University of Hertfordshire UH

School of Physics, Engineering and Computer Science

Title of Programme: MSc Modular Masters in Electronics

Programme Code: EIMASTE

Programme Specification

This programme specification is relevant to students entering:
01 September 2021

Associate Dean of School (Academic Quality Assurance):
Dr Mariana Lilley

Signature

A programme specification is a collection of key information about a programme of study (or course). It identifies the aims and learning outcomes of the programme, lists the modules that make up each stage (or year) of the programme, and the teaching, learning and assessment methods used by teaching staff. It also describes the structure of the programme, its progression requirements and any programme-specific regulations. This information is therefore useful to potential students to help them choose the right programme of study, to current students on the programme, and to staff teaching and administering the programme.

Summary of amendments to the programme

Date	Section	Amendment
29.03.2021	D	**7ENT1003** adjusted from 60% exam/ 40% coursework to 100% coursework* in the academic year 2021/22, due to the covid pandemic.

29.03.2021	D	**7ENT1008** adjusted from 60% exam/ 40% coursework to 100% coursework* in the academic year 2021/22, due to the covid pandemic.
29.03.2021	D	**7ENT1012** adjusted from 60% exam/ 40% coursework to 100% coursework* in the academic year 2021/22, due to the covid pandemic.
29.03.2021	D	**7ENT1042** adjusted from 60% exam/ 40% coursework to 100% coursework* in the academic year 2021/22, due to the covid pandemic.
29.03.2021	D	**7ENT1050** adjusted from 60% exam/ 40% coursework to 100% coursework* in the academic year 2021/22, due to the covid pandemic.
29.03.2021	D	**7ENT1051** adjusted from 60% exam/ 40% coursework to 100% coursework* in the academic year 2021/22, due to the covid pandemic.
29.03.2021	D	**7ENT1054** adjusted from 60% exam/ 40% coursework to 100% coursework* in the academic year 2021/22, due to the covid pandemic.
29.03.2021	D	**7ENT1105** adjusted from 60% exam/ 40% coursework to 100% coursework* in the academic year 2021/22, due to the covid pandemic.
29.03.2021	D	**7ENT1112** adjusted from 60% exam/ 40% coursework to 100% coursework* in the academic year 2021/22, due to the covid pandemic.
29.03.2021	D	**7ENT1113** adjusted from 60% exam/ 40% coursework to 100% coursework* in the academic year 2021/22, due to the covid pandemic.
29.03.2021	D	**7ENT1116** adjusted from 60% exam/ 40% coursework to 100% coursework* in the academic year 2021/22, due to the covid pandemic.
29.03.2021	D	**7ENT1119** adjusted from 60% exam/ 40% coursework to 100% coursework* in the academic year 2021/22, due to the covid pandemic.

* Learning outcomes for this module will be assessed via coursework using alternative modes of assessment. Alternative modes of assessment include, but are not limited to, take home coursework and online timed assessments.

If you have any queries regarding the changes please email AQO@herts.ac.uk

Programme Specification

MSc in Communications and Information Engineering
MSc in Electronics Engineering
MSc in Power Electronics and Control

This programme specification (PS) is designed for prospective students, enrolled students, academic staff and potential employers. It provides a concise summary of the main features of the programme and the intended learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if he/she takes full advantage of the learning opportunities that are provided. More detailed information on the teaching, learning and assessment methods, learning outcomes and content for each module can be found in Definitive Module Documents (DMDs) and Module Guides.

Section 1

Awarding Institution/Body	University of Hertfordshire
Teaching Institution	University of Hertfordshire
University/partner campuses	College Lane
Programme accredited by	Please refer to Section D
Final Award (Qualification)	MSc
All Final Award titles (Qualification and Subject)	Communications and Information Engineering Electronics Engineering Power Electronics and Control
FHEQ level of award	7
Language of Delivery	English

A. Programme Rationale

This programme consists of three Masters awards with an expectation that students will have studied a related engineering discipline to a Bachelor's level or equivalent, as opposed to a "conversion" masters' philosophy aimed at students from a non-engineering background. The MSc awards can be studied over three semesters with the final semester being a 60 credit point individual project. The MSc has two starting points in semester A and B with options to take an 'early start' for the project over Semester C or to extend and take the project in the next opportunity in Semester A as the final third semester.

This structure has been adopted to meet the demand from international students whose previous studies were conducted with a different academic year to the normal September to September year operated in the UK. The consequence of this is that the modules that make up the MSc curriculum need to be independent of each other as the two intake groups of students will not necessarily take modules in the same order. Students entering in Semester B will therefore complete their studies over an 18-month period rather than 12 months. It is also possible for a student to study these awards on a part-time basis over a three-year period.

The successful postgraduates of the programme will acquire the knowledge and understanding, intellectual, practical and transferable skills necessary for the analysis and synthesis of problems in engineering and manufacturing through a combination of experimental, simulation, research methods and case studies.

The Communications and Information Engineering course enables students to understand the fundamentals of information theory and apply appropriate performance and quality measures to engineer enhanced data communication systems. A communications engineer is responsible for the research, design, development and production of communications equipment/systems. Communications engineering encompasses modes of communication such as satellites, radio, internet and broadband technologies and wireless telephone services. Defence industries, consultancy and communication support companies recruit with this qualification.

Electronics Engineering students could develop and test components, devices, systems or equipment that use electricity as part of their source of power. You can find work in a variety of areas including acoustics, defence, nanotechnology, radio and satellite communication and robotics. Industry sectors that recruit this type of qualification include the automotive electronics sector, defence, hardware design and consulting.

For Power and Electronic Control students this programme has emphasis on advanced power electronics and drives, and advanced power systems. Exciting new developments such as wide band gap electronics, energy harvesting and solar cells are discussed and recent developments in power electronics are highlighted. Notable companies recruit with this qualification such as Siemens and defence companies such as Lockheed Martin.

