

School of Engineering and Computer Science

Title of Programme: General Transition Masters in Engineering

Programme Code: ENENGMSC

Programme Specification

This programme specification is relevant to students entering:
16 September 2019

Associate Dean of School (Academic Quality Assurance):



pp
Signature

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

Summary of amendments to the programme

Date	Section	Amendment

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

Programme Specification

MSc Engineering (Aerospace)

MSc Engineering (Automotive)

MSc Engineering (Mechanical)

MSc Engineering (Manufacturing)

MSc Engineering (Electronics)

MSc Engineering (Electronics & Communications)

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	Not applicable
Final Award (Qualification)	MSc
All Final Award titles (Qualification and Subject)	Engineering (Aerospace) Engineering (Automotive) Engineering (Mechanical) Engineering (Manufacturing) Engineering (Electronics) Engineering (Electronics & Communications)
FHEQ level of award	7
Language of Delivery	English

A. Programme Rationale

This innovative programme was created in response to a recommendation in the Science and Innovation Strategy published in December 2014 by HM Treasury. The findings in that report indicate that many, if not most, industry sectors would benefit from an increased supply of engineers qualified in disciplines that support employment in a range of engineering occupations, including “converts”. Therefore, this pioneering programme consists of a number of “specialist” Masters awards with an expectation that students will have studied a STEM related discipline to a Bachelor’s level or equivalent, as opposed to a “traditional” masters philosophy aimed at students from an engineering background. The programme offers options with separate entry routes for candidates transitioning from ‘Near STEM’ and ‘Far STEM’ disciplines:

- The Near STEM route is for admission of relevant first degree candidates and whose programme would have made extensive use of applied mathematics to design and explain engineering and/or scientific concepts (e.g., physics or maths).
- The Far STEM route is for first degrees where statistical analysis was a dominant feature of their analytical studies. Students will spend one to two semesters studying appropriate Level 4/5 modules in the first year then joining the Near STEM cohort (e.g., chemistry or biology).

All graduates will complete an Individual Masters Project thus demonstrating technical and practical competencies commensurate with an engineering graduate. Full- and part-time modes of study will be accommodated, alongside existing cohorts and pathways. Part-time students will be expected to study at a

slower and reduced rate which will be no less than 50% of the full-time study rate. More details on the different delivery modes can be found in section D.

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 through a combination of experimental, simulation, research methods and case studies.

Communications engineering encompasses modes of communication such as satellites, radio, internet and broadband technologies and wireless telephone services. Defence industries, consultancy and communication support companies recruit with this qualification.

Electronic Engineers work in a variety of areas including acoustics, defence, nanotechnology, radio and satellite communication and robotics. Industry sectors that recruit this type of qualification include the automotive electronics sector, defence, hardware design and consulting.

On the MSc Engineering (Aerospace), the development of skills and advancement of knowledge focus on:

- dynamic structural and aeroelastic analysis of aerospace vehicles, flight dynamics, stability and control and the implications for the design and construction of aerospace vehicles;
- the construction of CFD models and to assess implications of results, the limitations of present techniques and the potential future direction of developments in the CFD and aerodynamics field;
- appreciation of the need for process, product development and quality and reliability issues relevant to the introduction of products in a cost effective and timely manner;
- critical review of the present knowledge base, its applicability, usage and relevance to enhance product and enterprise performance.

On the MSc Engineering (Automotive), the development of skills and advancement of knowledge focus on:

- the selection of materials, process and techniques for the structural analysis and the design and construction of automotive components such as body and chassis, in relation to vibration and vehicle dynamics;
- understanding of alternative power train and fuel technologies, their impact on vehicle performance and environment;
- the construction of CAE models and to assess implications of the results, the limitations of present techniques and the potential future direction of developments in the CAE field;
- appreciation of the need for process and product development relevant to the introduction of products in a cost effective and timely manner;
- critical review of the present knowledge base, its applicability, usage and relevance to enhance product and enterprise performance.

On the MSc Engineering (Mechanical), the development of skills and advancement of knowledge focus on:

- the selection of materials, process and techniques for the structural analysis, design and construction of engineered components;
- the understanding of the control and dynamics theories used in the design of systems and more specifically their application in a wide variety of engineered systems and subsystems;
- the construction of CAE models and evaluation of results, the limitations of present techniques and the potential future direction of developments in the CAE field;
- appreciation of the need for process, product development and quality and reliability issues relevant to the introduction of products in a cost effective and timely manner;
- critical review of the present knowledge base, its applicability, usage and relevance to enhance product and enterprise performance.

On the MSc Engineering (Manufacturing), the development of skills and advancement of knowledge focus on:

- the broad areas of business, operations management, information systems, product development and quality systems;
- design orientated tasks, including analysis and synthesis, to develop relevant and applicable procedures and processes to resolve technical and ultimately business problems;

- critical review of the present knowledge base, its applicability, usage and relevance to enhance product and enterprise performance.

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

- Introducing students to recent advances in today's electronics and embedded systems;
- 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 electronics and embedded systems for sustainable and smart applications, using DSP/FPGA/ASIC technology.

On the MSc Engineering (Electronics and Communications), 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.

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 the disciplines of aerospace, automotive, mechanical, manufacturing technology, electrical and electronics and electronics and communications;
- provide an educational opportunity and experience to graduates and/or those with appropriate previous experience which enhances their prospects of professional employment with 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 fields of engineering, management and technology;
- 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
Aerospace (AM), Automotive (AUM) and Mechanical (MECM) A1am. The advanced CAE and simulation methods employed by aerospace engineers.	Acquisition of knowledge and understanding is through a combination of lectures, seminars, group discussions and assignments.	Knowledge and understanding are assessed through a series of case studies, assignments, project reports and unseen examinations.

- A1aum. The advanced CAE and simulation methods employed by automotive engineers.
- A1mecm. The advanced CAE and simulation methods employed by mechanical engineers.
- A2am. The fundamental sciences appropriate to aerospace engineering.
- A2aum. The fundamental sciences appropriate to automotive engineering.
- A2mecm. The fundamental sciences appropriate to mechanical engineering.
- A3. Appropriate research methods employed in analysis of technical and commercial problems.
- A4. The product/process definition and systems design process.

