

School of Engineering and Technology

Title of Programme: MSc Modular Masters in Electronics

Programme Code: EIMASTE

Programme Specification

This programme specification is relevant to students entering:
17 September 2018

Associate Dean of School (Academic Quality Assurance):
George Haritos

Signature pp 

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
Mar 2018	E, F, pages 9, 16,	Change to sections E and F including link for Herts Handbook and addition of accreditation detail. Programme IET and UH assessment compensation detail added where applicable.
June 2018	Table 3 from page	Added AHEP 3 LO mapping and key. Change old Table 3 to Table 4

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

Programme Specification

MSc in Communications and Information Engineering

MSc in Microelectronics and Computer Engineering

MSc in Power Electronics and Control

MSc in Mechatronics

MSc in Radio and Mobile Communication Systems

MSc in Embedded Intelligent Systems

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	See Section D
Final Award (Qualification)	MSc
All Final Award titles	Communications and Information Engineering
(Qualification and Subject)	Microelectronics and Computer Engineering
	Power Electronics and Control
	Mechatronics
	Radio and Mobile Communications Systems
	Embedded Intelligent Systems
FHEQ level of award	7
Language of Delivery	English

A. Programme Rationale

This programme consist of a number of “specialist” 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 are normally studied over three semesters with the final semester being a 60 credit point individual project. The MSc has two starting points.

This 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. They

can expect to gain work in a range of disciplines within a variety of industries from specialist technical roles to positions of management responsibility.

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.

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

- Developing in students strong design skills for the seamless integration of software and hardware subsystems through the adoption of software-hardware co-design methodologies;
- Enabling students to gain experience of designing digital systems for sustainable and smart applications, using DSP/FPGA/ASIC technology;
- Giving students an awareness of alternatives to the mainstream superscalar approach to computer design and instil in them design skills for a variety of acceleration intelligence techniques.

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.

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

- Enabling students to understand high level knowledge on Mechanical and Electronic Engineering and to gain a broad range expertise in these areas;
- Develop student's ability to control mechanical systems using analogue and digital electronics;
- Giving students an awareness of modern digital embedded platforms for mechatronic systems.

On the MSc in Embedded Intelligent Systems, the development of skills and advancement of knowledge focus on:

- developing in students the ability to integrate software and hardware in order to develop systems that demonstrate intelligence by increasing the system's effectiveness through learning;
- introducing students to some of the latest applications of embedded intelligent systems in fields such as neurofuzzy systems, cybernetics and biometrics;
- introducing students to the latest processor designs and enable them to evaluate alternative processor designs as platforms for embedded intelligent systems.

On the MSc in Radio and Mobile Communication Systems, the development of skills and advancement of knowledge focus on:

- introducing students to recent advances in mobile communication systems, with full coverage of both radio-frequency (RF) and data communication networks;
- enabling students to understand the latest protocols used in the implementation of robust and secure mobile communication systems.

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
<p>All Awards:</p> <p>A2 - The product/process definition and system design process.</p> <p>Communications and Information Engineering (CIE)</p> <p>A1 CIE- The advanced theoretical issues and their practical implementations that underlie recent developments in Communications and Information Engineering.</p> <p>A3 CIE- A range of hardware components and architectures that are used in modern systems appropriate to Communications and Information Engineering.</p> <p>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.</p> <p>A6- The physical principles underlying the design of the hardware components used in optical systems.</p> <p>A8- The engineering challenges inherent in a variety of data communication applications.</p>	<p>Acquisition of knowledge and understanding is through a combination of lectures, seminars, group discussions and assignments.</p> <p>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.</p>	<p>Knowledge and understanding are assessed through a series of case studies, assignments, project reports and unseen examinations.</p>

Microelectronics and Computer Engineering (MCE)

- A1 MCE- The advanced theoretical issues and their practical implementations that underlie recent developments in Microelectronics and Computer Engineering.
- A3 MCE- A range of hardware components and architectures that are used in modern systems appropriate to Microelectronics and Computer Engineering.
- A4 MCE- A range of algorithms and/or protocols and their strengths and weaknesses that are suitable for designing systems appropriate to Microelectronics and Computer Engineering.
- A5- Suitable application areas in which advanced digital hardware and algorithms can be deployed to produce effective systems.

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.
- A5- Suitable application areas in which advanced digital hardware and algorithms can be deployed to produce effective systems.

Mechatronics (MTM)

- A1 MTM- The advanced theoretical issues and their practical implementations that underlie recent developments in Mechatronics.
- A3 MTM - A range of hardware components and architectures that are used in modern systems appropriate to Mechatronics.
- A4 MTM - A range of algorithms and/or protocols and their strengths and weaknesses that are suitable for designing systems appropriate to Mechatronics.
- A5- Suitable application areas in which advanced digital hardware and algorithms can be deployed to produce effective systems.

Embedded Intelligent Systems (EIS)

- A1 EIS- The advanced theoretical issues and their practical implementations that underlie recent developments in Embedded Intelligent Systems.
- A4 EIS- A range of algorithms and/or protocols and their strengths and weaknesses that are suitable for designing systems appropriate to Embedded Intelligent Systems.
- A9- A range of applications in which artificial intelligence and related techniques can add value to embedded systems.
- A10- The practical performance and reliability issues that arise in hardware implementations of intelligent systems.

Radio and Mobile Communication Systems (RMCS)

- A1 RMCS- The advanced theoretical issues and their practical implementations that underlie recent developments in Radio and Mobile Communication Systems.
- A3 RMCS- A range of hardware components and architectures that are used in modern systems appropriate to Radio and Mobile Communication Systems.
- A4 RMCS - A range of algorithms and/or protocols and their strengths and weaknesses that are suitable for designing systems appropriate to Radio and Mobile Communication Systems.
- A11- The diverse quality of service requirements of modern mobile communication systems.

Intellectual skills:

All awards:

- B1- Plan and carry out a significant piece of independent investigative or development work as part of their project.

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

Teaching/learning methods & strategies

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.

Assessment

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.

equipment, configurations, protocols and algorithms.

- B5 CIE - Evaluate the performance of systems appropriate to Communications and Information Engineering by theoretical analysis and/or simulation.

Microelectronics and Computer Engineering

- B2 MCE - Evaluate, select and deploy appropriate software tools to create/manage or simulate applications/systems appropriate to Microelectronics and Computer Engineering.
- B3 MCE - Select appropriate hardware components and platforms for use in systems appropriate to Microelectronics and Computer Engineering.

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 - Evaluate the performance of systems appropriate to Power Electronics and Control by theoretical analysis and/or simulation.

Mechatronics

- B2 MTM- Evaluate, select and deploy appropriate software tools to create/manage or simulate applications/systems appropriate to Mechatronics.
- B3 MTM - Select appropriate hardware components and platforms for use in systems appropriate to Mechatronics.
- B4 MTM - Design systems appropriate to Mechatronics by selecting appropriate equipment, configurations, protocols and algorithms.
- B5 MTM - Evaluate the performance of systems appropriate to Mechatronics by theoretical analysis and/or simulation.

Throughout, the learner is encouraged to develop intellectual skills further by independent study.

<p>Embedded Intelligent Systems</p> <p>B3 EIS- Select appropriate hardware components and platforms for use in systems appropriate to Embedded Intelligent Systems.</p> <p>B4 EIS- Design systems appropriate to Embedded Intelligent Systems by selecting appropriate equipment, configurations, protocols and algorithms.</p> <p>Radio and Mobile Communication Systems</p> <p>B3 – RMCS Select appropriate hardware components and platforms for use in systems appropriate to Radio and Mobile Communication Systems.</p> <p>B4 RMCS- Design systems appropriate to Radio and Mobile Communication Systems by selecting appropriate equipment, configurations, protocols and algorithms.</p> <p>B5 RMCS - Evaluate the performance of systems appropriate to Radio and Mobile Communication Systems by theoretical analysis and/or simulation.</p>		
<p>Practical skills:</p>	<p>Teaching/learning methods & strategies</p>	<p>Assessment</p>
<p>C1- Apply appropriate analytical and modelling techniques to electrical and electronic engineering problems.</p> <p>C2- Perform experimental laboratory work and draw conclusions.</p> <p>C3- Use computer-based engineering tools.</p> <p>C4- Prepare technical documentation.</p> <p>C5- Evaluate appropriate systems, components or processes.</p> <p>C6 - Plan and manage a project, taking into account economic, social, legal, ethical and sustainability constraints and business strategy</p>	<p>Practical skills are developed throughout the programme by the methods and strategies outlined in sections A and B above.</p> <p>C1 is developed through laboratory work, coursework assignments and tutorial work.</p> <p>C2 and C5 are developed through laboratory work.</p> <p>C3 is developed through the use of software simulation tools at all levels.</p> <p>C4 is developed through project work, lab exercises and software documentation.</p> <p>C6 is developed through lectures and project work.</p> <p>Feedback is given to all students on all work produced.</p>	<p>Practical skills C1-C6 are formerly assessed through assignment work on case studies and the individual project.</p>
<p>Transferable skills:</p>	<p>Teaching/learning methods & strategies</p>	<p>Assessment</p>
<p>D1 - Communicate information effectively, orally and/or in writing.</p> <p>D2 - Manage time and resources effectively.</p>	<p>Transferable skills are developed throughout the programme by using group discussions and report writing and require students to manage</p>	<p>Transferable skills D1-D6 are assessed through</p>

D3 - Carry out independent investigations to determine the state of knowledge and research in a subject area.	their own time for achieving targets.	assignment work and the project.
D4 - Work effectively individually and/or within a team	D1 and D2 developed through group work, coursework reports, oral presentations and the project report.	
D5- Make effective use of a wide range of information resources, such as those offered to them by the university.	D3 – D6 are developed throughout most modules;	
D6- Progress to research work, or work at an advanced level within an academic or commercial setting	through lectures, group work, assessments and the individual 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 start in September when it runs over one calendar year or in January for a Semester B start when it 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 Semester C or B respectively.

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

Accreditation is a mark of assurance that the degree meets the standards set by the Engineering Council in the UK Standard for Professional Engineering Competence (UK-SPEC). Some employers recruit preferentially from accredited degrees, and an accredited degree is likely to be recognised by other countries that are signatories to international accords.

Professional Accreditation by the IET

Accreditation as Partial CEng (Further Learning) 2 years accreditation from the 2017 to the 2018 intake.

MSc Communications and Information Engineering
MSc Embedded Intelligent Systems
MSc Microelectronics and Computer Engineering
MSc Radio and Mobile Communication Systems

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

See pages 11 and 12

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

MCE = Microelectronics and Computer Engineering

PEC = Power Electronics and Control

MTM = Mechatronics

EIS = Embedded Intelligent Systems

RMCS = Radio and Mobile Communication Systems

c = compulsory module

o = optional 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.

