University of the West of England
BRISTOL

PROGRAMME SPECIFICATION

Section 1: Basic Data

Awarding institution/body	UWE
Teaching institution	UWE
Delivery Location(s)	Frenchay
Faculty responsible for programme	FET
Modular Scheme title	FET Modular Scheme
Professional Statutory or Regulatory Body Links (type and dates)	IET accreditation in partial fulfilment of the requirements for CEng
Highest award title	MEng (Hons)Electrical and Electronic Engineering (Electronic) MEng (Hons)Electrical and Electronic Engineering(Electrical)
Default award title	BEng(Hons) Electrical and Electronic Engineering(Electronic) BEng(Hons) Electrical and Electronic Engineering(Electrical)
Interim award titles	Certificate / Diploma of Higher Education (fulltime pathways only), BEng Electrical & Electronic Engineering(Electrical), BEng Electrical & Electronic Engineering(Electronic)
UWE progression route	
Mode(s) of delivery	Full-time / Part-time
Codes **UCAS code H600 / H601**	**JACS code H600 / H601**
ISIS code	**HESA code**
Relevant QAA subject benchmark statements	Engineering
On-going/valid until* (*delete as appropriate/insert end date)	
Valid from (insert date if appropriate)	September 2011
Original Validation Date:	
Latest Committee Approval…	**Date:…**

Version Code 1 February 2011

Section 2: Educational aims of the programme

The programme is a rationalisation of the current MEng (Hons) Electronic Engineering and MEng (Hons) Electrical & Electronic Engineering programmes. It provides for a common first year of study with an increasing degree of specialisation through each succeeding year of study. This is provided by two pathways, electrical engineering and electronic engineering.

- The programme is designed to provide the balance of theoretical and practical understanding needed to meet the demands of the engineering industry for engineering practitioners, and in particular to meet the requirements for professional accreditation in partial fulfilment of CEng.
- To produce graduates with a broad and deep understanding of the discipline in conjunction with a detailed understanding of their chosen specialism of either electrical or electronic engineering.
- The Electrical and Electronic Engineering programme produces graduates with a wide range of expertise relevant to the electronics and/or electrical industry. The programme covers a range of disciplines such as digital and analogue circuit design, power electronics, control, signal processing and project management. A number of developments have occurred in both electrical and electronic engineering in recent times. Although, signals are analogue in nature, most electrical or electronic designs involve conversion to digital format as soon a possible and processing by microprocessor or digital integrated circuit. In recognition of this, this programme allows students to develop expertise particularly in system design, microprocessor hardware/software design and simulation and modelling techniques. For the Electrical Engineering pathway, students gain competence in modern power generation and distribution systems

The aims are that the graduate shall:

- gain a sound knowledge and understanding of the fundamental principles governing the behaviour of electronic or electrical systems and of the related mathematics;
- be capable of analysis of the behaviour of complex electronic, digital electronic or electrical systems ;
- demonstrate a capacity for innovative and creative design and be able to draw on knowledge of fundamental principles and proven systems to further develop existing systems and to generate new systems which meet required specifications;
- have a broad knowledge and understanding of engineering theory, practices and applications and be able to use advanced techniques of analysis, synthesis and implementation in the field of electronic engineering or electrical engineering,
- have developed the ability, interest and motivation to conduct independent study and keep abreast of future changes in technology and engineering practices.
- be able to work in a largely unsupervised way to undertaken an individual research project and present the findings in a professional manner,
- be able to communicate clearly, concisely and persuasively with individuals and groups, using a professional standard of English, both orally and in writing.
- Demonstrate the leadership and innovative design expertise required of a Master of Engineering.

