University of Plymouth

Faculty of Science and Engineering

School of Engineering, Computing and Mathematics

Programme Specification

MEng (Hons) Electrical and Electronic Engineering (3747)

September 2021

1. MEng (Hons) Electrical and Electronic Engineering

Final award title: MEng (Hons) Electrical and Electronic Engineering

Intermediate award title(s): Certificate of Higher Education
Diploma of Higher Education
BEng (Hons) Electrical and Electronic Engineering

UCAS code : H608
JACS code : H600

Awarding Institution: University of Plymouth

Teaching institution(s): University of Plymouth

Accrediting body:

The Institution of Engineering and Technology (**IET**).

2. Distinctive Features of the Programme and the Student Experience

The MEng (Hons) Electrical and Electronic Engineering programme provides a course of study at honours level which satisfies the requirements of accreditation by the Institution of Engineering and Technology (IET). The programme satisfies the educational requirements for Chartered Engineer (CEng) registration and enables employment as a professional engineer.

The first three years of the programme are shared with the BEng (Hons) Electrical and Electronic Engineering programme. In similar fashion, MEng Electrical and Electronic Engineering moves gradually from a taught-based approach in the first two years to a project-based approach in the final two years, with the aim to encourage and support students to develop a self-motivated learning attitude and self-management skills, such as working effectively under time and resource constraints.

The MEng has a strong focus on a challenging individual project in the third year and on a substantial team project in the final year, where the team is entirely responsible for the project definition and implementation, legal and ethical aspects of the project and provides an excellent framework for stretching the students' abilities. Business, marketing, and managerial aspects are addressed during the preparation of the final project through market analysis, business planning, project management, combined with seeking and strengthening links with industry. Indeed, MEng final year projects can often be accomplished in collaboration with industrial companies that provide technical, material, and budgetary support. The final year project will also test and strengthen their negotiation, managerial and team-working attitude, in order to be prepared for taking bigger responsibilities after the degree.

At University of Plymouth we strongly believe that practical experience provides the best context for grounding and practising theoretical knowledge. Thus, through substantial hands-on sessions in the extensive lab facilities available at the University, the programme aims to provide students with an immersive learning-by-doing experience, which will develop fundamental practical and analytical skills in electronic, embedded and high-level programming, renewable energy, communications, and the most modern findings in Electrical and Electronic Engineering research. This will be complemented by in-depth theoretical, analytical, and design abilities required for undertaking managerial engineering roles in their future career.

Throughout the MEng course a fundamental role is played by:

- hardware design
- analysis
- building and programming

Microprocessors are introduced to students in the first week of teaching and it will be through the design, analysis and programming of increasingly complex systems that knowledge and engineering practice will be integrated and contextualised. By moving from simple programmable devices to complex communications and renewable energy systems, students will experience:

- analogue and digital electronic
- embedded and high-level programming
- classical and modern control theory

Extensive Electrical and Electronic Engineering practice is complemented by theoretical lectures on principles and mathematics, which provide the essential background and analytical tools of a modern engineer.

A significant part of the practical work at Level 4 and 5 is research informed and takes the form of mini-projects in which the students can develop their research skills and independent/group working skills under staff supervision (ELEC143, PROJ101, ELEC237, ELEC239, ELEC240). This is in preparation of the Level 6 project where the student applies the principles learned and his/her project development experience to a project of his/her choice.

Advanced topics for the MEng programme currently relate to

- the power tracking renewable energy systems
- digital and wireless coding and
- nanotechnology

The concepts are applied in labs and workshops, such as the Nanotechnology and the Communications/Photovoltaic lab. Nanotechnology, power tracking and communications are all research informed teaching areas supported by research active staff who have developed spin-off companies (such as PulsiV for solar panels) or secured current research grants in the field. Extensive practice is complemented by theoretical lectures on principles and mathematics, which provide the essential background and analytical tools of a modern engineer.