Manufacturing (MANM)

- A5. The techniques relevant to the analysis of business strategy and planning.
- A6. The product definition and systems design process.
- A7manm. Relevant techniques for commercial and professional engineering practice in the context of Manufacturing.
- A8. Operations management techniques and processes in manufacturing and service sectors.
- A9. Resource management planning and systems implications.
- A10. The analytical techniques employed in management and process control.

Electronics (EEM)

- A4. The product definition and systems design process.
- A11eem. The advanced theoretical issues and their practical implementations that underlie recent developments in Electronics Engineering.
- A12eem. A range of hardware components and architectures that are used in modern systems appropriate to Electronics and Electrical Engineering.
- A13eem. A range of algorithms and/or protocols and their strengths and weaknesses that are suitable for designing systems appropriate to Electrical and Electronics Engineering.
- A14. Suitable application areas in which advanced digital hardware and algorithms can be deployed to produce effective systems.
- A15. Understanding of business practice and the limitations within an engineering specialisation
- A16. Understand the roles in an engineering team and personal responsibilities

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>Electronics and Communications (ECM)</p> <p>A4. The product definition and systems design process.</p> <p>A11ecm. The advanced theoretical issues and their practical implementations that underlie recent developments in Electronics and Communications Engineering.</p> <p>A12ecm. A range of hardware components and architectures that are used in modern systems appropriate to Electronics and Communications Engineering.</p> <p>A13ecm. A range of algorithms and/or protocols and their strengths and weaknesses that are suitable for designing systems appropriate to Electronics and Communications Engineering..</p> <p>A15. The physical principles underlying the design of the hardware components used in optical systems.</p> <p>A16. The engineering challenges inherent in a variety of data communication applications.</p> <p>A17. Understanding of business practice and the limitations within an engineering specialisation</p> <p>A18. Understand the roles in an engineering team and personal responsibilities</p>		
<p>Intellectual skills:</p>	<p>Teaching/learning methods & strategies</p>	<p>Assessment</p>
<p>Aerospace (AM), Automotive (AUM) and Mechanical (MECM)</p> <p>B1. Analyse and solve engineering problems using appropriate techniques.</p> <p>B2. Design/model/analyse relevant engineering systems/subsystems.</p> <p>B3. Critically review and select appropriate research methods to solve engineering and commercial problems.</p> <p>B4. Evaluate external influences on the design process.</p> <p>Manufacturing (MANM)</p> <p>B1manm. Analyse and solve Manufacturing problems using appropriate techniques.</p> <p>B2. Design/model/analyse relevant engineering systems/subsystems.</p> <p>B3. Critically review and select appropriate research methods to solve engineering and commercial problems.</p> <p>B4manm. Evaluate external influences on the design process in the context of Manufacturing.</p> <p>B5. Identify the influence of resource related issues on operations and business.</p>	<p>Intellectual skills are developed throughout the programme by the methods and strategies outlined in section A, above.</p> <p>Analysis, problem solving and modelling skills are further developed through case studies, class discussion, in-course exercises, assignments and exams.</p> <p>Throughout, the learner is encouraged to further develop intellectual skills by guided and independent study</p>	<p>Intellectual skills are assessed through case studies, experiential work, tutorials, assignments and examinations. These are supported by work centred on analysis and synthesis, problem solving, in technical and managerial contexts.</p>

B6. Design appropriate management systems and processes.

Electronics (EEM)

B7. Plan and carry out a significant piece of independent investigative or development work as part of their project.

B8eem. Evaluate, select and deploy appropriate software tools to create/manage or simulate applications/systems appropriate to Electronics and Electrical Engineering.

B9eem. Select appropriate hardware components and platforms for use in systems appropriate to Electrical and Electronics Engineering.

B10 Develop skills in ethical operations and show insight on the commercial and social context.

Electronics and Communications (ECM)

B7. Plan and carry out a significant piece of independent investigative or development work as part of their project.

B9ecm. Select appropriate hardware components and platforms for use in systems appropriate to Electronics and Communications Engineering.

B10ecm. Design systems appropriate to Electronics and Communications Engineering by selecting appropriate equipment, configurations, protocols and algorithms.

B11ecm. Evaluate the performance of systems appropriate to Electronics and Communications Engineering by theoretical analysis and/or simulation.

B12 Develop skills in ethical operations and show insight on the commercial and social context.

Practical skills:

Teaching/learning methods & strategies

Assessment

Aerospace (AM), Automotive (AUM) and Mechanical (MECM)

C1am. Apply appropriate experimental, analytical and modelling techniques to a range of aerospace engineering problems draw conclusions.

C1aum. Apply appropriate experimental, analytical and modelling techniques to a range of automotive engineering problems and draw conclusions.

C1mecm. Apply appropriate experimental, analytical and modelling techniques to a range of mechanical engineering problems and draw conclusions.

C2. Use advanced computer-aided engineering tools.

C3. Prepare technical documentation.

Practical skills are developed throughout the programme through a series of case studies, experimental and simulation exercises, project reports and viva.

Practical skills are developed through the programme of study and associated written reports and submissions.

C5 is developed throughout the

Practical skills are formerly assessed through assignment work on case studies and the individual project.

- C4. Evaluate the design of appropriate systems, components or processes.
- C5. Plan and manage a project, taking into account commercial, industrial and resource constraints.

Manufacturing (MANM)

- C1manm. Apply appropriate experimental, analytical and modelling techniques to a range of manufacturing problems and draw conclusions.
- C6. Appropriate evaluation of the resource constraint implications on management decision making.
- C7. Plan the effective implementation of appropriate management systems and processes.

Electronics (EEM) and Electronics and Communications (ECM)

- C3. Prepare technical documentation.
- C4. Evaluate the design of appropriate systems, components or processes.
- C8. Plan and carry out a significant piece of independent investigative or development work as part of their project.
- C9. Perform experimental laboratory work and draw conclusions.
- C10. Use computer-based engineering tools.
- C11. Plan and manage a project, taking into account economic, social, legal, ethical and sustainability constraints and business strategy.

programme of the study, with one-to-one supervision during the individual project.