Section 3: Learning outcomes of the programme

The award route provides opportunities for students to develop and demonstrate knowledge and understanding, qualities, skills and other attributes in the following areas: …

A Knowledge and understanding

Learning outcomes	Teaching, Learning and Assessment Strategies
A Knowledge and understanding of: 1. scientific principles and methodology necessary to underpin electrical and electronic engineering, to enable appreciation of its scientific and engineering context in support of understanding of future developments and technologies. 2. mathematical principles necessary to underpin electrical and electronic engineering and mathematical methods, tools and notations used in the analysis and solution of electrical and electronic engineering problems, number systems and their applications. 3. the range of applicability of abstract models of electronic components and their fundamental limitations in linear and non-linear circuit applications. 4. electronic components, digital circuits and logic families and an ability to characterise them; ability to use combinatorial and sequential logic circuits; basic computer structure (microcomputer and DSP) their use in real-time applications. Ability to use HDL systems and techniques (electronic pathway). 5. system-on-chip design methodologies and their application to the top-down design of electronic systems (electronic pathway). 6. the design, application and utilization of electrical and electronic equipment with emphasis on a systems approach to real world problems and applications (electrical pathway) 7. the design of power generation and distribution systems and the impact of renewable energy sources on such systems (electrical pathway)	**Teaching/learning methods and strategies:** Acquisition of 1 through 9 is through a combination of formal lectures, laboratory work, tutorials, student directed learning and coursework, both individual and group. Additional support is provided through Peer Assisted Learning (PAL) sessions (year 1) along with drop-in sessions for mathematics support. Appropriate software and technical support is provided for all years. Throughout, the learner is encouraged to undertake independent reading both to supplement and consolidate what is being taught/learnt and to broaden their individual knowledge and understanding of the subject. At level M students will be expected to demonstrate synthesis of the previous study and the application of this learning to novel situations or to form innovative solutions to existing problems. This will be supported by an increase in the use of problem based learning for the laboratory sessions with tutors acting as mentors and facilitators. **Assessment:** 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.

8. the commercial, ethical, economic and legal context of engineering processes, including sustainable development, risk management, health and safety and environmental legislation. 9. management and business practices, and their limitations, and how these may be applied appropriately;	

B Intellectual Skills

B Intellectual Skills	***Teaching/learning methods and strategies***
1. Demonstrate an understanding of the need for a high level of professional and ethical conduct in engineering. 2. The ability to investigate and define a problem and identify constraints including environmental and sustainability limitations, health and safety and risk assessment issues. 3. Critically review available literature relevant to the subject discipline. 4. Demonstrate independent thinking in the design and development of solutions to real-world problems. 5. The ability to select and apply appropriate computer-based methods for modelling and analysing problems in fields relating to the design, manufacture and control of electrical and electronic components and systems. 6. The ability to understand issues relating to the marketing of products and the management processes associated with their design and manufacture. 7. The ability to use fundamental knowledge to investigate new and emerging technologies; 8. Wide knowledge and comprehensive understanding of design processes and methodologies and the ability to apply and adapt them in unfamiliar situations 9. The ability to make general evaluations of commercial risks through some understanding of the basis of such risks	**Intellectual skills (esp. 1) are developed throughout all modules, supported by presentations to the first year and final year students from their professional body (IET). Skill 1 is addressed in the Graduate Development Programme (GDP) sessions.** **The engineering subject modules will develop the skills to evaluate different methods or designs, to balance conflicting requirements.** 3 is addressed in all years, particularly in Professional Studies, Group Project & Management and Individual Project. 2, 4, 5 & 6 are introduced at level 1 through examples and laboratory exercises and further developed through the use of problem based learning along with tutorial examples and further laboratory exercises, culminating in unaided solution of design problems at level M. As a means to develop intellectual skills problem based learning is a key feature of engineering modules at level 2, 3 & M : Micro-Controller Based Systems, Embedded Co-Design being examples. 7 & 8 are addressed at M level in modules such as Intelligent Algorithms or Wireless Sensor Networks as well as through the MEng individual and group projects. 9 is addressed in the Group Projects ***Assessment*** Comprehension of and ability to apply intellectual skills are tested in all engineering modules, through coursework, lab and computer exercises and examinations.

	1,2 & 3 are also assessed in the professional skills, project management and project modules.