The programmes are greatly enhanced by high-qualified staff that enjoy international recognition in fore-front electronics, communications research. This creates a fertile research environment around the students and offers many occasions for deepening their knowledge through numerous workshops and seminars delivered by international researchers. The teaching also benefits from the positive research environment, as the lecturers will feed the latest findings and tools into their teaching, by exposing the students to new and exciting research to which the MEng students often directly collaborate in project based coursework toward the final year of their degree.

Personal Development Planning (PDP)
Level 4 and 5 students will receive career related guidance via a variety of mechanisms that are directed to ensure that students obtain placement opportunities which will enable them to realise their true potential. These include a range of project based practicals (embedded in the coursework of modules such as ELEC143, PROJ101, ELEC240, ELEC241, ELEC239), in which students are encouraged to develop their group work interaction, to produce a business plan, keep a log book and present their work in front of an audience.
Students on a professional training year will be able to develop their PDP further through the training reflective journal.
Level 6 and 7 students are encouraged to self-manage their learning and career planning with the support of Careers and Employability (Careers Hub). However, strong support is provided mainly via the project module (project supervisor at Level 6 and project manager at Level 7) and personal tutor. At both Level 6 and 7 there are invited talks as part of the project modules on Intellectual Property, career development, funding opportunities for start-up companies, employment. The Level 7 project module (PROJ515) includes group work, a business plan and English lectures on how to produce high quality reports which students have commended in the SSLG as a significant support to improve the way they present themselves to potential employers. The Level 7 project is Industry lead and supervised, providing significant industrial input to the students.

3. Relevant QAA Subject Benchmark Group(s)

QAA Subject benchmark: **Engineering**.
The programme follows the **IET UK-SPEC** learning outcomes and integrates those not fully specified with additional QAA learning outcomes (e.g. Key and Transferable skills).

4. Programme Structure

The programme of study is comprised of the raft of modules outlined in this document with 120 module credits per level, with four levels of study. The aim is to develop skills consistent with those required in the Engineering Subject Benchmarks. The 2015 version of the Benchmarks is available at UK-SPEC Link.

This specification provides a concise summary of the main features of the programme and the learning outcomes that a typical student might reasonably expect to achieve and demonstrate if he/she takes full advantage of the learning opportunities available. More detailed information can be found in individual module literature provided during the course. Module delivery methods are diverse but are usually a mix of lectures, seminars, tutorials, laboratory sessions, research investigations and problem clinics. This delivery involves teams of academic, technical, support staff and students. To support learning, the University operates an electronic learning environment accessed via the DLE. All students have dedicated accounts linked to this which forms the primary mechanism to arrange meetings with staff outside of programmed sessions. The campus is well equipped with computers and there are additional dedicated computer labs running specialist software to support this programme. Lecture and support materials are available via web access using the DLE to facilitate home study and preparation for sessions.

Students are expected to pass all modules in order to progress. Industrial placement is strongly encouraged through personal tutors, stage tutors, SSLG, placement student talks on the BPIE module.

Compensation is allowed in accordance with University of Plymouth regulations.

Level 4-6 Pass requirement for each module: 40% (≥ 30% in each elements: Exam, Coursework, in-class Test, Practice).

Level 7 Pass requirement for each module: 50% (≥ 40% in each elements: Exam, Coursework and in-class Test).

Level 4 – 120 Credits

The overall mark for the best 80 credits from this level carries forward as 10% of the final MEng award. Intermediate award on satisfactory completion of Level 4 but subsequent failure to progress leads to ***Certificate of Higher Education***