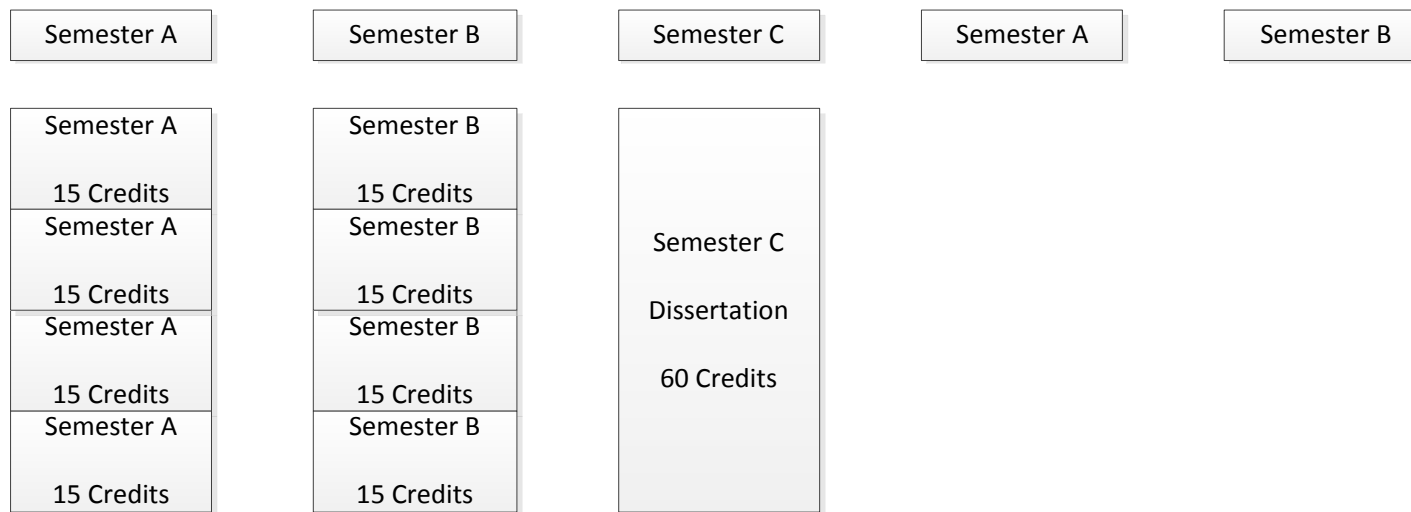
Module Title	Module Code	Award						Credit Pts.	Language of Delivery	% Examination	% In-course assessment	% Practical	Semester	Year of Study	
		CIE	MCE	PEC	MTM	EIS	RMCS							Full Time Mode	Part Time Mode
Digital Signal Processing and Processors	7ENT1005		c	c		c		15	English	60	40	-	A	1	1
Advanced Reconfigurable Systems and Applications	7ENT1003		c		c	c	c	15	English	60	40	-	A	1	1
Digital Mobile Communication Systems	7ENT1054	c					c	15	English	60	40	-	A	1	1
Wireless, Mobile and Ad-hoc Networking	7COM1031	c					c	15	English	70	30	-	A	1	2
Computer Architecture Design	7ENT1004		c			c		15	English	60	40	-	A	1	2
Dynamics and Performance of Mechanical Systems	7AAD0068				c			15	English	60	40	-	A	1	1
Control of Engineering Systems	7ENT1074			c	c			15	English	60	40	-	A	1	2
Operations Management	7ENT1060	c	c	c	c	c	c	15	English	60	40	-	A	1	2
Advanced Power Electronics and Control	7ENT1051			c				15	English	60	40	-	A	1	1
Multicast and Multimedia Networking	7COM1030	c						15	English	75	25	-	A	1	1
Sustainability and Smart Systems Engineering	7ENT1002		c					15	English	60	40	-	B	1	1
Embedded Control Systems	7ENT1042			c	c	c		15	English	60	40	-	B	1	1
Operations Research	7ENT1070	c	c	c	c	c	c	15	English	60	40	-	B	1	1
Artificial Intelligence	7ENT1013		c	c	o	c		15	English	60	40	-	B	1	2
Mixed Mode and VLSI Technologies	7ENT1008		c		c		c	15	English	60	40	-	B	1	2
Broadband Networks and Data Communications	7ENT1050	c					c	15	English	60	40	-	B	1	2
Biometric Systems and Speech Processes	7ENT1025					c		15	English	60	40	-	B	1	2
Information Theory and DSP in Communications	7ENT1053	c					c	15	English	60	40	-	B	1	1
Renewable Energy Systems and Smart Grid	7ENT1052			c	o			15	English	-	100	-	B	1	2
Optical Communication Technologies	7ENT1012	c						15	English	60	40	-	B	1	2
MSc Individual Project (MSc Projects)	7ENT1072	c	c	c	c	c	c	60	English	-	100	-	C, B, A	2	3

Entry Point B

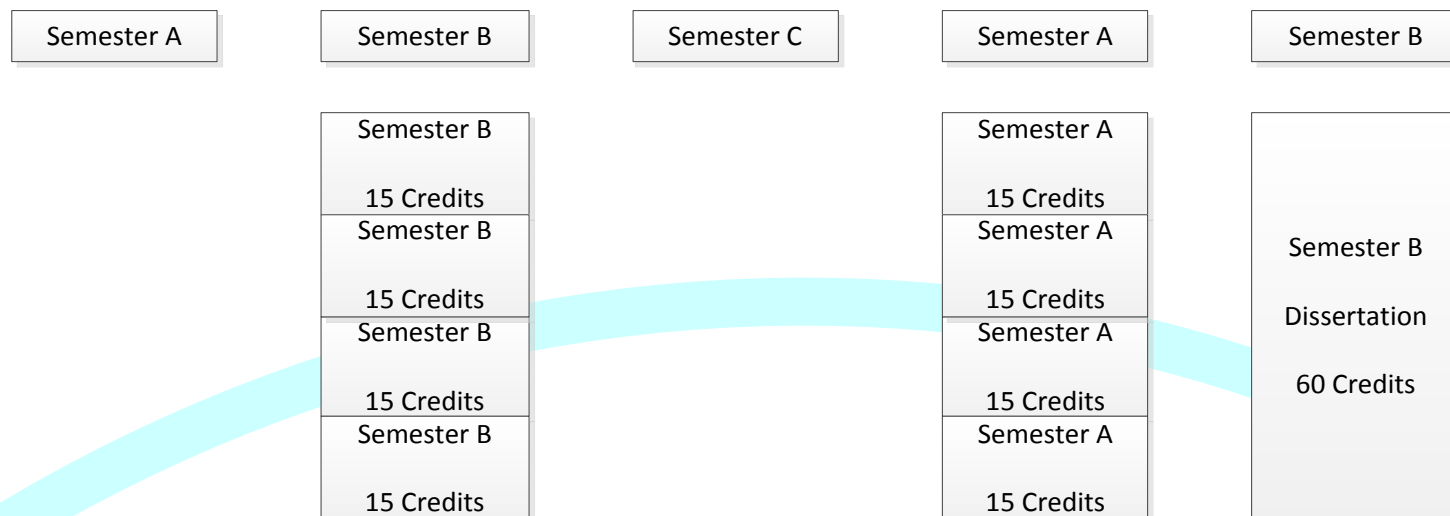
To progress to the project stage, the candidates are expected to have successfully completed a minimum of 90 credits.
The award of a Masters Degree requires 180 credit points passed at level 7, including the MSc Individual Project.

Module Title	Module Code	Award						Credit Pts.	Language of Delivery	% Examination	% In-course assessment	% Practical	Semester	Year of Study	
		CIE	MCE	PEC	MTM	EIS	RMCS							Full Time Mode	Part Time Mode
Sustainability and Smart Systems Engineering	7ENT1002		c					15	English	60	40	-	B	1	1
Embedded Control Systems	7ENT1042			c	c	c		15	English	60	40	-	B	1	1
Operations Research	7ENT1070	c	c	c	c	c	c	15	English	60	40	-	B	1	1
Artificial Intelligence	7ENT1013		c	c	o	c		15	English	60	40	-	B	1	2
Mixed Mode and VLSI Technologies	7ENT1008		c		c		c	15	English	60	40	-	B	1	2
Broadband Networks and Data Communications	7ENT1050	c					c	15	English	60	40	-	B	1	2
Biometric Systems and Speech Processes	7ENT1025					c		15	English	60	40	-	B	1	2
Information Theory and DSP in Communications	7ENT1053	c					c	15	English	60	40	-	B	1	1
Renewable Energy Systems and Smart Grid	7ENT1052			c	o			15	English	-	100	-	B	1	2
Optical Communication Technologies	7ENT1012	c						15	English	60	40	-	B	1	2
Digital Signal Processing and Processors	7ENT1005		c	c		c		15	English	60	40	-	A	2	2
Advanced Reconfigurable Systems and Applications	7ENT1003		c		c	c	c	15	English	60	40	-	A	2	2
Digital Mobile Communication Systems	7ENT1054	c					c	15	English	60	40	-	A	2	2
Wireless, Mobile and Ad-hoc Networking	7COM1031	c					c	15	English	70	30	-	A	2	3
Computer Architecture Design	7ENT1004		c			c		15	English	60	40	-	A	2	3
Dynamics and Performance of Mechanical Systems	7AAD0068				c			15	English	60	40	-	A	2	2
Control of Engineering Systems	7ENT1074			c	c			15	English	60	40	-	A	2	3
Operations Management	7ENT1060	c	c	c	c	c	c	15	English	60	40	-	A	2	3
Advanced Power Electronics and Control	7ENT1051			c				15	English	60	40	-	A	2	2
Multicast and Multimedia Networking	7COM1030	c						15	English	75	25	-	A	2	2
MSc Individual Project (MSc Projects)	7ENT1072	c	c	c	c	c	c	60	English	-	100	-	C, B, A	2	3, 4

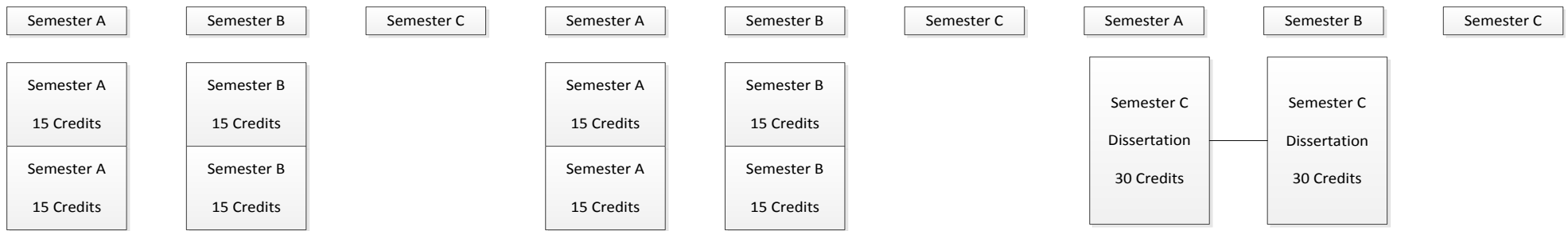
MSc (Semester A Entrant) – Full Time Structure



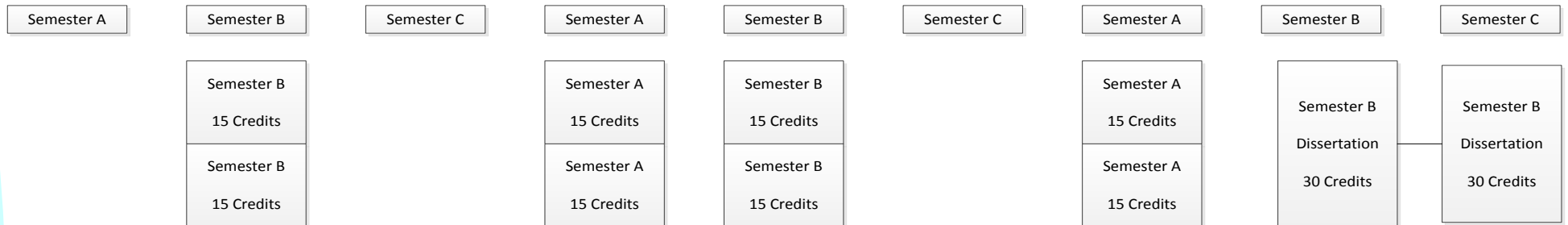
MSc (Semester B Entrant) – Full Time Structure



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 Microelectronics and Computer Engineering Power Electronics and Control Mechatronics Radio and Mobile Communication Systems Embedded Intelligent Systems	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 Microelectronics and Computer Engineering Power Electronics and Control Mechatronics Radio and Mobile Communication Systems Embedded Intelligent Systems	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	<i>For untitled awards:</i> 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](#) (*delete as applicable*) and [UPR AS14](#)) with the exception of those listed below, which have been specifically approved by the University:

To comply with IET accreditation regulations students must achieve in all 15 credit point modules, 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 for an accredited degree

This applies to:

MSc Communications and Information Engineering
MSc Embedded Intelligent Systems
MSc Microelectronics and Computer Engineering
MSc Radio and Mobile Communication Systems

Compensatory credit on the following awards shall be awarded in accordance with UPR AS14 Sections D4.1, D4.2 and D4.5. In exercising their discretion under D4.1, Programme Boards shall not award compensatory credit unless there is clear evidence of genuine engagement with a failed module as shown by a student's attendance record on the module, together with a serious attempt at all elements of assessment.

MSc Power Electronics and Control
MSc Mechatronics

For all awards compensation is not permitted for individual modules worth 30 or more credit points at level 7. Major projects such as the MSc individual project cannot be compensated.

Where the mode of assessment for an individual module is 60/40 (exam/coursework) or 50/50 (exam/coursework) then for a student to pass the module he/she must achieve no less than 40% in each mode of assessment for a Level 7 module.

