programme:
Immersive Project Work creating an apprentice engineer community within curriculum.

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

Industry informed curriculum driven by the trailblazer.

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

Professional and personal development embedded throughout all levels of the programme to meet Engineering Council needs.

Interdisciplinary projects.

Real engineering problems in core curriculum where apprentices can explore

industrial, environmental and societal impact of discipline.

Mathematics skills is taught in an engineering context.

Provides the requisite academic knowledge, skills and preparation for progression to study for higher degrees in appropriate engineering disciples for themselves or as a requirement by their employer.

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

- be able to work as an effective graduate in the aerospace industry across the engineering sector within a multidisciplinary team.

- have acquired the knowledge and understanding of scientific principles, tools and techniques necessary to underpin an education in engineering. The programme will provide insight into, and practical skills in, the creation and maintenance of engineering products 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 range of engineering problems either individually or as part of a team.

- have developed and demonstrated understanding of the competencies and global 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, apprentices 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.

- prepare for an End Point Assessment to successfully complete their apprenticeship.

Programme Learning Outcomes:

On successful completion of this programme graduates will achieve the following learning outcomes.

Programme Learning Outcomes

PO1. Demonstrate a strong understanding of the engineer's role in adhering to legal, ethical, health, and safety regulations throughout an aeronautical and aerospace project's lifecycle. Identify potential risks and failures, ensuring the design, production, and operation of safe and compliant aerospace systems. (Duty 9, 10)

PO2. Adeptly utilise mathematical and scientific principles to solve complex problems in aeronautical and aerospace engineering. Formulate solutions and assess their effectiveness through the application of relevant theories and concepts. (Duty 3, 5)

PO3. Develop analytical, numerical, and experimental techniques to model vehicles, components, and systems related to aeronautical and aerospace engineering. Perform accurate simulations and conduct performance evaluations critical for design optimisation and project success. (Duty 5)

PO4. Identify and demonstrate manufacturing, financial, and marketing considerations that influence design decisions as part of continuous improvement of products, processes and systems whilst contributing to the UN's sustainability goals. Contribute effectively to integrated project teams, balancing technical feasibility with economic viability. (Duty 11)

PO5. Apply a holistic, systems-based approach to solve challenging aeronautical and aerospace engineering problems. Integrate various disciplines, utilising novel engineering analysis tools, and considering the overall impact of design choices and environment. (Duty 1, 4, 6)

PO6. Recognise the importance of collaboration in today's engineering environment, and develop strong communication skills. Work effectively in interdisciplinary teams, manage resources efficiently, and inclusively communicate complex technical concepts clearly to diverse stakeholders. (Duty 1, 2)

PO7. Build detailed knowledge of Aerospace Engineering, pursue independent study and inquiry, demonstrating intellectual curiosity and a commitment to continuous learning. Promote and adapt to new and clean technologies and readily embrace change in the rapidly evolving aerospace industry. (Duty 7, 8)

PO8. Analyse test data, in-service data, and apply advanced analytics techniques to understand and evaluate the performance of aerospace products and systems. Make informed decisions even in situations with incomplete information. (Duty 8, 10)

PO9. Demonstrate an occupational competence through End-Point-Assessment (EPA) assessed by independent specialists and non-specialist audience. Through high-quality reports and presentations, critically evaluate and discuss the professional experiences, and effectively apply quality management systems and continuous improvement methodologies.

Assessment strategy: Assessment Strategy

The assessment strategy for the new curriculum 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 current requirements of the Royal Aeronautical Society (RAeS) who place high importance on the demonstration of authentic and verifiable learning outcomes for each individual apprentice. This consideration can lead to a reliance on written examinations and limit the scope for project or group work activities. We have therefore widened the range of activities within our examinations to include a more diverse assessment framework such as, 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. There is an overall 10% of group assessment throughout the programme to allow apprentices develop their communication and collaboration skills. Overall the assessment strategy has been designed with the intention to suit a diverse audience and apprentices will find at least 8 different assessment types.

The above factors influence and inform the design of this programme's assessment strategy. In year 1 the Professional Practice for Engineers module develops professional attributes and engineering habits of mind through activities and assessments that encourage reflections through a structured portfolio and professional report. Apprentices need to complete a group portfolio based on a given scenario which will enable them to demonstrate the knowledge and skills needed within an engineering project. Apprentices will also provide a professional report based on an engineering ethical dilemma linked to the requirements of the

Engineering Council.