Semester	Module	Subject	Credit	E1 (%)	C1 (%)	T1 (%)	P1 (%)
1	**ELEC143**	**Embedded Software in Context**	**20**		**50**		**50**
1	**ELEC144**	**Electrical Principles and Machines**	**20**	**70**	**30**		
1	**MATH190**	**Engineering Mathematics**	**20**	**50**	**50**		
2	**PROJ101**	**Electronic and Robot Design and Build**	**20**		**100**		
2	**ELEC142**	**Digital Electronics**	**20**	**60**	**40**		
2	**ELEC141**	**Analogue Electronics**	**20**	**60**	**40**		**P/F**
2	**BPIE112**	**Stage 1 Electrical/Robotics Placement Preparation**	**0**				
			120	**40%**	**52%** **51%**		**8%** **9%**

Level 5 - 120 Credits

The overall mark from this level carries forward as 20% of the final MEng award. Intermediate award on satisfactory completion of Level 5 but subsequent failure to progress leads to ***Diploma of Higher Education***

Semester	Module	Subject	Credit	E1 (%)	C1 (%)	T1 (%)	P1 (%)
1	**BPIE212**	**Stage 2 Electrical/Robotics Placement Preparation**	**0**				
1	**MATH237**	**Engineering Mathematics and Statistics**	**20**	**80**	**20**		
1	**ELEC240**	**Embedded Systems**	**20**	**50**	**50**		
1	**ELEC239**	**Communications Systems**	**20**	**70**	**30**		
2	**ELEC241**	**Real Time Systems**	**20**		**50**		**50**
2	**ELEC237**	**Power Electronics & Generation**	**20**	**60**	**40**		
2	**ROCO219**	**Control Engineering**	**20**	**60**	**40**		
		Total	**120**	**53%**	**38%**		**9%**

Optional Industrial Placement

BPIE332 Electrical Engineering Industrial Placement (Generic)

Level 6 – 120 Credits
The overall mark from this Level carries forward as 30% of the final MEng award. Intermediate award on satisfactory completion of Level 6 but subsequent failure to progress leads to ***BEng (Hons) Electrical and Electronic Engineering*** *Degree* where the final mark for award classification is **60% Level 6 + 30% Level 5 + 10% Level 4 (best 80 credits only).**

Semester	Module	Subject	Credit	E1 (%)	C1 (%)	T1 (%)	P1 (%)
1	ELEC347	Information & Communication Signal Processing	20	80	10		10
1	ELEC351	Advanced Embedded Programming	20	40	60		
1 Option	AINT351Z	Machine Learning	20	50	50		
1 Option	ELEC345	Advanced Embedded Programming	20	40	60		
2	ELEC349	Design and Control of Renewable Energy Technology	20		70	30	
2	PROJ324	Individual Project	40		90		10
				28% 26%	62% 64%	5%	5%

Level 7 - 120 Credits
Final mark for award classification is 40% Level 7 + 30% Level 6 + 20% Level 5 + 10% Level 4 (with only the best 80 credits counting).
Classification bands:
First class honours 70% and above.
Upper second class honours 60-69%
Lower second class honours 50-59%
Third class honours 40-49%
BEng (Hons) degree below 40%

Semester	Module	Subject	Credit	E1 (%)	C1 (%)	T1 (%)	P1 (%)
1	ELEC512	Nanotechnology & Nanoelectronics	20	70	30		
1	ELEC518	Digital & Wireless Communications	20	70	30		
2	ELEC514	Advanced Power Systems	20	70	30		
1/2	PROJ515	MEng Project	60		95		5

		Total (excluding Project)	**60**	**70%**	**30%**		

5. Programme Aims

The general aims of the course are:

- To be inspirational and to support the students to unlock their potential with an innovative, experience-based, and self-motivated approach to Electrical and Electronic Engineering and to support their personal and professional development for a fulfilling post-graduate career in engineering;
- To provide a sustained programme of study at honours level that satisfies the requirements of accreditation by the Institution of Engineering and Technology and enables employment as a professional engineer;
- To be highly informative and capable of stretching the intellectual skills of students to form an exceptional knowledge base suitable for a future career in Engineering based industry and research;
- To encourage and support students during their professional development in applying technical and generic skills and to foster flexible and creative intellectual skills that will facilitate life-long learning and continuing professional development.
- To encourage original and innovative thinking in order to be prepared to deal with uncertainty and undefined context with competence and professionalism.