On the MSc in Communications and Information Engineering, the development of skills and advancement of knowledge focus on:

- Enabling students to understand the fundamentals of information theory and apply appropriate performance and quality measures to engineer enhanced data communication systems;
- Enabling students to design state-of-the-art networks using legacy as well as emerging optical and wireless technologies;
- Developing the students' ability to define and apply appropriate analytic, algorithmic and a mix of simulation and hardware tools for reliable data transfer.
- Developing in students' skills to critically evaluate new developments in technology, carry out independent research and coordinate project activities.

On the MSc in Electronics Engineering, the development of skills and advancement of knowledge focus on:

- developing in-depth knowledge and understanding of a broad range of Electronics Engineering expertise;
- building strong design skills for the seamless integration of software and hardware for sustainable and smart applications using Microprocessor/DSP/FPGA technology;
- introducing students to the recent advances in embedded intelligent systems with coverage of artificial intelligence, sustainability and smart system engineering;
- Developing in students' skills to critically evaluate new developments in technology, carry out independent research and coordinate project activities.

On the MSc in Power Electronics and Control, the development of skills and advancement of knowledge focus on:

- Enabling students to solve multidisciplinary problems related to energy conversion, renewable energy systems integration and energy efficiency;
- Developing in students practical skills for the analysis, design and application of power conversion systems in key areas of industry;
- Developing in students' skills to critically evaluate new developments in technology, carry out independent research and coordinate project activities.

B. Educational Aims of the Programme

The programme has been devised in accordance with the University's graduate attributes of programmes of study as set out in UPR TL03.

Additionally this programme aims to:

- provide a quality education at postgraduate level in disciplines associated with electronics;
- provide an educational opportunity and experience to graduates and/or those with appropriate previous experience which enhances their prospects of professional employment in industry;

- provide a variety of awards of study through which the postgraduate may demonstrate competence, knowledge, skills and understanding, in and of, selected disciplines in the field of electronic engineering;
- provide the students with the knowledge and understanding to equip them for a career in technical and engineering management;
- provide and equip the students with theory and the practice of process and technology management, system design and implementation.

C. Intended Learning Outcomes

The programme provides opportunities for students to develop and demonstrate knowledge and understanding, skills and other attributes in the following areas. The programme outcomes are referenced the Frameworks for Higher Education Qualifications of UK Degree-Awarding Bodies (2014), and relate to the typical student. Additionally, the SEEC Credit Level Descriptors for Further and Higher Education (2016) have been used as a guiding framework for curriculum design.

Knowledge and Understanding:	Teaching/learning methods & strategies	Assessment
All Awards: A2 - The product/process definition and system design process. A5 - Suitable application areas in which advanced digital hardware and algorithms can be deployed to produce effective systems. A7 – Understanding of business practice and the limitations within an engineering specialisation A8 – Understand the roles in an engineering team and personal responsibilities **Communications and Information Engineering (CIE)** A1 CIE- The advanced theoretical issues and their practical implementations that underlie recent developments in Communications and Information Engineering. A3 CIE- A range of hardware components and architectures that are used in modern systems appropriate to Communications and Information Engineering. A4 CIE- A range of algorithms and/or protocols and their strengths and weaknesses that are suitable for designing systems appropriate to Communications and Information Engineering. A6- The physical principles underlying the design of the hardware components used in optical systems. **Electronics Engineering (EE)**	Acquisition of knowledge and understanding is through a combination of lectures, seminars, group discussions and assignments. Throughout, the learner is encouraged to undertake independent study both to supplement and consolidate what is being taught/learnt and to broaden their individual knowledge and understanding of the subject.	Knowledge and understanding are assessed through a series of case studies, assignments, project reports and unseen examinations.

A1ee The advanced theoretical issues and their practical implementations that underlie recent developments in Electronics Engineering. A3ee Application of a range of software and hardware that are used in modern smart, sustainable systems A4ee A range of algorithms and/or protocols and their strengths and weaknesses that are suitable for designing systems appropriate to electronics engineering. **Power Electronics and Control (PEC)** A1 PEC- The advanced theoretical issues and their practical implementations that underlie recent developments in Power Electronics and Control. A3 PEC - A range of hardware components and architectures that are used in modern systems appropriate to Power Electronics and Control. A4 PEC - A range of algorithms and/or protocols and their strengths and weaknesses that are suitable for designing systems appropriate to Power Electronics and Control.		
Intellectual skills:	Teaching/learning methods & strategies	Assessment
All awards: B1- Plan and carry out a significant piece of independent investigative or development work as part of their project. B6 – Develop skills in ethical operations and show insight on the commercial and social context. **Communications and Information Engineering** B3 CIE - Select appropriate hardware components and platforms for use in systems appropriate to Communications and Information Engineering. B4 CIE - Design systems appropriate to Communications and Information Engineering by selecting appropriate equipment, configurations, protocols and algorithms. B5 CIE - Evaluate the performance of systems appropriate to Communications and Information Engineering by theoretical analysis and/or simulation.	Intellectual skills are developed throughout the programme by the methods and strategies outlined in section A, above. Throughout, the learner is encouraged to further develop intellectual skills by guided and independent study. Analysis, problem solving and modelling skills are further developed through case studies, class discussion, in-course exercises, assignments and exams. Throughout, the learner is encouraged to develop intellectual skills further by independent study.	Intellectual skills are assessed through case studies, experiential work, tutorials, assignment and examinations. These are supported by work centred on analysis and synthesis, problem solving, in a technical context.