This applies to:

MSc Communications and Information Engineering
MSc Embedded Intelligent Systems
MSc Microelectronics and Computer Engineering
MSc Radio and Mobile Communication Systems

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 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;
- Nightline – a confidential student listening and information service in the evening when other services are not available;
- 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 [Herts Handbook](#) is an introduction to the academic, social, cultural and sporting services and opportunities available at the University of Hertfordshire, and includes the Student Charter and Student Code of Conduct.

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.

The UK Quality Assurance Agency for Higher Education (QAA) has confirmed the quality and standards of provision at the University of Hertfordshire. A key part of QAA's role is to review and report on how universities maintain their academic standards and quality, to inform students and the wider public. The team of QAA reviewers visited the University of Hertfordshire in 2015/16 and judged that its academic standards, the quality

and enhancement of its students' learning experience, and the quality of information about this learning experience all meet UK expectations. In other words, the University meets national requirements for standards and quality. The QAA's report can be accessed at: <http://www.qaa.ac.uk/reviews-and-reports/provider?UKPRN=10007147#.V-KHajXy0nE>

G. Entry requirements

The normal entry requirements for the programme are:

The normal entry requirements for the programme are:

- i. typically a minimum of 2:ii honours degree in Aerospace, Automotive, Mechanical, or Manufacturing (with a relevant analytical content) based discipline; **or**
- ii. any other contiguous discipline the subject content of which does not overlap with that of the programme to any substantial extent; **or**
- iii. a qualification from any other recognised International academic institution which is of comparable academic standard to those identified above; **or**
- iv. Exceptionally, a number of applicants with other relevant professional qualifications who have the necessary academic achievements and experience will be considered under APCL and APEL.

English Language Requirements

In addition to the requirements stated above, students entering the programme and whose first language is not English will be required to demonstrate a proficiency in English to TOEFL 550/IELTS 6.0 or an equivalent recognised qualification. For IELTS, this should include a minimum score of 5.5 in each band. Students without IELTS of 6.0 or equivalent, depending on the Country of Origin, would normally be expected to complete a suitable programme of study prior to the commencement of their MSc programme, such as Pre-Sessional English Classes or any other suitable programme deemed appropriate by the University.

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: School Administration Manager

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	A1cie	A2	A3cie	A4cie	A6	A8	B1	B3cie	B4cie	B5cie	C1	C2	C3	C4	C5	C6	D1	D2	D3	D4	D5	D6		
Level 7	Wireless, Mobile and Ad-hoc Networking	7COM1031	X		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			
	Multicast and Multimedia Networking	7COM1030	X			X				X		X	X	X		X		X		X		X			
	Operations Management	7ENT1060		X								X		X	X	X	X	X	X		X		X	X	
	Operations Research	7ENT1070		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 DSP in Communications	7ENT1053	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	7ENT1072	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.
- A6 The physical principles underlying the design of the hardware components used in optical systems.
- A8 The engineering challenges inherent in a variety of data communication applications.

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 appropriate to Communications and Information Engineering.
- B4cie Design systems appropriate to Communications and Information Engineering by selecting appropriate equipment, configurations, protocols and algorithms.
- B5cie Evaluate the performance of systems appropriate to Communications and Information Engineering by theoretical analysis and/or simulation.

Practical Skills

- C1 Apply appropriate analytical and modelling techniques to electrical and 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.

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 Microelectronics and Computer Engineering

		Programme Learning Outcomes (as identified in section 1 and below)																			
		Knowledge & Understanding					Intellectual Skills			Practical Skills						Transferable Skills					
Module Title	Module Code	A1mce	A2	A3mce	A4mce	A5	B1	B2mce	B3mce	C1	C2	C3	C4	C5	C6	D1	D2	D3	D4	D5	D6
Level 7	Digital Signal Processing and Processors	7ENT1005	X		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		X
	Computer Architecture Design	7ENT1004	X		X				X	X	X	X		X		X		X		X	
	Operations Management	7ENT1060		X						X		X	X	X	X	X		X		X	X
	Operations Research	7ENT1070		X									X			X	X		X		
	Sustainability and Smart Systems Engineering	7ENT1002	X						X	X	X	X		X		X		X		X	
	Artificial Intelligence	7ENT1013	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	7ENT1072	X					X			X	X	X	X	X	X	X	X	X	X	X

Key to Programme Learning Outcomes for Microelectronics and Computer Engineering

Knowledge and Understanding e.g.

- A1mce The advanced theoretical issues and their practical implementations that underlie recent developments in Microelectronics and Computer Engineering.
- A2 The product/process definition and system design process.
- A3mce A range of hardware components and architectures that are used in modern systems appropriate to Microelectronics and Computer Engineering
- A4mce A range of algorithms and/or protocols and their strengths and weaknesses that are suitable for designing systems appropriate to Microelectronics and Computer Engineering.
- A5 Suitable application areas in which advanced digital hardware and algorithms can be deployed to produce effective systems.

Intellectual Skills e.g.

- B1 Plan and carry out a significant piece of independent investigative or development work as part of their project.
- B2mce Evaluate, select and deploy appropriate software tools to create/manage or simulate applications/systems appropriate to Microelectronics and Computer Engineering.
- B3mce Select appropriate hardware components and platforms for use in systems appropriate to Microelectronics and Computer Engineering

Practical Skills

- C1 Apply appropriate analytical and modelling techniques to electrical and 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.

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						Transferable Skills						
Module Title	Module Code	A1pec	A2	A3pec	A4pec	A5	B1	B2pec	B3pec	B4pec	B5pec	C1	C2	C3	C4	C5	C6	D1	D2	D3	D4	D5	D6	
Digital Signal Processing and Processors	7ENT1005	X		X	X	X			X			X	X	X		X		X				X		
Control of Engineering Systems	7ENT1074		X	X	X			X	X	X		X	X	X		X								
Advanced Power Electronics and Control	7ENT1051	X	X	X					X	X	X	X	X			X								
Operations Management	7ENT1060		X									X		X	X	X	X	X			X	X	X	
Operations Research	7ENT1070		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	7ENT1013	X			X	X			X			X	X	X		X		X		X		X		
Renewable Energy Systems and Smart Grid	7ENT1052	X	X	X	X		X			X			X				X			X		X	X	
MSc Individual Project	7ENT1072	X					X					X	X	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.
- A5 Suitable application areas in which advanced digital hardware and algorithms can be deployed to produce effective systems.

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.

Practical Skills

- C1 Apply appropriate analytical and modelling techniques to electrical and 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.

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 Mechatronics

		Programme Learning Outcomes (as identified in section 1 and below)																							
		Knowledge & Understanding					Intellectual Skills					Practical Skills						Transferable Skills							
Module Title	Module Code	A1me	A2	A3me	A4me	A5	B1	B2me	B3me	B4me	B5me	C1	C2	C3	C4	C5	C6	D1	D2	D3	D4	D5	D6		
Advanced Reconfigurable Systems and Applications	7ENT1003	X		X		X		X	X		X	X	X		X		X	X		X		X			
Dynamics and Performance of Mech Systems	7AAD0068	X						X	X		X	X		X									X		
Control of Engineering Systems	7ENT1074		X	X	X			X	X	X	X	X	X	X		X									
Operations Management	7ENT1060		X									X		X	X	X	X	X		X		X	X		
Operations Research	7ENT1070		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	7ENT1013	X			X	X		X	X			X	X	X		X		X		X		X			
Renewable Energy Systems and Smart Grid	7ENT1052	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	7ENT1072	X					X					X	X	X	X	X	X	X	X	X	X	X	X		

Key to Programme Learning Outcomes for Mechatronics

Knowledge and Understanding e.g.

- A1mtm The advanced theoretical issues and their practical implementations that underlie recent developments in Mechatronics.
- A2 The product/process definition and system design process.
- A3mtm A range of hardware components and architectures that are used in modern systems appropriate to Mechatronics.
- A4mtm A range of algorithms and/or protocols and their strengths and weaknesses that are suitable for designing systems appropriate to Mechatronics.
- A5 Suitable application areas in which advanced digital hardware and algorithms can be deployed to produce effective systems.

Intellectual Skills e.g.

- B1 Plan and carry out a significant piece of independent investigative or development work as part of their project.
- B2mtm Evaluate, select and deploy appropriate software tools to create/manage or simulate applications/systems appropriate to Mechatronics.
- B3mtm Select appropriate hardware components and platforms for use in systems appropriate to Mechatronics.
- B4mtm Design systems appropriate to Mechatronics by selecting appropriate equipment, configurations, protocols and algorithms.
- B5mtm Evaluate the performance of systems appropriate to Mechatronics by theoretical analysis and/or simulation.

Practical Skills

- C1 Apply appropriate analytical and modelling techniques to electrical and 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.

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 Embedded Intelligent Systems

		Programme Learning Outcomes (as identified in section 1 and below)																				
		Knowledge & Understanding					Intellectual Skills			Practical Skills						Transferable Skills						
Module Title	Module Code	A1eis	A2	A4eis	A9	A10	B1	B3eis	B4eis	C1	C2	C3	C4	C5	C6	D1	D2	D3	D4	D5	D6	
Level 7	Computer Architecture Design	7ENT1004	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	
	Embedded Control Systems	7ENT1042		X	X	X	X		X	X		X	X	X	X		X	X				
	Operations Management	7ENT1060		X							X		X	X	X	X	X		X	X	X	
	Operations Research	7ENT1070		X									X			X	X		X			
	Biometric Systems and Speech Processies	7ENT1025	X		X	X				X	X	X	X		X		X		X		X	
	Artificial Intelligence	7ENT1013	X		X	X	X			X	X	X	X		X		X		X		X	
	Digital Signal Processing and Processors	7ENT1005	X		X					X	X	X			X		X		X		X	
	MSc Individual Project	7ENT1072	X					X			X	X	X	X	X	X	X	X	X	X	X	X

Key to Programme Learning Outcomes for Embedded Intelligent Systems

Knowledge and Understanding e.g.

- A1eis The advanced theoretical issues and their practical implementations that underlie recent developments in Embedded Intelligent Systems.
- A2 The product/process definition and system design process.
- A4eis A range of algorithms and/or protocols and their strengths and weaknesses that are suitable for designing systems appropriate to Embedded Intelligent Systems.
- A9 A range of applications in which artificial intelligence and related techniques can add value to embedded systems.
- A10 The practical performance and reliability issues that arise in hardware implementations of intelligent systems.

Intellectual Skills e.g.

- B1 Plan and carry out a significant piece of independent investigative or development work as part of their project.
- B3eis Select appropriate hardware components and platforms for use in systems appropriate to Embedded Intelligent Systems.
- B4eis Design systems appropriate to Embedded Intelligent Systems by selecting appropriate equipment, configurations, protocols and algorithms.

Practical Skills

- C1 Apply appropriate analytical and modelling techniques to electrical and 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, and 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 Radio and Mobile Communication Systems

		Programme Learning Outcomes (as identified in section 1 and below)																				
		Knowledge & Understanding					Intellectual Skills				Practical Skills						Transferable Skills					
Module Title	Module Code	A1rmcs	A2	A3rmcs	A4rmcs	A11	B1	B3rmcs	B4rmcs	B5rmcs	C1	C2	C3	C4	C5	C6	D1	D2	D3	D4	D5	D6
Digital Mobile Communication Systems	7ENT1054	X		X	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	
Wireless, Mobile and Ad-hoc Networking	7COM1031	X		X	X	X		X	X		X	X	X		X		X		X		X	
Operations Management	7ENT1060		X								X		X	X	X	X	X		X	X	X	X
Operations Research	7ENT1070		X											X			X	X		X		
Broadband Networks and Data Communications	7ENT1050	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	
Information Theory and DSP in Communications	7ENT1053	X			X			X	X		X	X	X		X		X		X		X	
MSc Individual Project	7ENT1072	X					X				X	X	X	X	X	X	X	X	X	X	X	X

Key to Programme Learning Outcomes for Radio and Mobile Communication Systems

Knowledge and Understanding e.g.

- A1rmcs The advanced theoretical issues and their practical implementations that underlie recent developments in Radio and Mobile Communication Systems.
- A2 The product/process definition and system design process.
- A3rmcs A range of hardware components and architectures that are used in modern systems appropriate to Radio and Mobile Communication Systems.
- A4rmcs A range of algorithms and/or protocols and their strengths and weaknesses that are suitable for designing systems appropriate to Radio and Mobile Communication Systems.
- A11 The diverse quality of service requirements of modern mobile communication systems.

Intellectual Skills e.g.

