Programme Specification

Aerospace Engineering [Frenchay]

Version: 2023-24, v1.4, Validated

Contents

Section 1: Key Programme Details

Part A: Programme Information

Programme title: Aerospace Engineering [Frenchay]

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

Teaching institutions: UWE Bristol

Study abroad: Yes

Year abroad: No

Sandwich year: Yes

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

Modes of delivery: Full-time, Sandwich

Entry requirements: For the current entry requirements see the UWE public website.

For implementation from: 01 September 2023

Programme code: H49Z00

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 the new curriculum is designed to connect topics and levels within the curriculum and to enable students to reflect upon their development. The assessment methods on the programme are aligned to the requirements of the Royal Aeronautical Society (RAeS) who place high importance on the demonstration of authentic and verifiable learning outcomes for each individual student. 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 more open book examinations, questions based on pre-seen scenarios, questions that build on practical laboratory-based activities and computer-based examinations where students demonstrate the use of software to solve engineering problems. The assessment strategy is designed to work for large module cohorts, typically associated with this programme (130-300).

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 students demonstrate key professional skills such as workshop skills, library skills and health and safety awareness. This “replicates” part of the experience of an engineering apprentice but for one who is working in an academic environment.

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 students 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 feeding into 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 students to communicate their wing design project findings and analysis. The assessment at level 4 should create the culture required for students 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 orientated modules Engineering Practice 2 and Engineering Research.

The module Engineering Practice 2 takes over from the level 4 version 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 forms the vehicle for the assessment is designed to be motivational and accessible and is assessed through group presentation.

Engineering Research is designed to have a significant impact on our operation. Students work in groups to scope out research ideas. 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. Students should be able to start their individual level 6 project from the very start of that academic year.

In the final years of the programmes students are able to work on individual and group projects to showcase their understanding and skill as engineering practitioners. The design of the Engineering Research module will strengthen performance, management and consistency of the Engineering Project. Optional modules provide the opportunity to pursue specialist areas and a variety of assessment approaches are used for these modules.

The Aerospace Design Project module will provide students 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 group design review meetings forming part of the assessment.

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

Year 1

Full time and sandwich students must take 120 credits from the modules in Year 1.

Year 1 Compulsory Modules (Full Time and Sandwich)

Full time and sandwich students must take 120 credits from the modules in Compulsory Modules (Full Time and Sandwich).

Module Code	Module Title	Credit
UFMFRU-15-1	Aerospace Engineering 2023-24	15
UFMFQU-15-1	Aerospace Thermofluids 2023-24	15
UFMFMS-30-1	Dynamics Modelling and Simulation 2023-24	30

UFMFKS-30-1	Engineering Practice 1 2023-24	30
UFMFLS-30-1	Solid Mechanics, Materials and Manufacturing 2023-24	30

Year 2

Full time and sandwich students must take 120 credits from the modules in Year 2.

Year 2 Compulsory Modules (Full Time and Sandwich)

Full time and sandwich students must take 120 credits from the modules in Compulsory Modules (Full Time and Sandwich).

Module Code	Module Title	Credit
UFMFSU-15-2	Aerospace Systems Design 2024-25	15
UFMFQS-15-2	Engineering Practice 2 2024-25	15
UFMFRS-15-2	Engineering Research 2024-25	15
UFMFFK-15-2	Flight 2024-25	15
UFMFTU-15-2	Fundamental Aero-Propulsion 2024-25	15
UFMFRK-15-2	Fundamental Aerodynamics 2024-25	15
UFMFSS-30-2	Structural Mechanics 2024-25	30

Year 3

Full time students must take 120 credits from the modules in Year 3.
Sandwich students must take 15 credits from the modules in Year 3.

Year 3 Compulsory Modules (Full Time)

Full time students must take 60 credits from the modules in Compulsory Modules (Full Time).

Module Code	Module Title	Credit
UFMFUU-15-3	Aerospace Group Design Project 2025-26	15
UFMFX8-30-3	Engineering Project 2025-26	30

UFMFNQ-15-3	Professionalism for Engineers 2025-26	15

Year 3 Compulsory Modules (Sandwich)

Sandwich students must take 15 credits from the modules in Compulsory Modules (Sandwich).