Electronics Engineering B2ee Evaluate, select and deploy appropriate software tools to create/manage or simulate applications/systems B3ee Select appropriate embedded systems using artificial intelligence and smart systems **Power Electronics and Control** B2 PEC - Evaluate, select and deploy appropriate software tools to create/manage or simulate applications/systems appropriate to Power Electronics and Control. B3 PEC - Select appropriate hardware components and platforms for use in systems appropriate to Power Electronics and Control. B4 PEC - Design systems appropriate to Power Electronics and Control by selecting appropriate equipment, configurations, protocols and algorithms. B5 PEC - Electronic control application areas in which advanced digital hardware and algorithms can be deployed to produce effective systems.		
Practical skills:	Teaching/learning methods & strategies	Assessment
C1- Apply appropriate analytical and modelling techniques to electronic engineering problems. C2- Perform experimental laboratory work and draw conclusions. C3- Use computer-based engineering tools. C4- Prepare technical documentation. C5- Evaluate appropriate systems, components or processes. C6 - Plan and manage a project, taking into account economic, social, legal, ethical and sustainability constraints and business strategy	Practical skills are developed throughout the programme by the methods and strategies outlined in sections A and B above. C1 is developed through laboratory work, coursework assignments and tutorial work. C2 and C5are developed through laboratory work. C3 is developed through the use of software simulation tools at all levels. C4 is developed through project work, lab exercises and software documentation. C6 is developed through lectures and project work. Feedback is given to all students on all work produced.	Practical skills C1-C6 are formerly assessed through assignment work on case studies and the individual project.
Transferable skills:	Teaching/learning methods & strategies	Assessment

D1 - Communicate information effectively, orally and/or in writing. D2 - Manage time and resources effectively. D3 - Carry out independent investigations to determine the state of knowledge and research in a subject area. D4 - Work effectively individually and/or within a team D5- Make effective use of a wide range of information resources, such as those offered to them by the university. D6- Progress to research work, or work at an advanced level within an academic or commercial setting	Transferable skills are developed throughout the programme by using group discussions and report writing and require students to manage their own time for achieving targets. D1 and D2 developed through group work, coursework reports, oral presentations and the project report. D3 – D6 are developed throughout most modules; through lectures, group work, assessments and the individual project.	Transferable skills D1-D6 are assessed through assignment work and the project.

D. Programme Structures, Features, Levels, Modules, and Credits

The programme is offered in full-time and part-time modes.

Full-time students may enter the programme for a Semester A entry option 1 start in September when it runs over one calendar year or Semester A entry option 2 when it will run for a period of 18 months. Semester B entry in January runs over 18 months. Identical modules will be studied on both September and January intakes. Students on the September and January intakes complete their projects in Semesters C, A or B respectively.

Semester A Entry Option 1 is to include an early start project module in a study pattern of A, B then C.
Semester A Entry Option 2 is to select a longer study time in a study pattern of A, B then A.
Semester B Entry study time is a pattern B, A then B.

In a part-time mode, the programme is normally offered in 3 years with identical modules studied with the full-time students.

Entry is normally at Masters Level 7 with related degree qualifications.

Accreditation of prior learning (APEL/APCL) is available for this programme. Students wishing to claim APL must document their relevant prior learning in detail and must provide full evidence for their prior achievement of the learning outcomes of this programme.

The Programme Learning Outcomes detailed in section C are developed and assessed through the constituent modules. Table 2 (at the end of this document) identifies where each learning outcome is developed and assessed.

Professional and Statutory Regulatory Bodies

The MSc in Electronics Engineering award is not currently accredited.

The MSc Power Electronics and Control is accredited as meeting the academic standard requirements for Partial CEng (Further Learning) by the Institution of Engineering and Technology (IET) for the cohort intakes from 2016 up to, and including, 2018.

The MSc Communications and Information Engineering is currently accredited as meeting the academic standard requirements for Partial CEng (Further Learning) by the Institution of Engineering and Technology (IET) for the 2017, 2018, 2019, 2020, 2021 intakes.

Work-Based Learning, including Sandwich Programmes

N/A

Programme Structure

The programme structure and progression information below (Table 1a and 1b) is provided for the award. Any interim awards are identified in Table 1b. The Programme Learning Outcomes detailed above are developed and assessed through the constituent modules. Table 2 identifies where each learning outcome is assessed.

Table 1a Outline Programme Structure

Mode of study: Full-time/Part-time
Part time: A typical study pattern for a 3-year part-time student would be 60 credit points of taught modules in the first year, a further 60 credit points of taught modules in the second year and the project in the final year. The order of the modules is agreed in consultation with the Programme Leader with a maximum of 75 credit points within any one academic year.

Entry point: Semester A or B

The following notations should be read in conjunction with tables below:

CIE = Communications and Information Engineering
EE = Electronics Engineering
PEC = Power Electronics and Control

c = compulsory module

Entry Point A

To progress to the project stage, the candidates are expected to have successfully completed a minimum of 90 credits.
The award of a Masters Degree requires 180 credit points passed at level 7, including the MSc Individual Project.