In addition, MEng Electrical and Electronic Engineering has the following specific aims:

- To provide advanced knowledge and understanding of a range of current Electrical and Electronic Engineering subjects such as:
  - Communications,
  - Nanotechnology, and
  - Renewable Power Systems.

- To provide comprehensive understanding of the key applications of embedded programming to complex electronic systems.
- To establish an extensive and in-depth knowledge of electronic systems on which to develop further skills as technology advances.
- To enable students to understand and apply engineering principles, mathematical modelling and advanced design methods to electrical and electronic engineering problems.
- To provide the drive and motivation to 'learn through design' via practical and project based work, particularly within the context of circuits and electrical and electronic systems design and testing.

6. Programme Intended Learning Outcomes

On completion graduates should have developed the following knowledge, understanding and skills:

8.1 Knowledge and Understanding

KU1. Understand the scientific principles and methodology necessary to enable appreciation of scientific and engineering context in electrical and electronic development, and to support the understanding of historical, current, and future developments in electrical and electronic engineering;

KU2. Identify, classify and describe the performance of analogue and digital systems (such as Communications and Power systems) and components, through the use of analytical methods and modelling techniques;

KU3. Have a comprehensive understanding of the scientific principles of electrical and electronic engineering design and related disciplines, such as Advanced Power Systems and Communications;

KU4. Have an awareness of new emerging and developing technologies related to the Electrical and Electronic Engineering domain, such as Renewable Power and Nanotechnology.

KU5. Have a comprehensive knowledge and understanding of mathematical and computer models relevant to electrical and electronic engineering, and an appreciation of their limitations.

8.2 Intellectual Skills

IS1. Investigate and define a problem and identify constraints including environmental and sustainability limitations, health and safety and risk assessment issues;

IS2. Understand legal requirements, professional and ethical conduct, and the commercial and economic context of electrical and electronic engineering processes and solutions;

IS3. Have a wide knowledge and comprehensive understanding of design processes and methodologies and the ability to apply and adapt them in unfamiliar situations;

IS4. Have an awareness of the nature of intellectual property and contractual issues;

IS5. Apply mathematical and computer-based models for solving problems in engineering, and possess the ability to assess the limitations of particular cases.

8.3 Employment Related and Transferable Skills

TS1. Understand and apply mathematical principles, methods, tools and notation proficiently in the analysis and solution of electrical and electronic engineering problems (such as communication limits, DC to DC converters and Solar Panel power point tracking);

TS2. Communicate effectively in written and oral form and proficiently use ICT technologies for effective communication purposes;

TS3. Reflect on their own learning, being autonomous in learning, being self-critical and demonstrate self-reliance to progress and plan for personal and professional development;

TS4. Work with, and relate effectively to others and to take responsibility for their own work and for the work done in a team;
TS5. Demonstrate leadership and the ability to deal with time and resource constraints with creativity and self-reliance;
TS6. Extract data pertinent to an unfamiliar problem, and apply solutions using computer based engineering tools when appropriate.

8.4 Practical Skills
PS1. Apply knowledge of characteristics of particular materials (electronic components, magnetic materials, graphene material for antenna design), equipment, processes, or products in the design and build of integrated software and hardware components, such as mechanical parts and electronic circuits;
PS2. Assess and use the appropriate hardware and software tools for the design and build of electrical and electronic systems in modern workshop and laboratory settings.
PS3. Identify and use modern modelling software for the design and analysis of electronic circuits such as embedded communications and power systems and models applied to electrical and electronic systems design.
PS4. Individually and in-group manage an electrical and electronics project from its inception to the final realisation
PS5. Understand the properties of a wide range of engineering materials and components pertinent to electrical and electronic systems' design and development (such as the properties of graphene for antenna design);
PS6. Apply engineering techniques, taking account of a range of commercial and industrial constraints.

