Programme Specification

Robotics [Frenchay]

Version: 2025-26, v2.0, Validated

Contents

Section 1: Key Programme Details

Part A: Programme Information

Programme title: Robotics [Frenchay]

Highest award: BEng (Hons) Robotics

Interim award: BEng Robotics

Interim award: DipHE Robotics

Interim award: CertHE Robotics

Awarding institution: UWE Bristol

Teaching institutions: UWE Bristol

Study abroad: No

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:

Institution of Engineering and Technology (IET)

Modes of delivery: Full-time, Sandwich

Entry requirements:

For implementation from: 01 September 2025

Programme code: H67H00

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, Visualising, Systems Thinking, Improving, and Adapting. Foundation principles of engineering science, skills and practice are integrated throughout all years of study.

The programme is designed to provide the balance of theoretical and practical understanding needed to meet the demands of the Robotics industry for engineering practitioners, and in particular to meet the requirements for professional accreditation in partial fulfilment of CEng. Furthermore, it caters for students with both industrial and/or academic backgrounds, to develop problem solving skills and be able to demonstrate leadership in a number of engineering settings.

The Robotics programme produces graduates with a wide range of expertise relevant to the robotics and electronics industries. Roboticists are employed throughout the engineering sector in the creation, development, maintenance and improvement of engineering operations. Consequently, Robotics 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. The programme covers a broad range of disciplines such as, robotics principles, mechatronics, digital and analogue circuit design, kinematics, control, signal processing and project management. A number of optional modules provide a deeper level of learning into

more advanced and state of the art technologies. As we move closer to a more digitally connected network of systems and devices, this programme allows students to develop expertise particularly in system design, microprocessor hardware/software design, machine vision and simulation and modelling techniques.

The BEng (Hons) Robotics programme is supported by the Bristol Robotics Laboratory (BRL). The BRL is the most comprehensive academic centre for multi-disciplinary robotics research in the UK. It is a collaborative partnership between the University of the West of England (UWE Bristol) and the University of Bristol, and home to a vibrant community of over 300 academics, researchers and industry practitioners. Together, they are world leaders in current thinking on service robotics, intelligent autonomous systems, assistive robotics and machine vision.

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, academics and external practitioners in a range of engineering fields.

The integration of knowledge, skills and practice allows the tackling of real engineering challenges and encourage students to engage with the wider role that robotics engineers and specifically engineering habits of mind can play in tackling global challenges. This is a 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: Immersive Project Weeks create student engineer communities.

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 and AI skills aligned taught in engineering context.

Educational Aims: To support graduates to develop the necessary skills to be able to work as an effective member of a multidisciplinary team, as a graduate robotics engineer across the engineering sector.

To support undergraduates in acquiring the knowledge and understanding of scientific principles and methods necessary to underpin an education in engineering.

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

The programme will provide insight into, and practical skills in, the creation and maintenance of complex engineering products and will explore the environmental impact of engineering.

To develop and demonstrate 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.

To develop and demonstrate an 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 professional scientific engineering habits. 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.

Programme Learning Outcomes:

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

Programme Learning Outcomes

PO1. Apply scientific and mathematical principles necessary to underpin Robotics and mathematical methods, computational tools and notation used in the evaluation, integration and analysis of robotics problems

PO2. Use systems incorporating digital, hardware, software, communication, processing algorithms, interfacing circuits and parameter sensing and actuating devices

PO3. Plan, design, model and build robotic systems and be able to specify and assess technical designs

PO4. Apply advanced problem-solving skills and technical knowledge, using a systems approach, to establish rigorous and creative solutions that are fit for purpose for all aspects of the problem including production, operation, maintenance and disposal

PO5. Demonstrate a critical awareness of the manufacturing, financial and marketing implications of design proposals

PO6. Pursue independent study, undertake scientific enquiry into novel and unfamiliar concepts and implement change in an engineering environment

PO7. Communicate and operate effectively, professionally and ethically as individuals and as members of a team

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

PO9. Develop and analyse machine learning and and artificial intelligence algorithms to enhance robotic systems with consideration of ethical implications.

Assessment strategy: The assessment strategy for the 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 Institution of Engineering and Technology (IET) 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 above Factors influence and inform the design of this programme's assessment strategy.

At level 4, the Professional Skills for Engineers module develops professional attributes and engineering habits of mind through activities and assessments that encourage reflections through a structured portfolio and presentations. This involves 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. Practical Electronics is a strong example of the design as students are assessed via a variety of methods but all connecting the core theme: PCB design, practical work, online exam.

The immersive project weeks for level 4 are nominally used by the Professional Skills for Engineers module and for PCB design in Practical Electronics.

At level 5 Microcontroller Applications Group Lab provide an example of how content and assessment is developed from level 4 to level 5 bringing together a range of theoretical, practical and teamworking/organisational skills. Engineering Research develops and test general science and engineering skills and features statistical

analysis, the scientific method, ethics, etc. Other modules offer more traditional assessments via exams (primarily online) and coursework reports, etc.

The immersive project weeks for level 5 are nominally used by the project management module and engineering research.

In the final year 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 interdisciplinary Group Design and Integration Project is an exciting module that brings mechatronics engineers and roboticists together on projects that are electromechanical in nature. Typical problem fields could involve projects in biomechanics, assistive living, autonomous vehicles, robotics or electric powered vehicles. Projects from these areas would each have the potential to demonstrate modern developments and impact of engineering. The assessment for this module replicates a professional environment with group design review meetings forming part of the assessment.

The immersive project weeks for level 6 are reserved for final-year project activity.