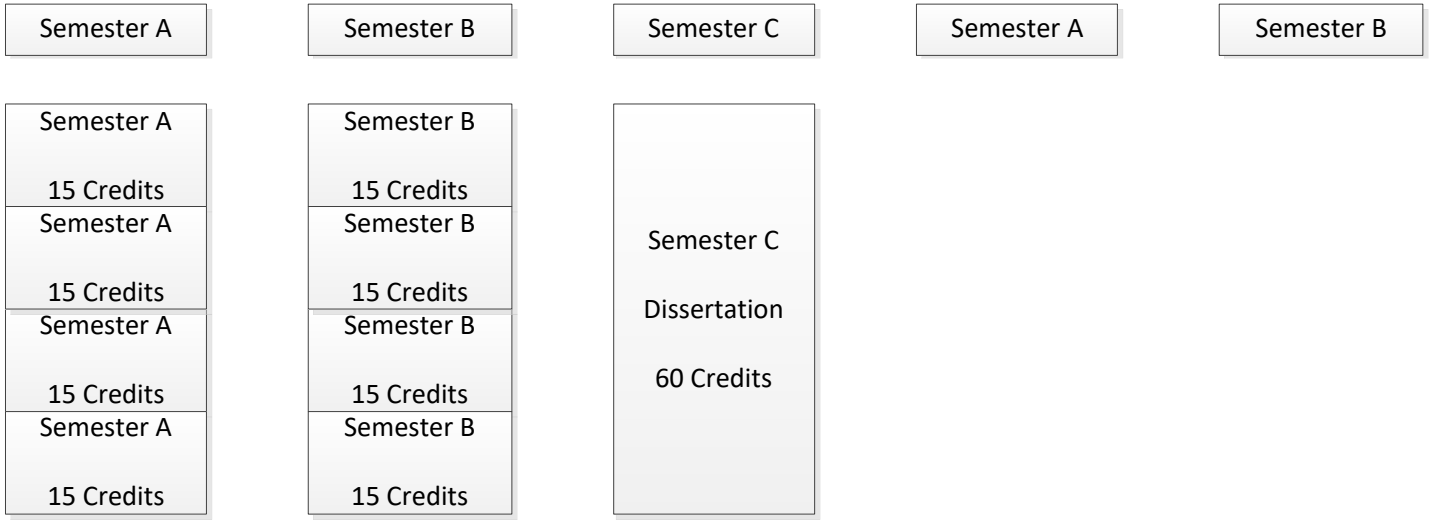
Module Title	Module Code	Award			Credit Pts.	Language of Delivery	% Examination	% In-course assessment	% Practical	Semester	Year of Study	
		CIE	EEE	PEC							Full Time Mode	Part Time Mode
Digital Signal Processing and Applications	7ENT1113	c	c	c	15	English	0	100	0	A	1	1
Digital Mobile Communication Systems	7ENT1054	c	c		15	English	0	100	0	A	1	2
Advanced Reconfigurable Systems & Applications	7ENT1003	c	c	c	15	English	0	100	0	A	1	1
Sustainable Business of Engineering	7ENT1106	c	c	c	15	English	0	100	0	A	1	2
Advanced Power Electronics and Control	7ENT1051			c	15	English	0	100	0	A	1	2
Smart Embedded Systems Engineering	7ENT1112		c		15	English	0	100	0	B	1	1
Embedded Control Systems	7ENT1042		c	c	15	English	0	100	0	B	1	1
Mixed mode and VLSI Technologies	7ENT1008		c		15	English	0	100	0	B	1	2
Optical Communication Technologies	7ENT1012	c			15	English	0	100	0	B	1	1
Artificial Intelligence	7ENT1116		c	c	15	English	0	100	0	B	1	2
Information Theory and Data Processing	7ENT1105	c		c	15	English	0	100	0	B	1	2
Broadband Networks and Data Communications	7ENT1050	c			15	English	0	100	0	B	1	1
Biometrics Systems and Speech Processing	7ENT1119	c			15	English	0	100	0	B	1	2
Renewable Energy Systems and Smart Grid Technologies	7ENT1120			c	15	English	0	100	0	B	1	1
MSc Individual Projects (E) **Note**: Full-time students can either study the project in Semester C (year 1) or Semester A (year 2). Part-time students will study the project in semester AB	7ENT1110	c	c	c	60	English	0	100	0	C, A AB	1, 2	3

Entry Point B

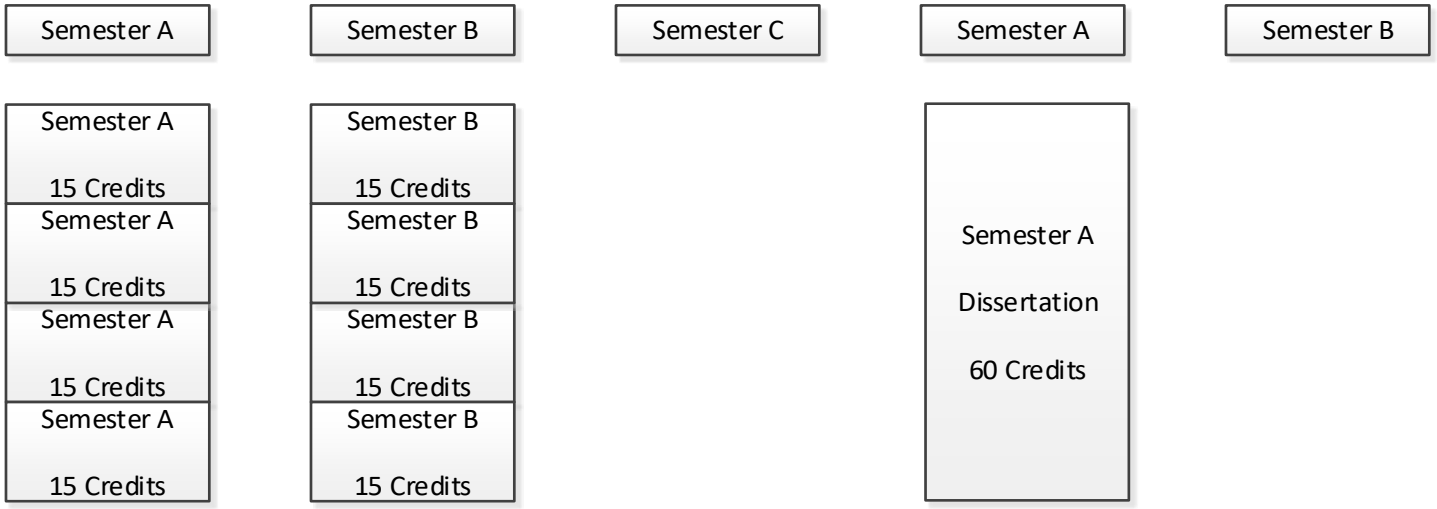
To progress to the project stage, the candidates are expected to have successfully completed a minimum of 90 credits.
The award of a Masters Degree requires 180 credit points passed at level 7, including the MSc Individual Project.