- B1 Plan and carry out a significant piece of independent investigative or development work as part of their project.
- B3rmcs Select appropriate hardware components and platforms for use in systems appropriate to Radio and Mobile Communication Systems.
- B4rmcs Design systems appropriate to Radio and Mobile Communication Systems by selecting appropriate equipment, configurations, protocols and algorithms.
- B5rmcs Evaluate the performance of systems appropriate to Radio and Mobile Communication Systems by theoretical analysis and/or simulation.

Practical Skills

- C1 Apply appropriate analytical and modelling techniques to electrical and 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.

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.

Table 3: AHEP3 Mapped Programme Learning Outcomes in the Constituent Modules
MSc in Communication and Information Engineering

Table 3 part 1 of 2: AHEP3 Mapped Learning Outcomes																									
Programme Title: MSc		Communications and Information Engineering (Entry Semester A = 1 year; Entry Semester B = 16 months)																							
YEAR	Modules	Level	O or C	% Examination	% Coursework	SM1fl	SM2fl	SM3fl	EA1fl	EA2fl	EA3fl	D1fl	D2fl	D3fl	ET1fl	ET2fl	ET3fl	ET4fl	ET5fl	ET6fl	EP1fl	EP2fl	EP3fl	EP4fl	
Level 7	Digital Mobile Communication Systems 7ENT1054	7	C	60	40	✓	✓		✓			✓											✓	✓	
	Wireless, Mobile and Ad-hoc Networking 7COM1031	7	C	70	30		✓				✓			✓									✓		
	Operations Management 7ENT1060	7	C	60	40		✓								✓	✓	✓	✓		✓			✓	✓	
	Multicast and Multimedia Networking 7COM1030	7	C	75	25			✓		✓						✓							✓		
	Operations Research 7ENT1070	7	C	60	40	✓		✓		✓			✓							✓					
	Broadband Networks and Data Communications 7ENT1050	7	C	60	40	✓									✓	✓	✓				✓	✓	✓		
	Information Theory and DSP in Communications 7ENT1053	7	C	60	40					✓	✓	✓					✓						✓		
	Optical Communication Technologies 7ENT1012	7	C	60	40	✓	✓						✓	✓								✓	✓		
MSc Individual Project 7ENT1072	7	C	-	100			✓	✓		✓		✓		✓	✓	✓	✓	✓	✓	✓		✓		✓	
Total Level 7						4	4	3	2	3	3	2	3	2	3	4	4	2	2	3	2	7	2	2	

Table 3 part 2 of 2: AHEP3 Mapped Learning Outcomes

SM1fi	<p>7ENT1054 Digital Mobile Communication Systems Explore building blocks, transmitters and receivers for mobile communication systems with particular reference to Software Defined Radio (SDR) techniques</p> <p>7ENT1070 Operations Research (partial) Critique the logical process of modelling complex decision problems</p> <p>7ENT1050 Broadband Networks and Data Communications * evaluate carrier networks and protocols (SONET/SDH, IP and Ethernet)</p> <p>7ENT1012 Optical Communication Technologies</p> <p>Recommend appropriate equipment for the deployment of an optical fibre system</p>	ET1fi	<p>7ENT1060 Operations Management MSc explore the issues of ethical conduct, legal requirements governing engineering and risk.</p> <p>7ENT1072 MSc Projects discuss their work in the context of Economic, Legal, Social, Ethical and Environmental issues. The project report must include a section where the student relates his/her project, and/or the subject area of his/her project to the various legal and ethical constraints under engineers and technologists are expected to operate</p>
SM2fi	<p>7ENT1054 Digital Mobile Communication Systems Examine modulation, transmission, error control and channel characteristics applicable to digital signals and cellular radio networks;</p> <p>7COM1031 Wireless, Mobile & Ad-Hoc Networking have a knowledge and understanding of the complex problems and issues arising when mobility occurs in networks.</p> <p>7ENT1060 Operations Management MSc present the results of analysis and synthesis in an appropriate required business format individually and as a group;</p> <p>7ENT1012 Optical Communication Technologies Describe at an advanced level of understanding of how light is transmitted in optical fibres, including power budget, dispersion and noise limitations;</p>	ET2fi	<p>7ENT1060 Operations Management MSc examine the role of Operations Management, the operational processes, planning and control systems; assess the relationships between operations management and other functions in the context of constraints;</p> <p>7COM1030 Multicast and Multi-Media Networking (partial) have a knowledge and deep understanding of the complex problems and issues arising when network applications have different quality of service requirements.</p> <p>7ENT1072 MSc Projects discuss their work in the context of Economic, Legal, Social, Ethical and Environmental issues. The project report must include a section where the student relates his/her project, and/or the subject area of his/her project to the various legal and ethical constraints under engineers and technologists are expected to operate</p>
SM3fi	<p>7COM1030 Multicast and Multi-Media Networking * have a knowledge and deep understanding of the complex problems and issues arising when network applications have different quality of service requirements.</p> <p>7ENT1070 Operations Research critically analyse and report results individually and as a group.</p> <p>7ENT1072 MSc Projects Construct, present and defend an argument based on their analysis</p>	ET3fi	<p>7ENT1060 Operations Management MSc examine the role of Operations Management, the operational processes, planning and control systems employed within a business environment; assess the relationships between operations management and other functions in the context of constraints;</p> <p>7ENT1053 Information Theory and DSP in Communications Distinguish appropriate circumstances in which digital signal processing techniques can be used effectively.</p> <p>7ENT1072 MSc Projects discuss their work in the context of Economic, Legal, Social, Ethical and Environmental issues. The project report must include a section where the student relates his/her project, and/or the subject area of his/her project to the various legal and ethical constraints under engineers and technologists are expected to operate</p>
EA1fi	<p>7ENT1054 Digital Mobile Communication Systems Analyse modulation, transmission, error control and channel characteristics applicable to digital signals and cellular radio networks;</p> <p>7ENT1072 MSc Projects Perform a literature search and develop analysis methodologies appropriate to different situations. Critique their chosen field of study through investigation of published work</p>	ET4fi	<p>7ENT1060 Operations Management MSc explore modern operational issues and concepts including cradle to grave production;</p> <p>7ENT1072 MSc Projects discuss their work in the context of Economic, Legal, Social, Ethical and Environmental issues. The project report must include a section where the student relates his/her project, and/or the subject area of his/her project to the various legal and ethical constraints under engineers and technologists are expected to operate</p>
EA2fi	<p>7COM1030 Multicast and Multi-Media Networking Use skills to articulate and critically evaluate protocols to solve complex problems or address new applications</p> <p>7ENT1070 Operations Research Evaluate quantitative modelling concepts for problem solving and decision making</p> <p>7ENT1053 Information Theory and DSP in Communications * implement and test a range of digital signal processing techniques, using appropriate simulation tools;</p>	ET5fi	<p>7ENT1070 Operations Research Derive solution(s) using a suitable software package when required</p> <p>7ENT1072 MSc Projects discuss their work in the context of Economic, Legal, Social, Ethical and Environmental issues. The project report must include a section where the student relates his/her project, and/or the subject area of his/her project to the various legal and ethical constraints under engineers and technologists are expected to operate</p>
EA3fi	<p>7COM1031 Wireless, Mobile & Ad-Hoc Networking (partial) Critical evaluation of protocols intended to solve problems or new applications that arise in mobile networking</p> <p>7ENT1053 Information Theory and DSP in Communications * design and simulate coding theory and digital filters using appropriate simulation tools, such as Matlab.</p> <p>7ENT1072 MSc Projects (partial) Recognise the organisational and communication skills required to manage a major investigative project.</p>	ET6fi	<p>7ENT1060 Operations Management MSc explore the issues of ethical conduct, legal requirements governing engineering and risk.</p> <p>7ENT1072 MSc Projects discuss their work in the context of Economic, Legal, Social, Ethical and Environmental issues. The project report must include a section where the student relates his/her project, and/or the subject area of his/her project to the various legal and ethical constraints under engineers and technologists are expected to operate</p>
D1fi	<p>7ENT1054 Digital Mobile Communication Systems Evaluate building blocks, transmitters and receivers for mobile communication systems with particular reference to Software Defined Radio (SDR) techniques.</p> <p>7ENT1053 Information Theory and DSP in Communications * quantify information transfer in noisy channel conditions;</p>	EP1fi	<p>7ENT1050 Broadband Networks and Data Communications design and simulate user and service-centric networks.</p> <p>7ENT1012 Optical Communication Technologies Explore the different types of network topology used in core metro and access optical communications.</p>
D2fi	<p>7ENT1070 Operations Research apply techniques and practice to model real world problems;</p> <p>7ENT1012 Optical Communication Technologies Evaluate the equipment used in point-to-point and WDM optical systems</p> <p>7ENT1072 MSc Projects Critically analyse an engineering or business problem and choose suitable methods to undertake research to resolve or better understand the problem with incomplete or uncertain information.</p>	EP2fi	<p>7ENT1054 Digital Mobile Communication Systems Explain principles of various generations of cellular communication systems including new and emerging technologies;</p> <p>7COM1031 Wireless, Mobile & Ad-Hoc Networking (partial) address new applications that arise in mobile networking.</p> <p>7COM1030 Multicast and Multi-Media Networking (partial) Address new applications that arise in multicast and multimedia networking</p> <p>7ENT1050 Broadband Networks and Data Communications * design state-of-the-art networks using legacy as well as emerging optical and wireless technologies;</p> <p>7ENT1053 Information Theory and DSP in Communications Apply coding techniques to minimise errors in digital communication systems</p> <p>7ENT1012 Optical Communication Technologies Identify the trends in optical networking in access networks</p> <p>7ENT1072 MSc Projects Critically analyse an engineering or business problem and choose suitable methods to undertake research to resolve or better understand the problem with incomplete or uncertain information.</p>
D3fi	<p>7COM1031 Wireless, Mobile & Ad-Hoc Networking * discuss and critically evaluate protocols intended to solve problems or address new applications that arise in mobile networking.</p> <p>7ENT1012 Optical Communication Technologies Design an optical fibre link, including power budget and dispersion compensation;</p>	EP3fi	<p>7ENT1054 Digital Mobile Communication Systems * critically evaluate the design and performance of current and future generations of cellular communication systems including new and emerging technologies;</p> <p>7ENT1060 Operations Management MSc Evaluation of the scope and variation of Ops Man strategies in a range of organisations</p>
		EP4fi	<p>7ENT1060 Operations Management MSc HRM topic covers motivation and leadership styles</p> <p>7ENT1072 MSc Projects Manage project work to set deadlines and milestones. Take action with internal departments to achieve project needs. Workshops and Purchasing</p>

MSc in Microelectronics and Computer Engineering

Table 3 part 1 of 2: AHEP3 Mapped Learning Outcomes																								
Programme Title: MSc		Microelectronics and Computer Engineering (Entry Semester A = 1 year; Entry Semester B = 16 months)																						
YEAR	Modules	Level	O or C	% Examination	% Coursework	SM1fl	SM2fl	SM3fl	EA1fl	EA2fl	EA3fl	D1fl	D2fl	D3fl	ET1fl	ET2fl	ET3fl	ET4fl	ET5fl	ET6fl	EP1fl	EP2fl	EP3fl	EP4fl
Level 7	Digital Signal Processing and Processors 7ENT1005	7	C	60	40	✓	✓		✓		✓	✓									✓	✓		
	Advanced Reconfigurable Systems and Applications 7ENT1003	7	C	60	40	✓						✓		✓						✓				
	Computer Architecture Design 7ENT1004	7	C	60	40					✓								✓					✓	
	Operations Management 7ENT1060	7	C	60	40		✓								✓	✓	✓	✓		✓			✓	✓
	Sustainability and Smart Systems Engineering 7ENT1002	7	C	60	40	✓				✓	✓		✓			✓				✓				
	Operations Research 7ENT1070	7	C	60	40	✓		✓		✓			✓							✓				
	Artificial Intelligence 7ENT1013	7	C	60	40	✓							✓		✓									
	Mixed Mode and VLSI Technologies 7ENT1008	7	C	60	40					✓					✓					✓		✓		
	MSc Individual Project 7ENT1072	7	C	-	100			✓	✓		✓		✓		✓	✓	✓	✓	✓	✓	✓		✓	
Total Level 7						5	2	2	2	4	3	3	3	3	2	3	3	2	4	3	2	2	2	2

