Programme Specification

Electronic Engineering (Nuclear) {Apprenticeship-UCW} {Top-Up} [MOD]

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Contents

Section 1: Key Programme Details

Part A: Programme Information

Programme title: Electronic Engineering (Nuclear) {Apprenticeship-UCW} {Top-Up} [MOD]

Highest award: BEng (Hons) Electronic Engineering (Nuclear)

Interim award: BEng Electronic Engineering (Nuclear)

Awarding institution: UWE Bristol

Teaching institutions: 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:

Apprenticeship: ST0289

Modes of delivery: Full-time

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

For implementation from: 03 August 2020

Programme code: H61I43

Section 2: Programme Overview, Aims and Learning Outcomes

Part A: Programme Overview, Aims and Learning Outcomes

Overview: The curriculum is delivered as a level 6 top-up programme for degree apprenticeship students requiring an engineering education closely aligned to engineering practice with specific relevance to the nuclear sector. Students entering the programme will have successfully completed FdSc Mechatronics which guarantees accredited learning can be awarded to level 4 and level 5 modules. 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. Specialist nuclear knowledge is provided at level 6. The inclusion of a 40 credit level 6 project is a requirement of the Nuclear Scientist/Engineer integrated degree apprenticeship standard and forms part of the end point assessment.

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 electronic engineering 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 Electronic Engineering programme produces graduates with a wide range of expertise relevant to the electronics industry. Electronic engineers are employed throughout the engineering sector in the creation, maintenance and improvement of engineering operations. Consequently, Electronic 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. The programme covers a broad range of disciplines such as digital and analogue circuit design, power electronics, 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 and simulation and modelling techniques.

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.

The integration of knowledge, skills and practice allows the tackling of real engineering challenges and encourage students to engage with the wider role that mechanical 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 and is designed to meet the demands of employers and degree apprentices.

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

The Bristol Robotics Laboratory

UWE Bristol undergraduate and postgraduate programmes in Electronics and Robotics are supported by the Bristol Robotics Lab (BRL) which is the most comprehensive academic centre for multi-disciplinary robotics and embedded and automated systems 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 150 academics, researchers, industry practitioners and students (undergraduate and postgraduate). The state-of-the-art facilities cover an area of over 3,500 sq. metres (over 37,000 sq. feet) and BRL is an internationally recognised Centre of Excellence in Robotics and Embedded Electronics. The researchers within the BRL engage with many of the curriculum development and teaching activities. Informing teaching through research provides students with a greater range of meaningful learning experiences, develops critical thinking and enhances employability.

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

be able to work as a graduate electronic engineer across the engineering sector able to work 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 with specific relevance to the nuclear sector;

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. Apply scientific and mathematical principles necessary to underpin electrical and electronic engineering and mathematical methods, computational tools and notation used in the evaluation, integration and analysis of electrical and electronic engineering 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 electronic engineering 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 manufacturing, financial and marketing implications of design proposals

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

PO7. Communicate and operate effectively, professionally and ethically either as individuals or 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

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 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. 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. Applied Electronics is a strong example 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 Applied Electronics feeds into the immersive project week activity. The assessment at level 4 should create the culture required for students to embrace active learning styles.

At level 5 Microcontroller Applications Group Lab provide an example 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 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 interdisciplinary Group Design and Integration Project is an exciting new development that brings mechanical, automotive, electronic 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.

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.

Students can explore industrial, environmental and societal impact of discipline.

Mathematics skills aligned taught in engineering context.

Part B: Programme Structure

Year 1

The student must take 60 credits from the modules in Year 1.

Year 1 Compulsory Modules

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

Module Code	Module Title	Credit
UFMFW7-15-3	Control Systems Design 2024-25	15
UFMFST-30-3	Power Electronics and Energy Systems 2024-25	30
UFMFNQ-15-3	Professionalism for Engineers 2024-25	15

Year 2

The student must take 60 credits from the modules in Year 2.

Year 2 Compulsory Modules

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

Module Code	Module Title	Credit
UFMFXL-40-3	Nuclear Apprenticeship Project 2025-26	40
UFMFYL-20-3	Nuclear Knowledge 2025-26	20

Part C: Higher Education Achievement Record (HEAR) Synopsis

Graduates of this programme will be equipped with a broad understanding of electronic analysis and design, combined with knowledge of engineering practice, information technology and project management.

The programme produces graduates with a broad-based ‘systems’ approach to engineering problem solving. Graduates 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 related to the nuclear engineering sector.

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: AHEP3

Industrial Advisory Board

Level 6 Degree Apprenticeship Standard: Nuclear Scientist/Engineer

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).

Condoned Credit

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.