Module Title	Module Code	Award			Credit Pts.	Language of Delivery	% Examination	% In-course assessment	% Practical	Semester	Year of Study	
		CIE	EEE	PEC							Full Time Mode	Part Time Mode
Smart Embedded Systems Engineering	7ENT1112		c		15	English	0	100	0	B	1	1
Embedded Control Systems	7ENT1042		c	c	15	English	0	100	0	B	1	1
Mixed mode and VLSI Technologies	7ENT1008		c		15	English	0	100	0	B	1	2
Optical Communication Technologies	7ENT1012	c			15	English	0	100	0	B	1	1
Artificial Intelligence	7ENT1116		c	c	15	English	0	100	0	B	1	2
Information Theory and Data Processing	7ENT1105	c		c	15	English	0	100	0	B	1	2
Broadband Networks and Data Communications	7ENT1050	c			15	English	0	100	0	B	1	1
Biometrics Systems and Speech Processing	7ENT1119	c			15	English	0	100	0	B	1	2
Renewable Energy Systems and Smart Grid Technologies	7ENT1120			c	15	English	0	100	0	B	1	1
Digital Signal Processing and Applications	7ENT1113	c	c	c	15	English	0	100	0	A	1	1
Digital Mobile Communication Systems	7ENT1054	c	c		15	English	0	100	0	A	1	2
Advanced Reconfigurable Systems & Applications	7ENT1003	c	c	c	15	English	0	100	0	A	1	1
Sustainable Business of Engineering	7ENT1106	c	c	c	15	English	0	100	0	A	1	2
Advanced Power Electronics and Control	7ENT1051			c	15	English	0	100	0	A	1	2
MSc Individual Projects (E) **Note**: Full-time students will study the project in Semester B (year 1). Part-time students will study the project in semester BC	7ENT1110	c	c	c	60	English	0	100	0	B BC	2	3

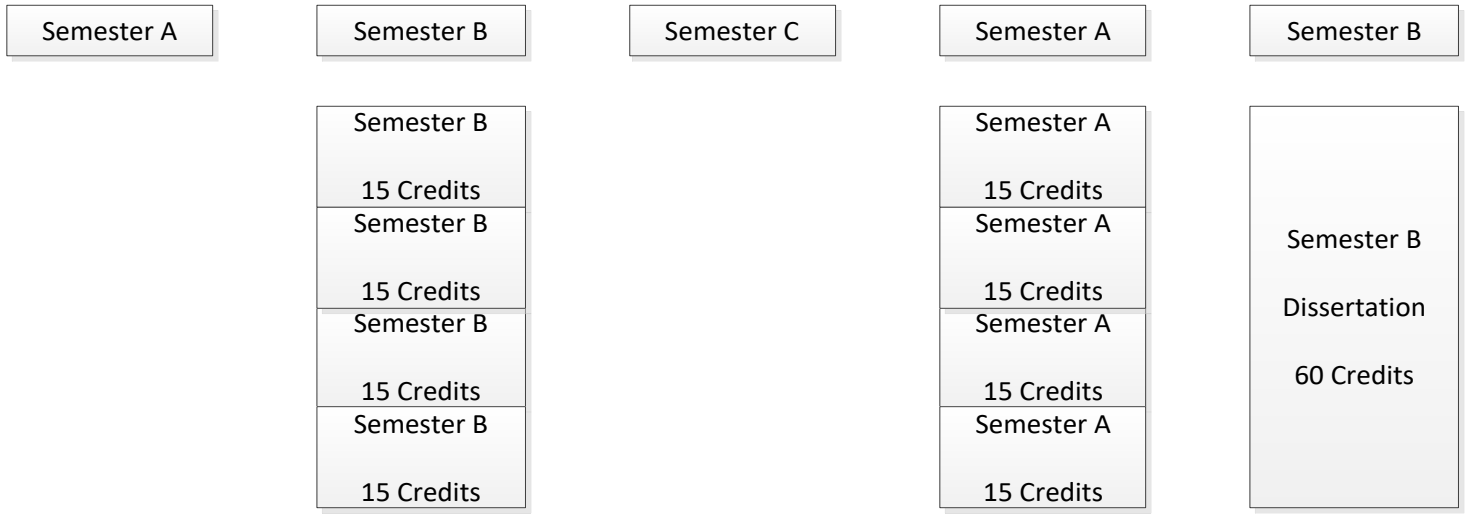
MSc (Semester A Entrant) – Full Time Structure Option 1



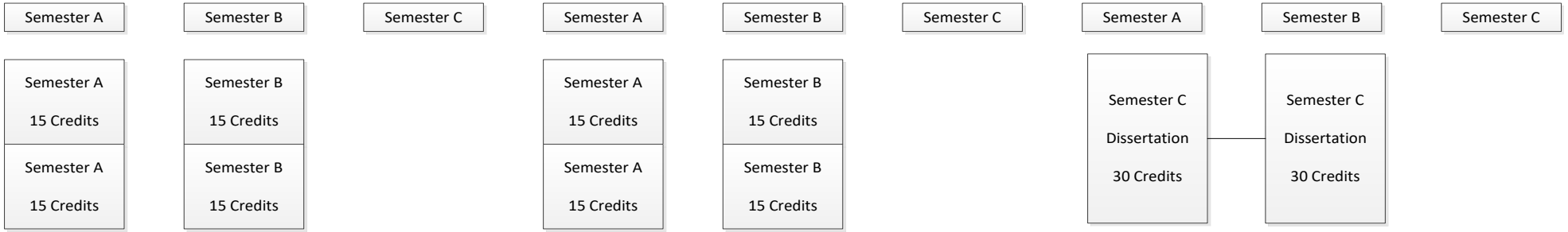
MSc (Semester A Entrant) – Full Time Structure Option 2