C Subject, Professional and Practical Skills

C Subject/Professional/Practical Skills	***Teaching/learning methods and strategies***
The learner is able to 1. select, apply and challenge appropriate quantitative methods and computer software tools for the evaluation, analysis and solution of electrical or electronic engineering problems and situations. 2. apply experimental methods in the laboratory relating to engineering design, manufacture and test. 3. use relevant design, test and measurement equipment. 4. execute and manage multi-disciplinary projects. 5. undertake practical testing of design ideas through laboratory work or simulation with technical analysis and critical evaluation of results. 6. apply engineering techniques taking account of environmental, industrial and commercial constraints 7. work with technical uncertainty 8. show an understanding of appropriate codes of practice and industry standards including an awareness of quality issues	These skills are introduced in level 1, and further developed in levels 2 and 3, as the students' understanding increases. Electrical/electronics and computer labs are used for practical classes, enabling students to gain skills in the use of suitable software and hardware, and to facilitate application of theory to practical problems. ***Assessment*** The modules with particular emphasis on lab skills at each level, in which each skill is assessed through practical work (component B) are: UFMEUK-20-1 Practical Electronics (2,3,5) UFMETT-20-1 Digital Design & Instrumentation(1,2,3,5) UFMEVR-20-2 Electrical Technology (1,2,3,5) UFMEVP-20-2 CPU Architecture with VHDL (1,2,3,5) UFME69-20-2 Micro-controller Based Systems(2,3,5,6) UFMEMY-20-3 Embedded Co-Design with VHDL & C(1,2,3,4,5,6) UFME5L-20-3 Digital Signal Processing(1,3,5) UFME5W-20-3 Control Systems Design(1,3,5) UFPED7-30-M Group Project (1 – 8) In addition, skill 4 is assessed in Group Project Management and, for the electronic pathway, in Embedded Co-design.

D: Transferable skills and other attributes	***Teaching/learning methods and strategies***
The learner is able to 1. to communicate using professional standards of English, both orally and in writing, including, for instance, the results of technical investigations, to peers and/or to "problem owners". 2. to manage his or her own time; to meet deadlines; 3. to work with others, being aware of the benefits and problems which teamwork can bring, having gained insights into the problems of team-based systems development. 4. to use software in the context of problem-solving investigations, and to interpret findings 5. to express problems in appropriate notations. 6. to gain experience of, and to develop skills in, learning independently of structured class work, including the use of on-line facilities to further self-study. 7. to read and to use literature sources appropriate to the discipline to support learning activities. 8. Demonstrate team leadership abilities.	*Support for transferable skills is provided through the GDP sessions, online library resources, specific modules such as Professional Skills and Group Project Management as well as being integrated into all teaching.* ***Assessment*** *assessment of key transferable skills is integrated into all modules. Students would not succeed on this programme without developing these skills*. Skill 1. In order to develop a wide variety of communication skills, students • maintain laboratory log books • participate in electronic conferences, workshops, and groupwork sessions. • participate in discussion tutorials • present research topic findings in tutorials • participate in individual tutorials • collaborate on group projects Skill 2. In order to develop personal time management skills, students • conduct self-managed practical work • participate in practically-oriented tutorial and laboratory sessions • work through practical work-sheets in teams • practice design and programming Skill 3 is developed widely throughout the programme, and is specifically taught in the following modules: • UFPENW-10-1 Professional Studies for Electrical & Electronic Engineers • UFPENX-20-2 Group Project & Management • UFPED7-30-M Group Project Skill 4. Use of software for problem solving is used particularly in the following modules: • UFMERR-10-1, UFMEUY-20-3 • UFMEWQ-20-2, UFME5W-20-3 • UFME66-20-3 Skill 8 is developed in • UFPENX-20-2 Group Project & Management • UFPED7-30-M Group Project Students practice design and programming in • UFMETS-20-1,UFME69-20-2 • UFMEVP-20-2, UFMEMY-20-3 • UFME5L--20-3 Students develop designs of larger systems in • UFME66-20-3, UFMEMY-20-3 • Use and development of Skills 5, 6 and 7 is expected throughout all technical modules. Both Group and Individual Projects require a thorough literature review.