Table 3 part 2 of 2: AHEP3 Mapped Learning Outcomes

<p>SM1fi</p>	<p>7ENT1005 Digital Signal Processing and Processors (partial) Examine the functional units of a digital signal processor 7ENT1003 Advanced Reconfigurable Systems and Applications (partial) Explore the architectures and functional units of an FPGA</p> <p>7ENT1002 Sustainability and Smart Systems Engineering (partial) Compare and contrast standards on smart systems</p> <p>7ENT1070 Operations Research (partial) Critique the logical process of modelling complex decision problems</p> <p>7ENT1013 Artificial Intelligence Examine the fundamental principles underlying an artificial intelligent system</p>	<p>ET1fi</p>	<p>7ENT1060 Operations Management MSc explore the issues of ethical conduct, legal requirements governing engineering and risk.</p> <p>7ENT1072 MSc Projects discuss their work in the context of Economic, Legal, Social, Ethical and Environmental issues. The project report must include a section where the student relates his/her project, and/or the subject area of his/her project to the various legal and ethical constraints under engineers and technologists are expected to operate</p>
<p>SM2fi</p>	<p>7ENT1005 Digital Signal Processing and Processors describe, in mathematical terms, algorithms and methods commonly used in digital signal processing applications; 7ENT1060 Operations Management MSc present the results of analysis and synthesis in an appropriate required business format individually and as a group;</p>	<p>ET2fi</p>	<p>7ENT1060 Operations Management MSc examine the role of Operations Management, the operational processes, planning and control systems; assess the relationships between operations management and other functions in the context of constraints;</p> <p>7ENT1002 Sustainability and Smart Systems Engineering Explain how the sustainability and low carbon government agenda influences relevant industries</p> <p>7ENT1072 MSc Projects discuss their work in the context of Economic, Legal, Social, Ethical and Environmental issues. The project report must include a section where the student relates his/her project, and/or the subject area of his/her project to the various legal and ethical constraints under engineers and technologists are expected to operate</p>
<p>SM3fi</p>	<p>7ENT1070 Operations Research critically analyse and report results individually and as a group.</p> <p>7ENT1072 MSc Projects Construct, present and defend an argument based on their analysis</p>	<p>ET3fi</p>	<p>7ENT1004 Computer Architecture Design Examine the major issues facing the designer of a state-of-the-art processors</p> <p>7ENT1060 Operations Management MSc examine the role of Operations Management, the operational processes, planning and control systems employed within a business environment, assess the relationships between operations management and other functions in the context of constraints;</p> <p>7ENT1072 MSc Projects discuss their work in the context of Economic, Legal, Social, Ethical and Environmental issues. The project report must include a section where the student relates his/her project, and/or the subject area of his/her project to the various legal and ethical constraints under engineers and technologists are expected to operate</p>
<p>EA1fi</p>	<p>7ENT1005 Digital Signal Processing and Processors * use advanced digital signal processing techniques in straightforward cases;</p> <p>7ENT1072 MSc Projects Perform a literature search and develop analysis methodologies appropriate to different situations. Critique their chosen field of study through investigation of published work</p>	<p>ET4fi</p>	<p>7ENT1060 Operations Management MSc explore modern operational issues and concepts including cradle to grave production;</p> <p>7ENT1072 MSc Projects discuss their work in the context of Economic, Legal, Social, Ethical and Environmental issues. The project report must include a section where the student relates his/her project, and/or the subject area of his/her project to the various legal and ethical constraints under engineers and technologists are expected to operate</p>
<p>EA2fi</p>	<p>7ENT1004 Computer Architecture Design * quantify the benefits of the techniques involved in high-performance processor design. 7ENT1002 Sustainability and Smart Systems Engineering Select appropriate strategies for the design and development of smart system engineering 7ENT1070 Operations Research Evaluate quantitative modelling concepts for problem solving and decision making 7ENT1008 Mixed mode and VLSI Technologies * use computer-aided methods for analysis and simulation of analogue circuits;</p>	<p>ET5fi</p>	<p>7ENT1002 Sustainability and Smart Systems Engineering (partial) Understand the standards on smart system development</p> <p>7ENT1070 Operations Research Derive solution(s) using a suitable software package when required</p> <p>7ENT1072 MSc Projects discuss their work in the context of Economic, Legal, Social, Ethical and Environmental issues. The project report must include a section where the student relates his/her project, and/or the subject area of his/her project to the various legal and ethical constraints under engineers and technologists are expected to operate</p>
<p>EA3fi</p>	<p>7ENT1005 Digital Signal Processing and Processors Use selected software tools for simulating and analyse using DSP techniques and systems</p> <p>7ENT1002 Sustainability and Smart Systems Engineering Analyse the performance of an embedded smart systems. Evaluate embedded and distributed smart sensors and systems</p> <p>7ENT1072 MSc Projects (partial) Recognise the organisational and communication skills required to manage a major investigative project.</p>	<p>ET6fi</p>	<p>7ENT1003 Advanced Reconfigurable Systems and Applications Evaluate the performance of FPGA-based project work in terms of operation speed and area.</p> <p>7ENT1060 Operations Management MSc explore the issues of ethical conduct, legal requirements governing engineering and risk.</p> <p>7ENT1072 MSc Projects discuss their work in the context of Economic, Legal, Social, Ethical and Environmental issues. The project report must include a section where the student relates his/her project, and/or the subject area of his/her project to the various legal and ethical constraints under engineers and technologists are expected to operate</p>
<p>D1fi</p>	<p>7ENT1005 Digital Signal Processing and Processors * compare and contrast the architectures of a digital signal processor fixed and floating point architectures.</p> <p>7ENT1003 Advanced Reconfigurable Systems and Applications Examine the design methodology of modern embedded systems on an FPGA.</p> <p>7ENT1013 Artificial Intelligence * critically evaluate the suitability of hybrid neural/fuzzy/traditional control systems for specific applications.</p>	<p>EP1fi</p>	<p>7ENT1005 Digital Signal Processing and Processors * implement digital signal processing algorithms on a digital signal processor</p> <p>7ENT1008 Mixed mode and VLSI Technologies * analyse and design typical filters and circuits using active devices for selected analogue and mixed-signal processing applications.</p>
<p>D2fi</p>	<p>7ENT1002 Sustainability and Smart Systems Engineering Design embedded systems to cater for specific requirements for smart systems</p> <p>7ENT1070 Operations Research apply techniques and practice to model real world problems;</p> <p>7ENT1072 MSc Projects Critically analyse an engineering or business problem and choose suitable methods to undertake research to resolve or better understand the problem with incomplete or uncertain information.</p>	<p>EP2fi</p>	<p>7ENT1005 Digital Signal Processing and Processors * evaluate the efficiency of DSP-design-based project work to ensure good cycle timing.</p> <p>7ENT1072 MSc Projects Critically analyse an engineering or business problem and choose suitable methods to undertake research to resolve or better understand the problem with incomplete or uncertain information.</p>
<p>D3fi</p>	<p>7ENT1003 Advanced Reconfigurable Systems and Applications * design and implementations of digital signal processing algorithms on an FPGA; 7ENT1013 Artificial Intelligence Design and simulate effective fuzzy control systems and neural network systems for specific applications 7ENT1008 Mixed mode and VLSI Technologies Examine typical applications of advanced IC techniques such as integrated filter design</p>	<p>EP3fi</p>	<p>7ENT1004 Computer Architecture Design Explore instruction-level parallelism in conventional RISC, VLIW, Superscalar architectures and Multiprocessor architectures;</p> <p>7ENT1060 Operations Management MSc Evaluation of the scope and variation of Ops Man strategies in a range of organisations</p>
		<p>EP4fi</p>	<p>7ENT1060 Operations Management MSc HRM topic covers motivation and leadership styles</p> <p>7ENT1072 MSc Projects Manage project work to set deadlines and milestones. Take action with internal departments to achieve project needs. Workshops and Purchasing</p>

MSc in Power Electronics and Control

Table 3 part 1 of 2: AHEP3 Mapped Learning Outcomes

Programme Title: MSc		Power Electronics and Control (Entry Semester A = 1 year; Entry Semester B = 16 months)																					
Modules	Module No.	O or C	% Examination	% Coursework	SM1fl	SM2fl	SM3fl	EA1fl	EA2fl	EA3fl	D1fl	D2fl	D3fl	ET1fl	ET2fl	ET3fl	ET4fl	ET5fl	ET6fl	EP1fl	EP2fl	EP3fl	EP4fl
Digital Signal Processing and Processors	7ENT1005	C	60	40	✓	✓		✓		✓	✓									✓	✓		
Control of Engineering Systems	7ENT1074	C	60	40	✓		ü			✓		✓								✓			
Operations Management	7ENT1060	C	60	40		✓								✓	✓	✓	✓		✓			✓	✓
Advanced Power Electronics and Control	7ENT1051	C	60	40			✓		✓			✓										✓	
Embedded Control Systems	7ENT1042	C	60	40		✓				✓		✓									✓	✓	
Operations Research	7ENT1070	C	60	40	✓		✓		✓			✓						✓					
Artificial Intelligence	7ENT1013	C	60	40	✓						✓		✓										
Renewable Energy Systems and Smart Grid	7ENT1052	C	60	100	✓	✓									✓					✓	✓		✓
MSc Individual Project (MSc Projects)	7ENT1072	C	-	100			✓	✓		✓		✓		✓	✓	✓	✓	✓	✓		✓		✓
Total Level 7					5	4	4	2	2	4	2	3	3	2	3	2	2	2	2	3	4	3	3