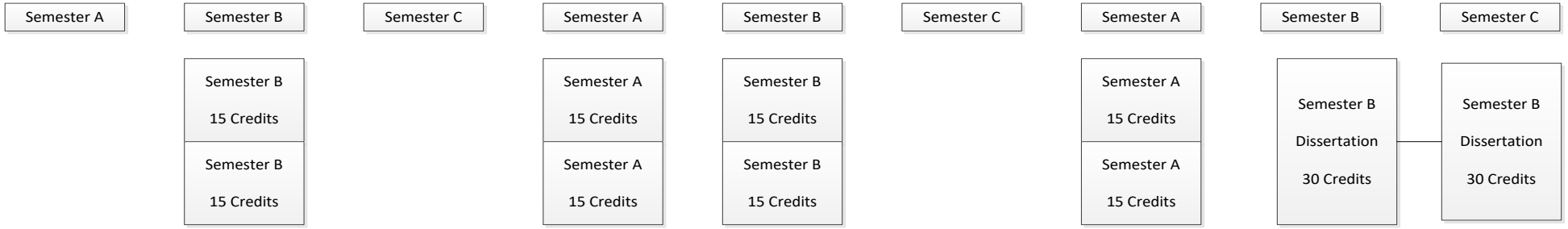
MSc (Semester B Entrant) – Full Time Structure



MSc (Semester A Entrant) Part Time Structure



MSc (Semester B Entrant) Part Time Structure



The award of an MSc requires 180 credit points passed at level 7, including the Masters project.

Table 1b Final and interim awards available

The programme provides the following final and interim awards:

Final Award	Award Title	Minimum requirements	Available at end of (normally):	Programme Learning Outcomes developed (see above)
MSc in named award	Communications and Information Engineering Electronics Engineering Power Electronics and Control	180 credit points including at least 150 at level 7	3 Semesters	All programme learning outcomes (see Table 2)
Interim Award	**Award Title**	**Minimum requirements**	**Available at end of Level**	**Programme Learning Outcomes developed (see above)**
Postgraduate Diploma	Communications and Information Engineering Electronics Engineering Power Electronics and Control	120 credit points, including at least 90 at level 7	2, 3 Semesters	List all relevant learning outcomes, e.g. A1, A3, A4, A5, B1, B2, B6, C1, C2, C3, C5, D1, D2, D3, D4, D5, D6
Postgraduate Certificate	Untitled	60 credit points, including at least 45 at level 7	1-2 Semesters	*For untitled awards:* See UPR AS11, section 13: http://sitem.herts.ac.uk/secreg/upr/AS11.htm

Masters and Diploma awards can be made "with Distinction" or "with Commendation" where criteria as described in UPR AS14, Section D and the students' handbook are met.

Programme-specific assessment regulations

The programme is compliant with the University's academic regulations (in particular, UPR AS11, UPR AS12/UPR AS13 and UPR AS14) with the exception of those listed below, which have been specifically approved by the University:

To comply with professional body regulations students must achieve, after all available attempts under the University regulations, a minimum of 40% (in any allowable attempt) at level 7, before the board of examiners will be able to consider compensation.

Maximum permissible compensation is 15 credits as per requirements of Professional Bodies. Major projects such as the MSc individual project cannot be compensated.

E. Management of Programme & Support for student learning

Management

The programme is managed and administered through:

- Dean of School;
- Associate Dean of School (AQA) who has overall responsibility for Quality Assurance;
- Associate Dean of School (L&T) who has overall responsibility for Learning & Teaching;
- the Programme Leader who is responsible for chairing the programme committee and advising students on the programme as a whole;
- the Student Records Administrator responsible for the administration associated with the programme;
- Programme Leaders who are responsible for the day to day management;
- an Admissions Tutor, with specific responsibility for selection;
- a programme committee that includes the above plus student representation;
- Module leaders who are responsible for individual modules

Support

Students are supported by:

- an induction week at the beginning of each new academic session;
- an extensive Learning Resources Centre, incorporating a library and computer centre;
- guided student-centred learning through the use of StudyNet;
- a student handbook that is specific to the programme;
- a Programme Leader who can advise on programme issues;
- a Student Administrator and admin assistants in the school office;
- Module teaching teams who provide academic support;
- Computer and technical laboratories facilities and technical support staff;
- a project supervisor;
- student representatives on the programme committee;
- the Mathematics Drop-in Centre;
- the Careers, Employment and Enterprise Service that support students looking for either graduate employment or an industrial placement
- a substantial Student Centre that provides advice on issues such as finance, University regulations, legal matters;
- the Medical Centre;
- the Accommodation Office;
- the International Students Centre who organise an Overseas Student Orientation induction programme;
- printing, photocopying, laminating and document binding facilities;
- a confidential counselling service;
- University Disability Advisors;
- an Equal Opportunities Officer;
- the Students' Union

F. Other sources of information

In addition to this Programme Specification, the University publishes guidance to registered students on the programme and its constituent modules:

- A Programme (or Student) Handbook;
- A Definitive Module Document (DMD) for each constituent module;
- A Module Guide for each constituent module.

The Ask Herts website provides information on a wide range of resources and services available at the University of Hertfordshire including academic support, accommodation, fees, funding, visas, wellbeing services and student societies.

As a condition of registration, all students of the University of Hertfordshire are required to comply with the University's rules, regulations and procedures. These are published in a series of documents called 'University Policies and Regulations' (UPRs). The University requires that all students consult these documents which are available on-line, on the UPR web site, at: http://www.herts.ac.uk/secreg/upr/. In particular, UPR SA07 'Regulations and Advice for Students' Particular Attention - Index' provides information on the UPRs that contain the academic regulations of particular relevance for undergraduate and taught postgraduate students.

In accordance with section 4(5) of the Higher Education and Research Act 2017 (HERA), the UK Office for Students (OfS) has registered the University of Hertfordshire in the register of English higher education providers. The Register can be viewed at: https://www.officeforstudents.org.uk/advice-and-guidance/the-register/the-ofs-register/. Furthermore, the OfS has judged that the University of Hertfordshire delivers consistently outstanding teaching, learning and outcomes for its students. It is of the highest quality found in the UK. Consequently, the University received a Gold award in the 2018 Teaching Excellence and Student Outcomes (TEF) exercise. This award was made in June 2018 and is valid for up to 3 years. The TEF panel's report and conclusions can be accessed at: https://www.officeforstudents.org.uk/advice-and-guidance/teaching/tef-outcomes/#/provider/10007147

G. Entry requirements

For current entry tariff point requirements, please refer to the relevant page for the Course on the University website or on the online prospectus.