9. Admissions Criteria, including APCL, APEL and DAS arrangements

Level 4 entry:

- **A Level/AS level**: 128 UCAS points from at least two A-levels, to include Mathematics and Science/Technology at grade B. AS levels or a 6 unit Vocational A level in relevant subjects considered with required A levels.
- **18 Unit BTEC National Diploma/QCF Extended Diploma**: DDD in Engineering/Science/Technology BTEC. To include Distinction in Maths as a core module Maths for Technicians. (IT Practitioners not accepted).
- **International Baccalaureate: 32** overall to include **5** at HL Maths and **5** at HL relevant second relevant subject. If overseas and not studying English within IB – MUST have **IELTS**: 6.0 overall with 5.5 in all other elements
- **European Baccalaureate:** 78% overall with 8.5 in Maths and 8.5 in relevant Science/Technology subject and 7.5 in English or first language.
- **Irish Highers**: AABBB @ Highers including Maths and 2nd Science/Technology subject.

– **Welsh Baccalaureate:** accept as add on points of 120 but also meet standard offer

– **Extended Project:** accept if in a relevant subject as an add-on but also must be studying at least 2 A Levels.

Level 5 entry:

– **Articulation International Colleges**: HNC with at least 70%.

– **Other**: Each case considered on its merits, normally HND level or above.

Level 6 entry:

– **Articulation International Colleges**: HND with at least 70%, IET accredited colleges only.

APEL is considered on an individual basis by admission tutors who will assess the suitability for the programme and will indicate the appropriate entry stage in accordance with the level of experience documented by the applicant.

We welcome applications from applicants with disabilities. Applicants will be subject to standard academic selection procedures. Some students may be invited to attend an informal meeting to ensure that University of Plymouth can provide the required support, and to indicate where any adjustments may need to be made. University of Plymouth's Disability Assist Service is nationally recognised for its good practice in supporting learners with disabilities.

10. Progression criteria for Final and Intermediate Awards

Students can transfer to the MEng at the end of BEng Level 4, 5 or 6 if their overall BEng classification is 2:1 or better.

11. Exceptions to Regulations

Due to accreditation requirements, where a module assessment involves more than one element, students are required to achieve a minimum of 30% in each element.

12. Transitional Arrangements

2020/21 Modules	2021/22 Modules
ROCO104	PROJ101
ELEC145	PROJ101

13. Mapping and Appendices:

13.1. ILO's against Modules Mapping

Knowledge and Understanding	
KU1	ELEC143, PROJ101, ELEC144, ELEC142, ELEC141, ELEC240, ELEC345
KU2	ELEC141, ELEC143, MATH190, ELEC144, ELEC241, ELEC239, ELEC349, ELEC512, ELEC518
KU3	ELEC237, ELEC239, ROCO219, ELEC347, ELEC349, ELEC514, ELEC512, ELEC518, AINT351Z
KU4	ELEC237, ELEC347, ELEC351, ELEC512, ELEC514
KU5	MATH237, ROCO219, ELEC240, ELEC241, ELEC345, ELEC347, ELEC512, ELEC518
Intellectual Skills	
IS1	ELEC143, PROJ101, ELEC240, PROJ324, PROJ515, AINT351Z
IS2	PROJ324, PROJ515
IS3	PROJ101, ELEC241, ELEC239, ELEC237, PROJ324, PROJ515
IS4	PROJ324, PROJ515
IS5	ROCO219, ELEC237, ELEC239, ELEC345, ELEC512, ELEC514, ELEC518
Key and Transferable Skills	
TS1	MATH183, MATH234, ELEC239, ELEC347, ELEC349, ELEC512, ELEC514, ELEC518, AINT351Z
TS2	BPIE112, ELEC143, ELEC241, ELEC347, PROJ324, PROJ515
TS3	BPIE212, BPIE332, ELEC240, PROJ324, PROJ515
TS4	PROJ515, ELEC240, ELEC345
TS5	PROJ515
TS6	ELEC237, ELEC239, ELEC240, PROJ515, ELEC512, ELEC514, ELEC518
Practical Skills	
PS1	PROJ101, ELEC143, ELEC239, ELEC240, ELEC241, ELEC345,PROJ324, PROJ515, ELEC514, ELEC512
PS2	PROJ101, ELEC142, ELEC143, ELEC240, ELEC241, ELEC237, ELEC239, ELEC345, ELEC349, ELEC351, PROJ324, PROJ515, ELEC512
PS3	ROCO219, ELEC349, ELEC351, ELEC514
PS4	ELEC240, ELEC239, PROJ324, PROJ515, ELEC514
PS5	PROJ324, PROJ515, ELEC514, ELEC512
PS6	PROJ324, PROJ515