SM1fi	<p>7ENT1074 Control of Mechanical Systems Explored advanced methods of control for engineering systems using advanced mathematical modelling techniques</p> <p>7ENT1070 Operations Research (partial) Critique the logical process of modelling complex decision problems</p> <p>7ENT1013 Artificial Intelligence Examine the fundamental principles underlying an artificial intelligent system</p> <p>7ENT1052 Renewable Energy Systems and Smart Grid demonstrate understanding of the physical principles of various renewable energy sources and their conversion path to electrical power;</p>	ET1fi	<p>7ENT1060 Operations Management MSc explore the issues of ethical conduct, legal requirements governing engineering and risk.</p> <p>7ENT1072 MSc Projects discuss their work in the context of Economic, Legal, Social, Ethical and Environmental issues. The project report must include a section where the student relates his/her project, and/or the subject area of his/her project to the various legal and ethical constraints under engineers and technologists are expected to operate</p>
SM2fi	<p>7ENT1005 Digital Signal Processing and Processors describe, in mathematical terms, algorithms and methods commonly used in digital signal processing applications;</p> <p>7ENT1060 Operations Management present the results of analysis and synthesis in an appropriate required business format individually and as a group;</p> <p>7ENT1042 Embedded Control Systems Specify hardware and software requirements for embedded mechatronic systems.</p> <p>7ENT1052 Renewable Energy Systems and Smart Grid (partial) * use research tools and industry-standard technologies to carry out independent research project.</p>	ET2fi	<p>7ENT1060 Operations Management MSc examine the role of Operations Management, the operational processes, planning and control systems; assess the relationships between operations management and other functions in the context of constraints;</p> <p>7ENT1052 Renewable Energy Systems and Smart Grid Demonstrate understanding of relevant technologies in renewable energy systems design, operation and integration into the electric power grid;</p> <p>7ENT1072 MSc Projects Discuss their work in the context of Economic, Legal, Social, Ethical and Environmental issues. The project report must include a section where the student relates his/her project, and/or the subject area of his/her project to the various legal and ethical constraints under engineers and technologists are expected to operate</p>
SM3fi	<p>7ENT1074 Control of Mechanical Systems Design, implement and evaluate changes to controllers to modify the performance for engineering systems</p> <p>7ENT1051 Advanced Power Elect and Control Examine the principal power electronic switches, converter circuits and their control methods using various PWM techniques;</p> <p>7ENT1070 Operations Research critically analyse and report results individually and as a group.</p> <p>7ENT1072 MSc Projects Construct, present and defend an argument based on their analysis</p>	ET3fi	<p>7ENT1060 Operations Management MSc Examine the role of Operations Management, the operational processes, planning and control systems employed within a business environment; assess the relationships between operations management and other functions in the context of constraints;</p> <p>7ENT1072 MSc Projects discuss their work in the context of Economic, Legal, Social, Ethical and Environmental issues. The project report must include a section where the student relates his/her project, and/or the subject area of his/her project to the various legal and ethical constraints under engineers and technologists are expected to operate</p>
EA1fi	<p>7ENT1005 Digital Signal Processing and Processors Use advanced digital signal processing techniques in straightforward cases;</p> <p>7ENT1072 MSc Projects Perform a literature search and develop analysis methodologies appropriate to different situations. Critique their chosen field of study through investigation of published work</p>	ET4fi	<p>7ENT1060 Operations Management MSc Explore modern operational issues and concepts including cradle to grave production;</p> <p>7ENT1072 MSc Projects Discuss their work in the context of Economic, Legal, Social, Ethical and Environmental issues. The project report must include a section where the student relates his/her project, and/or the subject area of his/her project to the various legal and ethical constraints under engineers and technologists are expected to operate</p>
EA2fi	<p>7ENT1051 Advanced Power Elect and Control Explain the concept of advanced converter topologies, principle of operation and control; *explore the application of power electronics technology in key areas of industry.</p> <p>7ENT1070 Operations Research Evaluate quantitative modelling concepts for problem solving and decision making</p>	ET5fi	<p>7ENT1070 Operations Research Derive solution(s) using a suitable software package when required</p> <p>7ENT1072 MSc Projects discuss their work in the context of Economic, Legal, Social, Ethical and Environmental issues. The project report must include a section where the student relates his/her project, and/or the subject area of his/her project to the various legal and ethical constraints under engineers and technologists are expected to operate</p>
EA3fi	<p>7ENT1005 Digital Signal Processing and Processors Use selected software tools for simulating and analyse using DSP techniques and systems</p> <p>7ENT1074 Control of Mechanical Systems Simulate the dynamic performance of a control system</p> <p>7ENT1042 Embedded Control Systems Test and evaluate hardware used in embedded mechatronic systems</p> <p>7ENT1072 MSc Projects (partial) Recognise the organisational and communication skills required to manage a major investigative project.</p>	ET6fi	<p>7ENT1060 Operations Management MSc Explore the issues of ethical conduct, legal requirements governing engineering and risk.</p> <p>7ENT1072 MSc Projects discuss their work in the context of Economic, Legal, Social, Ethical and Environmental issues. The project report must include a section where the student relates his/her project, and/or the subject area of his/her project to the various legal and ethical constraints under engineers and technologists are expected to operate</p>
D1fi	<p>7ENT1005 Digital Signal Processing and Processors Compare and contrast the architectures of a digital signal processor fixed and floating point architectures.</p> <p>7ENT1013 Artificial Intelligence Critically evaluate the suitability of hybrid neural/fuzzy/traditional control systems for specific applications.</p>	EP1fi	<p>7ENT1005 Digital Signal Processing and Processors Implement digital signal processing algorithms on a digital signal processor</p> <p>7ENT1074 Control of Mechanical Systems Design, implement and evaluate changes to controllers to modify the performance for engineering systems</p> <p>7ENT1052 Renewable Energy Systems and Smart Grid Demonstrate understanding of the concepts and principles of smart grid and related technologies.</p>
D2fi	<p>7ENT1042 Embedded Control Systems Develop software to control mechatronic systems;</p> <p>7ENT1070 Operations Research apply techniques and practice to model real world problems;</p> <p>7ENT1072 MSc Projects Critically analyse an engineering or business problem and choose suitable methods to undertake research to resolve or better understand the problem with incomplete or uncertain information.</p>	EP2fi	<p>7ENT1005 Digital Signal Processing and Processors Evaluate the efficiency of DSP-design-based project work to ensure good cycle timing.</p> <p>7ENT1042 Embedded Control Systems Implement embedded real time software for mechatronic systems;</p> <p>7ENT1052 Renewable Energy Systems and Smart Grid Demonstrate competencies necessary for the development, control and integration of renewable energy sources into the electric power grid.</p> <p>7ENT1072 MSc Projects Critically analyse an engineering or business problem and choose suitable methods to undertake research to resolve or better understand the problem with incomplete or uncertain information.</p>
D3fi	<p>7ENT1074 Control of Mechanical Systems Evaluate appropriate equipment and software to implement digital controllers for engineering systems</p> <p>7ENT1051 Advanced Power Elect and Control Design, test and operate simple power electronic converter circuits for practical energy conversion applications;</p> <p>7ENT1013 Artificial Intelligence Design and simulate effective fuzzy control systems and neural network systems for specific applications</p>	EP3fi	<p>7ENT1060 Operations Management MSc Evaluation of the scope and variation of Ops Man strategies in a range of organisations</p> <p>7ENT1051 Advanced Power Elect and Control Design and analyse closed-loop control for DC and AC converter applications.</p> <p>7ENT1042 Embedded Control Systems Test, evaluate and demonstrate software development through a team project</p>
		EP4fi	<p>7ENT1060 Operations Management MSc HRM topic covers motivation and leadership styles</p> <p>7ENT1052 Renewable Energy Systems and Smart Grid (partial) Test, Feasibility, Projects, presentation, report</p> <p>7ENT1072 MSc Projects Manage project work to set deadlines and milestones. Take action with internal departments to achieve project needs. Workshops and Purchasing</p>

MSc in Mechatronics

Table 3 part 1 of 2: AHEP3 Mapped Learning Outcomes																									
Programme Title: MSc		Mechatronics (Entry Semester A = 1 year; Entry Semester B = 16 months)																							
YEAR	Modules	Module No.	O or C	% Examination	% Coursework	SM1fl	SM2fl	SM3fl	EA1fl	EA2fl	EA3fl	D1fl	D2fl	D3fl	ET1fl	ET2fl	ET3fl	ET4fl	ET5fl	ET6fl	EP1fl	EP2fl	EP3fl	EP4fl	
Level 7	Advanced Reconfigurable Systems and Applications	7ENT1003	C	60	40	✓						✓		✓						✓					
	Dynamics and Performance of Mechanical Systems	7AAD0068	C	60	40				✓			✓					✓			✓					
	Control of Engineering Systems	7ENT1074	C	60	40	✓		✓			✓			✓							✓				
	Operations Management	7ENT1060	C	60	40		✓								✓	✓	✓	✓		✓			✓	✓	✓
	Embedded Control Systems	7ENT1042	C	60	40		✓				✓		✓									✓	✓		
	Operations Research	7ENT1070	C	60	40	✓		✓		✓			✓							✓					
	Artificial Intelligence	7ENT1013	O	60	40	✓						✓		✓											
	Mixed Mode and VLSI Technologies	7ENT1008	C	60	40					✓					✓					✓		✓			
	Renewable Energy Systems and Smart Grid	7ENT1052	O	-	100	✓	✓									✓						✓	✓		✓
MSc Individual Project (MSc Projects)	7ENT1072	C	-	100			✓	✓		✓		✓		✓	✓	✓	✓	✓	✓	✓		✓		✓	
Total Level 7						5	3	3	2	2	3	3	3	4	2	3	3	2	3	4	3	3	2	3	

Table 3 part 2 of 2: AHEP3 Mapped Learning Outcomes

<p>SM1fi</p>	<p>7ENT1003 Advanced Reconfigurable Systems and Applications (partial) Explore the architectures and functional units of an FPGA</p> <p>7ENT1074 Control of Mechanical Systems Explored advanced methods of control for engineering systems using advanced mathematical modelling techniques</p> <p>7ENT1070 Operations Research (partial) Critique the logical process of modelling complex decision problems</p> <p>7ENT1013 Artificial Intelligence Examine the fundamental principles underlying an artificial intelligent system</p>	<p>ET1fi</p>	<p>7ENT1060 Operations Management MSc Explore the issues of ethical conduct, legal requirements governing engineering and risk.</p> <p>7ENT1072 MSc Projects Discuss their work in the context of Economic, Legal, Social, Ethical and Environmental issues. The project report must include a section where the student relates his/her project, and/or the subject area of his/her project to the various legal and ethical constraints under engineers and technologists are expected to operate</p>
<p>SM2fi</p>	<p>7ENT1060 Operations Management MSc present the results of analysis and synthesis in an appropriate required business format individually and as a group;</p> <p>7ENT1042 Embedded Control Systems Specify hardware and software requirements for embedded mechatronic systems.</p>	<p>ET2fi</p>	<p>7ENT1060 Operations Management MSc Examine the role of Operations Management, the operational processes, planning and control systems; assess the relationships between operations management and other functions in the context of constraints;</p> <p>7ENT1072 MSc Projects Discuss their work in the context of Economic, Legal, Social, Ethical and Environmental issues. The project report must include a section where the student relates his/her project, and/or the subject area of his/her project to the various legal and ethical constraints under engineers and technologists are expected to operate</p>
<p>SM3fi</p>	<p>7ENT1074 Control of Mechanical Systems Design, implement and evaluate changes to controllers to modify the performance for engineering systems</p> <p>7ENT1070 Operations Research critically analyse and report results individually and as a group.</p> <p>7ENT1072 MSc Projects Construct, present and defend an argument based on their analysis</p>	<p>ET3fi</p>	<p>7AAD0068 Dynamics and Performance of Mechanical Systems Simulate the dynamic performance of a mechanical system</p> <p>7ENT1060 Operations Management MSc examine the role of Operations Management, the operational processes, planning and control systems employed within a business environment; assess the relationships between operations management and other functions in the context of constraints;</p> <p>7ENT1072 MSc Projects Discuss their work in the context of Economic, Legal, Social, Ethical and Environmental issues. The project report must include a section where the student relates his/her project, and/or the subject area of his/her project to the various legal and ethical constraints under engineers and technologists are expected to operate</p>
<p>EA1fi</p>	<p>7AAD0068 Dynamics and Performance of Mechanical Systems Analyse and evaluate the performance of a mechanical system using condition monitoring techniques.</p> <p>7ENT1072 MSc Projects Perform a literature search and develop analysis methodologies appropriate to different situations. Critique their chosen field of study through investigation of published work</p>	<p>ET4fi</p>	<p>7ENT1060 Operations Management MSc explore modern operational issues and concepts including cradle to grave production;</p> <p>7ENT1072 MSc Projects Discuss their work in the context of Economic, Legal, Social, Ethical and Environmental issues. The project report must include a section where the student relates his/her project, and/or the subject area of his/her project to the various legal and ethical constraints under engineers and technologists are expected to operate</p>
<p>EA2fi</p>	<p>7ENT1070 Operations Research Evaluate quantitative modelling concepts for problem solving and decision making</p> <p>7ENT1008 Mixed mode and VLSI Technologies Use computer-aided methods for analysis and simulation of analogue circuits;</p>	<p>ET5fi</p>	<p>7ENT1070 Operations Research Derive solution(s) using a suitable software package when required</p> <p>7ENT1072 MSc Projects Discuss their work in the context of Economic, Legal, Social, Ethical and Environmental issues. The project report must include a section where the student relates his/her project, and/or the subject area of his/her project to the various legal and ethical constraints under engineers and technologists are expected to operate</p>
<p>EA3fi</p>	<p>7ENT1074 Control of Mechanical Systems Simulate the dynamic performance of a control system</p> <p>7ENT1042 Embedded Control Systems Test and evaluate hardware used in embedded mechatronic systems</p> <p>7ENT1072 MSc Projects (partial) Recognise the organisational and communication skills required to manage a major investigative project.</p>	<p>ET6fi</p>	<p>7ENT1003 Advanced Reconfigurable Systems and Applications Evaluate the performance of FPGA-based project work in terms of operation speed and area.</p> <p>7AAD0068 Dynamics and Performance of Mechanical Systems Recommend appropriate equipment to implement condition monitoring on mechanical systems</p> <p>7ENT1060 Operations Management MSc explore the issues of ethical conduct, legal requirements governing engineering and risk.</p> <p>7ENT1072 MSc Projects Discuss their work in the context of Economic, Legal, Social, Ethical and Environmental issues. The project report must include a section where the student relates his/her project, and/or the subject area of his/her project to the various legal and ethical constraints under engineers and technologists are expected to operate</p>
<p>D1fi</p>	<p>7ENT1003 Advanced Reconfigurable Systems and Applications Examine the design methodology of modern embedded systems on an FPGA.</p> <p>7AAD0068 Dynamics and Performance of Mechanical Systems Explore advanced methods of modelling dynamic motion</p> <p>7ENT1013 Artificial Intelligence Critically evaluate the suitability of hybrid neural/fuzzy/traditional control systems for specific applications.</p>	<p>EP1fi</p>	<p>7ENT1074 Control of Mechanical Systems Design, implement and evaluate changes to controllers to modify the performance for engineering systems</p> <p>7ENT1008 Mixed mode and VLSI Technologies Analyse and design typical filters and circuits using active devices for selected analogue and mixed-signal processing applications.</p>
<p>D2fi</p>	<p>7ENT1042 Embedded Control Systems Develop software to control mechatronic systems;</p> <p>7ENT1070 Operations Research apply techniques and practice to model real world problems;</p> <p>7ENT1072 MSc Projects Critically analyse an engineering or business problem and choose suitable methods to undertake research to resolve or better understand the problem with incomplete or uncertain information.</p>	<p>EP2fi</p>	<p>7ENT1042 Embedded Control Systems Implement embedded real time software for mechatronic systems;</p> <p>7ENT1072 MSc Projects Critically analyse an engineering or business problem and choose suitable methods to undertake research to resolve or better understand the problem with incomplete or uncertain information.</p>
<p>D3fi</p>	<p>7ENT1003 Advanced Reconfigurable Systems and Applications Design and implementations of digital signal processing algorithms on an FPGA;</p> <p>7ENT1074 Control of Mechanical Systems Evaluate appropriate equipment and software to implement digital controllers for engineering systems</p> <p>7ENT1013 Artificial Intelligence Design and simulate effective fuzzy control systems and neural network systems for specific applications</p>	<p>EP3fi</p>	<p>7ENT1060 Operations Management MSc Evaluation of the scope and variation of Ops Man strategies in a range of organisations</p> <p>7ENT1042 Embedded Control Systems Test, evaluate and demonstrate software development through a team project</p>
		<p>EP4fi</p>	<p>7ENT1060 Operations Management MSc HRM topic covers motivation and leadership styles</p> <p>7ENT1072 MSc Projects Manage project work to set deadlines and milestones. Take action with internal departments to achieve project needs. Workshops and Purchasing</p>