The assessment strategies of the other core level 4 modules each designed to make sure that the content covered is connected. Aeronautical Principles is a strong example of the design as apprentices are assessed first on key technical material, then moving to an exercise where the knowledge and skill is assessed in the context of an engineer when proving theory with practice in a contextual manner with a controlled assessment at the end of the module. The written examination references and builds upon theoretical activities undertaken during the module and provides an efficient driver for integrating the different module elements and assessing individual knowledge.

The level 4 module Aerospace Mathematics and Applications, the level 5 module Principles of Flight and the level 6 module Aerospace Group Design Project, feed into the industry demand needs. Apprentices will have an extended experience using industry standard programmes to solve problem based activities using numerical methods that demand iterations and loops throughout the programme. The assessments at all levels should create the culture required for apprentices to embrace active learning styles and working in groups through learning blocks from wings only to a long haul commercial aircraft.

At level 5 Engineering Research and Collaborative Project provides an example of how content and assessment is developed from level 4 to level 5. The independent continuous professional development and the work-based project subject ensures an immersive focus in their individual and group related softer and wider skills which they are required to develop by the Engineering Council (AHEP4).

The module Engineering Research and Collaborative Project takes over from the level 4 version Professional Practice for Engineers and is a module that 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 that forms the vehicle for the assessment is designed to be motivational and accessible and is assessed through group presentation. Consolidating the knowledge and experience through level 4 and level 5 professional modules, gives

the apprentices a final opportunity at level 6 to generate two presentations as a full-fledged engineering project design to bring all their knowledge together from throughout their studies.

The End-point Assessment (EPA) project proposal is designed to have a significant impact on their work related operations. Apprentices work on their own to scope out research ideas approved by their employers. They then work with technical and academic staff to develop a project proposal that will be pitched as an individual presentation that will feed forward to an individual written proposal. Apprentices should be able to start their individual level 6 EPA project planning and execution during their final year.

Student support: Academic Development sessions and one-to-ones provided by the UCW Academic Development Team.

Welfare, finance and pastoral support provided through the UCW HEART team

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

Year 1

Learners must take 120 credits from the modules in Year 1.

Year 1 is delivered at UCW.

Year 1 Compulsory Modules

Apprentices on the four year programme must take 120 credits from the modules in Compulsory Modules.

Module Code	Module Title	Credit
UFMEAJ-30-1	Aeronautical Principles 2024-25	30
UFMEAK-30-1	Aerospace Mathematics and Applications 2024-25	30
UFME3K-15-1	Fundamentals of Materials for Manufacturing 2024-25	15
UFME3H-15-1	Fundamentals of Mechanical Principles 2024-25	15
UFME3N-30-1	Professional Practice for Engineers 2024-25	30

Year 2

Learners must take 90 credits from the modules in Year 2.

Year 2 is delivered at UCW.

Year 2 Compulsory modules

Learners must take 90 credits from the modules in Compulsory modules.

Module Code	Module Title	Credit
UFMEAL-15-2	Aircraft Systems Design 2025-26	15
UFMEAM-30-2	Fundamental Aircraft Structures 2025-26	30

UFMEAN-15-2	Principles of Aerodynamics 2025-26	15
UFMEAP-15-2	Principles of Flight 2025-26	15
UFMEAQ-15-2	Principles of Propulsion 2025-26	15

Year 3
Learners must take 90 credits from the modules in Year 3.

Year 3 is delivered by UCW for Level 5 Modules and UWE Level 6 Modules.

Year 3 Compulsory modules
Learners must take 90 credits from the modules in Compulsory Modules.

Module Code	Module Title	Credit
UFMFVU-15-3	Aero Structures 2026-27	15
UFMFU6-15-3	Composite Engineering 2026-27	15
UFMFXU-15-3	Further Aerodynamics 2026-27	15
UFMFSL-15-3	Integrated Electro-Mechanical Systems 2026-27	15
UFME78-30-2	Engineering Research and Collaborative Project 2026-27	30

Year 4
Learners must take 60 credits from the modules in Year 4.

Learners must have achieved 330 credits before they can pass through gateway and take the End-Point Assessment module UFME7T-30-3. 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
Learners must take 60 credits from the modules in Compulsory Modules.

Learners 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 Aeronautical and Aerospace analysis and design, combined with knowledge of professional practice, information technology and project management.

The programme produces graduates with a broad-based ‘systems’ approach to engineering problem solving. Apprentices from this programme will 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
QAA UK Quality Code for HE

Framework for higher education qualifications (FHEQ)

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

Strategy 2030

University policies

Relevant PSRB requirements: AHEP4

Level 6 Degree Apprenticeship standard ST0010 Aerospace Engineer

Industrial Advisory Board/Industry Programme Development Collaboration

Part E: Regulations

Approved to variant University Academic Regulations and Procedures.

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

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