13.2. Assessment against Modules Mapping

See Section 6 - Programme Structure

13.3. Skills against Modules Mapping

See next page - IET Skills mapping

13.4 Appendices

IET Skills Mapping	ELEC143	ELEC144	MATH190	PROJ101	PROJ101	ELEC142	ELEC141	BPIE112	BPIE212	MATH237	ELEC240	ELEC239	ELEC241	ROCO219	ELEC237	ELEC351	ELEC345	ELEC347	ELEC349	PROJ324	ELEC512	ELEC514	ELEC518	PROJ515
1. UNDERPINNING SCIENCE AND MATHEMATICS																								
1.1 Scientific Principles and Methodology																								
US1 Knowledge and understanding of scientific principles and methodology necessary to underpin their education in their engineering discipline, to enable appreciation of its scientific and engineering context, and to support their understanding of historical, current, and future developments and technologies.		x	x			x	x			x		x			x	x	x		x					
US1m A comprehensive understanding of the scientific principles of own specialisation and related disciplines; US2m An awareness of developing technologies related to own specialisation.						x	x			x		x			x		x		x		x	x	x	
1.2 Mathematics																								
US2 Knowledge and understanding of mathematical principles necessary to underpin their education in their engineering discipline and to enable them to apply mathematical methods, tools and notations proficiently in the analysis and solution of engineering problems.			x				x			x		x		x	x		x	x	x		x	x	x	x
US3m A comprehensive knowledge and understanding of mathematical and computer models relevant to the engineering discipline, and an appreciation of their limitations.			x				x			x					x						x	x	x	x

1.3 Integrated Engineering																								
US3 Ability to apply and integrate knowledge and understanding of other engineering disciplines to support study of their own engineering discipline.	x			x	x						x					x				x				
US4m An understanding of concepts from a range of areas including some outside engineering, and the ability to apply them effectively in engineering projects.																x								x
2. ENGINEERING ANALYSIS																								
2.1 Application of Engineering Principles																								
E1 Understanding of engineering principles and the ability to apply them to analyse key engineering processes.	x			x	x		x				x	x	x	x	x		x			x				x
E1m An ability to use fundamental knowledge to investigate new and emerging technologies.				x	x		x				x		x	x	x		x			x	x	x	x	x
2.2 Performance Classification and Modelling																								
E2 Ability to identify, classify and describe the performance of systems and components through the use of analytical methods and modelling techniques.	x		x			x	x			x	x	x		x			x	x	x					
2.3 Quantitative Methods and Computer Based Problem Solving																								
E3 Ability to apply quantitative methods and computer software relevant to their engineering discipline, in order to solve engineering problems.	x					x	x				x	x	x			x	x	x					x	