Transferable skills:

All awards

- D1. Communicate information effectively, orally and/or in writing.
- D2. Manage time and resources effectively.
- D3. Work effectively individually and/or within a team.

Additionally, for:

Aerospace (AM), Automotive (AUM) and Mechanical (MECM)

- D4. Solve problems in a logical and coherent manner.
- D5. Manipulate, sort and present data.
- D6. Learn effectively and independently, in preparation for lifelong learning.

Manufacturing (MANM)

Teaching/learning methods & strategies

Transferable skills are developed throughout the programme by using group discussions and report writing and require students to manage their own time for achieving targets.

Skill D1 is developed through coursework reports, oral presentations, research methods and the project report.

Skill D2 is developed through meeting deadlines for scheduled

Assessment

Transferable skills are assessed through assignment work and the project.

- D4. Solve problems in a logical and coherent manner.
- D6. Learn effectively and independently, in preparation for lifelong learning.

Electronics (EEM) and Electronics and Communications (ECM)

- D7. Carry out independent investigations to determine the state of knowledge and research in a subject area.
- D8. Make effective use of a wide range of information resources, such as those offered to them by the university.
- D9. Progress to research work, or work at an advanced level within an academic or commercial setting.

assignments and the individual project.

Skills D3, D4, D5, D7, D8 and D9, are developed throughout most modules; through lectures, group work, assessments and the individual project.

Skill D6 is encouraged and developed by the nature of the programme of study and the acquisition of transferable skills.

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

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

Near STEM students:

- Full-time near STEM students may enter an 18-month programme for a Semester A start in September;
- Part-time near STEM students may enter a 3-year programme for a Semester A start in September, with identical modules studied with the full-time students. However, there is the option to reduce the duration to 2 years for Individual Masters Project 'early starters'.

Far STEM students:

- Full-time far STEM students may enter a 2-year programme for a Semester B start in January;
- Part-time far STEM students may enter a 4-year programme for a Semester A start in September, with identical modules studied with the full-time students. However, there is an option to reduce the duration to 3 years for Individual Masters Project 'early starters'.

Accreditation of prior learning (APEL/APCL) is available for this programme in accordance to the University UPRs. 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

Have not submitted for accreditation

Programme Structure

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

Table 1a Outline Programme Structure

Mode of study: Full-time/Part-time

The different study patterns are shown in pages 18 and 19 for both Near and Far STEM and Full-time and Part-time students. The order of the modules is agreed in consultation with the Programme or Deputy Programme Leader with a maximum of 75 credit points per two semester academic year or up to 120 credit points over a year of more than two semesters for part-time students.

Entry points:

Near STEM Full-Time/Part-Time: A
Far STEM Full-Time: B
Far STEM Part-Time: A

Note 1: Far STEM Part-Time students study two different modules than Far STEM Full-Time students. This is due to the different entry point. Both join the Near-STEM in semester A of the following academic year.

Note 2: The Individual Masters Project runs the following way:

- in semester A for Full-Time students;
- across semesters A and B for Part-Time students;
- across semesters B and C for Part-Time 'project early starter' students

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

AM = Engineering (Aerospace)
AUM = Engineering (Automotive)
MANM = Engineering (Manufacturing)
MECM = Engineering (Mechanical)
EEM = Engineering (Electronics)
ECM = Engineering (Electronics and Communications)

c = compulsory module.

Mode of study Near STEM

To progress to the project stage, candidates are expected to have successfully completed a minimum of 90 credits.

The award of a Masters Degree requires 180 credit points, to include at least 150 credits passed at level 7 and 15 credits at level 6, and must include the Individual Masters Project.

Mode of study Far STEM

To progress to the Near STEM stage, the candidates must pass all modules taken which are indicated in the Far STEM table with ** after module titles. To progress to the project stage, the candidates are expected to have successfully completed a minimum of 150 credits, 60 of which are indicated above with **.

The award of a Masters Degree requires 240 credit points, to include at least 150 credits passed at level 7 and 15 credits at level 6, and must include the Individual Masters Project

Mode of study Near STEM – Semester A Entry (Full Time and Part Time)

Module Title	Module Code	Award						Credit Pts.	Language of Delivery	% exam	% ICA	% Practical	Semester.	Year of Study	
		AM	AUM	MANIM	MECM	EEM	ECM							Full Time Mode	Part Time Mode
Digital Design & Embedded Systems	5ELE0060					c	c	15	English	70	30	-	A	2	-
Microelectronics & VLSI	6ENT1027					c	c	15	English	60	40	-	A	2	-
Dynamics	5ENT1114	c	c		c			15	English	70	30	-	A	2	-
Engineering Operations Management	5ENT1087			c				15	English	60	40	-	A	2	-
Automotive Materials & Manufacture	7AAD0057		c					15	English	60	40	-	A	2	-
Manufacturing Information Systems	7AAD0059			c				15	English	60	40	-	A	2	-
Digital Signal Processing and Applications	7ENT1113					c	c	15	English	60	40	-	A	2	-
CFD Techniques	7ENT1007	c	c		c			15	English	60	40	-	A	2	-
Digital Mobile Communication Systems	7ENT1054					c	c	15	English	60	40	-	A	2	-
Operations Management	7ENT1060	c	c	c	c			15	English	60	40	-	A	2	-
Financial Control	7ENT1065			c				15	English	60	40	-	A	2	-
Control of Engineering Systems	7ENT1074	c			c			15	English	60	40	-	A	2	-
Automotive Chassis & Powertrain Technology	6AAD0006		c					15	English	60	40	-	B	2	-
Aerodynamics	6ENT1064	c						15	English	60	40	-	B	2	-
Flight Mechanics	7AAD0038	c						15	English	60	40	-	B	2	-
Automotive Dynamics & Safety	7AAD0054		c					15	English	60	40	-	B	2	-
Manufacturing Strategy	7AAD0064			c	c			15	English	60	40	-	B	2	-
Sustainability and Smart Systems Engineering	7ENT1002					c		15	English	60	40	-	B	2	-
Embedded Control Systems	7ENT1042					c		15	English	60	40	-	B	2	-
Mixed mode and VLSI Technologies	7ENT1008					c		15	English	60	40	-	B	2	-
Aerospace Applications	7ENT1111	c						15	English	60	40	-	B	2	-
Optical Communication Technologies	7ENT1012						c	15	English	60	40	-	B	2	-
Artificial Intelligence	7ENT1116					c		15	English	60	40	-	B	2	-
Information Theory and Data Processing	7ENT1105						c	15	English	60	40	-	B	2	-
Broadband Networks and Data Communications	7ENT1050						c	15	English	60	40	-	B	2	-
Biometrics Systems and Speech Processing	7ENT1119						c	15	English	60	40	-	B	2	-
FEA and Applications	7ENT1059				c			15	English	60	40	-	B	2	-
Advanced Engines & Power Systems	7ENT1066		c					15	English	60	40	-	B	2	-
Quality, Reliability and Maintenance	7ENT1068			c	c			15	English	60	40	-	B	2	-
Procurement & Supply Chain Management	7ENT1069			c				15	English	60	40	-	B	2	-
Operations Research	7ENT1070	c	c	c	c			15	English	60	40	-	B	2	-
Mechanics & Properties of Materials	6ACM0003			c	c			15	English	60	40	-	A	3	-
Aeroelasticity	7AAD0039	c						15	English	60	40	-	A	3	-
Automotive Electrical Systems	7AAD0056		c					15	English	60	40	-	A	3	-
Dynamics and Performance of Mechanical Systems	7AAD0068				c			15	English	60	40	-	A	3	-
Advanced Reconfigurable Systems & Applications	7ENT1003					c	c	15	English	60	40	-	A	3	-
Sustainable Business of Engineering	7ENT1106					c	c	15	English	-	100	-	A	3	-
Integrated Product Engineering	7ENT1064	c	c	c				15	English	60	40	-	A	3	-
Individual Masters Project	7ENT1078	c	c	c	c	c	c	30	English	-	100	-	A, AB, BC or	3	-