Student support: Espresso Programming and Espresso Maths drop-in support stations .

Personality and professional strengths finding activity at start of programme.

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.

Student success coach.

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
UFMEAU-15-1	Digital and Mechanics Skills 2025-26	15
UFMEAT-15-1	Mathematics for Robotics 2025-26	15
UFMEAS-15-1	Professional Skills for Engineers 2025-26	15
UFMEAH-30-1	Practical Electronics 2025-26	30
UFMFKT-30-1	Fundamental Robotics Principles 2025-26	30
UFMFGT-15-1	Programming for Engineers 2025-26	15

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

UFMEB5-15-2	Project Management for Engineers 2026-27	15
UFMFLQ-15-2		15
UFMFNT-15-2	Signal Theory 2026-27	15
UFMFKA-30-2	Microcontrollers Applications Group Lab 2026-27	30
UFMFRS-15-2		15
UFMFVF-30-2	Robot Control Systems 2026-27	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 students must take 105 credits from the modules in Compulsory Modules (Full Time).

Module Code	Module Title	Credit
UFMEB6-15-3	Engineering in Society 2027-28	15
UFMFX8-30-3	Engineering Project 2027-28	30
UFMEAX-15-3	Robot Learning 2027-28	15
UFMFV8-15-3	Group Design and Integration Project 2027-28	15
UFMFTT-30-3	Advanced Vision for Localisation and Mapping 2027-28	30

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 2027-28	15

Year 3 Optional Modules Technical (Full Time)
Full time students on the technical pathway must take 15 credits from Optional Modules Technical.

Module Code	Module Title	Credit
UFMFUT-15-3	Human Robot Interaction Technologies 2027-28	15
UFMFH8-15-3	Digital Signal Processing 2027-28	15
UFMFWT-15-3	Robotic System Architectures 2027-28	15

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

Year 4 Compulsory Modules (Sandwich)
Sandwich students must take 90 credits from Compulsory Modules.

Module Code	Module Title	Credit
UFMEAX-15-3	Robot Learning 2028-29	15
UFMFX8-30-3	Engineering Project 2028-29	30
UFMFTT-30-3	Advanced Vision for Localisation and Mapping 2028-29	30
UFMFV8-15-3	Group Design and Integration Project 2028-29	15

Year 4 Optional Modules (Sandwich)
Sandwich students must take 15 credits from Optional Modules.

Module Code	Module Title	Credit
UFMFUT-15-3	Human Robot Interaction Technologies 2028-29	15
UFMFWT-15-3	Robotic System Architectures 2028-29	15
UFMFH8-15-3	Digital Signal Processing 2028-29	15

Part C: Higher Education Achievement Record (HEAR) Synopsis

Designed in conjunction with key national and multi-national employers, the programme provides graduates with the mix of skills and capabilities required by UK business for the specification, design and delivery of robotic, electronic and embedded systems and solutions, including safety critical systems, as required by the aerospace, transport, medical, military and other industries.

Delivered in a way that develops technically competent individuals who think and communicate effectively and who can conduct inquiry, solve problems, undertake critical analysis and deliver effective robotic systems solutions in a constantly changing business context. It provides a solid foundation for lifelong learning, emphasising the development of knowledge, skills and professional values essential to the practice of systems development.

Part D: External Reference Points and Benchmarks

Description of how the following reference points and benchmarks have been used in the design of the programme:

QAA UK Quality Code for HE (October 2019)

Framework for higher education qualifications (FHEQ)

Subject Benchmark Statement for Higher Education qualifications in engineering (October 2019)

Strategy 2030

University policies

Staff research projects

IET requirements: AHEP4

Industrial Advisory Board

The learning outcomes required by the Engineering Council UK are mandatory for accredited engineering programmes. The specific outcomes are derived from the The IET Learning Outcomes Handbook for BEng programmes. There are constraints from IET that have been taken into account. While this provides a constraint on the style of assessments, it does not inhibit our integrated learning approach.

The modules have been designed to ensure adequate and appropriate coverage of these outcomes across the levels of study.

SEEC level descriptors have informed the design of the assessment of the learning outcomes.

University strategies and policies: This programme is a refreshed and updated version of a programme that has run for many years. It has a long tradition of accepting students from diverse backgrounds and a wide range of entry qualifications. The school-wide foundation year has been developed in conjunction with academic and industrial partners as feeders into this programme.

The curriculum has been designed to take the best practice from the previous structure along with the introduction of the integrated learning framework and UWE Programmes guidelines. This, when combined with the School of Engineering laboratories, will provide enhanced student experience.

Employer interaction and feedback: The school works with a number of industrial partners. Feedback from employers during visits to placement students has also has also helped inform this revised programme.

Part E: Regulations

B: Approved variant to University Academic Regulations and Procedures

The Institution for Engineering and Technology accreditation requirements:

All level 5 and 6 credits are considered when calculating the Degree classification.

The degree classification for the 360 credit honours degrees BEng (Hons) Electrical and Electronic Engineering, BEng (Hons) Electronic Engineering, BEng (Hons) Robotics and BEng (Hons) Electronics and Computer Engineering (or 480 credit honours degree with an integrated foundation year) is based upon all the marks achieved at level 5 and all the marks achieved at level 6. Marks achieved for level 6 credits are weighted three times the value of the marks for the level 5 credits (Paper AB16/05/07).

Approved to variant University Academic Regulations and Procedures.

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

The variant applied to Level 4 September 2023 intake onwards (Note - Compensation applied to all levels not just new students).

- 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 30% to 39% for Levels 4-6 and 40%-49% for Level 7.

No excused credit.