E2m Ability to apply mathematical and computer-based models for solving problems in engineering, and the ability to assess the limitations of particular cases.	x					x	x				x					x	x	x					x	
2.4 Systems																								
E4 Understanding of and ability to apply a systems approach to engineering problems.	x					x	x				x	x				x	x	x		x				x
E3m Ability to extract data pertinent to an unfamiliar problem, and apply in its solution using computer based engineering tools when appropriate.											x							x		x			x	x
3. DESIGN																								
D1 Investigate and define a problem and identify constraints including environmental and sustainability limitations, health and safety and risk assessment issues;				x	x	x	x				x						x	x	x	x				x
D2 Understand customer and user needs and the importance of considerations such as aesthetics;				x	x															x				x
D3 Identify and manage cost drivers;				x	x						x					x				x				x
D4 Use creativity to establish innovative solution;				x	x	x	x				x	x			x					x				x
D5 Ensure fitness for purpose for all aspects of the problem including production, operation, maintenance and disposal;				x	x								x			x				x				x
D6 Manage the design process and evaluate outcomes.				x	x						x	x			x					x				x
D1m Wide knowledge and comprehensive understanding of design processes and methodologies and the ability to apply and adapt them in unfamiliar situations;																		x		x				x

D2m Ability to generate an innovative design for products, systems, components or processes to fulfil new needs.													x							x				x
4. ECONOMIC, SOCIAL, AND ENVIRONMENTAL CONTEXT																								
S1 Knowledge and understanding of commercial and economic context of engineering processes;											x		x											x
S2 Knowledge of management techniques, which may be used to achieve engineering objectives within that context;								x	x															x
S3 Understanding of the requirement for engineering activities to promote sustainable development;	x										x								x					x
S4 Awareness of the framework of relevant legal requirements governing engineering activities, including personnel, health, safety, and risk (including environmental risk) issues;						x		x	x		x				x									x
S5 Understanding of the need for a high level of professional and ethical conduct in engineering.	x							x	x				x											x
S1m Extensive knowledge and understanding of management and business practices, and their limitations, and how these may be applied appropriately;																								x
S2m The ability to make general evaluations of commercial risks through some understanding of the basis of such risks.																								x
5. ENGINEERING PRACTICE																								
5.1 Materials and Components																								
P1 Knowledge of characteristics of particular materials, equipment, processes, or products.	x	x				x	x				x		x		x		x		x	x				x

P1m A thorough understanding of current practice and its limitations, and some appreciation of likely new developments;						x	x				x				x		x							x
P2m Extensive knowledge and understanding of a wide range of engineering materials and components.						x	x								x		x		x					x
5.2 Workshop and Laboratory Skills																								
P2 Workshop and laboratory skills.	x					x	x				x		x	x	x		x		x					
5.3 Appropriate use of Engineering Knowledge																								
P3 Understanding of contexts in which engineering knowledge can be applied (e.g. Modified by the policy working party 2009 to include IEng UK-SPEC learning outcomes. 34 of 40 operations and management, technology development, etc).													x	x		x								
P3m Ability to apply engineering techniques taking account of a range of commercial and industrial constraints.																								x
5.4 Technical Information																								
P4 Understanding use of technical literature and other information sources.	x	x				x	x				x				x		x		x	x				x
5.5 Intellectual Property and Contracts																								
P5 Awareness of nature of intellectual property and contractual issues.													x							x				x
5.6 Codes of Practice and Standards																								
P6 Understanding of appropriate codes of practice and industry standards.													x		x		x							
5.7 Quality																								
P7 Awareness of quality issues.						x	x						x		x					x				x

5.8 Working with Uncertainty																								
P8 Ability to work with technical uncertainty.						x	x				x		x		x				x	x				x

13.4 Appendices

Teaching and learning methods and strategies

Teaching strategies and assessment methodologies applied within the programme vary according to the different learning outcomes and specific module content. Assessment methodologies, in particular, are based upon recent pedagogic research and indications provided by UK-SPEC for assessing the competences and knowledge of chartered engineers.

Module delivery methods are diverse but are usually a mix of lectures, seminars, tutorials, laboratory sessions, research investigations and problem clinics. This delivery involves teams of academic, technical, support staff and students.