Far STEM – Semester B Entry (Full Time)
2 pages

Module Title	Module Code	Award						Credit Pts.	Language of Delivery	% exam	% ICA	% Practical	Semester.	Year of Study	
		AM	AUM	MANM	MECM	EEM	ECM							Full Time Mode	Part Time Mode
Computer Programming for Electronics Engineers **	4ELE0049					c	c	15	English	-	100	-	B	1	-
Mechanical Experimental Engineering **	4ENT1006	c	c	c	c			15	English	-	100	-	B	1	-
Electrical and Electronic Theory **	4ENT1026					c	c	15	English	80	20	-	B	1	-
Mechanical Science **	4ENT1067	c	c	c	c			15	English	80	20	-	B	1	-
Electronic Engineering Practice **	4ENT1113					c	c	15	English	-	100	-	B	1	-
Computing for Business & Technology **	4ENT1130	c	c	c	c			15	English	-	100	-	B	1	-
Engineering Applications of Mathematics **	4PAM1033	c	c	c	c	c	c	15	English	-	100	-	B	1	-
Digital Design & Embedded Systems	5ELE0060					c	c	15	English	70	30	-	A	2	-
Microelectronics & VLSI	6ENT1027					c	c	15	English	60	40	-	A	2	-
Dynamics	5ENT1013	c	c		c			15	English	70	30	-	A	2	-
Engineering Operations Management	5ENT1087			c				15	English	60	40	-	A	2	-
Automotive Materials & Manufacture	7AAD0057		c					15	English	60	40	-	A	2	-
Manufacturing Information Systems	7AAD0059			c				15	English	60	40	-	A	2	-
Digital Signal Processing and Applications	7ENT1113					c	c	15	English	60	40	-	A	2	-
CFD Techniques	7ENT1007	c	c		c			15	English	60	40	-	A	2	-
Digital Mobile Communication Systems	7ENT1054					c	c	15	English	60	40	-	A	2	-
Operations Management	7ENT1060	c	c	c	c			15	English	60	40	-	A	2	-
Financial Control	7ENT1065			c				15	English	60	40	-	A	2	-
Control of Engineering Systems	7ENT1074	c			c			15	English	60	40	-	A	2	-
Automotive Chassis & Powertrain Technology	6AAD0006		c					15	English	60	40	-	B	2	-
Aerodynamics	6ENT1064	c						15	English	60	40	-	B	2	-
Flight Mechanics	7AAD0038	c						15	English	60	40	-	B	2	-
Automotive Dynamics & Safety	7AAD0054		c					15	English	60	40	-	B	2	-
Manufacturing Strategy	7AAD0064			c	c			15	English	60	40	-	B	2	-
Sustainability and Smart Systems Engineering	7ENT1002					c		15	English	60	40	-	B	2	-
Embedded Control Systems	7ENT1042					c		15	English	60	40	-	B	2	-
Mixed mode and VLSI Technologies	7ENT1008					c		15	English	60	40	-	B	2	-
Aerospace Applications	7ENT1111	c						15	English	60	40	-	B	2	-
Optical Communication Technologies	7ENT1012						c	15	English	60	40	-	B	2	-
Artificial Intelligence	7ENT1116					c		15	English	60	40	-	B	2	-
Information Theory and Data Processing	7ENT1105						c	15	English	60	40	-	B	2	-
Broadband Networks and Data Communications	7ENT1050						c	15	English	60	40	-	B	2	-
Biometrics Systems and Speech Processing	7ENT1119						c	15	English	60	40	-	B	2	-
FEA and Applications	7ENT1059				c			15	English	60	40	-	B	2	-
Advanced Engines & Power Systems	7ENT1066		c					15	English	60	40	-	B	2	-
Quality, Reliability and Maintenance	7ENT1068			c	c			15	English	60	40	-	B	2	-
Procurement & Supply Chain Management	7ENT1069			c				15	English	60	40	-	B	2	-
Operations Research	7ENT1070	c	c	c	c			15	English	60	40	-	B	2	-
Mechanics & Properties of Materials	6ACM0003			c	c			15	English	60	40	-	A	3	-
Aeroelasticity	7AAD0039	c						15	English	60	40	-	A	3	-
Automotive Electrical Systems	7AAD0056		c					15	English	60	40	-	A	3	-

