Programme Specification

Electrical and Electronic Engineering 2017-18

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 s/he takes full advantage of the learning opportunities that are provided.

Awarding Institution	University of Southampton
Teaching Institution	University of Southampton
Mode of Study	Full Time
Duration in Years	3 Years BEng 4 Years MEng
Accreditation details	Currently accredited by the The Institution of Engineering and Technology (IET)
Final award	Master of Engineering (MEng)
Name of award	Electrical and Electronic Engineering
Interim Exit awards	Bachelor of Engineering (BEng) Bachelor of Engineering (BEng Ordinary) Diploma of Higher Education (DipHE) Certificate of Higher Education (CertHE)
FHEQ level of final award	Level 7
UCAS code	H602 MEng Electrical and Electronic Engineering MEng Electrical and Electronic Engineering with Industrial Studies H600 BEng Electrical and Electronic Engineering
QAA Subject Benchmark or other external reference	Quality Assurance Agency (QAA) Engineering Benchmark QAA Framework for Higher Education Qualifications (FHEQ) Engineering Council (UK-SPEC)
Programme Lead	Dr Paolo Rapisarda
Date specification was written	01/02/2016
Date specification last updated	07/12/2017

Programme Overview

Brief outline of the programme

Electrical and Electronic engineering drives the fundamental technologies of today's connected world. Every area of our lives, from energy supply and transmission, medicine and healthcare to industrial applications, global trade, transport, communications, entertainment and security, is dependent on electrical and electronic technology. As a result, electrical and electronic engineering is now one of the fastest growing job fields in the world and skilled electrical and electronic engineers are very much in demand.

At Southampton, we will ensure that you have a thorough grounding in a wide range of technologies. Our project work will enable you to acquire valuable skills in teamwork, project planning, time-management and presentation, applying your learning to design and build problems, and working to a brief. All of these will stand you in good stead as you move into your career. We offer outstanding facilities in our labs and teaching is based on the latest research, ensuring that, at the end of your programme, your skills will be highly regarded by leading employers. All of our programmes have a wide range of courses and modules to choose from, enabling you to specialise in what really interests you and also to work in depth. Our "MEng Electrical and Electronic Engineering with Industrial Studies" variant includes a year in industry, giving you additional experience and the opportunity to relate your academic skills and knowledge to contemporary industrial practice.

Please Note: As a research-led University, we undertake a continuous review of our programmes to ensure quality enhancement and to manage our resources. As a result, this programme may be revised during a student's period of registration; however, any revision will be balanced against the requirement that the student should receive the educational service expected. Please read our **Disclaimer** to see why, when and how changes may be made to a student's programme.

Programmes and major changes to programmes are approved through the University's programme validation process which is described in the University's Quality handbook.

Learning and teaching

A range of learning and teaching methods are used on this programme, including:

- Staff-led lectures, demonstrations, laboratories and seminars
- Directed reading
- Student-led seminars and presentations
- Specification, design, analysis, implementation and verification exercises
- Revision for written examinations
- Staff and post-graduate supervision of your research dissertation
- Industrial placements

Assessment

A range of assessment methods are used on this programme to enable students to demonstrate their achievement of the intended learning outcomes, including:

- Written examinations
- In-class tests
- Design exercises
- Programming exercises
- Oral presentations
- Written assessments, including technical reports, literature searches and surveys
- Assessed laboratories and logbook checks
- Group work exercises, presentations and reports

Feedback

A range of feedback methods are used on this programme to enable students to gauge their progress in meeting the intended learning outcomes, including:

- Feedback from personal tutor
- Written feedback for large courseworks
- Instant oral feedback on presentations, tutorials and practical laboratories
- Feedback on the overall class performance in particular modules
- Marked courseworks

Educational Aims of the Programme

The aims of the programme are to:

- Provide you with a sound foundation and to develop the skills, knowledge, and application required for a wide range of professional engineering careers as a high quality practitioner and leader in business, engineering, research and development, and industry,
- Provide coherent and well balanced coverage of theory, design and practical subjects based on mathematics, science and engineering, integrated with business and management,
- Have a flexible academic structure, which is relevant and attractive not only to you, but also to staff and industry and which is responsive to progress and development in technology and the needs of the industrial and academic communities,
- Be at the leading edge of scholarship in electrical and electronic engineering,
- Maximise the benefit of an environment in which staff are carrying out internationally competitive and leading research across all aspects of electronics and computer science,
- Provide an environment which contributes towards your personal and professional development and provides a foundation for a wide range of subsequent study and lifelong learning,
- Provide a well-found learning environment with sufficient laboratories containing appropriate equipment and facilities, up-to date CAD tools, and a first class web-site, motivating you towards the practice of engineering,
- Provide a supportive pastoral environment with opportunities for you to participate in social and recreational activities, and
- (For the "MEng Electrical and Electronic Engineering with Industrial Studies" variant) Provide you with industrial experience, to enable you to relate your academic skills and knowledge to contemporary industrial practice.

Programme Learning Outcomes

Knowledge and Understanding

Having successfully completed this programme you will be able to demonstrate knowledge and understanding of:

A1. Underpinning key mathematics and science skills appropriate to electrical and electronic engineering, both as a method for communicating results, concepts and ideas and as a tool for solving complex problems,

A2. Underpinning principles, methodologies and concepts applicable to electrical and electronic engineering, as well as their role in historical, current, and future developments and technologies,

A3. Practical, computational and programming skills relating to electrical and electronic engineering, and compatible with current industrial practice,

A4. Demonstrate specialised technical knowledge in chosen areas of engineering; if you are an MEng student you will exhibit an increased depth and range of specialist knowledge,

A5. Apply the knowledge and understanding outlined above to the development and evaluation of possible solutions to electrical and electronic engineering problems,

A6. Demonstrate awareness of major issues at the frontiers of engineering research and development, and their possible exploitation to enhance current practices,

A7. Demonstrate awareness of financial, economic, and social factors of significance to electrical and electronic engineering including the broader obligations of engineers to society.

If you are an MEng student, you will also have:

A8. A comprehensive understanding of techniques applicable to their own research or advanced scholarship,

A9. Conceptual understanding that enables you to make critical evaluations of current research and advanced scholarship in electrical and electronic engineering, to evaluate methodologies and to develop critiques of them, coupled with practical understanding of how established techniques of research and enquiry are used to create and interpret knowledge in electrical and electronic engineering.

A10. (For the "with Industrial Studies" variant) How to apply your academic skills and knowledge to solving problems in industry.

A11. (For the "with Industrial Studies" variant) The relevance of the learning outcomes listed above to a successful career in industry.

Teaching and Learning Methods

Programmes are taught mainly through Lectures and Directed Reading. Learning is reinforced through tutorials (in the first two parts), design exercises (in the first two parts), coursework assignments, and project work (both individual and in groups). Outcome A1 is largely taught by self-paced methods (worksheets and in-class tests) in parts 1 and 2, and a satisfactory knowledge and understanding is implicit in your ability to complete the second and third part modules. Outcomes A2, A6-A9 are largely taught through lectured modules with understanding developed through coursework and Laboratories. A substantial body of coursework in part 2 develops outcome A3, and outcome A5 is developed through project supervisions in parts 3 and 4. Outcomes A10 and A11 are reached during the year in industry of the "with Industrial Studies" variant.

Assessment methods

Knowledge and understanding of each subject (outcomes A1-A3) are assessed mainly through written examinations. Additional forms of assessment include technical reports (outcomes A5-A7), seminar presentations (A8-A9), and project reports (A5-A9). Outcomes A10 and A11 are assessed by a report, which is written during the year in industry of the "with Industrial Studies" variant.

Subject Specific Intellectual and Research Skills

Having successfully completed this programme you will be able to:

B1. Integrate knowledge of mathematics, science, information technology, businesses context and electrical and electronic engineering practice, to develop analytical and innovative solutions to engineering problems,

B2. Critically analyse and evaluate the extent to which designs and products meet the criteria defined for their current use and future developments, taking account of the impact of new and advancing technology to enhance current practice,

B3. Apply in an appropriate manner computer-aided tools in the design process so as to aid understanding of design trade-offs, and recognise capabilities and limitations of computer-based methods for engineering problem solving,

B4. Recognise the professional, moral and ethical issues involved in the exploitation of technology and science and be guided by the adoption of appropriate professional, ethical and legal practices,

B5. Assess technical and commercial risks, and take appropriate steps to manage those risks in the context of engineering design and solutions,

B6. Solve problems through systematic analysis and design methods and to tackle non-routine problems in creative and innovative ways,

B7. Exercise awareness of quality systems and management in engineering; (MEng only) requirements and responsibilities of leadership; business and management practices relevant to electronic engineering enterprises.