MSc in Radio and Mobile Communication Systems

Table 3 part 1 of 2: AHEP3 Mapped Learning Outcomes																									
Programme Title: MSc			Radio and Mobile Communication Systems (Entry Semester A = 1 year; Entry Semester B = 16 months)																						
YEAR	Modules	Module No.	O or C	% Examination	% Coursework	SM1fl	SM2fl	SM3fl	EA1fl	EA2fl	EA3fl	D1fl	D2fl	D3fl	ET1fl	ET2fl	ET3fl	ET4fl	ET5fl	ET6fl	EP1fl	EP2fl	EP3fl	EP4fl	
Level 7	Operations Research	7ENT1070	C	60	40	✓		✓		✓			✓						✓						
	Mixed Mode and VLSI Technologies	7ENT1008	C	60	40					✓				✓					✓		✓				
	Broadband Networks and Data Communications	7ENT1050	C	60	40	✓									✓	✓	✓			✓	✓	✓			
	Information Theory and DSP in Communications	7ENT1053	C	60	40					✓	✓	✓						✓				✓			
	Advanced Reconfigurable Systems and Applications	7ENT1003	C	60	40	✓						✓		✓						✓					
	Digital Mobile Communication Systems	7ENT1054	C	60	40	✓	✓		✓				✓										✓	✓	
	Wireless, Mobile and Ad-hoc Networking	7COM1031	C	70	30		✓				✓				✓								✓		
	Operations Management	7ENT1060	C	60	40		✓									✓	✓	✓	✓		✓			✓	✓
	MSc Individual Project (MSc Projects)	7ENT1072	C	-	100			✓	✓		✓		✓		✓	✓	✓	✓	✓	✓	✓		✓		✓
Total Level 7						4	3	2	2	3	3	3	2	3	3	3	4	2	3	4	2	5	2	2	

SM1fi	<p>7ENT1054 Digital Mobile Communication Systems Explore building blocks, transmitters and receivers for mobile communication systems with particular reference to Software Defined Radio (SDR) techniques</p> <p>7ENT1003 Advanced Reconfigurable Systems and Applications (partial) Explore the architectures and functional units of an FPGA</p> <p>7ENT1070 Operations Research (partial) Critique the logical process of modelling complex decision problems</p> <p>7ENT1050 Broadband Networks and Data Communications Evaluate carrier networks and protocols (SONET/SDH, IP and Ethernet)</p>	ET1fi	<p>7ENT1060 Operations Management MSc Explore the issues of ethical conduct, legal requirements governing engineering and risk.</p> <p>7ENT1072 MSc Projects Discuss their work in the context of Economic, Legal, Social, Ethical and Environmental issues. The project report must include a section where the student relates his/her project, and/or the subject area of his/her project to the various legal and ethical constraints under engineers and technologists are expected to operate</p>
SM2fi	<p>7ENT1054 Digital Mobile Communication Systems Examine modulation, transmission, error control and channel characteristics applicable to digital signals and cellular radio networks;</p> <p>7COM1031 Wireless, Mobile & Ad-Hoc Networking have a knowledge and understanding of the complex problems and issues arising when mobility occurs in networks.</p> <p>7ENT1060 Operations Management Present the results of analysis and synthesis in an appropriate required business format individually and as a group;</p>	ET2fi	<p>7ENT1060 Operations Management MSc Examine the role of Operations Management, the operational processes, planning and control systems; assess the relationships between operations management and other functions in the context of constraints;</p> <p>7ENT1072 MSc Projects Discuss their work in the context of Economic, Legal, Social, Ethical and Environmental issues. The project report must include a section where the student relates his/her project, and/or the subject area of his/her project to the various legal and ethical constraints under engineers and technologists are expected to operate</p>
SM3fi	<p>7ENT1070 Operations Research Critically analyse and report results individually and as a group.</p> <p>7ENT1072 MSc Projects Construct, present and defend an argument based on their analysis</p>	ET3fi	<p>7ENT1060 Operations Management MSc Examine the role of Operations Management, the operational processes, planning and control systems employed within a business environment; assess the relationships between operations management and other functions in the context of constraints;</p> <p>7ENT1053 Information Theory and DSP in Communications Distinguish appropriate circumstances in which digital signal processing techniques can be used effectively.</p> <p>7ENT1072 MSc Projects Discuss their work in the context of Economic, Legal, Social, Ethical and Environmental issues. The project report must include a section where the student relates his/her project, and/or the subject area of his/her project to the various legal and ethical constraints under engineers and technologists are expected to operate</p>
EA1fi	<p>7ENT1054 Digital Mobile Communication Systems Analyse modulation, transmission, error control and channel characteristics applicable to digital signals and cellular radio networks;</p> <p>7ENT1072 MSc Projects Perform a literature search and develop analysis methodologies appropriate to different situations. Critique their chosen field of study through investigation of published work</p>	ET4fi	<p>7ENT1060 Operations Management MSc Explore modern operational issues and concepts including cradle to grave production;</p> <p>7ENT1072 MSc Projects discuss their work in the context of Economic, Legal, Social, Ethical and Environmental issues. The project report must include a section where the student relates his/her project, and/or the subject area of his/her project to the various legal and ethical constraints under engineers and technologists are expected to operate</p>
EA2fi	<p>7ENT1008 Mixed mode and VLSI Technologies Use computer-aided methods for analysis and simulation of analogue circuits;</p> <p>7ENT1070 Operations Research Evaluate quantitative modelling concepts for problem solving and decision making</p> <p>7ENT1053 Information Theory and DSP in Communications Implement and test a range of digital signal processing techniques, using appropriate simulation tools;</p>	ET5fi	<p>7ENT1070 Operations Research Derive solution(s) using a suitable software package when required</p> <p>7ENT1072 MSc Projects Discuss their work in the context of Economic, Legal, Social, Ethical and Environmental issues. The project report must include a section where the student relates his/her project, and/or the subject area of his/her project to the various legal and ethical constraints under engineers and technologists are expected to operate</p>
EA3fi	<p>7COM1031 Wireless, Mobile & Ad-Hoc Networking (partial) Critical evaluation of protocols intended to solve problems or new applications that arise in mobile networking</p> <p>7ENT1053 Information Theory and DSP in Communications Design and simulate coding theory and digital filters using appropriate simulation tools, such as Matlab.</p> <p>7ENT1072 MSc Projects (partial) Recognise the organisational and communication skills required to manage a major investigative project.</p>	ET6fi	<p>7ENT1003 Advanced Reconfigurable Systems and Applications Evaluate the performance of FPGA-based project work in terms of operation speed and area.</p> <p>7ENT1060 Operations Management MSc explore the issues of ethical conduct, legal requirements governing engineering and risk.</p> <p>7ENT1072 MSc Projects Discuss their work in the context of Economic, Legal, Social, Ethical and Environmental issues. The project report must include a section where the student relates his/her project, and/or the subject area of his/her project to the various legal and ethical constraints under engineers and technologists are expected to operate</p>
D1fi	<p>7ENT1054 Digital Mobile Communication Systems Evaluate building blocks, transmitters and receivers for mobile communication systems with particular reference to Software Defined Radio (SDR) techniques.</p> <p>7ENT1003 Advanced Reconfigurable Systems and Applications Examine the design methodology of modern embedded systems on an FPGA.</p> <p>7ENT1053 Information Theory and DSP in Communications Quantify information transfer in noisy channel conditions;</p>	EP1fi	<p>7ENT1008 Mixed mode and VLSI Technologies Analyse and design typical filters and circuits using active devices for selected analogue and mixed-signal processing applications.</p> <p>7ENT1050 Broadband Networks and Data Communications Design and simulate user and service-centric networks.</p>
D2fi	<p>7ENT1070 Operations Research Apply techniques and practice to model real world problems;</p> <p>7ENT1072 MSc Projects Critically analyse an engineering or business problem and choose suitable methods to undertake research to resolve or better understand the problem with incomplete or uncertain information.</p>	EP2fi	<p>7ENT1054 Digital Mobile Communication Systems Explain principles of various generations of cellular communication systems including new and emerging technologies;</p> <p>7COM1031 Wireless, Mobile & Ad-Hoc Networking (partial) address new applications that arise in mobile networking.</p> <p>7ENT1050 Broadband Networks and Data Communications Design state-of-the-art networks using legacy as well as emerging optical and wireless technologies;</p>
D3fi	<p>7ENT1003 Advanced Reconfigurable Systems and Applications Design and implementations of digital signal processing algorithms on an FPGA;</p> <p>7COM1031 Wireless, Mobile & Ad-Hoc Networking Discuss and critically evaluate protocols intended to solve problems or address new applications that arise in mobile networking.</p> <p>7ENT1008 Mixed mode and VLSI Technologies Examine typical applications of advanced IC techniques such as integrated filter design</p>	EP3fi	<p>7ENT1054 Digital Mobile Communication Systems Critically evaluate the design and performance of current and future generations of cellular communication systems including new and emerging technologies;</p> <p>7ENT1060 Operations Management MSc Evaluation of the scope and variation of Ops Man strategies in a range of organisations</p>
		EP4fi	<p>7ENT1060 Operations Management MSc HRM topic covers motivation and leadership styles</p> <p>7ENT1072 MSc Projects Manage project work to set deadlines and milestones. Take action with internal departments to achieve project needs. Workshops and Purchasing</p>

MSc in Embedded Intelligent Systems

Table 3 part 1 of 2: AHEP3 Mapped Learning Outcomes																								
Programme Title: MSc		Embedded Intelligent Systems (Entry Semester A = 1 year; Entry Semester B = 16 months)																						
YEAR	Modules	Module No.	O or C	% Examination	% Coursework	SM1fl	SM2fl	SM3fl	EA1fl	EA2fl	EA3fl	D1fl	D2fl	D3fl	ET1fl	ET2fl	ET3fl	ET4fl	ET5fl	ET6fl	EP1fl	EP2fl	EP3fl	EP4fl
Level 7	Digital Signal Processing and Processors	7ENT1005	C	60	40	✓	✓		✓		✓	✓									✓	✓		
	Advanced Reconfigurable Systems and Applications	7ENT1003	C	60	40	✓						✓		✓						✓				
	Computer Architecture Design	7ENT1004	C	60	40				✓								✓						✓	
	Operations Management	7ENT1060	C	60	40		✓								✓	✓	✓	✓		✓			✓	✓
	Embedded Control Systems	7ENT1042	C	60	40		✓				✓		✓									✓	✓	
	Operations Research	7ENT1070	C	60	40	✓		✓		✓			✓						✓					
	Artificial Intelligence	7ENT1013	C	60	40	✓						✓		✓										
	Biometric Systems and Speech Processes	7ENT1025	C	60	40	✓		✓			✓		✓				✓					✓		
	MSc Individual Project (MSc Projects)	7ENT1072	C	-	100			✓	✓		✓		✓		✓	✓	✓	✓	✓	✓	✓		✓	
Total Level 7						5	3	3	2	2	4	3	4	2	2	3	3	2	2	3	2	3	3	2