Module Title	Module Code	Award						Credit Pts.	Language of Delivery	% exam	% ICA	% Practical	Semester.	Year of Study	
		AM	AUM	MANM	MECM	EEM	ECM							Full Time Mode	Part Time Mode
Dynamics and Performance of Mechanical Systems	7AAD0068				c			15	English	60	40	-	A	3	-
Advanced Reconfigurable Systems & Applications	7ENT1003					c	c	15	English	60	40	-	A	3	-
Sustainable Business of Engineering	7ENT1106					c	c	15	English	-	100	-	A	3	
Integrated Product Engineering	7ENT1064	c	c	c				15	English	60	40	-	A	3	-
Individual Masters Project	7ENT1078	c	c	c	c	c	c	30	English	-	100	-	A, AB, BC or	3	-

To progress to the Near STEM stage, the candidates must pass all modules taken which are indicated in the Far STEM table with ** after module titles. To progress to the project stage, the candidates are expected to have successfully completed a minimum of 150 credits, 60 of which are indicated above with **. The award of a Masters Degree requires 240 credit points, to include at least 150 credits passed at level 7 and 15 credits at level 6, and must include the Individual Masters Project

Structure

Near STEM - Full Time - SEM A Intake (18 months)

Year 1 (120 Credits)			Year 2 (60 Credits)		
Semester A (60 Credits)	Semester B (60 Credits)	Semester C (0 Credits)	Semester A (60 Credits)	Semester B (0 Credits)	Semester C (0 Credits)
15 Credit Module	15 Credit Module		15 Credit Module		
15 Credit Module	15 Credit Module		15 Credit Module		
15 Credit Module	15 Credit Module		30 Credit Project		
15 Credit Module	15 Credit Module				

Near STEM - Part Time - SEM A Intake (3 years)

Year 1 (75 Credits)			Year 2 (75 Credits)			Year 3 (30 Credits)		
Semester A (45 Credits)	Semester B (30 Credits)	Semester C (0 Credits)	Semester A (45 Credits)	Semester B (30 Credits)	Semester C (0 Credits)	Semester A (15 Credits)	Semester B (15 Credits)	Semester C (0 Credits)
15 Credit Module	15 Credit Module		15 Credit Module	15 Credit Module		30 Credit Project		
15 Credit Module	15 Credit Module		15 Credit Module	15 Credit Module				
15 Credit Module			15 Credit Module					

Near STEM - Part Time - SEM A Intake (2 years version - project early starters)

Year 1 (75 Credits)			Year 2 (105 Credits)		
Semester A (45 Credits)	Semester B (30 Credits)	Semester C (0 Credits)	Semester A (45 Credits)	Semester B (45 Credits)	Semester C (15 Credits)
15 Credit Module	15 Credit Module		15 Credit Module	30 Credit Project	
15 Credit Module	15 Credit Module		15 Credit Module	15 Credit Module	
15 Credit Module			15 Credit Module	15 Credit Module	

Far STEM - Full Time - SEM B Intake (2 years)

Year 1 (60 Credits)			Year 2 (120 Credits)			Year 3 (60 Credits)		
Semester A (0 Credits)	Semester B (60 Credits)	Semester C (0 Credits)	Semester A (60 Credits)	Semester B (60 Credits)	Semester C (0 Credits)	Semester A (60 Credits)	Semester B (0 Credits)	Semester C (0 Credits)
	15 Credit Module		15 Credit Module	15 Credit Module		15 Credit Module		
	15 Credit Module		15 Credit Module	15 Credit Module		15 Credit Module		
	15 Credit Module		15 Credit Module	15 Credit Module		30 Credit		
	15 Credit Module		15 Credit Module	15 Credit Module		Project		

Far STEM - Part Time - SEM A Intake (4 years)

Year 1 (60 Credits)			Year 2 (75 Credits)			Year 3 (75 Credits)			Year 4 (30 Credits)		
Semester A (30 Credits)	Semester B (30 Credits)	Semester C (0 Credits)	Semester A (45 Credits)	Semester B (30 Credits)	Semester C (0 Credits)	Semester A (45 Credits)	Semester B (30 Credits)	Semester C (0 Credits)	Semester A (15 Credits)	Semester B (15 Credits)	Semester C (0 Credits)
15 Credit Module	15 Credit Module		15 Credit Module	15 Credit Module		15 Credit Module	15 Credit Module		30 Credit	Project	
15 Credit Module	15 Credit Module		15 Credit Module	15 Credit Module		15 Credit Module	15 Credit Module				
			15 Credit Module			15 Credit Module					

Far STEM - Part Time - SEM A Intake (3 years version - project early starters)

Year 1 (60 Credits)			Year 2 (75 Credits)			Year 3 (105 Credits)		
Semester A (30 Credits)	Semester B (30 Credits)	Semester C (0 Credits)	Semester A (45 Credits)	Semester B (30 Credits)	Semester C (0 Credits)	Semester A (45 Credits)	Semester B (45 Credits)	Semester C (15 Credits)
15 Credit Module	15 Credit Module		15 Credit Module	15 Credit Module		15 Credit Module	30 Credit	Project
15 Credit Module	15 Credit Module		15 Credit Module	15 Credit Module		15 Credit Module	15 Credit Module	
			15 Credit Module			15 Credit Module	15 Credit Module	

The award of an MSc degree requires 180 credit points including at least 150 passed at level 7.