Teaching and Learning Methods

These intellectual skills are taught mainly through Course- and Project-work, and design exercises. Relevant material is also covered in Lectures, Guest Lectures and (for part four MEng students) Seminars. Skill B1 is developed through Group Project Work in parts 2 and 4. Skill B2 is a consistent theme in the taught technical modules in part 3. Advanced CAD tools (skill B3) are used in laboratory and project work in every part of the degree. Skills B4, B5 and B7 are covered through Professional Issues within the laboratory programme in part 1 and developed further in parts 3 and 4. Skill B6 is developed through the Individual and Group Project work in parts 2-4.

Assessment methods

In-class tests and Written Examinations (skill B1), Technical Reports (skills B2, B4 and B7), Design Exercises (skill B3), Logbook Checks (skill B4), Design Project Reports and Presentations (skills B4-B7).

Transferable and Generic Skills

Having successfully completed this programme you will be able to:

C1. Use IT facilities including word processing, spreadsheets, browsers and search engines to find technical information,

C2. Effectively present to audiences (orally, electronically or in writing) rational and reasoned arguments that address a given engineering problem or opportunity, including assessment of the impact of new technologies,

C3. Work on a significant technical project both independently and as a member of a design team, managing both the overall task and your contribution to that task, particularly in the MEng programmes,

C4. Understand the need for continuing professional development in recognition of lifelong learning,

C5. Competently manage projects, people, resources and time.

C6. (For the "with Industrial Studies" variant.) Apply the key skills listed above to industrial projects.

Teaching and Learning Methods

General proficiency with IT (skill C1) pervades the degree, and is not specifically taught. Presentations and report-writing (skill C2) are covered in part 1 lectures and practiced throughout the programme. Independent, and group working, and organisational skills (skills C3 and C5) are taught for, and developed by, the Individual and Group Projects. Professional development (skill C4) is covered in lectures.

Assessment methods

Design Exercises and Projects (both Individual and Group), Technical Reports, Project and Seminar Presentations.

Subject Specific Practical Skills

Having successfully completed this programme you will be able to:

D1. Specify, design, and construct electronic circuits, systems and computer software, taking account of commercial and industrial constraints,

D2. Use CAD, simulation, design, and verification tools to aid in the design of systems, and to report and comment on results,

D3. Use test and measurement instrumentation appropriate to the discipline including awareness of measurements accuracy and coverage,

D4. Recognise any risks or safety aspects that may be involved in the operation of systems within a given context,

D5. Search for information related to a design solution and present it for discussion.

Teaching and Learning Methods

Skill D1 is taught and developed through Design Modules and Projects in parts 2-4. Advanced CAD tools (skill D2) are used in laboratory and project work in every part of the degree. Skills D3-D4 are covered in Lectures and Laboratory Sessions in parts 1 and 2. Skill D5 is taught through Lectures and Project Supervisions.

Assessment methods

Design Exercises (skills D1,D2 and D5), Supervised Laboratories (skills D3-D4), Design Projects (skills D4-D5), Technical Reports and Seminar Presentations (skill D5).

Graduate Attributes

Graduate Attributes are the personal qualities, skills and understanding you can develop during your studies. They include but extend beyond your knowledge of an academic discipline and its technical proficiencies. Graduate Attributes are important because they equip you for the challenge of contributing to your chosen profession and may enable you to take a leading role in shaping the society in which you live.

We offer you the opportunity to develop these attributes through your successful engagement with the learning and teaching of your programme and your active participation in University life. The skills, knowledge and personal qualities that underpin the Graduate Attributes are supported by your discipline. As such, each attribute is enriched, made distinct and expressed through the variety of learning experiences you will experience. Your development of Graduate Attributes presumes basic competencies on entry to the University.

There are six Graduate Attributes:

Global Citizenship
Global Citizens recognise the value of meaningful contribution to an interconnected global society and aspire to realise an individual's human rights with tolerance and respect.

Ethical Leadership
Ethical Leaders understand the value of leading and contributing responsibly to the benefit of their chosen professions, as well as local, national and international communities.

Research and Inquiry
Research and Inquiry underpin the formulation of well-informed new ideas and a creative approach to problem resolution and entrepreneurial behaviours

Academic
Academic attributes are the tools that sustain an independent capacity to critically understand a discipline and apply knowledge

Communication Skills
Communication Skills encompass an individual's ability to demonstrate knowledge, and to express ideas with confidence and clarity to a variety of audiences

Reflective Learner
The Reflective Learner is capable of the independent reflection necessary to develop their learning and continuously meet the challenge of pursuing excellence

The following table shows the mapping between the University's Graduate Attributes, and a key subset of the core and compulsory modules that form the degree programme.

Code	Module Title	Global Citizenship	Ethical Leadership	Research and Inquiry	Academic	Communication Skills	Reflective Learner
	Part 1 labs	•	•			•	
COMP3200	Individual Project			•	•	•	•
COMP3219	Engineering Management and Law	•	•				
ELEC3200	Industrial Studies		•		•	•	•
COMP6200	Group Design Project			•	•	•	•

Programme Structure

Typical course content

You will study 60 ECTS credits, in parts 1, 2 and 3, and, if an MEng student, 60 ECTS credits in part 4. These credits are at level 4 in the Framework for Higher Education Qualifications in part 1, mainly at level 5 in part 2, then at level 6 in part 3, and level 7 in part 4. If you complete a year in industry, as part of the "with Industrial Studies" variant, you will complete a study worth 30 ECTS credits at level 6. This will qualify you for the award of the enhanced degree. Students intending to graduate with MEng degrees are encouraged to spend 20 weeks in industry, usually as two 10-week summer placements. For students studying at USMC, the normal expectation is that you will complete your first two years of study in Malaysia prior to direct entry into year 3 of the MEng course.

The main areas addressed in the first two parts are mathematics, mechanics, electrical materials and fields, electronic circuits and systems, microprocessors, programming, software design, development and verification, control and systems engineering, power circuits and power electronics, CAD tools and practical laboratory work. Core material covers professional practice, with major individual and group projects, and taught components covering industrial practice and engineering management. You will also choose from a range of technical options. Many of these are in the specialist areas of Electrical Power Engineering, High Voltage Engineering, Computational Intelligence, Mobile & Secure Systems, Computer Systems, Nanotechnology, Optical Electronics, and Wireless Communications.

It should be noted that it may not be possible to run some optional modules if the number of students registered on the module is very small. It should also be noted that optional module choice can be restricted by the University Timetable, which varies from year to year: some optional modules may clash with other optional or compulsory modules. Please be aware that many modules are shared between different cohorts; and the class size depends on cohort size, which varies from year to year.

Programme details

The programme comprises four parts.

Part I: 60 ECTS credits at FHEQ level 4
All modules are core and so are not eligible for compensation. Seven compulsory modules (C) plus one option (O).

Module Code	Title	Semester	ECTS	
ELEC1206	Electrical Materials and Fields	1+2	7.5	C
MATH1055	Mathematics for Electronic and Electrical Engineering I	1+2	7.5	C
ELEC1200	Electronic Circuits	1	7.5	C
ELEC1201	Programming	1	7.5	C
ELEC1202	Digital Systems & Microprocessors	1	7.5	C
ELEC1207	Electronic Systems	2	7.5	C
ELEC1205	Solid State Electronics	2	7.5	C
ELEC1203	Mechanics	2	7.5	O
ELEC1204	Advanced Programming	2	7.5	O

University of Southampton Malaysia Campus (USMC): initially it is anticipated that only one of ELEC1203, ELEC1204 will be offered.

Part II: 60 ECTS credits at FHEQ level 5 except as noted
Seven compulsory modules (C) plus one option (O).

Module Code	Title	Semester	ECTS	UK	USMC
ELEC2221	Digital Systems and Signal Processing	1	7.5	C	C
ELEC2220	Control and Communications	1	7.5	C	C
ELEC2219	Electromagnetism for EEE	1	7.5	C	C
MATH2047	Mathematics for Electrical & Electronic Engineering II	1	7.5	C	C
ELEC2217	EEE Design	2	7.5	C	C
ELEC2222	Circuits and Transmission	2	7.5	C	C
ELEC2208	Power Electronics and Drives	2	7.5	C	C
ELEC2201	Devices	2	7.5	O	O
ELEC2213	Electrical Machines	2	7.5	O	O
ELEC2204	Computer Engineering	2	7.5	O	
ELEC2216	Advanced Electronic Systems	2	7.5	O	
ELEC2206	Materials	2	7.5	O	

University of Southampton Malaysia Campus (USMC): One option (ELEC1204) is available at USMC in Pt I, while two options (ELEC2201 and ELEC2213) are available to the USMC cohort in Pt II.