Section 4: Programme structure

<table>
<tr><td>Level 1</td><td>Core modules

UFMERR-10-1 Analogue Circuit Analysis
UFMEUK-20-1 Practical Electronics
UFMETT-20-1 Digital Design & Instrumentation
UFMETU-20-1 Digital Systems Development
UFMETS-20-1 Programming in C
UFMXXX-20-1 Mathematics
UFPENW-10-1 Professional Studies for Electrical & Electronic Engineers</td><td>Interim Awards:

Cert. HE</td></tr>
<tr><td rowspan="2">Level 2</td><td>Core modules

UFME69-20-2 Micro-controller Based Systems
UFMEWQ-20-2 Signal Processing & Circuits
UFMEUY-20-3 Control Systems Engineering
UFQEQ8-20-2 Mathematics for Signal Analysis & Control
UFPENX-20-2 Group Project & Management</td><td rowspan="2">Interim Awards:

Diploma HE</td></tr>
<tr><td>Compulsory modules (pathway specific)

Electrical pathway
UFMEVR-20-2 Electrical Technology

Electronic pathway
UFMEVP-20-2 CPU Architecture with VHDL</td></tr>
<tr><td>Year out</td><td colspan="2">Optional Industrial placement module UFPEJH-210-P</td></tr>
</table>

level 3	***Core modules*** UFPERX-30-3 MEng Individual Project part A UFMEHL-10-3 Integrated Case Studies UFME5W-20-3 Control Systems Design UFME77-20-3 Telecommunication systems ***Compulsory modules (pathway specific)*** Electrical pathway UFME66-20-3 Power Systems UFMEB4-20-3 Alternative Energy Electronic pathway UFMEMY-20-3 Embedded Co-Design with VHDL & C UFME5L-20-3 Digital Signal Processing	**Interim Award:** BEng(Hons) EEE(Electrical) BEng(Hons) EEE(Electronics) (Subject to approval of project A matching the LO of UFMEAY-30-3) **Credit requirements** • 360 credits to include at least 120 @ level 3 120 @ level 2 BEng EEE(Electronics) BEng EEE(Electrical) **Credit requirements** • 300 credits to include at least 60 @ level 2 and 60 @ level 3

Level M	**Core modules** UFPERY-30-3 MEng Individual Project part B UFPED7-30-M M.Eng Group Project	**Awards:** **Default Award:** **BEng Hons EEE(Electronics)** **BEng Hons EEE(Electrical)**
	Compulsory modules Electrical Pathway UFME7M-15-M Modern Power systems UFMF36-15-M Intelligent Algorithms Electronic Pathway UFMF3E-15-M Wirelsess Sensor Networks UFME7G-15-M Behavioural Systems Design **Optional modules** UFMEKM-15-M DSP for Real-time Systems UFME7F-15-M Advanced Control & Dynamics UFME7L-15-M Mobile Communications	**Credit requirements** • 360 credits to include at least 120 @ level 3 120 @ level 2 **Target/highest** **MEng EEE(Electronics),** **MEng EEE(Electrical)** **Credit requirements** 480 credits to include at least 320 @ level2 or greater, 220@ level 3 or greater, 120 @ level M

→ GRADUATION

Section 5: Entry requirements

Standard UCAS tariff of 320 points, which must include:

GCSE: Maths and English Language at Grade C or above

Specific subjects:

- At GCE A level - grade C or equivalent in Maths plus one of Chemistry, Computing, Design and Technology, Electronics, Engineering, Physics, Computing.
- Relevant BTEC National Diplomas to included Further Maths for Technicians.
- 14-19 Engineering Diploma provided that the Additional Specialist Learning module in Mathematics or an A level in Mathematics is taken alongside.

- **Access to HE Diploma**; achievement of level 3 credits in Maths (to match content of A level maths in Calculus and Pure Maths) plus at least one other Science or Technology subject;

- **Baccalaureate IB:** to include HL Maths and Science

Section 6: Assessment Regulations

A: Approved to University Academic Regulations and Procedures

The University's Academic Regulations and Procedures apply to this programme.

B: Approved variant to University Academic Regulations and Procedures (insert title of variant)

Institute of Engineering and Technology accreditation requirements:
All modules in the final two levels should contribute towards the calculation of the final award.
Individual Project modules must be passd at first attempt.