To support learning, the University operates a digital learning environment accessed via Moodle. All students have dedicated accounts linked to this which forms the primary mechanism to arrange meetings with staff outside of programmed sessions. The campus is well equipped with computers and there are additional dedicated computer labs running specialist software to support this programme. Lecture and support materials are available via web access using the DLE to facilitate home study and preparation for sessions.

Knowledge and understanding

Elements of teaching related to general and specific knowledge of engineering are mainly delivered by traditional in-class lectures. This traditional delivery method is always complemented by real and virtual laboratories, where students can experience and understand the theory through practice, as well as demonstrations and multimedia presentations. University of Plymouth has a strong focus on electronic resources as a means for providing equal accessibility to knowledge. Therefore, the electronic resources already available on the market are often integrated by tailored material produced and made available to the students by the teaching staff in various forms, such as, lecture slides, podcasts, multimedia products and video-recorded lectures.

Lectures and presentations from visiting industrialists, practising engineers and representatives of professional groups are included in the delivery of some modules and some are open to students as extramural activities for added value.

Knowledge related skills are usually assessed by a mix of practice-based elements and examination, which may take the form of formal exams or in-class tests. Inclusive strategies in support of disabled students are put in place to complement other forms of assessment.

Intellectual skills

Intellectual skills are fostered by the application of learning methods based on self-discovery and learning-by-doing, in which the responsibility for taking the initiative, self-reliance and self-discipline is given to the student. Students are introduced to conception, development, design, analysis and review of real solutions to engineering challenges. These activities are usually stimulated during interactive sessions in labs and practical settings. Task-based and project-based teaching methods support the development of the necessary ability to apply theory and knowledge in practice and to widening the learning perspective of students in an integrative and comprehensive way, by favouring connections between specific engineering skills and other topics, such as market, legal, and ethical aspects. These skills are assessed through the robust defence of design decisions by means of viva voce and reports. Tasks and case studies based on problem solving and forward planning to make provision for professional challenges such as lead times, secondary sourcing, critical functions and creative alternative solutions are presented to the students.

Key and transferable skills

A range of student centred activities require students to work alone and in groups, focussing and researching topics, which are assessed through a variety of means including: viva voce, presentations, written reports, and an essay style dissertation. Sometimes the deliverables are in the form of design solutions underpinned by comprehensive mathematical analysis, or computer models of actual physical entities. Assessment not only includes the results obtained but also the methodology used and the means of presenting the results.

Projects in general, and particularly the Level 6 and 7 projects, present opportunities for individuals to take a holistic view of a problem, and set specific measureable and realistic goals within a strict timeframe.

As part of their personal and professional development, students are encouraged to take an optional placement year after the second year, during which they spend a full year in an industrial or research environment relevant to their study.

Practical skills

The teaching and learning strategy is based on a wide range of student centred activities involving hardware and software design and development which necessitate the full range of practical skills acquisition required by an engineer.

The modules link theory and practice, with a high commitment to project work.

From week 1 at the university, students select devices, construct, analyse and test analogue and digital circuits. This approach continues with increasing rigour as the programme progresses.

Students will use a wide range of devices to develop analogue and digital circuits and integrated embedded systems. Knowledge of what is available and how it may be applied is a fundamental part of the programme, together with the extensive use of a variety of circuits as teaching platforms for mathematics, electronics, mechatronics, and programming.

Students will write high and low level code and study good software engineering practice.

In Level 4 general engineering skills are acquired through tasks with materials provided. In Levels 5, 6 and 7 the range and complexity of tasks increases and enlarges its breadth, further enhancing students’ familiarity with a host of skills and numerous disciplines related to the Electrical and Electronic Engineering domain, such as renewable energy, communications and interfacing. This culminates with the Level 6 and 7 project showcase where students display innovative designs and compete for industrially sponsored prizes.