Year in Industry: 30 ECTS credits at FHEQ level 6

Students on the "with Industrial Studies" variant will complete a year at a recognised partner company. This year may be taken between years 2 and 3, or between years 3 and 4 (MEng only). During this year, students must complete one or more projects, as agreed between the partner company and the School. The placement will be assessed by a report and other activities, as described in the module specification (ELEC3200). This module is core, and must be passed for the award of the "with Industrial Studies" degree title, but marks for this module will not contribute to the final degree classification.

Part III: 60 ECTS credits at FHEQ level 6 except as noted

All students must take the COMP3200 Individual Project (22.5 ECTS), which is core and is weighted 7.5 ECTS in Semester I and 15 ECTS in semester II. In addition, students must take certain specified modules, as given in the tables below.

Students should note that there are a number of prerequisites for the optional modules that are listed in the module specifications; decisions they made for Pt II may affect their choice. It should also be noted that it may not be possible to run some modules if the number of students registered is very small.

Finally, students should select optional modules to make up the total to 60 ECTS. Besides COMP3200, COMP3219 and specialised modules, a maximum of 2 other “externally taught” modules (COMPxxxx, OPTOxxxx, ENTRxxxx, FRENxxxx, GERMxxxx, LANGxxxx, LAWSxxxx MANGxxxx, UOSMxxxx and MATHxxxx) may be chosen. Students must select a 60:60 credit balance between semesters. 15 ECTS can be backtracked from part II optional modules.

Students should note that there are a number of prerequisites for the optional modules that are listed in the module specifications; decisions they made for Pt III may affect their choice.

To ensure that a broad perspective on both the electrical and the electronics areas is provided during the course of study, it is stipulated that optional courses be chosen in a balanced way. The available options are divided in 2 classes: a) “*specific electrical*”, see Appendix IV; b) “*specific electronic*”, consisting of the modules listed in Appendix IV.

Part III students are required to choose at least **one specific electrical and one specific electronics** module among those available.

The BEng and MEng programmes have core (CO), compulsory (C) and optional (O) modules as follows:

Part III modules					
Module Code	Title	Semester	ECTS	BEng	MEng
COMP3200	Individual Project	both	22.5	CO	CO
COMP3219	Engineering Management and Law	1	7.5	O	C
COMP3201	Cyber Security	1	7.5	O	O
COMP3206	Machine Learning	1	7.5	O	O
COMP3215	Real-time Computing and Embedded Systems	1	7.5	O	O
ELEC3201	Robotic Systems	1	7.5	O	O
ELEC3203	Digital Coding and Transmission	1	7.5	O	O
ELEC3205	Control System Design	1	7.5	O	O
ELEC3207	Nanoelectronic Devices	1	7.5	O	O
ELEC3210	Design Studies	1	7.5	O	O
ELEC3218	Signal and Image Processing	1	7.5	O	O
ELEC3221	Digital IC and Systems Design	1	7.5	O	O

ELEC3222	Computer Networks	1	7.5	O	O
MATH3083	Advanced Partial Differential Equations	1	7.5	O	O
MATH3081	Operational Research	1	7.5	O	O
ELEC3214	Power Systems Technology	1	7.5	O	O
COMP3212	Computational Biology	2	7.5	O	O
COMP3214	Principles and Practice of Computer Graphics	2	7.5	O	O
COMP3216	Safety-Critical Systems	2	7.5	O	O
COMP3217	Secure Systems	2	7.5	O	O
ELEC3202	Green Electronics	2	7.5	O	O
ELEC3204	Wireless and Optical Communications	2	7.5	O	O
ELEC3206	Digital Control System Design	2	7.5	O	O
ELEC3208	Analogue and Mixed Signal Electronics	2	7.5	O	O
ELEC3217	Photonics	2	7.5	O	O
ELEC3219	Advanced Computer Architecture	2	7.5	O	O
ELEC3213	Power Systems Engineering	2	7.5	O	O
ELEC3223	Introduction to Bionanotechnology	1	7.5	O	O
ELEC3211	High Voltage Engineering	2	7.5	O	O
ELEC2201	Devices	2	7.5	O	O
ELEC2213	Electrical Machines	2	7.5	O	O
ELEC2204	Computer Engineering	2	7.5	O	O
ELEC2216	Advanced Electronic Systems	2	7.5	O	O
ELEC2206	Materials	2	7.5	O	O
LANGxxxx	A language module scheduled in the Broadening Horizons slot. The appropriate stage will be selected after assessment by the language school	2	7.5	O	O
MATH3084	Integral Transform Methods	2	7.5	O	O
MATH3082	Optimisation	2	7.5	O	O
UOSMxxxx	Any other module from the University's Broadening Horizons programme	2	7.5	O	O

Part IV: 60 ECTS credits at FHEQ level 7

All students must take the ELEC6200 Group Design Project (22.5 credits), which is core and is weighted 15 ECTS in Semester I and 7.5 ECTS in semester II. In addition, students must take certain specified modules, as given in the tables below.

Students should note that there are a number of prerequisites for the optional modules which are listed in the module specifications; decisions they made for Pt III may affect their choice. It should also be noted that it may not be possible to run some modules if the number of students registered is very small.

Finally, students should select optional modules to make up the total to 60 ECTS. Besides COMP6228 and specialised modules, a maximum of 2 other "externally taught" modules (COMPxxxx, OPTOxxxx, ENTRxxxx, FRENxxxx, GERMxxxx, LANGxxxx, LAWSxxxx MANGxxxx and MATHxxxx) may be chosen. Students must select a 30:30 ECTS balance between semesters.

To ensure that a broad perspective on both the electrical and the electronics areas is provided during the course of study, it is stipulated that optional courses be chosen in a balanced way. The available options are divided in 2 classes: a) "*specific electrical*", consisting of the modules listed in Appendix IV; b) "*specific electronic*", consisting of the modules listed in Appendix IV.

Part IV students are required to choose at least **one specific electrical and one specific electronics** module among those available.

Alternatively, semester II of Pt IV may be taken at a partner institution overseas, which has been approved by the Erasmus coordinator. In this case, ELEC62xx Group Design Project (Overseas Placement) should be taken instead of ELEC6200 Group Design Project during semester I. In this case, ELEC62xx is core and carries 15 ECTS credits. The modules selected at the overseas institution must be approved by the programme leader. The module selection must include at least 30 ECTS (or equivalent) at masters level, that is relevant to the degree title. In 'with X' programmes, the requirement to take 15 ECTS credits specific to the specialisation must be met across the two semesters. The marks awarded by the overseas institution will be converted to equivalent UK marks by the Erasmus coordinator.

The MEng programme has core (CO), compulsory (C) and optional (O) modules as follows:

Part IV modules				
Module Code	Title	Semester	ECTS	
ELEC6200	Group Design Project	both	22.5	CO
COMP6202	Evolution of Complexity	1	7.5	O
COMP6204	Software Project Management and Development	1	7.5	O

ELEC6201	Microfabrication	1	7.5	O
ELEC6202	Advanced Memory and Storage	1	7.5	O
ELEC6203	Microsensor technologies	1	7.5	O
ELEC6204	Microfluidics and Lab-on-a-Chip	1	7.5	O
ELEC6205	Bionanotechnology	1	7.5	O
ELEC6217	Radio Communications Engineering	1	7.5	O
ELEC6230	VLSI Systems Design	1	7.5	O
ELEC6237	Secure Hardware Design	1	7.5	O
ELEC6245	Wireless Networks	1	7.5	O
MATH6141	Numerical Methods	1	7.5	O
OPTO6007	An Introduction to Silicon Photonics	1	7.5	O
OPTO6008	Optical Fibre Technology I	1	7.5	O
OPTO6009	Optical Fibre Technology I I	1	7.5	O
ELEC6220	Power Systems Analysis	1	7.5	O
ELEC6221	Power Generation: Technology and Impact on Society	1	7.5	O
ELEC6222	Power and Distribution	1	7.5	O
ELEC6203	Introduction to MEMs	1	7.5	O
COMP6206	Advanced Computer Vision	2	7.5	O
COMP6208	Advanced Machine Learning	2	7.5	O
COMP6210	Automated Software Verification	2	7.5	O
COMP6212	Computational Finance	2	7.5	O
COMP6228	Individual Research Project	2	7.5	O
ELEC6206	Nanofabrication and Microscopy	2	7.5	O
ELEC6207	Quantum Devices and Technology	2	7.5	O
ELEC6208	Bio/Micro/Nano Systems	2	7.5	O
ELEC6209	Practical Applications of MEMS	2	7.5	O
ELEC6210	Biosensors	2	7.5	O
ELEC6212	Biological Inspired Robotics	2	7.5	O
ELEC6213	Image Processing	2	7.5	O
ELEC6214	Advanced Wireless Communication Networks and Systems	2	7.5	O
ELEC6216	Personal Multimedia Communications	2	7.5	O
ELEC6227	Medical Electrical and Electronic Technologies	2	7.5	O
ELEC6228	Applied Control Systems	2	7.5	O
ELEC6231	VLSI Design Project	2	7.5	O
ELEC6232	Analogue and Mixed Signal CMOS design	2	7.5	O
ELEC6233	Digital System Synthesis	2	7.5	O
ELEC6234	Embedded Processors	2	7.5	O
ELEC6235	System on Chip Design Project	2	7.5	O
ELEC6242	Cryptography	2	7.5	O
MATH6149	Modelling with Differential Equations	2	7.5	O
OPTO6003	Photonic Materials	2	7.5	O
OPTO6004	Metamaterials, Nanophonics and Plasmonics	2	7.5	O
ELEC6224	Advanced Electrical Materials	2	7.5	O
ELEC6225	High Voltage Insulation Systems	2	7.5	O
ELEC6226	Power Electronics for DC Transmission	2	7.5	O

Additional Costs

Students are responsible for meeting the cost of essential textbooks, and of producing such essays, assignments, laboratory reports and dissertations as are required to fulfil the academic requirements for each programme of study. Costs that students registered for this programme typically also have to pay for are included in Appendix 2.