Section 7: Student learning: distinctive features and support

Timetabled classes:
The mode of delivery of a module is determined by its Module Leader, and involves any combination of the following: lectures, tutorials, 'lectorials' (where the distinction between traditional lectures and tutorials is blurred), laboratory classes in electronics labs and computer rooms. Learning is a mixture of individual and group activities.

Students are expected to attend all classes on their timetable and to submit work for assessment at the appropriate time.

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.

Personal Development

The Graduate Development Programme at all levels provides cohort and individual student support. At level one this is designed to equip students with the necessary skills and information to help them develop as effective learners and to approach their work with confidence. Level two work is designed to help them recognise, describe and demonstrate their academic achievements and skills, in preparation for a placement year. At level three this should help them plan their own 'preferred future' and present their skills, attributes and abilities in a way that will help them achieve their goals.

Pastoral Care

The university offers pastoral care through Student Advisers, a team of staff who
provide comprehensive, full-time student support service on a drop-in basis or by appointment. The Adviser will, when necessary, advise the student to seek advice to from other including the Student Advice and Welfare Services, the Counselling and Psychological Service, or from members of academic staff.

Facilities to Support Learning

Within the Faculty of Environment and Technology student learning will be supported in the following distinctive ways :

1. Through provision of Open Access and other available computer laboratories that provide access to a range of relevant computer based applications
2. Through provision of the System Support Helpdesk that provides a range of support for learning to students including: support for a wide range of applications used by the students; help in the form of assistants who are trained to resolve many common student problems and help in the form of a large set of 'help-sheet documents', developed over a number of years, that cover a variety of common student requests for information.
3. Technical support staff are available in laboratory sessions and during project work.
4. Extensive laboratory facilities to support the technological modules. These include the Electronics Laboratory (1N70) with facilities for investigation of electrical and electronic principles and circuit design, build and test, the Control and Telecommunications Laboratory (2N40) with facilities for control system analysis and design, the

Robotics and Microprocessors laboratory (2N24) and the Unix laboratory 3P28 for DSP and digital hardware analysis.

5. Several Project Rooms which provide students with individual and group work spaces and the facilities.

University-wide services include a Virtual Learning Environment (Blackboard), significant library facilities including dedicated services for international students, and a Global Student Support team.

Computing Facilities

In addition to the wide range of computing facilities offered by the University, the Faculty runs a specialised system with 13 laboratories running Windows and 4 with the Linux operating system. The facilities are available on a 24 hours basis during term time, with swipe card access during evenings, at night and at weekends. The labs offer a variety of specialist engineering software, much of which is available for students to download for their home machines. In addition there is an Open Access lab, not used for teaching so giving access to machines at all times.

Support for the computing system is provided with extensive information on the web, ranging from which lab has free machines (on a real time basis), where to find specific software packages and how to use the printing system, to problem solving and FAQs. A support desk, staffed largely by placement students, provides first line support to users during normal office hours.

Section 8 Reference points/benchmarks

- *Subject benchmarks (QAA Unit …)*
- *University teaching and learning policies:*
- *staff research projects:*
- *employer interaction/feedback:*

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. These are available on the University Intranet.

Programme monitoring and review may lead to changes to approved programmes. There may be a time lag between approval of such changes/modifications and their incorporation into an authorised programme specification. Enquiries about any recent changes to the programme made since this specification was authorised should be made to the relevant Faculty Academic Registrar.

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The programme is a rationalisation of the current BEng(Hons) Electronic Engineering and BEng(Hons) Electrical & Electronic Engineering programmes. It provides for a common first year of study with an increasing degree of specialisation through each succeeding year of study. This is provided by two pathways, electrical engineering and electronic engineering.

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- be capable of analysis of the behaviour of complex electronic, digital electronic or electrical systems ;
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- have a broad knowledge and understanding of engineering theory, practices and applications and be able to use advanced techniques of analysis, synthesis and implementation in the field of electronic engineering or electrical engineering,
- have developed the ability, interest and motivation to conduct independent study and keep abreast of future changes in technology and engineering practices.
- be able to work in a largely unsupervised way to undertaken an individual research project and present the findings in a professional manner,
- be able to communicate clearly, concisely and persuasively with individuals and groups, using a professional standard of English, both orally and in writing.

