# Programme Specification

## Electronic and Computer Engineering [SHAPE]

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# Section 1: Key Programme Details

## Part A: Programme Information

**Programme title:** Electronic and Computer Engineering [SHAPE]

**Highest award:** BEng (Hons) Electronic and Computer Engineering

**Awarding institution:** UWE Bristol

**Affiliated institutions:** School for Higher and Professional Education

**Teaching institutions:** School for Higher and Professional Education

**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:**

Institution of Engineering and Technology (IET)

**Modes of delivery:** Full-time, Part-time

**Entry requirements:**

**For implementation from:** 01 August 2018

**Programme code:** H65J43

# 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.

The programme is designed to provide the balance of theoretical and practical understanding needed to meet the demands of the electronic and computer 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 and Computer Engineering programme produces graduates with a wide range of expertise relevant to the electronics and computer science industries. Electronic and computer engineers are employed throughout the engineering sector in the creation, maintenance and improvement of engineering operations. Consequently, graduates in this field 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, software and programming, power electronics, systems engineering and project management. The optional modules provide a deeper level of learning into more advanced and state of the art technologies. As move closer to a more digitally connected network of systems and devices, this programme allows students to develop expertise particularly in embedded systems design and simulation and modelling techniques.

The integration of knowledge, skills and practice allows the tacking of real engineering challenges and encourage students to engage with the wider role that electronic and computer 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:** Academic Support.
Academic advice and support is the responsibility of those delivering the individual modules. Academic staff are expected to be available outside normal timetabled hours, either by appointment or during published "surgery" hours, in order to offer advice and guidance on matters relating to the material being taught and on its assessment. Students also have a personal academic tutor.

Industrial Support.
The School has strong links with industrial partners through knowledge exchange, student placements and regular industrial liaison panel meetings. These links are used to inform the curriculum by identifying changing skill needs and gaps in provision. Employers also actively participate in aspects of course delivery.

**Educational Aims:** Support graduates to develop the necessary skills to be able to work as an effective member of a multidisciplinary team, as a graduate electronic and computer engineer across the engineering sector.

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

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.

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.

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 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.

**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 methods and tools and notation used in the evaluation, integration and analysis of electrical, electronic and computer 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 and computer 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:** Assessment strategy to enable the learning outcomes to be achieved and demonstrated:

A broad range of assessment strategies are used ensuring that both theoretical and practical aspects of the learning outcomes are assessed.

Testing of the knowledge base is through assessed coursework (individual and group), laboratory work, oral presentation, observed group meetings, through tasks undertaken under controlled conditions and through formal examinations.

Comprehension of and ability to apply intellectual skills are tested in all engineering modules, through coursework, lab and computer exercises and examinations.

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.

In the top-up years of the programme students are able to work on individual and group projects to showcase their understanding and skill as engineering practitioners. For example, the interdisciplinary Group Design and Integration Project is an exciting 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.

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

**Student support:** The School for Higher and Professional Education (SHAPE) is one of the member institutions of the VTC in Hong Kong. It operates top-up degree programmes through collaboration with overseas and local universities primarily to provide VTC’s Higher Diploma graduates with an articulation pathway to degree level

studies. SHAPE will deliver a top-up Electronic and Computer Engineering (ECE) degree.

1. Staff

SHAPE academic staff who teach on this programme are academically well qualified up to PhD level, with significant teaching and industrial experience. Some of them are also members of professional institutions like the Institution of Engineering and Technology (IET) and Hong Kong Institution of Engineers (HKIE). They are experienced in dealing with the needs of mature and part-time students.

2. Teaching Facilities

Students have access to various types of general and specialised learning facilities and support available at the offering site in IVE (Sha Tin). General teaching facilities include lecture theatres, classrooms, and computer laboratories. Supporting facilities include Learning Resources Centres and the Centre for Independent Language Learning. There are also well-equipped computer laboratories where students can access the Internet and various applications essential for their study and project work. IVE (Sha Tin) has also been equipped with up-to-date specialised facilities to support the operation of different modules. Some examples are Alistair Harvey Foundation IoT Innovation and Technology Centre, Extended Reality Studio, Telecommunication and Incubation Laboratory, Computer and Electronic Engineering Laboratory and Communications Engineering Laboratory.

3. Equipment

The educational experience of students on this programme will be enhanced by the use of equipment such as computer based test instrumentation, microprocessor and microcontroller development systems, miniaturised PLC electro mechanical rigs and specialist software, including electronic and mechanical Computer Aided Design.