Progression Requirements

The programme follows the University's regulations for Progression, Determination and Classification of Results: Undergraduate and Integrated Masters Programmes and Academic Regulations - Faculty of Physical Sciences and Engineering as set out in the University Calendar.

Intermediate exit points

You will be eligible for an interim exit award if you complete part of the programme but not all of it, as follows:

Qualification	Minimum overall credit in ECTS credits	Minimum ECTS Credits required at level of award
Honours degree - BEng (hons)	at least 180	45
Ordinary degree - BEng	at least 150	30

Diploma of Higher Education - DipHE	at least 120	45
Certificate of HE - CertHE	at least 60	45

Support for student learning

There are facilities and services to support your learning some of which are accessible to students across the University and some of which will be geared more particularly to students in your particular Faculty or discipline area.

The University provides:

- library resources, including e-books, on-line journals and databases, which are comprehensive and up-to-date; together with assistance from Library staff to enable you to make the best use of these resources
- high speed access to online electronic learning resources on the Internet from dedicated PC Workstations onsite and from your own devices; laptops, smartphones and tablet PCs via the Eduroam wireless network. There is a wide range of application software available from the Student Public Workstations.
- computer accounts which will connect you to a number of learning technologies for example, the Blackboard virtual learning environment (which facilitates online learning and access to specific learning resources)
- standard ICT tools such as Email, secure filestore and calendars.
- access to key information through the MySouthampton Student Mobile Portal which delivers timetables, Module information, Locations, Tutor details, Library account, bus timetables etc. while you are on the move.
- IT support through a comprehensive website, telephone and online ticketed support and a dedicated helpdesk in the Student Services Centre
- Enabling Services offering assessment and support (including specialist IT support) facilities if you have a disability, dyslexia, mental health issue or specific learning difficulties
- the Student Services Centre (SSC) to assist you with a range of general enquiries including financial matters, accommodation, exams, graduation, student visas, ID cards
- Career Destinations, advising on job search, applications, interviews, paid work, volunteering and internship opportunities and getting the most out of your extra-curricular activities alongside your degree programme when writing your CV
- a range of personal support services : mentoring, counselling, residence support service, chaplaincy, health service
- a Centre for Language Study, providing assistance in the development of English language and study skills for non-native speakers.

The Students' Union provides

- an academic student representation system, consisting of Course Representatives, Academic Presidents, Faculty Officers and the Vice-President Education; SUSU provides training and support for all these representatives, whose role is to represent students' views to the University.
- opportunities for extracurricular activities and volunteering
- an Advice Centre offering free and confidential advice including support if you need to make an academic appeal
- Support for student peer-to-peer groups, such as Nightline.

Associated with your programme you will be able to access:

- Induction – You will have an induction programme at the start of your programme. Besides covering the usual routine matters, it is especially important for you to be properly registered and to have your computer account set up, since the modules you study are supported by on-line systems. Assessment is also managed on-line, so any delay in registration could be detrimental to your studies. In addition, a diagnostic exercise helps us to assess your strengths and offer advice on how best to focus your efforts in the early stages of your studies.
- Personal tutoring – At the start of your studies, you are allocated a Personal Tutor who you will see regularly. Also there is Senior Tutoring team if your personal tutor is not available.
- Computer workstations, with a range of software, manuals and books, with early to late access through a card-lock mechanism.
- Traditional and wireless local area networks.
- Helpdesk for computer support and programming advice.
- Postgraduate demonstrators, who support programming intensive modules.
- A website with notes for every module.

- The FPSE Student Handbook.
- Vending machines.

Methods for evaluating the quality of teaching and learning

You will have the opportunity to have your say on the quality of the programme in the following ways:

- Completing student evaluation questionnaires for each module of the programme
- Acting as a student representative on various committees, e.g. Staff: Student Liaison Committees, Faculty Programmes Committee OR providing comments to your student representative to feed back on your behalf.
- Serving as a student representative on Faculty Scrutiny Groups for programme validation
- Taking part in programme validation meetings by joining a panel of students to meet with the Faculty Scrutiny Group

The ways in which the quality of your programme is checked, both inside and outside the University, are:

- Regular module and programme reports which are monitored by the Faculty
- Programme validation, normally every five years.
- External examiners, who produce an annual report
- Accreditation/inspection by the Institution of Engineering and Technology
- A national Research Excellence Framework (our research activity contributes directly to the quality of your learning experience)
- Higher Education Review by the Quality Assurance Agency

Your views matter to us. We have a high reputation for quality of delivery, and we aim to keep it that way. The most important form of feedback comes through direct, personal contact, and we encourage you to talk to us if anything becomes a concern at any stage. If you find it difficult to talk directly to the member of staff with whom you have immediate contact, you are encouraged to talk to someone else in the teaching team, the Senior Tutor, or the School's Student Services Office, but we do encourage you to talk about it immediately. In addition, there is always a formal evaluation of each module by questionnaire at the end of the semester. These questionnaires are analysed and peer reviewed, and must be responded to formally, both to you and to the University. We also hold Student-Staff Liaison Committee meetings at least twice a year. Anyone is welcome to these meetings, but depending on the circumstances, it may be more effective to elect programme representatives who will make your views known. This then enables you to have an element of anonymity should you be embarrassed in any way about the idea of speaking up.

Criteria for admission

The University's Admissions Policy applies equally to all programmes of study. The following are the typical entry criteria to be used for selecting candidates for admission. The University's approved equivalencies for the requirements listed below will also be acceptable.

Undergraduate programmes

Qualification	Grades	Subjects required	Subjects not accepted	EPQ Alternative offer (if applicable)	Contextual Alternative offer (if applicable)
GCE A level	BEng: AAA MEng: A*AA	Maths and Physics. In some cases, Physics may be substituted by Further Maths of Electronics.	General Studies and Critical Thinking.	n/a	Considered on a case-by-case basis.
GCSE					
BTEC	Considered on a case-by-case basis				
International Baccalaureate	BEng: 36 points overall with 18 at	Maths, Physics			

	Higher Level including 6 in Maths, 6 in Physics at HL MEng: 38 points overall with 18 at Higher Level including 6 in Maths, 6 in Physics at HL				
European Baccalaureate	85% overall with 85% in both Maths and Physics				

Postgraduate programmes

Qualification	Grade/GPA	Subjects requirements	Specific requirements
Bachelor's degree	N/A	N/A	N/A
Master's degree	N/A	N/A	N/A

Mature applicants
Applications from mature students (over 21 years in the October of the year of entry) are welcome. Applications will be considered on an individual basis.

English Language Proficiency

Overall	Reading	Writing	Speaking	Listening
6.5	5.5	5.5	5.5	5.5

Transfer policy

Electronic Engineering (EL) and Electrical & Electronic Engineering (EEE) have higher entry requirements than Electrical Engineering (EE) and Electromechanical Engineering (EM). Likewise, MEng programmes have higher entry requirements than BEng programmes. Part 1 of the above-listed programmes are identical, with the exception that EL students take ELEC1204 Advanced Programming, while EE and EM students take ELEC1203 Mechanics and while EEE students have the choice of either ELEC1203 or ELEC1204. Parts 1 and 2 of BEng programmes are identical to those of the corresponding MEng programmes, but they diverge in part 3. These issues impose complications upon transfers between these programmes, which are resolved as follows.