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Learning outcomes	Teaching, Learning and Assessment Strategies
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8. the commercial, ethical, economic and legal context of engineering processes, including sustainable development, risk management, health and safety and environmental legislation.	

B Intellectual Skills

B Intellectual Skills	*Teaching/learning methods and strategies*
1. Demonstrate an understanding of the need for a high level of professional and ethical conduct in engineering. 2. The ability to investigate and define a problem and identify constraints including environmental and sustainability limitations, health and safety and risk assessment issues. 3. Critically review available literature relevant to the subject discipline. 4. Demonstrate independent thinking in the design and development of solutions to real-world problems. 5. The ability to select and apply appropriate computer-based methods for modelling and analysing problems in fields relating to the design, manufacture and control of electrical and electronic components and systems. 6. The ability to understand issues relating to the marketing of products and the management processes associated with their design and manufacture.	**Intellectual skills (esp. 1) are developed throughout all modules, supported by presentations to the first year and final year students from their professional body (IET). Skill 1 is addressed in the Graduate Development Programme (GDP) sessions.** **The engineering subject modules will develop the skills to evaluate different methods or designs, to balance conflicting requirements.** 3 is addressed in all years, particularly in Professional Studies, Group Project & Management and Individual Project. 2, 4, 5 & 6 are introduced at level 1 through examples and laboratory exercises and further developed through the use of problem based learning along with tutorial examples and further laboratory exercises. As a means to develop intellectual skills problem based learning is a key feature of engineering modules at level 2 & 3 : Micro-Controller Based Systems, Embedded Co-Design being examples. ***Assessment*** Comprehension of and ability to apply intellectual skills are tested in all engineering modules, through coursework, lab and computer exercises and examinations. 1,2 & 3 are also assessed in the professional skills, project management and project modules.

C Subject, Professional and Practical Skills

C Subject/Professional/Practical Skills	*Teaching/learning methods and strategies*
The learner is able to 1. select, apply and challenge appropriate quantitative methods and computer software tools for the evaluation, analysis and solution of electrical or electronic engineering problems and situations. 2. apply experimental methods in the laboratory relating to engineering design, manufacture and test. 3. use relevant design, test and measurement equipment. 4. execute and manage multi-disciplinary projects. 5. undertake practical testing of design ideas through laboratory work or simulation with technical analysis and critical evaluation of results. 6. apply engineering techniques taking account of environmental, industrial and commercial constraints	These skills are introduced in level 1, and further developed in levels 2 and 3, as the students' understanding increases. Electrical/electronics and computer labs are used for practical classes, enabling students to gain skills in the use of suitable software and hardware, and to facilitate application of theory to practical problems. ***Assessment*** The modules with particular emphasis on lab skills at each level, in which each skill is assessed through practical work (component B) are: UFMEUK-20-1 Practical Electronics (2,3,5) UFMETT-20-1 Digital Design & Instrumentation(1,2,3,5) UFMEVR-20-2 Electrical Technology (1,2,3,5) UFMEVP-20-2 CPU Architecture with VHDL (1,2,3,5) UFME69-20-2 Micro-controller Based Systems(2,3,5,6) UFMEMY-20-3 Embedded Co-Design with VHDL & C(1,2,3,4,5,6) UFME5L-20-3 Digital Signal Processing(1,3,5) UFME5W-20-3 Control Systems Design(1,3,5) In addition, skill 4 is assessed in Group Project Management and, for the electronic pathway, in Embedded Co-design.