Module Code	Module Title	Credit
UFMF89-15-3	Industrial Placement 2025-26	15

Year 3 Optional Modules (Full Time)

Full time students select 60 credits from the following:

Note that UFME7S-30-3 is only available to students transferring from Aerospace Engineering with Pilot Studies

Module Code	Module Title	Credit
UFMFVU-15-3	Aero Structures 2025-26	15
UFME7S-30-3	Airline Operations 2025-26	30
UFMFWU-15-3	Avionics 2025-26	15
UFMFU6-15-3	Composite Engineering 2025-26	15
UFMFYJ-15-3	Control Engineering 2025-26	15
UFMF7V-15-3	Digital Manufacturing in Aerospace 2025-26	15
UFMFYU-15-3	Further Aero-Propulsion 2025-26	15
UFMFXU-15-3	Further Aerodynamics 2025-26	15
UFMFSL-15-3	Integrated Electro-Mechanical Systems 2025-26	15
UFMF8V-15-3	Space Engineering 2025-26	15
UFMFCH-15-3	Spaceflight 2025-26	15

Year 4

Sandwich students must take 105 credits from the modules in Year 4.

Year 4 Compulsory Modules (Sandwich)

Sandwich students must take 45 credits from the modules in Compulsory Modules (Sandwich).

Module Code	Module Title	Credit
UFMFUU-15-3	Aerospace Group Design Project 2026-27	15
UFMFX8-30-3	Engineering Project 2026-27	30

Year 4 Optional Modules (Sandwich)

Sandwich students select 60 credits from the following:

Note that UFME7S-30-3 is only available to students transferring from Aerospace Engineering with Pilot Studies

Module Code	Module Title	Credit
UFMEBW-15-3	Aerospace Control Engineering 2026-27	15
UFMFVU-15-3	Aero Structures 2026-27	15
UFME7S-30-3	Airline Operations 2026-27	30
UFMFWU-15-3	Avionics 2026-27	15
UFMFU6-15-3	Composite Engineering 2026-27	15
UFMF7V-15-3	Digital Manufacturing in Aerospace 2026-27	15
UFMFYU-15-3	Further Aero-Propulsion 2026-27	15
UFMFXU-15-3	Further Aerodynamics 2026-27	15
UFMFSL-15-3	Integrated Electro-Mechanical Systems 2026-27	15
UFMF8V-15-3	Space Engineering 2026-27	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

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: AHEP3

Industrial Advisory Board

Part E: Regulations

Approved variant to University Academic Regulations and Procedures.

The following variant regulations have been approved by the University Regulations to comply with conditions set out be Engineering Council UK.

The degree classification for the 360 credit honours degree BEng (Hons) Aerospace Engineering (or 480 credit honours degree with an integrated foundation year) is based upon:

The best marks for 100 credits at level 3 and the best marks achieved for the next 100 credits at level 2 or above.

The calculation at level 3 must always use the full credit and mark for the level 3 project module UFMFX8-30-3 followed by the best marks associated with the remaining level 3 credits.

Where the credit size of the best marks associated with the remaining level 3 modules would give a credit total greater than 100, only the relevant portion of credit is counted. The unused credit may be counted towards the set of best marks at level 2 or above.

Marks achieved for the 100 level 3 credits are weighted three times the value of the marks for the 100 credits at level 2 or above.

The classification method for direct entrants to the BEng in Aerospace Engineering will include the marks and whole credit for the project.
Approved to University Regulations and Procedures.
The PSRB requirements below are permitted within the regulations.
The following requirements apply to awards which have been accredited by a PSRB that comes under the auspices of the Engineering Council UK:
- The permitted maximum compensated credit is 30 credits for a Bachelors or Integrated Masters degree, and a maximum of 20 credits in a Masters degree.
- The awarding of compensated credit may be considered for an overall module

mark in the range of 30% to 39% for Levels 4-6 and 40%-49% for Level 7.
- Major individual and group-based project modules must not be compensated.

- This requirement applies to Award Boards from (for learners at all levels) 2023/24 onwards.