Students who are thinking about transferring between EL, EEE, EE and EM are encouraged to discuss this with their academic tutors at the earliest possible opportunity. Transfers between these programmes can be arranged at any time, at the discretion of the programme leader of the destination programme. Additionally, the programme leaders will guarantee transfers between BEng EL, EEE, EE and EM at the end of part 1, for students that have passed that part with an overall average (before referral marks are capped) of at least 58% (without rounding up). Likewise, the programme leaders will guarantee transfers between MEng EL, EEE, EE and EM at the end of part 1, for students that have met the same criterion. However, students seeking transfer to EM will also need to have taken ELEC1203, in order to meet this criterion. Students seeking transfer to EE will not need to have taken ELEC1203, in order to meet this criterion, although in this case they are advised to study the topics of ELEC1203 during the summer before beginning part 2. Likewise, students seeking transfer to EL will not need to have taken ELEC1204, in order to meet this criterion, although in this case they are advised to study the topics of ELEC1204 during the summer before beginning part 2.

Similarly, students who are thinking about transferring between BEng and MEng programmes are encouraged to discuss this with their academic tutors at the earliest possible opportunity. Transfers between BEng and MEng programmes can be arranged at any time, at the discretion of the programme leader of the destination programme. Additionally, the programme leaders will guarantee transfers between BEng and MEng programmes at the end of

part 2, for students that have passed that part with an overall average (before referral marks are capped) of at least 58% (without rounding up).

Career Opportunities

Major employers worldwide are keen to employ our graduates – in system development, information technology and communications in the IT sector, and in the finance, service, communications and entertainment industries. We have strong relationships with employers, run our own Careers Hub website (www.ecs.soton.ac.uk/careers) and hold our own annual careers fair.

External Examiners(s) for the programme

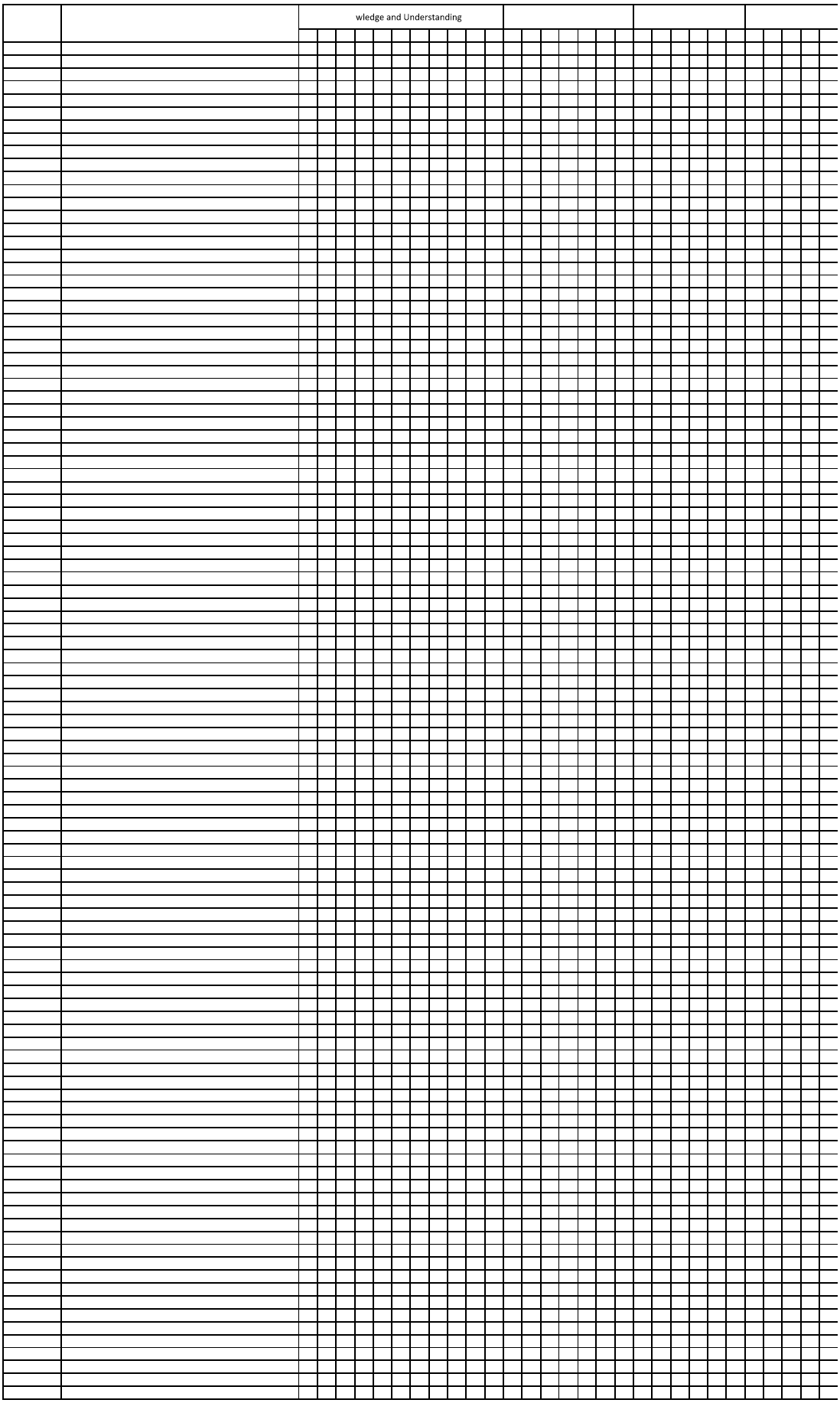
Name: Jan Maciejowski
Institution: University of Cambridge

Students must not contact External Examiner(s) directly, and external examiners have been advised to refer any such communications back to the University. Students should raise any general queries about the assessment and examination process for the programme with their Course Representative, for consideration through Staff: Student Liaison Committee in the first instance, and Student representatives on Staff: Student Liaison Committees will have the opportunity to consider external examiners' reports as part of the University's quality assurance process. External examiners do not have a direct role in determining results for individual students, and students wishing to discuss their own performance in assessment should contact their personal tutor in the first instance.

Please note: 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 s/he takes full advantage of the learning opportunities that are provided. More detailed information can be found in the programme handbook (or other appropriate guide) or online at https://secure.ecs.soton.ac.uk/student/, see also http://www.fpse.soton.ac.uk/student_handbook for related information.

The information in this programme specification is accurate at the time of writing, but may change in minor ways from year to year due to staff availability or other factors. Some of these modules are subject to pre-requisites and exclusions that, for brevity, are not given here; this information is available in the module specifications available at https://secure.ecs.soton.ac.uk/student/

Appendix 1: Learning outcomes



Appendix I: Assessment table

The information in this table is valid at the time of compilation of this document, but should be checked against the relevant course Web page for updates.

Module Code	Module Title	Coursework 1	Coursework 2	Coursework 3	Coursework 4	Coursework 5	Exam
ELEC1206	Electrical Materials and Fields	20% - Technical and Skill Lab Sessions	5% - Maths tests and in-class test				25% - Exam, 1 hour(s) 50% - Exam, 2 hour(s)
MATH1055	Mathematics for Electronic and Electrical Engineering I	20% - Coursework mark generated from 18 tests at end of each weekly topic.					10% - Exam, 1 hour(s) 70% - Exam, 2 hour(s)
ELEC1200	Electronic Circuits	20% - Practical Lab Sessions	15% - Lab project	30% - Problem Sheets	35% - In Class Test		
ELEC1201	Programming	20% - Practical Lab Sessions: C Programming	25% - Practical Lab Sessions: Embedded C Programming	15% - Project	40% - Two in-class tests.		
ELEC1202	Digital Systems & Microprocessors	20% - Practical Lab Sessions	10% - Design Exercise	10% - Problem Sheets			60% - Exam, 2 hour(s)
ELEC1204	Advanced Programming	30% - Practical Lab Sessions	30% - Collaborative Project				40% - Exam, 1.5 hour(s)
ELEC1205	Solid State Electronics	20% - Practical Lab Sessions	10% - Coursework Assignment				70% - Exam, 2 hour(s)
ELEC1207	Electronic Systems	20% - Practical Lab Sessions	10% - Coursework Assignment				70% - Exam, 2 hour(s)
ELEC1203	Mechanics	10% - Practical Lab Sessions	5% - Problem sheet on dynamics of particles	10% - Problem sheet on statics and dynamics of rigid bodies			75% - Exam, 2 hour(s)
ELEC2219	Electromagnetism for EEE	15% - Practical Lab Sessions	17.5% - Coursework	17.5% - Coursework			50% - Exam, 2 hour(s)
ELEC2220	Control and Communications	15% - Practical Lab Sessions	10% Coursework				75% - Exam, 2 hour(s)
ELEC2221	Digital Systems and Signal Processing	15% - Practical Lab Sessions	15% - Coursework				70% - Exam, 2 hour(s)
MATH2047	Mathematics for Electrical & Electronic Engineering II	20% - Coursework					80% - Exam, 2 hour(s)
ELEC2201	Devices	5% - Practical Lab Sessions	10% - Coursework				85% - Exam, 2 hour(s)
ELEC2204	Computer Engineering	10% - 3 Lab Sessions	5% - In-class tests	10%- Design task			75% - Exam, 2 hour(s)
ELEC2217	EEE Design	30% - D2 Integrated circuit design exercise	70% Smart power design exercise				
ELEC2222	Circuits and Transmission	15% - Practical Lab Sessions	20% - Coursework				65% - Exam, 2 hour(s)
ELEC2208	Power Electronics and Drives	5% - Practical Lab Session	10% - Coursework				70% - Exam, 2 hour(s)
ELEC2216	Advanced Electronic Systems	10% - 2 Lab Sessions	10% - Design task				80% - Exam, 2 hour(s)
ELEC2213	Electrical Machines	10% - Practical Lab Sessions	20% - Coursework				70% - Exam, 2 hour(s)
ELEC2206	Materials						100% - Exam. 2 hour(s)
ELEC3200	Year in Industry	100% - Project report					
COMP3200	Individual Project	10% - Progress Report	80% - Final Report	10% - Viva			
COMP3201	Cyber Security	5% - Coursework Assignment Identify faults in web based security	20% - Coursework Assignment Identify and fix faults in web based security				75% - Exam, 2 hours