D: Transferable skills and other attributes	***Teaching/learning methods and strategies***
The learner is able to 1. to communicate using professional standards of English, both orally and in writing, including, for instance, the results of technical investigations, to peers and/or to "problem owners". 2. to manage his or her own time; to meet deadlines; 3. to work with others, being aware of the benefits and problems which teamwork can bring, having gained insights into the problems of team-based systems development. 4. to use software in the context of problem-solving investigations, and to interpret findings 5. to express problems in appropriate notations. 6. to gain experience of, and to develop skills in, learning independently of structured class work, including the use of on-line facilities to further self-study. 7. to read and to use literature sources appropriate to the discipline to support learning activities.	*Support for transferable skills is provided through the GDP sessions, online library resources, specific modules such as Professional Skills and Group Project Management as well as being integrated into all teaching.* ***Assessment*** *assessment of key transferable skills is integrated into all modules. Students would not succeed on this programme without developing these skills*. Skill 1. In order to develop a wide variety of communication skills, students • maintain laboratory log books • participate in electronic conferences, workshops, and groupwork sessions. • participate in discussion tutorials • present research topic findings in tutorials • participate in individual tutorials • collaborate on group projects Skill 2. In order to develop personal time management skills, students • conduct self-managed practical work • participate in practically-oriented tutorial and laboratory sessions • work through practical work-sheets in teams • practice design and programming Skill 3 is developed widely throughout the programme, and is specifically taught analysed in the following modules: • UFPENW-10-1 Professional Studies for Electrical & Electronic Engineers • UFPENX-20-2 Group Project & Management Skill 4. Use of software for problem solving is used particularly in the following modules: UFMERR-10-1, UFMEUY-20-3 UFMEWQ-20-2, UFME5W-20-3 UFME66-20-3 Students practice design and programming in UFMETS-20-1,UFME69-20-2 UFMEVP-20-2, UFMEMY-20-3 UFME5L--20-3 Students sketch designs of larger systems in UFME66-20-3, UFMEMY-20-3 Use and development of Skills 5, 6 and 7 is expected throughout all technical modules. Both Group and Individual Projects require a thorough literature review.

Section 4: Programme structure

<table>
<tr><td>Level 1</td><td>Core modules

UFMERR-10-1 Analogue Circuit Analysis
UFMEUK-20-1 Practical Electronics
UFMETT-20-1 Digital Design & Instrumentation
UFMETU-20-1 Digital Systems Development
UFMETS-20-1 Programming in C
UFMXXX-20-1 Mathematics
UFPENW-10-1 Professional Studies for Electrical & Electronic Engineers</td><td>Interim Awards:

Cert. HE</td></tr>
<tr><td rowspan="2">Level 2</td><td>Core modules

UFME69-20-2 Micro-controller Based Systems
UFMEWQ-20-2 Signal Processing & Circuits
UFMEUY-20-3 Control Systems Engineering
UFQEQ8-20-2 Mathematics for Signal Analysis & Control
UFPENX-20-2 Group Project & Management</td><td rowspan="2">Interim Awards:

Diploma HE</td></tr>
<tr><td>Compulsory modules (pathway specific)

Electrical pathway
UFMEVR-20-2 Electrical Technology

Electronic pathway
UFMEVP-20-2 CPU Architecture with VHDL</td></tr>
<tr><td>Year out</td><td colspan="2">Optional Industrial placement module UFPEJH-210-P</td></tr>
</table>

level 3	***Core modules*** UFMEAY-30-3 Individual Project UFMEHL-10-3 Integrated Case Studies UFME5W-20-3 Control Systems Design UFME77-20-3 Telecommunication systems ***Compulsory modules (pathway specific)*** Electrical pathway UFME66-20-3 Power Systems UFMEB4-20-3 Alternative Energy Electronic pathway UFMEMY-20-3 Embedded Co-Design with VHDL & C UFME5L-20-3 Digital Signal Processing	**Awards:** • Target/highest BEng(Hons) Electrical and Electronic Engineering (Electrical) BEng (Hons) Electrical & Electronic Engineering(Electronic) • Default BEng Electrical and Electronic Engineering (Electrical). BEng Electrical & Electronic Engineering(Electronic) **Credit requirements** 360 credits to include at least 120 @ level 3 120 @ level 2

→ **GRADUATION**

Section 5: Entry requirements

Standard UCAS tariff of 300 points, which must include:

GCSE: Maths and English Language at Grade C or above

Specific subjects:

- At GCE A level - grade C or equivalent in Maths plus one of Chemistry, Computing, Design and Technology, Electronics, Engineering, Physics, Computing.
- Relevant BTEC National Diplomas to included Further Maths for Technicians.
- 14-19 Engineering Diploma provided that the Additional Specialist Learning module in Mathematics or an A level in Mathematics is taken alongside.
- **Access to HE Diploma**; achievement of level 3 credits in Maths (to match content of A level maths in Calculus and Pure Maths) plus at least one other Science or Technology subject;
- **Baccalaureate IB:** to include HL Maths and Science

Section 6: Assessment Regulations

A: Approved to University Academic Regulations and Procedures

The University's Academic Regulations and Procedures apply to this programme.