The programme is subject to the University's Principles, Policies and Regulations for the Admission of Students to Undergraduate and Taught Postgraduate Programmes (in UPR SA03), along with associated procedures. These will take account of University policy and guidelines for assessing accredited prior certificated learning (APCL) and accredited prior experiential learning (APEL).

If you would like this information in an alternative format please contact: Hutton Hub Services Administration Service: hhaq@herts.ac.uk

If you wish to receive a copy of the latest Programme Annual Monitoring and Evaluation Report (AMER) and/or the External Examiner's Report for the programme, please email a request to aqo@herts.ac.uk

Table 2: Development of Intended Programme Learning Outcomes in the Constituent Modules

This map identifies where the programme learning outcomes are assessed in the constituent modules. It provides (i) an aid to academic staff in understanding how individual modules contribute to the programme aims (ii) a checklist for quality control purposes and (iii) a means to help students monitor their own learning, personal and professional development as the programme progresses.

MSc in Communication and Information Engineering

			Programme Learning Outcomes (as identified in section 1 and below)																							
			Knowledge & Understanding								Intellectual Skills					Practical Skills						Transferable Skills					
	Module Title	Module Code	A1 cie	A2	A3 cie	A4 cie	A5 cie	A6 cie	A7	A8	B1	B3 cie	B4 cie	B5 cie	B6	C1	C2	C3	C4	C5	C6	D1	D2	D3	D4	D5	D6
Level 7	Digital Signal Processing and Applications	7ENT1113	X		X		X						X			X	X	X		X		X		X		X	
	Digital Mobile Communication Systems	7ENT1054	X		X	X				X		X	X	X		X	X	X		X		X		X		X	
	Advanced Reconfigurable Systems & Applications	7ENT1003	X			X							X			X	X	X		X		X		X		X	
	Sustainable Business of Engineering	7ENT1106		X					X	X					X			X	X		X	X	X	X	X	X	
	Biometrics Systems and Speech Processing	7ENT1119	X			X							X		X	X	X	X		X		X		X		X	
	Broadband Networks and Data Communications	7ENT1050	X			X		X		X			X	X		X	X	X		X		X		X		X	
	Information Theory and Data Processing	7ENT1105	X			X						X	X			X	X	X		X		X		X		X	
	Optical Communication Technologies	7ENT1012	X			X		X					X	X		X	X	X		X		X		X		X	
	MSc Individual Project (E)	7ENT1110	X								X					X	X	X	X	X	X	X	X	X	X	X	X

Key to Programme Learning Outcomes for Communications and Information Engineering

Knowledge and Understanding e.g.

A1cie	The advanced theoretical issues and their practical implementations that underlie recent developments in Communications and Information Engineering.
A2	The product/process definition and system design process.
A3cie	A range of hardware components and architectures that are used in modern systems appropriate to Communications and Information Engineering.
A4cie	A range of algorithms and/or protocols and their strengths and weaknesses that are suitable for designing systems appropriate to Communications and Information Engineering.
A5	Suitable application areas in which advanced digital hardware and algorithms can be deployed to produce effective systems.
A6cie	The physical principles underlying the design of the hardware components used in optical systems.
A7	Understanding of business practice and the limitations within an engineering specialisation
A8	Understand the roles in an engineering team and personal responsibilities

Practical Skills

C1	Apply appropriate analytical and modelling techniques to electronics engineering problems.
C2	Perform experimental laboratory work and draw conclusions.
C3	Use computer-based engineering tools.
C4	Prepare technical documentation.
C5	Evaluate appropriate systems, components or processes.
C6	Plan and manage a project, taking into account economic, social, legal, ethical and sustainability constraints and business strategy.

Intellectual Skills e.g.

B1	Plan and carry out a significant piece of independent investigative or development work as part of their project.
B3cie	Select appropriate hardware components and platforms for use in systems
B4cie	Design systems by selecting appropriate equipment, configurations, protocols and algorithms.
B5cie	Evaluate the performance of systems by theoretical analysis and/or simulation.
B6	Develop skills in ethical operations and show insight on the commercial and social context.

Transferable Skills

D1	Communicate information effectively, orally and/or in writing.
D2	Manage time and resources effectively.
D3	Carry out independent investigations to determine the state of knowledge and research in a subject area.
D4	Work effectively individually and/or within a team
D5	Make effective use of a wide range of information resources, such as those offered to them by the university.
D6	Progress to research work, or work at an advanced level within an academic or commercial setting.

MSc Electronics Engineering

			Programme Learning Outcomes (as identified in section 1 and below)																							
			Knowledge &							Intellectual Skills				Practical Skills						Transferable Skills						
	Module Title	Module Code	A1 ee	A2	A3 ee	A4 ee	A5 ee	A7	A8	B1	B2 ee	B3 ee	B6	C1	C2	C3	C4	C5	C6	D1	D2	D3	D4	D5	D6
Level 7	Digital Signal Processing and Applications	7ENT1113	X		X		X				X	X		X	X	X		X		X		X		X	
	Advanced Reconfigurable Systems and Applications	7ENT1003	X		X	X					X			X	X	X		X		X		X		X	
	Digital Mobile Communication Systems	7ENT1054	X		X		X				X			X	X	X		X		X		X		X	
	Sustainable Business of Engineering	7ENT1106		X				X	X				X			X	X		X	X	X	X	X	X	
	Embedded Control Systems	7ENT1042		X	X	X	X				X	X			X	X	X	X		X	X				
	Smart Embedded Systems Engineering	7ENT1112	X									X		X	X	X		X		X		X		X	
	Artificial Intelligence	7ENT1116	X			X	X				X	X		X	X	X		X		X		X		X	
	Mixed Mode and VLSI Technologies	7ENT1008	X		X							X		X	X	X		X		X		X		X	
	MSc Individual Project (Electronics)	7ENT1110	X							X				X	X	X	X	X	X	X	X	X	X	X	X

Key to Programme Learning Outcomes for Electronics Engineering

Knowledge and Understanding e.g.