COMP3206	Machine Learning	30% - 3 x small courseworks	20% - Large coursework				50% - Exam, 2 hours
COMP3215	Real-time Computing and Embedded Systems	30% - Real-time laboratories					70% - Exam, 2 hours
ELEC3201	Robotic Systems	25% - Kinematic design and analysis of robotic systems					75% - Exam, 2 hours
ELEC3203	Digital Coding and Transmission						100% - Exam, 2.5 hours
ELEC3205	Control System Design	20% - 4 problem sheets					80% - Exam, 2 hours
ELEC3207	Nanoelectronic Devices	30% - SILVACO finite element simulation					70% - Exam, 2 hours
ELEC3218	Signal and Image Processing						100% - Exam, 3 hours
ELEC3221	Digital IC and Systems Design	10% - L-Edit Gate Design	10% - Digital Systems Design				80% - Exam, 2.5 hours
ELEC3222	Computer Networks	40% - Group coursework					60% - Exam, 2 hours
ELEC3223	Introduction to Bionanotech.	30% assignment (report)					70% Exam, 2 hours
COMP3219	Engineering Management and Law	33% - Formative coursework assessing Accounting for Engineering Decision Making	33% - Summative computer mediated testing assessing Law in Engineering	33% - Formative coursework assessing Managerial Decisions, Marketing, Human Resource Management and Entrepreneurship			
MATH3081	Operational Research	20% - Group Coursework assignment					80% - Exam, 2 hours
MATH3083	Advanced Partial Differential Equations	20% - Coursework					80% - Exam, 2 hours
COMP3212	Computational Biology	30% - short assignments	40% - major assignment	30% - Best two of three in-class quizzes			
COMP3214	Principles and Practice of Computer Graphics	10% - Two 3 hour labs introducing low level 2D and basic 3D Computer Graphics	10% - Introduction to OpenGL coursework	5% - Introduction to physics based modeling coursework	25% - 3D world Simulation, using OpenGL and modeling where appropriate		50% - Exam, 1.5 hours
COMP3216	Safety-Critical Systems	30% - Coursework					70% - Exam, 2 hours
COMP3217	Secure Systems	80% - Labs					20% - Exam, 1 hour
ELEC3202	Green Electronics	30% - Photo-voltaic exercise					70% - Exam, 2 hours
ELEC3204	Wireless and Optical Communications	5% - Space time coding parametrisation and design in Matlab	5% - OFDM parametrisation and design in Matlab	5% - Modelling of material and fibre dispersion in Matlab			85% - Exam, 2.5 hours
ELEC3206	Digital Control System Design						100% - Exam, 2 hours
ELEC3208	Analogue and Mixed Signal Electronics	10% - Analogue Circuit Design coursework					90% - Exam, 2 hours
ELEC3217	Photonics						100% - Exam, 2.5 hours
ELEC3219	Advanced Computer Architecture	35% - Architecture simulation					65% - Exam, 2 hours

MATH3084	Integral Transform Methods	20% - Coursework					80% - Exam, 2 hours
MATH3082	Optimization	20% - Coursework					80% - Exam, 2 hours
ELEC3214	Power Systems Technology	10% - Coursework	10% - Coursework				80% - Exam, 2 hours
ELEC3213	Power Systems Engineering	50% - Coursework on power system stability					50% - Exam, 2 hours
ELEC3211	High Voltage Engineering						100% - Exam, 2 hours
ELEC3210	Design Studies	50% - Design Thinking Exercise	50% - Design Study				
ELEC6200	Group Design Project	50% - Group Report	10% - Group Presentation	10% - Individual Reflection	30% - Individual Report and Poster on Business Case Study		
ELEC62XX	Group Design Project (overseas placement)	70% group report	15% group presentation	15% Individual reflection			
COMP6202	Evolution of Complexity	0% - code a genetic algorithm	50% - reimplement a selected paper and extend				50% - Exam, 1.5 hours
COMP6204	Software Project Management and Development	25% - Project Management Plan					75% - Exam, 2 hours
ELEC6201	Microfabrication	30% - Fabrication report					70% - Exam, 2 hours
ELEC6202	Advanced Memory and Storage	50% - Advanced memory device and lab report					50% - Exam, 2 hours
ELEC6203	Microsensor technologies	30% - laboratory report					70% - Exam, 2 hours
ELEC6204	Microfluidics and Lab-on-a-Chip	30% - Report on simulation laboratory and technology review					70% - Exam, 2 hours
ELEC6205	Bionanotechnology	30% - laboratory report					70% - Exam, 2 hours
ELEC6217	Radio Communications Engineering	5% - Software defined radio exercise	15% - Matlab simulation	50% - Transceiver System Design (group exercise)			30% - Exam, 1 hour
ELEC6230	VLSI Systems Design	25% - Mini design assignments with electronic submission of designs	75% - Design assignments with formal documentation	25% - Lab (attendance and log book assessment)			
ELEC6237	Secure Hardware Design	50% - Analogue IC Design	50% - Digital IC design				
ELEC6245	Wireless Networks	20% - Tutorial presentation	80% - group coursework				
MATH6141	Numerical Methods	40% - 3 coursework assignments					60% - Exam, 2.25 hours
OPTO6007	An Introduction to Silicon Photonics	25% - 2 work sheets					75% - Exam, 2 hours
OPTO6008	Optical Fibre Technology I	20% - Assignments and problem sheets					80% - Exam. 2.5 hours