B: Approved variant to University Academic Regulations and Procedures (insert title of variant)

Institution for Engineering and Technology accreditation requirements:

All modules in the final two levels should contribute towards the calculation of the final award.
The project module must be passed at the first attempt.

Section 7: Student learning: distinctive features and support

Timetabled classes:
The mode of delivery of a module is determined by its Module Leader, and involves any combination of the following: lectures, tutorials, 'lectorials' (where the distinction between traditional lectures and tutorials is blurred), laboratory classes in electronics labs and computer rooms. Learning is a mixture of individual and group activities.

Students are expected to attend all classes on their timetable and to submit work for assessment at the appropriate time.

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.

Personal Development

The Graduate Development Programme at all levels provides cohort and individual student support. At level one this is designed to equip students with the necessary skills and information to help them develop as effective learners and to approach their work with confidence. Level two work is designed to help them recognise, describe and demonstrate their academic achievements and skills, in preparation for a placement year. At level three this should help them plan their own 'preferred future' and present their skills, attributes and abilities in a way that will help them achieve their goals.

Pastoral Care

The university offers pastoral care through Student Advisers, a team of staff who
provide comprehensive, full-time student support service on a drop-in basis or by appointment. The Adviser will, when necessary, advise the student to seek advice to from other including the Student Advice and Welfare Services, the Counselling and Psychological Service, or from members of academic staff.

Facilities to Support Learning

Within the Faculty of Environment and Technology student learning will be supported in the following distinctive ways :

1. Through provision of Open Access and other available computer laboratories that provide access to a range of relevant computer based applications
2. Through provision of the System Support Helpdesk that provides a range of support for learning to students including: support for a wide range of applications used by the students; help in the form of assistants who are trained to resolve many common student problems and help in the form of a large set of 'help-sheet documents', developed over a number of years, that cover a variety of common student requests for information.
3. Technical support staff are available in laboratory sessions and during project work.
4. Extensive laboratory facilities to support the technological modules. These include the Electronics Laboratory (1N70) with facilities for investigation of electrical and electronic principles and circuit design, build and test, the Control and Telecommunications Laboratory (2N40) with facilities for control system analysis and design, the Robotics and Microprocessors laboratory (2N24) and the Unix laboratory 3P28 for DSP and digital hardware analysis.
5. Several Project Rooms which provide students with individual and group work spaces and the facilities.

University-wide services include a Virtual Learning Environment (Blackboard), significant library facilities including dedicated services for international students, and a Global Student Support team.

Computing Facilities

In addition to the wide range of computing facilities offered by the University, the Faculty runs a specialised system with 13 laboratories running Windows and 4 with the Linux operating system. The facilities are available on a 24 hours basis during term time, with swipe card access during evenings, at night and at weekends. The labs offer a variety of specialist engineering software, much of which is available for students to download for their home machines. In addition there is an Open Access lab, not used for teaching so giving access to machines at all times.

Support for the computing system is provided with extensive information on the web, ranging from which lab has free machines (on a real time basis), where to find specific software packages and how to use the printing system, to problem solving and FAQs. A support desk, staffed largely by placement students, provides first line support to users during normal office hours.

Section 8 Reference points/benchmarks

- *Subject benchmarks (QAA Unit …)*
- *University teaching and learning policies:*
- *staff research projects:*
- *employer interaction/feedback:*

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. These are available on the University Intranet.

Programme monitoring and review may lead to changes to approved programmes. There may be a time lag between approval of such changes/modifications and their incorporation into an authorised programme specification. Enquiries about any recent changes to the programme made since this specification was authorised should be made to the relevant Faculty Academic Registrar.