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)
Masters	Engineering (Aerospace)	180 credit points to include at least 150 credits @ Level 7 and no more than 15 below Level 6. This must include Individual Masters Project.	Near STEM: 3 -6 Semesters	All relevant award related programme learning outcomes (See Table 2)
	Engineering (Automotive)			
	Engineering (Mechanical)			
	Engineering (Manufacturing)	240 credit points to include at least 150 credits @ Level 7 and no more than 15 below Level 6. This must include Individual Masters Project	Far STEM: 4-8 Semesters	
	Engineering (Electronics)			
	Engineering (Electronics & Communications)			
Postgraduate Diploma		120 credit points to include at least 90 credits @ Level 7 and no more than 15 below Level 6.	Near STEM: 2-3 Semesters Far STEM: 3-5 Semesters	Aerospace, Automotive and Mechanical A1, A2, B1, B2, B4, C1, C2, C3, C4, D1, D4, D5 Manufacturing A9, B1, B2, B4, B5, C1, D1, D3, D4 Electrical and Electronics and Electronics and Communications A11, A12 or A13, B9 or B10, C8, C9, C10, C4, D1, D7, D8
Postgraduate Certificate		60 credit points to include at least 45 @ Level 7.	Near STEM: 1-2 Semesters Far STEM: 2-4 Semesters	See: <i>For untitled awards:</i> See UPR AS11, section 13: http://sitem.herts.ac.uk/secreg/upr/AS11.htm
University Certificate (Far STEM only)		45 credit points @ Level 4.	Near STEM: n/a. Far STEM: 1 Semester	

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:

- For Far STEM students; to progress to the Near STEM stage, the candidates must pass all modules taken which are indicated in table 1a with ** after module titles. To progress to the project stage, the candidates are expected to have successfully completed a minimum of 150 credits, 60 of which are indicated above with **. The award of a Masters Degree requires 240 credit points, to include at least 150 credits passed at level 7 and 15 credits at level 6, and must include the Individual Masters Project.
- For Near STEM; 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, to include at least 150 credits passed at level 7 and 15 credits at level 6, and must include the Individual Masters Project.
- The Individual Masters Project cannot be compensated.

Further points of clarification and interpretation relevant to this specific programme are given below:

Compensatory credit on this award 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.

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.

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

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

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

G. Entry requirements

The normal entry requirements for the programme are:

- a pass in A-Level Mathematics or equivalent; **and**
- typically, a minimum of 2:2 honours degree in mathematics, physics, astrophysics or other relevant first degree and whose programme would have made extensive use of applied mathematics to design and explain engineering and/or scientific concepts will give access to the **Near STEM** route; **or**
- typically, a minimum of 2:2 honours degree in chemistry, biotechnology, biochemistry, food science, computer science based or similar first degrees where statistical analysis was a dominant feature of their analytical studies will give access to the **Far STEM** route; **or**
- any other contiguous discipline the subject content of which does not overlap with that of the programme to any substantial extent; **or**

- v. a qualification from any other recognised International academic institution which is of comparable academic standard to those identified above; **or**
- vi. exceptionally, a number of applicants with other relevant professional qualifications who have the necessary academic achievements and experience will be considered under APEL (accreditation of prior experiential learning) or APCL (accreditation of prior certified learning).
- vii. Overseas students must satisfy all visa requirements as stipulated by UKVI to enrol on the programme.

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, Foundation Certificate in English for Academic Studies, International Pre-Masters Programme (IPM), or any other suitable programme deemed appropriate by the University.

Prospective students may be required to attend an interview typically in order to review their subject background or English proficiency. In certain cases, a student may be advised or required to undertake preliminary studies or bridging course before starting the course.

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

MSc Engineering (Aerospace)

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.

			Programme Learning Outcomes (as defined in section 1 and below)																		
			Knowledge & Understanding				Individual Skills				Practical Skills					Transferable Skills					
	Module titles	Code	A1am	A2am	A3	A4	B1	B2	B3	B4	C1am	C2	C3	C4	C5	D1	D2	D3	D4	D5	D6
Level 4	Mechanical Experimental Engineering	4ENT1006														X			X		
	Mechanical Science	4ENT1067		X			X														
	Computing for Business & Technology	4ENT1130																	X	X	
	Engineering Applications of Mathematics	4PAM1033																	X	X	
	Aerospace Technology & Industry	4AAD0016								X						X	X				X
	Engineering Mathematics	4PAM1007																	X	X	
Level 5	Dynamics	5ENT1114		X																	
Level 6	Aerodynamics	6ENT1064					X														
Level 7	CFD Techniques	7ENT1007	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		
	Control of Engineering Systems	7ENT1074	X	X			X	X			X	X	X	X					X	X	
	Flight Mechanics	7AAD0038	X	X		X	X	X			X	X		X		X			X		
	Aerospace Applications	7ENT1111	X	X		X	X	X			X	X	X	X		X			X	X	
	Operations Research	7ENT1070	X	X		X	X	X	X	X	X	X	X	X		X		X	X	X	
	Aeroelasticity	7AAD0039	X	X		X	X	X			X	X		X		X			X		
	Integrated Product Engineering	7ENT1064			X	X	X	X		X				X	X	X		X	X		
	Individual Masters Project	7ENT1078			X	X	X	X	X	X				X		X	X	X	X		X

Key to Programme Learning Outcomes for Aerospace

Knowledge and Understanding

- A1am. The advanced CAE and simulation methods employed by aerospace engineers.
- A2am. The fundamental sciences appropriate to aerospace engineering.
- A3. Appropriate research methods employed in analysis of technical and commercial problems.
- A4. The product/process definition and systems design process.

Intellectual Skills

- B1. Analyse and solve engineering problems using appropriate techniques.
- B2. Design/model/analyse relevant engineering systems/subsystems.
- B3. Critically review and select appropriate research methods to solve engineering and commercial problems.
- B4. Evaluate external influences on the design process.

Practical Skills

- C1am. Apply appropriate experimental, analytical and modelling techniques to a range of aerospace engineering problems and draw conclusions.
- C2. Use advanced computer-aided engineering tools.
- C3. Prepare technical documentation.
- C4. Evaluate the design of appropriate systems, components or processes.
- C5. Plan and manage a project, taking into account commercial, industrial and resource constraints.

Transferable Skills

- D1. Communicate information effectively, orally and/or in writing.
- D2. Manage time and resources effectively.
- D3. Work effectively individually and/or within a team.
- D4. Solve problems in a logical and coherent manner.
- D5. Manipulate, sort and present data.
- D6. Learn effectively and independently, in preparation for lifelong learning.