4. Student Support

SHAPE provides high quality learning support services to enable smooth transitions to Higher Education degrees. With a very diverse population of students, SHAPE provides specific learner support arrangements for flexible learners who are enrolled on both full-time and part-time programmes. Some of the facilities that SHAPE provides for student support are:

Access to all computer and network services

Learning Portal

Centre for Independent Language learning

Learning Resources Centre

Sports facilities

Counselling and Career Support services

Safe and Secure Campus with Insurance Coverage

5. Industrial Support

The close ties that VTC has with local industry in Hong Kong has helped to identify gaps in technology and engineering industry and thus help structure the top-up programme in ECE through new modules and changing skills requirements mainly in the context of Smart City that the Hong Kong government is putting a lot of emphasis on. Useful and up-to-date industry information is regularly provided by the engineering companies that participate in the Industry Based Student Project (IBSP) of the HD programmes, Engineering Discipline Advisory Board, the manpower survey from Electronics and Telecommunications Training Board (ECTB), etc.

## Part B: Programme Structure

### Year 1

Full-time students must take 120 credits from the modules in Year 1.
Part-time students must take 60 credits from the modules in Year 1.

Students join via Direct Entry at Level 6.

### Year 1 Compulsory Modules (Full-time)

Full-time students must take 120 credits from the modules in Compulsory Modules (Full-time).

| Module Code | Module Title | Credit |
|---|---|---|
| UFMFW7-15-3 | Control Systems Design 2024-25 | 15 |
| UFMFH8-15-3 | Digital Signal Processing 2024-25 | 15 |
| UFMFPQ-15-3 | Embedded Systems Development 1 2024-25 | 15 |
| UFMFX8-30-3 | Engineering Project 2024-25 | 30 |
| UFMFV8-15-3 | Group Design and Integration Project 2024-25 | 15 |
| UFMFDE-15-3 | Power Electronics 2024-25 | 15 |
| UFMFNQ-15-3 | Professionalism for Engineers 2024-25 | 15 |

### Year 1 Compulsory Modules (Part-time)

Part-time students must take 60 credits from the modules in Compulsory Modules (Part-time).

| Module Code | Module Title | Credit |
|---|---|---|
| UFMFPQ-15-3 | Embedded Systems Development 1 2024-25 | 15 |

| | | |
|---|---|---|
| UFMFV8-15-3 | Group Design and Integration Project 2024-25 | 15 |
| UFMFDE-15-3 | Power Electronics 2024-25 | 15 |
| UFMFNQ-15-3 | Professionalism for Engineers 2024-25 | 15 |

**Year 2**
Part-time students must take 60 credits from the modules in Year 2.

**Year 2 Compulsory Modules (Part-time)**
Part-time students must take 60 credits from the modules in Compulsory Modules (Part-time).

| Module Code | Module Title | Credit |
|---|---|---|
| UFMFW7-15-3 | Control Systems Design 2025-26 | 15 |
| UFMFH8-15-3 | Digital Signal Processing 2025-26 | 15 |
| UFMFX8-30-3 | Engineering Project 2025-26 | 30 |

**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 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 electronic and embedded software 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
• IET requirements: AHEP4

The learning outcomes required by the Engineering Council UK are mandatory for accredited engineering programmes. The specific outcomes are derived from the requirements for electronic and computer engineering described in the IET Learning Outcomes Handbook for BEng programmes. There are constraints from IET that have been considered, for example, that a minimum of 40% written examinations across the programme is considered an acceptable form of controlled assessment.

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

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. It accommodates student entry on a part-time basis at several points within the programme as well as having a tradition of direct entry to year 2 for full-time overseas students. Modules within the programme are also delivered within partner institutions regionally and globally. Foundation degrees and higher apprenticeship schemes have been developed in conjunction with academic and industrial partners as feeders into this programme.

It has been designed to closely match a key foundation degree thus facilitating entry into year 3. This was developed in conjunction with academic and industrial partners as feeders into this programme. The curriculum has been designed to take the best practice from other programmes along with the introduction of online and electronic assessment.

Any relevant PSRB requirements:

All modules in the programme have been written to conform to the learning outcomes required by the Engineering Council UK. This is mandatory for accredited engineering programmes. The specific outcomes are derived from the requirements for electronic, digital and computer systems engineering as described in the Accreditation of Higher Education Programmes (AHEP) fourth edition and associated documentation and in the QAA UK Quality Code for HE (October 2019).

Employer interaction and feedback: The School of Engineering works with a number of industrial partners through two consortia and a newly formed industrial liaison panel. Feedback from employers during visits to placement students has also has also helped inform this revised programme. The programme provides part-time options which ensure an ongoing interaction with regional employers. This specification provides a concise summary of the main features of the programme and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if he/she takes full advantage of the learning opportunities that are provided. More detailed information on the learning outcomes, content and teaching, learning and assessment methods of individual modules can be found in module specifications, available on the University's website.

**Part E: Regulations**

Approved to University Regulations and Procedures

With the following variant:

The degree classification for the 360 credit honours degrees BEng (Hons) Electrical

and Electronic Engineering, BEng (Hons) Electronic Engineering, BEng Robotics and BEng Electronics and Computer Engineering (or 480 credit honours degree with an integrated foundation year) is based upon all the marks achieved at level 3 and all the marks achieved at level 2. Marks achieved for level 3 credits are weighted three times the value of the marks for the level 2 credits (Paper AB 16/05/07).

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.