A1ee	The advanced theoretical issues and their practical implementations that underlie recent developments in Electronics Engineering.
A2	The product/process definition and system design process.
A3ee	Application of a range of software and hardware that are used in modern smart, sustainable systems
A4ee	A range of algorithms and/or protocols and their strengths and weaknesses that are suitable for designing systems appropriate to electronics engineering.
A5ee	Suitable application areas in which advanced digital hardware and algorithms can be deployed to produce effective systems.
A7	Understanding of business practice and the limitations within an engineering specialisation
A8	Understand the roles in an engineering team and personal responsibilities

Intellectual Skills e.g.

B1	Plan and carry out a significant piece of independent investigative or development work as part of their project.
B2ee	Evaluate, select and deploy appropriate software tools to create/manage or simulate applications/systems
B3ee	Select appropriate embedded systems using artificial intelligence and smart systems
B6	Develop skills in ethical operations and show insight on the commercial and social context.

Practical Skills

C1	Apply appropriate analytical and modelling techniques to electronics engineering problems.
C2	Perform experimental laboratory work and draw conclusions.
C3	Use computer-based engineering tools.
C4	Prepare technical documentation.
C5	Evaluate appropriate systems, components or processes.
C6	Plan and manage a project, taking into account economic, social, legal, ethical and sustainability constraints and business strategy.

Transferable Skills

D1	Communicate information effectively, orally and/or in writing. .
D2	Manage time and resources effectively.
D3	Carry out independent investigations to determine the state of knowledge and research in a subject area.
D4	Work effectively individually and/or within a team
D5	Make effective use of a wide range of information resources, such as those offered to them by the university.
D6	Progress to research work, or work at an advanced level within an academic or commercial setting.

MSc Power Electronics and Control

			Programme Learning Outcomes (as identified in section 1 and below)																				
			Knowledge & Understanding							Intellectual Skills						Practical Skills						Transfera		
	Module Title	Module Code	A1 pec	A2	A3 pec	A4 pec	A5	A7	A8	B1	B2 pec	B3 pec	B4 pec	B5 pec	B6	C1	C2	C3	C4	C5	C6	D1	D2	D3
Level 7	Digital Signal Processing and Applications	7ENT1113	X		X	X	X					X	X			X	X	X		X		X		X
	Advanced Recongigurable Systems & Applications	7ENT1003	X			X							X			X	X	X		X		X		X
	Advanced Power Electronics and Control	7ENT1051	X	X	X							X	X	X		X	X			X				
	Information Theory and Data Processing	7ENT1105	X			X						X	X			X	X	X		X		X		X
	Sustainable Business of Engineering	7ENT1106		X				X	X						X			X	X		X	X	X	X
	Embedded Control Systems	7ENT1042		X	X	X	X				X	X	X	X			X	X	X	X		X	X	
	Artificial Intelligence	7ENT1116	X			X	X					X				X	X	X		X		X		X
	Renewable Energy Systems and Smart Grid Technologies	7ENT1120	X	X	X	X				X			X				X				X			X
	MSc Individual Projects (E)	7ENT1110	X							X						X	X	X	X	X	X	X	X	X

Key to Programme Learning Outcomes for Power Electronics and Control

Knowledge and Understanding e.g.

A1pec	The advanced theoretical issues and their practical implementations that underlie recent developments in Power Electronics and Control.
A2	The product/process definition and system design process.
A3pec	A range of hardware components and architectures that are used in modern systems appropriate to Power Electronics and Control.
A4pec	A range of algorithms and/or protocols and their strengths and weaknesses that are suitable for designing systems appropriate to Power Electronics and Control.
A5pec	Electronic control application areas in which advanced digital hardware and algorithms can be deployed to produce effective systems.
A7	Understanding of business practice and the limitations within an engineering specialisation
A8	Understand the roles in an engineering team and personal responsibilities

Intellectual Skills e.g.

B1	Plan and carry out a significant piece of independent investigative or development work as part of their project.
B2pec	Evaluate, select and deploy appropriate software tools to create/manage or simulate applications/systems appropriate to Power Electronics and Control.
B3pec	Select appropriate hardware components and platforms for use in systems appropriate to Power Electronics and Control
B4pec	Design systems appropriate to Power Electronics and Control by selecting appropriate equipment, configurations, protocols and algorithms.
B5pec	Evaluate the performance of systems appropriate to Power Electronics and Control by theoretical analysis and/or simulation.
B6	Develop skills in ethical operations and show insight on the commercial and social context.

Practical Skills

C1	Apply appropriate analytical and modelling techniques to electronics engineering problems.
C2	Perform experimental laboratory work and draw conclusions.
C3	Use computer-based engineering tools.
C4	Prepare technical documentation.
C5	Evaluate appropriate systems, components or processes.
C6	Plan and manage a project, taking into account economic, social, legal, ethical and sustainability constraints and business strategy.

Transferable Skills

D1	Communicate information effectively, orally and/or in writing. .
D2	Manage time and resources effectively.
D3	Carry out independent investigations to determine the state of knowledge and research in a subject area.
D4	Work effectively individually and/or within a team
D5	Make effective use of a wide range of information resources, such as those offered to them by the university.
D6	Progress to research work, or work at an advanced level within an academic or commercial setting.

Section 2

Programme management

Relevant QAA subject benchmarking statements	Engineering
Type of programme	Taught postgraduate
Date of validation/last periodic review	February 19
Date of production/ last revision of PS	April 21/March 20
Relevant to level/cohort	Level 7 entering Sept 2021 & Jan 2022
Administrative School	School of Physics, Engineering and Computer science

Table 4 Course structure

Course details		
Course code	Course description	HECOS
EIMASTECI	MSc Communications and Information Engineering	100159
EIMASTEE	MSc Electronics Engineering	100165
EIMASTEPE	MSc Power Electronics and Control	100164