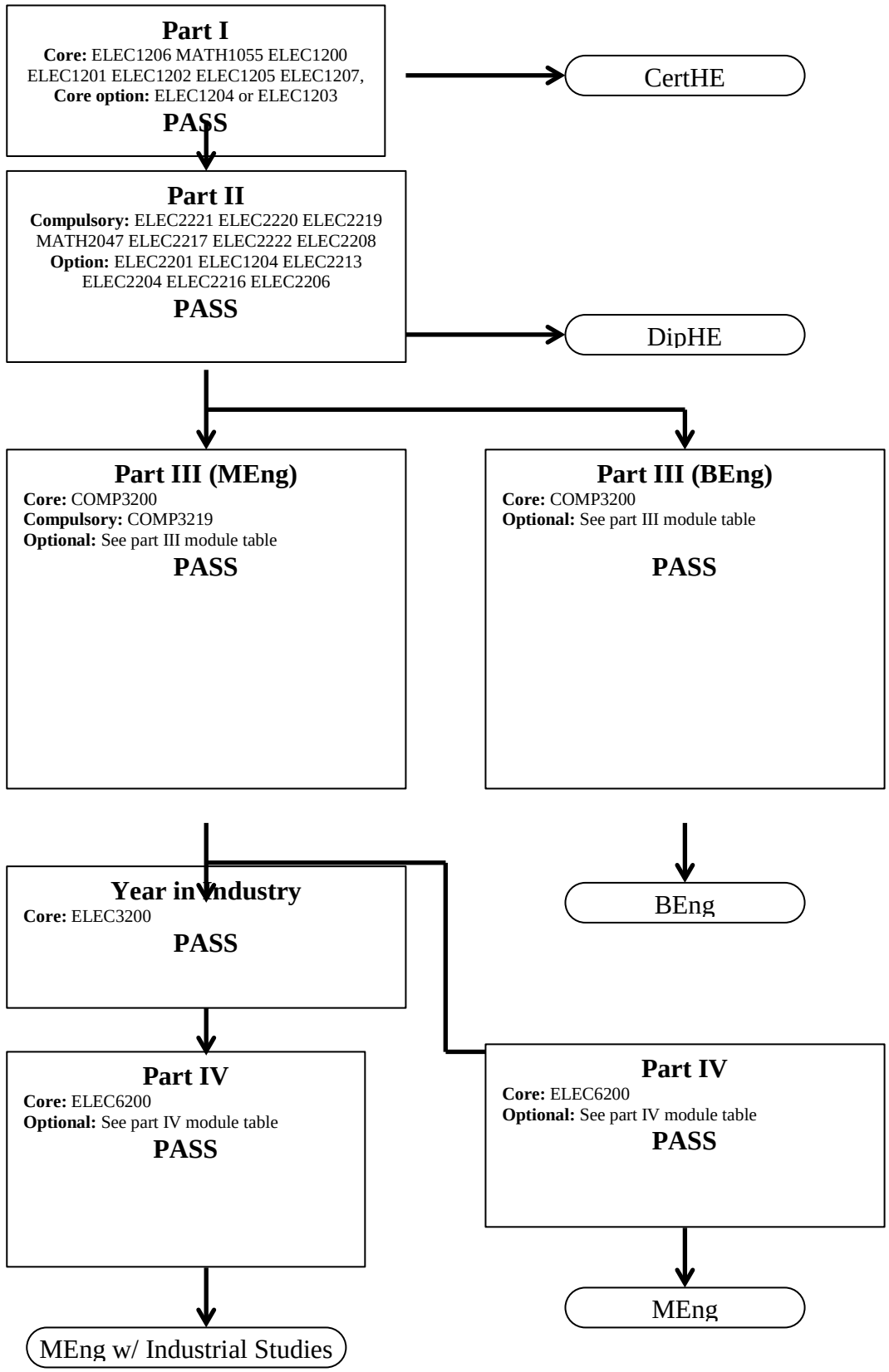
OPTO6009	Optical Fibre Technology I I	20% - Assignments and problem sheets					80% - Exam. 2.5 hours
COMP6206	Advanced Computer Vision	60% - Lecture material	40% - Group coursework				
COMP6208	Advanced Machine Learning	33.3% - Research Report					66.7% - Exam, 2 hours
COMP6210	Automated Software Verification	10% - Exercise in explicit state model checking	5% - Model checking exercise using CBMC	15% - Group exercise in using an OO software verification tool			70% - Exam, 2 hours
COMP6212	Computational Finance	100% - four computer labs					
COMP6228	Individual Research Project	75% - Literature search, interim and final report	25% - Poster				
ELEC6206	Nanofabrication and Microscopy	30% - Report about lithography simulation lab					70% - Exam, 2 hours
ELEC6207	Quantum Devices and Technology	50% - Advance logic device and lab report					50% - Exam, 2 hours
ELEC6208	Bio/Micro/Nano Systems	40% - Accelerometer lab report	30% - Resonator lab report	30% - Glucose sensor lab report			
ELEC6209	Practical Applications of MEMS	10% - Two lab sessions	30% - Assignment 1: research, design, report	30% - Assignment 2: simulate, construct, report	30% - Assignment 3: characterisation/test report and analysis		
ELEC6210	Biosensors	50% - Report on laboratory work, data analysis and literature context					50% - Exam, 2 hours
ELEC6212	Biologically-Inspired Robotics	5%- Quality of initial plan	40%- Technical execution	30% - Documentation	20%- Individual contributions to Wiki or video	5%- Individual reflection	
ELEC6213	Image Processing						100% - Exam, 2 hours
ELEC6214	Advanced Wireless Communication Networks and Systems						100% - Exam, 2 hours
ELEC6216	Personal Multimedia Communications	100% - progress report, individual presentation, final report					
ELEC6227	Medical Electrical and Electronic Technologies	50% - Report on Health Hazards of one electrical/electronic technology	25% - Report on one existing medical imaging technology and approaches being considered for improvement/development	25% - Report on new emerging medical technologies			
ELEC6228	Applied Control Systems	30% - Coursework sheet associated with each of the 3 control topics	50% - Group report of the experimental component	10% - Seminar presentation session given by each group	10% - Written critique of another group's work		
ELEC6231	VLSI Design Project	20% - Milestone Submissions	75% - Design Submission	5% - Individual Reflection			

ELEC6232	Analogue and Mixed Signal CMOS design	25% - Design Assignment					75% - Exam, 2 hours
ELEC6233	Digital System Synthesis	10% - Low Power Lab	40% - Complex system synthesis				50% - Exam, 2 hours
ELEC6234	Embedded Processors	50% - picoMIPS synthesis					50% - Exam, 2 hour(s)
ELEC6235	System on Chip Design Project	100% - Main Report					
ELEC6242	Cryptography	20% - Cryptanalysis Investigation					80% - Exam, 2 hours
MATH6149	Modelling with Differential Equations	75% - 3 group projects	25% - coursework				
OPTO6003	Photonic Materials	30% - 6 x 2 pages					70% - Exam, 2 hours
OPTO6004	Metamaterials, Nanophonics and Plasmonics	60% - 3000 words	40% - Problem classes				
ELEC6203	Microsensor technologies	30% - laboratory report					70% - Exam, 2 hours
ELEC6204	Microfluidics and Lab-on-a-Chip	30% - Report on simulation laboratory and technology review					70% - Exam, 2 hours
ELEC6205	Bionanotechnology	30% - laboratory report					70% - Exam, 2 hours
ELEC6245	Wireless Networks	20% - Tutorial presentation	80% - group coursework				
COMP6212	Computational Finance	100% - four computer labs					
ELEC6208	Bio/Micro/Nano Systems	25% - Sensing and Actuation	25% - Interfacing with Sensors and Actuators	25% - RF MEMS	25% - MEMS Lab report		
ELEC6210	Biosensors	50% - Report on laboratory work, data analysis and literature context					50% - Exam, 2 hours
ELEC6227	Medical Electrical and Electronic Technologies	33% - Report on Health Hazards of one electrical/electronic technology	33% - Report on one existing medical imaging technology and approaches being considered for improvement/development	33% - Report on new emerging medical technologies			
ELEC6220	Power Systems Analysis	50% - Coursework					50% - Exam, 2 hours
ELEC6221	Power Generation: Technology and Impact on Society	30% - Business plan for energy generation	20% - Steam plant analysis				50% - Exam, 2 hours
ELEC6222	Transmission and Distribution	25% - Design project 1	25% - Design project 2				50% - Exam, 2 hours
ELEC6224	Advanced Electrical Materials	50% - Research Review	50% - Mini project				
ELEC6225	High Voltage Insulation Systems	60% - Bushing Design	40% - Partial discharge identification				

ELEC6226	Power Electronics for DC Transmission	34% - Report on the characteristics of power semiconductor devices	33% - Report on power converters	33% - Report on DC Transmission Links			

Appendix II: Programme structure

This programme structure refers to the University of Southampton courses; please refer to the previous sections for information about the structure at USMC.



Appendix III: Additional Costs

Students are responsible for meeting the cost of essential textbooks, and of producing such essays, assignments, laboratory reports and dissertations as are required to fulfil the academic requirements for each programme of study. In addition to this, students registered for this programme typically also have to pay for the items listed in the table below.

In some cases you'll be able to choose modules (which may have different costs associated with that module) which will change the overall cost of a programme to you. Details of such costs will be listed in the Module Profile. Please also ensure you read the section on additional costs in the University's Fees, Charges and Expenses Regulations in the University Calendar available at www.calendar.soton.ac.uk.

Main Item	Sub-section	PROGRAMME SPECIFIC COSTS
Approved Calculators		Candidates may use calculators in the examination room only as specified by the University and as permitted by the rubric of individual examination papers. The University approved models are Casio FX-570 and Casio FX-85GT Plus. These may be purchased from any source and no longer need to carry the University logo.
Stationery		You will be expected to provide your own day-to-day stationary items, e.g. pens, pencils, notebooks, etc). Any specialist stationery items will be specified under the Additional Costs tab of the relevant module profile.
T**extbooks**		Where a module specifies core texts these should generally be available on the reserve list in the library. However due to demand, students may prefer to buy their own copies. These can be purchased from any source. Some modules suggest reading texts as **optional** background reading. The library may hold copies of such texts, or alternatively you may wish to purchase your own copies.