MSc Engineering (Automotive)

		Programme Learning Outcomes (as defined in section 1 and below)																		
		Knowledge & Understanding				Individual Skills				Practical Skills					Transferable Skills					
Module titles	Code	A1aum	A2aum	A3	A4	B1	B2	B3	B4	C1aum	C2	C3	C4	C5	D1	D2	D3	D4	D5	D6
Level 4	Mechanical Experimental Engineering	4ENT1006													X			X		
	Mechanical Science	4ENT1067		X			X													
	Computing for Business & Technology	4ENT1130																X	X	
	Engineering Applications of Mathematics	4PAM1033																X	X	
	Engineering Fundamentals	4ENT1098							X						X	X				X
	Engineering Mathematics	4PAM1007																X	X	
Level 5	Dynamics	5ENT1114		X																
Level 6	Automotive Chassis & Powertrain Technology	6AAD0006							X				X		X					
Level 7	Automotive Materials & Manufacture	7AAD0057		X			X	X	X			X	X		X			X		
	CFD Techniques	7ENT1007	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		
	Automotive Dynamics & Safety	7AAD0054	X	X			X	X		X	X	X	X		X			X	X	
	Advanced Engines & Power Systems	7ENT1066		X		X	X	X		X			X		X			X	X	
	Operations Research	7ENT1070	X	X		X	X	X	X	X	X	X	X		X		X	X	X	
	Automotive Electrical Systems	7AAD0056		X		X	X	X		X			X		X			X	X	
	Integrated Product Engineering	7ENT1064			X	X	X	X		X			X	X	X		X	X		
	Individual Masters Project	7ENT1078			X	X	X	X	X	X				X		X	X	X	X	

Key to Programme Learning Outcomes for Automotive

Knowledge and Understanding

- A1aum. The advanced CAE and simulation methods employed by automotive engineers.
- A2aum. The fundamental sciences appropriate to automotive engineering.
- A3. Appropriate research methods employed in analysis of technical and commercial problems.
- A4. The product/process definition and systems design process.

Intellectual Skills

- B1. Analyse and solve engineering problems using appropriate techniques.
- B2. Design/model/analyse relevant engineering systems/subsystems.
- B3. Critically review and select appropriate research methods to solve engineering and commercial problems.
- B4. Evaluate external influences on the design process.

Practical Skills

- C1aum. Apply appropriate experimental, analytical and modelling techniques to a range of automotive engineering problems and draw conclusions.
- C2. Use advanced computer-aided engineering tools.
- C3. Prepare technical documentation.
- C4. Evaluate the design of appropriate systems, components or processes.
- C5. Plan and manage a project, taking into account commercial, industrial and resource constraints.

Transferable Skills

- D1. Communicate information effectively, orally and/or in writing.
- D2. Manage time and resources effectively.
- D3. Work effectively individually and/or within a team.
- D4. Solve problems in a logical and coherent manner.
- D5. Manipulate, sort and present data.
- D6. Learn effectively and independently, in preparation for lifelong learning.

MSc Engineering (Mechanical)

		Programme Learning Outcomes (as defined in section 1 and below)																		
		Knowledge & Understanding				Individual Skills				Practical Skills					Transferable Skills					
Module titles	Code	A1mecm	A2mecm	A3	A4	B1	B2	B3	B4	C1mecm	C2	C3	C4	C5	D1	D2	D3	D4	D5	D6
Level 4	Mechanical Experimental Engineering	4ENT1006													X			X		
	Mechanical Science	4ENT1067		X			X													
	Computing for Business & Technology	4ENT1130																X	X	
	Engineering Applications of Mathematics	4PAM1033	X											X				X		
	Engineering Fundamentals	4ENT1098							X						X	X				X
	Engineering Mathematics	4PAM1007																X	X	
Level 5	Dynamics	5ENT1114		X																
Level 6	Mechanics & Properties of Materials	6ACM0003				X														
Level 7	CFD Techniques	7ENT1007	X	X		X	X			X	X	X	X		X			X	X	
	Operations Management	7ENT1060				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	
	Manufacturing Strategy	7AAD0064				X	X		X			X	X	X	X	X		X		
	FEA and Applications	7ENT1059	X	X		X	X	X	X	X	X	X	X		X			X	X	
	Quality, Reliability and Maintenance	7ENT1068			X	X	X	X	X				X		X			X		
	Operations Research	7ENT1070	X	X		X	X	X	X	X	X	X	X		X		X	X	X	
	Dynamics and Performance of Mechanical Systems	7AAD0068	X	X			X	X			X	X	X					X	X	
	Individual Masters Project	7ENT1078			X	X	X	X	X	X				X		X	X	X	X	

Key to Programme Learning Outcomes for Mechanical

Knowledge and Understanding

- A1mecm. The advanced CAE and simulation methods employed by mechanical engineers.
- A2mecm. The fundamental sciences appropriate to mechanical engineering.
- A3. Appropriate research methods employed in analysis of technical and commercial problems.
- A4. The product/process definition and systems design process.

Intellectual Skills

- B1. Analyse and solve engineering problems using appropriate techniques.
- B2. Design/model/analyse relevant engineering systems/subsystems.
- B3. Critically review and select appropriate research methods to solve engineering and commercial problems.
- B4. Evaluate external influences on the design process.

Practical Skills

- C1mecm. Apply appropriate experimental, analytical and modelling techniques to a range of mechanical engineering problems and draw conclusions.
- C2. Use advanced computer-aided engineering tools.
- C3. Prepare technical documentation.
- C4. Evaluate the design of appropriate systems, components or processes.
- C5. Plan and manage a project, taking into account commercial, industrial and resource constraints.

Transferable Skills

- D1. Communicate information effectively, orally and/or in writing.
- D2. Manage time and resources effectively.
- D3. Work effectively individually and/or within a team.
- D4. Solve problems in a logical and coherent manner.
- D5. Manipulate, sort and present data.
- D6. Learn effectively and independently, in preparation for lifelong learning.