SM1fi	<p>7ENT1005 Digital Signal Processing and Processors (partial) Examine the functional units of a digital signal processor</p> <p>7ENT1003 Advanced Reconfigurable Systems and Applications (partial) Explore the architectures and functional units of an FPGA</p> <p>7ENT1070 Operations Research (partial) Critique the logical process of modelling complex decision problems</p> <p>7ENT1013 Artificial Intelligence Examine the fundamental principles underlying an artificial intelligent system</p> <p>7ENT1025 Biometric Systems and Speech Processing Describe the fundamentals of biometrics methods</p>	ET1fi	<p>7ENT1060 Operations Management MSc Explore the issues of ethical conduct, legal requirements governing engineering and risk.</p> <p>7ENT1072 MSc Projects Discuss their work in the context of Economic, Legal, Social, Ethical and Environmental issues. The project report must include a section where the student relates his/her project, and/or the subject area of his/her project to the various legal and ethical constraints under engineers and technologists are expected to operate</p>
SM2fi	<p>7ENT1005 Digital Signal Processing and Processors Describe, in mathematical terms, algorithms and methods commonly used in digital signal processing applications;</p> <p>7ENT1060 Operations Management MSc present the results of analysis and synthesis in an appropriate required business format individually and as a group;</p> <p>7ENT1042 Embedded Control Systems Specify hardware and software requirements for embedded mechatronic systems.</p>	ET2fi	<p>7ENT1060 Operations Management MSc Examine the role of Operations Management, the operational processes, planning and control systems; assess the relationships between operations management and other functions in the context of constraints;</p> <p>7ENT1025 Biometric Systems and Speech Processing Implement appropriate speech processing techniques in straightforward cases</p> <p>7ENT1072 MSc Projects Discuss their work in the context of Economic, Legal, Social, Ethical and Environmental issues. The project report must include a section where the student relates his/her project, and/or the subject area of his/her project to the various legal and ethical constraints under engineers and technologists are expected to operate</p>
SM3fi	<p>7ENT1070 Operations Research Critically analyse and report results individually and as a group.</p> <p>7ENT1025 Biometric Systems and Speech Processing Explore various principles of speech processing techniques;</p> <p>7ENT1072 MSc Projects Construct, present and defend an argument based on their analysis</p>	ET3fi	<p>7ENT1004 Computer Architecture Design Examine the major issues facing the designer of a state-of-the-art processors</p> <p>7ENT1060 Operations Management MSc Examine the role of Operations Management, the operational processes, planning and control systems employed within a business environment; assess the relationships between operations management and other functions in the context of constraints;</p> <p>7ENT1072 MSc Projects Discuss their work in the context of Economic, Legal, Social, Ethical and Environmental issues. The project report must include a section where the student relates his/her project, and/or the subject area of his/her project to the various legal and ethical constraints under engineers and technologists are expected to operate</p>
EA1fi	<p>7ENT1005 Digital Signal Processing and Processors Use advanced digital signal processing techniques in straightforward cases;</p> <p>7ENT1072 MSc Projects Perform a literature search and develop analysis methodologies appropriate to different situations. Critique their chosen field of study through investigation of published work</p>	ET4fi	<p>7ENT1060 Operations Management MSc Explore modern operational issues and concepts including cradle to grave production;</p> <p>7ENT1072 MSc Projects Discuss their work in the context of Economic, Legal, Social, Ethical and Environmental issues. The project report must include a section where the student relates his/her project, and/or the subject area of his/her project to the various legal and ethical constraints under engineers and technologists are expected to operate</p>
EA2fi	<p>7ENT1004 Computer Architecture Design Quantify the benefits of the techniques involved in high-performance processor design.</p> <p>7ENT1070 Operations Research Evaluate quantitative modelling concepts for problem solving and decision making</p>	ET5fi	<p>7ENT1070 Operations Research Derive solution(s) using a suitable software package when required</p> <p>7ENT1072 MSc Projects Discuss their work in the context of Economic, Legal, Social, Ethical and Environmental issues. The project report must include a section where the student relates his/her project, and/or the subject area of his/her project to the various legal and ethical constraints under engineers and technologists are expected to operate</p>
EA3fi	<p>7ENT1005 Digital Signal Processing and Processors Use selected software tools for simulating and analyse using DSP techniques and systems</p> <p>7ENT1042 Embedded Control Systems Test and evaluate hardware used in embedded mechatronic systems</p> <p>7ENT1025 Biometric Systems and Speech Processing Compare and contrast different biometrics methods for a given application.</p> <p>7ENT1072 MSc Projects (partial) Recognise the organisational and communication skills required to manage a major investigative project.</p>	ET6fi	<p>7ENT1003 Advanced Reconfigurable Systems and Applications Evaluate the performance of FPGA-based project work in terms of operation speed and area.</p> <p>7ENT1060 Operations Management MSc explore the issues of ethical conduct, legal requirements governing engineering and risk.</p> <p>7ENT1072 MSc Projects discuss their work in the context of Economic, Legal, Social, Ethical and Environmental issues. The project report must include a section where the student relates his/her project, and/or the subject area of his/her project to the various legal and ethical constraints under engineers and technologists are expected to operate</p>
D1fi	<p>7ENT1005 Digital Signal Processing and Processors Compare and contrast the architectures of a digital signal processor fixed and floating point architectures.</p> <p>7ENT1003 Advanced Reconfigurable Systems and Applications Examine the design methodology of modern embedded systems on an FPGA.</p> <p>7ENT1013 Artificial Intelligence Critically evaluate the suitability of hybrid neural/fuzzy/traditional control systems for specific applications.</p>	EP1fi	<p>7ENT1005 Digital Signal Processing and Processors Implement digital signal processing algorithms on a digital signal processor</p> <p>7ENT1025 Biometric Systems and Speech Processing Discuss the features of different biometrics methods.</p>
D2fi	<p>7ENT1042 Embedded Control Systems Develop software to control mechatronic systems;</p> <p>7ENT1070 Operations Research Apply techniques and practice to model real world problems;</p> <p>7ENT1025 Biometric Systems and Speech Processing Evaluate the methodology involved in a given biometric system;</p> <p>7ENT1072 MSc Projects Critically analyse an engineering or business problem and choose suitable methods to undertake research to resolve or better understand the problem with incomplete or uncertain information.</p>	EP2fi	<p>7ENT1005 Digital Signal Processing and Processors Evaluate the efficiency of DSP-design-based project work to ensure good cycle timing.</p> <p>7ENT1042 Embedded Control Systems Implement embedded real time software for mechatronic systems;</p> <p>7ENT1072 MSc Projects Critically analyse an engineering or business problem and choose suitable methods to undertake research to resolve or better understand the problem with incomplete or uncertain information.</p>
D3fi	<p>7ENT1003 Advanced Reconfigurable Systems and Applications Design and implementations of digital signal processing algorithms on an FPGA;</p> <p>7ENT1013 Artificial Intelligence Design and simulate effective fuzzy control systems and neural network systems for specific applications</p>	EP3fi	<p>7ENT1004 Computer Architecture Design Explore instruction-level parallelism in conventional RISC, VLIW, Superscalar architectures and Multiprocessor architectures;</p> <p>7ENT1060 Operations Management MSc Evaluation of the scope and variation of Ops Man strategies in a range of organisations</p> <p>7ENT1042 Embedded Control Systems Test, evaluate and demonstrate software development through a team project</p>
		EP4fi	<p>7ENT1060 Operations Management MSc HRM topic covers motivation and leadership styles</p> <p>7ENT1072 MSc Projects Manage project work to set deadlines and milestones. Take action with internal departments to achieve project needs. Workshops and Purchasing</p>

Section 2

Programme management

Relevant QAA subject benchmarking statements

Engineering

Type of programme

Taught postgraduate

Date of validation/last periodic review

October 15

Date of production/ last revision of PS

Feb 2017

Relevant to level/cohort

Level 7 entering September 2018 & January 2019

Administrative School

School of Engineering and Technology

Table 4 Course structure

Course details					
Course code		Course description			JACS
EIMASTE		MSc Embedded Intelligent Systems			H600
Course Instances					
Instances code	Intake	Stream	Instances Year	Location:	Mode of study
EISM1F-1 EISM1F-2	A	Embedded Intelligent Systems	1	Hatfield	Full-time
EISMP1P	A	Embedded Intelligent Systems	1	Hatfield	Part-time
EISMP2P	A	Embedded Intelligent Systems	2	Hatfield	Part-time
EISMP3P	A	Embedded Intelligent Systems	3	Hatfield	Part-time
EISMB1F-1 EISMB1F-2	B	Embedded Intelligent Systems	1	Hatfield	Full-time

Course details					
Course code		Course description			JACS
EIMASTE		MSc Radio and Communication Systems			H600
Course Instances					
Instances code	Intake	Stream	Instances Year	Location:	Mode of study
RMCSM1F-1 RMCSM1F-2	A	Radio and Mobile Communication Systems	1	Hatfield	Full-time
RMCSMP1P	A	Radio and Mobile Communication Systems	1	Hatfield	Part-time
RMCSMP2P	A	Radio and Mobile Communication Systems	2	Hatfield	Part-time

RMCSMP3P	A	Radio and Mobile Communication Systems	3	Hatfield	Part-time
RMCSMB1F-1 RMCSMB1F-2	B	Radio and Mobile Communication Systems	1	Hatfield	Full-time

Course details					
Course code		Course description		JACS	
EIMASTECI		MSc Communications and Information Engineering		H640 and I200	
Course Instances					
Instances code	Intake	Stream	Instances Year	Location:	Mode of study
CIEMSEP1F-1 CIEMSEP1F-2	A	Communications and Information Engineering	1	Hatfield	Full-time
CIEMSEP1P	A	Communications and Information Engineering	1	Hatfield	Part-time
CIEMSEP2P	A	Communications and Information Engineering	2	Hatfield	Part-time
CIEMSEP3P	A	Communications and Information Engineering	3	Hatfield	Part-time
CIEMJAN1F-1 CIEMJAN1F-2	B	Communications and Information Engineering	1	Hatfield	Full-time

Course details					
Course code		Course description		JACS	
EIMASTEMC		MSc Microelectronics and Computer Engineering		H611 and I100	
Course Instances					
Instances code	Intake	Stream	Instances Year	Location:	Mode of study
MCEMSEP1F-1 MCEMSEP1F-2	A	Microelectronics and Computer Engineering	1	Hatfield	Full-time
MCEMSEP1P	A	Microelectronics and Computer Engineering	1	Hatfield	Part-time
MCEMSEP2P	A	Microelectronics and Computer Engineering	2	Hatfield	Part-time
MCEMSEP3P	A	Microelectronics and Computer Engineering	3	Hatfield	Part-time
MCEMJAN1F-1 MCEMJAN1F-2	B	Microelectronics and Computer Engineering	1	Hatfield	Full-time

Course details					
Course code		Course description			JACS
EIMASTEPE		MSc Power Electronics and Control			H630
Course Instances					
Instances code	Intake	Stream	Instances Year	Location:	Mode of study
PECMSEP1F-1 PECMSEP1F-2	A	Power Electronics and Control	1	Hatfield	Full-time
PECMSEP1P	A	Power Electronics and Control	1	Hatfield	Part-time
PECMSEP2P	A	Power Electronics and Control	2	Hatfield	Part-time
PECMSEP3P	A	Power Electronics and Control	3	Hatfield	Part-time
PECMJAN1F-1 PECMJAN1F-2	B	Power Electronics and Control	1	Hatfield	Full-time

Course details					
Course code		Course description			JACS
EIMASTEM		MSc Mechatronics			H730
Course Instances					
Instances code	Intake	Stream	Instances Year	Location:	Mode of study
MMSEP1F-1 MMSEP1F-2	A	Mechatronics	1	Hatfield	Full-time
MMSEP1P	A	Mechatronics	1	Hatfield	Part-time
MMSEP2P	A	Mechatronics	2	Hatfield	Part-time
MMSEP3P	A	Mechatronics	3	Hatfield	Part-time
MMJAN1F-1 MMJAN1F-2	B	Mechatronics	1	Hatfield	Full-time