Main Item	Sub-section	PROGRAMME SPECIFIC COSTS
		Although not essential reading, you may benefit from the additional reading materials for the module.
Equipment and Materials Equipment	Art Equipment and Materials: Drawing paper; painting materials; sketchbooks	
	Art Equipment and Materials: Fabric, Thread, Wool	
	Design equipment and materials:	
	Excavation equipment and materials:	
	Field Equipment and Materials:	
	Laboratory Equipment and Materials:	
	Medical Equipment and Materials: Fobwatch; stethoscopes;	
	Music Equipment and Materials	
	Photography:	
	Recording Equipment:	
IT	Computer Discs	
	Software Licenses	
	Hardware	
Clothing	Lab Coats	

Main Item	Sub-section	PROGRAMME SPECIFIC COSTS
	Protective Clothing: Hard hat; safety boots; hi-viz vest/jackets;	
	Fieldcourse clothing:	
	Wet Suits?	
	Uniforms?	
Printing and Photocopying Costs		In the majority of cases, coursework such as essays; projects; dissertations is likely to be submitted on line. However, there are some items where it is not possible to submit on line and students will be asked to provide a printed copy.
Fieldwork: logistical costs	Accommodation:	
	Insurance	
	Travel costs	
	Immunisation/vaccination costs	
	Other:	
Placements (including Study Abroad Programmes)	Accommodation	
	Insurance	
	Medical Insurance	
	Travel costs	
	Immunisation/vaccination costs	
	Disclosure and Barring Certificates or Clearance	
	Translation of birth certificates	

Main Item	Sub-section	PROGRAMME SPECIFIC COSTS
	Other	
Conference expenses	Accommodation	
	Travel	
Optional Visits (e.g. museums, galleries)		
Professional Exams		
Parking Costs		
Anything else not covered elsewhere		

Appendix IV: List of specific electrical and specific electronics modules

Specific electronic modules:

Part 3:

ELEC3201	Robotic Systems
ELEC3203	Digital Coding and Transmission
ELEC3205	Control System Design
ELEC3207	Nanoelectronic Devices
ELEC3210	Design Studies
ELEC3218	Signal and Image Processing
ELEC3221	Digital IC and Systems Design
ELEC3222	Computer Networks
ELEC3223	Introduction to Bionanotechnology
ELEC3202	Green Electronics
ELEC3204	Wireless and Optical Communications
ELEC3206	Digital Control System Design
ELEC3208	Analogue and Mixed Signal Electronics
ELEC3217	Photonics
ELEC3219	Advanced Computer Architecture

Part 4:

ELEC6200	Group Design Project
ELEC6201	Microfabrication
ELEC6202	Advanced Memory and Storage
ELEC6203	Microsensor Technologies
ELEC6204	Microfluidics and Lab-on-a-Chip
ELEC6205	Bionanotechnology
ELEC6217	Radio Communications Engineering
ELEC6230	VLSI Systems Design
ELEC6237	Secure Hardware Design
ELEC6245	Wireless Networks
ELEC6206	Nanofabrication and Microscopy
ELEC6207	Quantum Devices and Technology
ELEC6208	Bio/Micro/Nano Systems
ELEC6209	Practical Applications of MEMS
ELEC6210	Biosensors
ELEC6212	Biologically-Inspired Robotics
ELEC6213	Image Processing
ELEC6214	Advanced Wireless Communication Networks and Systems
ELEC6216	Personal Multimedia Communications
ELEC6227	Medical Electrical and Electronic Technologies
ELEC6228	Applied Control Systems
ELEC6231	VLSI Design Project
ELEC6232	Analogue and Mixed Signal CMOS design
ELEC6233	Digital System Synthesis
ELEC6234	Embedded Processors
ELEC6235	System on Chip Design Project
ELEC6242	Cryptography

Specific electrical modules:

Part 3:

ELEC3214	Power Systems Technology
ELEC3213	Power Systems Engineering
ELEC3211	High Voltage Engineering
ELEC3201	Robotic Systems
ELEC3205	Control Systems Design
ELEC3210	Design Studies
ELEC3215	Fluids and Mechanical Materials
ELEC3206	Digital Control System Design
ELEC3216	Mechanical Power Transmission and Vibration

Part 4:

ELEC6200	Group Design Project
ELEC6220	Power Systems Analysis
ELEC6221	Power Generation: Technology and Impact on Society
ELEC6222	Transmission and Distribution
ELEC6203	Microsensor technologies
ELEC6204	Microfluidics & Lab on a Chip

ELEC6205	Bionanotechnology
ELEC6245	Wireless Networks
ELEC6227	Medical Electrical and Electronic Technologies
ELEC6228	Applied Control Systems
ELEC6208	Bio/Micro/Nano Systems
ELEC6210	BioSensors
ELEC6224	Advanced Electrical Materials
ELEC6225	High Voltage Insulation Systems
ELEC6226	Power Electronics for DC Transmission
ELEC6212	Biological Inspired Robotics

Revision History

1. November 2011, Paul Lewin first draft.
2. October 2012, Mark Zwolinski, Mark French, minor changes.
3. May 2014, Mark French, Updates to new Pt III/IV, updates to Pt II, adopted new programme specification template.
4. December 2014, Rob Maunder, Some slight updates to MATHxxxx and OPTOxxxx modules. Correction to assessment of ELEC1201. Slight changes to the exam weighting in ELEC1207 and ELEC6242. Included transfer policy. Added ELEC3222. Updated ELEC6230 assessments and adopted some best practice from CS/SE.
5. January 2015, Rob Maunder, reweighted the assessment in ELEC2201, ELEC2216, ELEC3206 and ELEC6227.
6. Rob Maunder, 05 Feb 2015, Added optional modules ELEC6234, OPTO6008, OPTO6009, OPTO6010, OPTO6011
7. P. Rapisarda, 04 March 2015, Added core category in tables, corrected some typos, introduced disclaimers about assessment rules table.
8. P. Rapisarda, 30 March 2015, Changed "ELEC3210 Electromechanical Design" in "ELEC3210 Design Studies", updated tables of Learning Outcomes and Assessment. Also created entries for OPTO6010 and 6011 in Options Table (note: syllabus non-existing on web pages ORC, so impossible to fill in requirements, LOs, etc.).
9. P. Rapisarda, 31 March 2015, eliminated OPTO6010 and OPTO6011 modules in Options Table and Assessment Table (they require OPTO6008 and OPTO6009, which would already exhaust the number of possible external modules to be taken).
10. P. Rapisarda, 1 April 2015, updated information on options available at USMC (p. 7).
11. P. Rapisarda, 30th April 2015, updated assessment percentages ELEC2220 (p. 17).
12. P. Rapisarda, 7th May 2015, updated ELEC2221 assessment (p. 17).
13. P. Rapisarda, 26th August 2015, updated ELEC6221 and ELEC2219 assessment.
14. P. Rapisarda, 8th September, updated ELEC6242 and ELEC6212 assessment.
15. CQA Team, 09th September, updated legal CMA requirements including Admission table.
16. P. Rapisarda, 16th September 2015, updated ELEC1206 assessment (p. 18).
17. P. Rapisarda, 18th September 15, updated ELEC2204 and ELEC2216 assessment.
18. P. Rapisarda, 29th October 2015, updated Part IV overseas study regulations.
19. P. Rapisarda, 9th November 2015, deleted all occurrences of ELEC3212- it will not be offered anymore.
20. P. Rapisarda, 8th December 2015, updated options selection rules for 3rd and 4th year (after approval at FPC of 25th November)
21. P. Rapisarda, 25th January 2016, eliminated option MATH6148 due to discontinuation of Maths offering it (low numbers)
22. P. Rapisarda, 1st Feb 2016, inserted Group Design Project (Overseas Placement) discussion in Part IV.
23. P. Rapisarda, 11 February 2016, included ELEC32XX Introduction to Bionanotechnology as optional module.
24. P. Rapisarda, 20th April 2016, eliminated ELEC32XX Introduction to Bionanotechnology as optional module due to failure to have it approved by FPC of 20/4/2016.
25. P. Rapisarda, 5th August 2016, changed coursework assessment percentage for ELEC3222.
26. CQA team, 7th December 2016, revised optional module viability (in Programme Structure).
27. P. Rapisarda, 15th December 2016, changed name to ELEC6237 and eliminated ELEC6241 (due to merging with ELEC3221).
28. P. Rapisarda, 13th February 2017, inserted ELEC3223 Introduction to Bionanotechnology as optional module in the third year, and as "specific electronic" module in list in appendix IV.
29. P. Rapisarda, 20th February 2017, changed MANG3067 code to COMP3219. Updated Learning Outcomes table to include ELEC3223.
30. P. Rapisarda, 22nd February 2017, changed assessment of ELEC2216 and ELEC6208, changed name of ELEC6203 and ELEC6208.
31. CQA Team, 8th March 2017, FPC approval of 2017/18 draft.
32. P. Rapisarda, 13th March 2017, eliminated backtrack option from Pt. II to ELEC1204.
33. P. Rapisarda, 15th March 2017, eliminated all mentions of ELEC6215 Integrated RF Transceiver Design due to discontinuation.
34. CQA Team, 30th March 2017, FPC approval for 2017/18
35. CQA Team, 17th May 2017, removal of ELEC6241
36. M. Rotaru, 6th November 2017, Pt II change to include ELEC2213 and ELEC2201 options following 25/10 FPC approval.
37. CQA Team, 7th December 2017, FPC approved optional module size caveat.