MSc Engineering (Manufacturing)

		Programme Learning Outcomes (as defined in section 1 and below)																						
		Knowledge & Understanding						Individual Skills						Practical Skills			Transferable Skills							
Module titles		Code	A5	A6	A7mann	A8	A9	A10	B1mann	B2	B3	B4mann	B5	B6	C1mann	C5	C6	C7	D1	D2	D3	D4	D6	
Level 4	Mechanical Experimental Engineering	4ENT1006																	X			X		
	Mechanical Science	4ENT1067							X															
	Computing for Business & Technology	4ENT1130																				X		
	Engineering Applications of Mathematics	4PAM1033	X												X							X		
	Engineering Fundamentals	4ENT1098																	X	X			X	
	Engineering Mathematics	4PAM1007						X														X		
Level 5	Engineering Operations Management	5ENT1087																						
Level 6	Mechanics & Properties of Materials	6ACM0003							X										X	X	X			
	Manufacturing Information Systems	7AAD0059		X	X		X		X					X	X			X	X			X		
	Operations Management	7ENT1060		X		X	X		X	X		X	X			X	X	X	X		X	X		
	Financial Control	7ENT1065	X					X		X			X		X				X					
	Manufacturing Strategy	7AAD0064	X		X		X		X			X							X					
	Quality, Reliability and Maintenance	7ENT1068		X				X	X	X		X		X	X				X			X		
	Procurement & Supply Chain Management	7ENT1069			X							X	X					X	X		X			
	Operations Research	7ENT1070				X	X	X	X	X	X	X	X		X		X		X		X	X		
	Integrated Product Engineering	7ENT1064		X					X	X		X	X			X			X		X	X		
	Individual Masters Project	7ENT1078		X				X	X	X	X	X		X	X	X			X			X	X	

Key to Programme Learning Outcomes for Manufacturing

Knowledge and Understanding

- A5. The techniques relevant to the analysis of business strategy and planning.
- A6. The product definition and systems design process.
- A7manm. Relevant techniques for commercial and professional engineering practice in the context of Manufacturing.
- A8. Operations management techniques and processes in manufacturing and service sectors.
- A9. Resource management planning and systems implications.
- A10. The analytical techniques employed in management and process control.

Intellectual Skills

- B1manm. Analyse and solve Manufacturing problems using appropriate techniques.
- B2. Design/model/analyse relevant engineering systems/subsystems.
- B3. Critically review and select appropriate research methods to solve engineering and commercial problems.
- B4 Evaluate external influences on the design process in the context of Manufacturing.
- B5. Identify the influence of resource related issues on operations and business.
- B6. Design appropriate management systems and processes.

Practical Skills

- C1manm. Apply appropriate experimental, analytical and modelling techniques to a range of manufacturing problems and draw conclusions.
- C5. Plan and manage a project, taking into account commercial, industrial and resource constraints.
- C6. Appropriate evaluation of the resource constraint implications on management decision making.
- C7. Plan the effective implementation of appropriate management systems and processes.

Transferable Skills

- D1. Communicate information effectively, orally and/or in writing.
- D2. Manage time and resources effectively.
- D3. Work effectively individually and/or within a team.
- D4. Solve problems in a logical and coherent manner.
- D6. Learn effectively and independently, in preparation for lifelong learning.

MSc Engineering (Electronics)

		Programme Learning Outcomes (as defined in section 1 and below)																					
		Knowledge & Understanding					Individual Skills				Practical Skills						Transferable Skills						
Module titles	Code	A11eem	A6	A12eem	A13eem	A14	B7	B8eem	B9eem	B10	C8	C9	C10	C3	C4	C11	D1	D2	D7	D3	D8	D9	
Level 4	Computer Programming for Electronics Engineers	4ELE0049		X					X			X	X										
	Electrical and Electronic Theory	4ENT1026	X	X				X	X					X									
	Electronic Engineering Practice	4ENT1113			X				X		X				X	X				X			
	Engineering Applications of Mathematics	4PAM1033	X												X								X
Level 5	Digital Design & Embedded Systems	5ELE0060		X	X				X				X										
Level 6	Microelectronics & VLSI	6ENT1027				X			X			X											
Level 7	Digital Mobile Communication Systems	7ENT1054	X		X	X	X	X	X		X	X	X		X		X		X		X		
	Digital Signal Processing and Applications	7ENT1105	X		X	X	X		X	X	X	X	X		X		X		X		X		
	Smart Embedded Systems Engineering	7ENT1112	X						X	X			X	X	X		X		X		X		
	Artificial Intelligence	7ENT1116	X			X	X		X	X		X	X	X	X		X		X		X		
	Advanced Reconfigurable Systems & Applications	7ENT1003	X		X		X		X	X		X	X	X	X		X		X		X		
	Sustainable Business of Engineering	7ENT1106		X						X	X		X	X	X	X	X	X		X	X	X	
	Mixed mode and VLSI Technologies	7ENT1008	X		X				X			X	X	X		X		X		X		X	
	Embedded Control Systems	7ENT1042		X	X	X	X		X	X		X	X	X		X		X		X		X	
	Individual Masters Project	7ENT1078	X					X				X	X	X	X	X	X	X	X	X	X	X	X

Key to Programme Learning Outcomes for Electrical and Electronics

Knowledge and Understanding e.g.

- A11eem The advanced theoretical issues and their practical implementations that underlie recent developments in Electrical and Electronics Engineering.
- A6 The product definition and systems design process.
- A12eem A range of hardware components and architectures that are used in modern systems appropriate to Electrical and Electronics Engineering
- A13eem A range of algorithms and/or protocols and their strengths and weaknesses that are suitable for designing systems appropriate to Electrical and Electronics Engineering.
- A14 Suitable application areas in which advanced digital hardware and algorithms can be deployed to produce effective systems.
- A15 Understanding of business practice and the limitations within an engineering specialisation
- A16 Understand the roles in an engineering team and personal responsibilities

Intellectual Skills e.g.

- B7 Plan and carry out a significant piece of independent investigative or development work as part of their project.
- B8eem Evaluate, select and deploy appropriate software tools to create/manage or simulate applications/systems appropriate to Electrical and Electronics Engineering.
- B9eem Select appropriate hardware components and platforms for use in systems appropriate to Electrical and Electronics Engineering
- B10** Develop skills in ethical operations and show insight on the commercial and social context.

Practical Skills

- C8 Apply appropriate analytical and modelling techniques to electrical and electronic engineering problems.
- C9 Perform experimental laboratory work and draw conclusions.
- C10 Use computer-based engineering tools.
- C3 Prepare technical documentation.
- C4 Evaluate the design of appropriate systems, components or processes.
- C11 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.
- D7 Carry out independent investigations to determine the state of knowledge and research in a subject area.
- D3 Work effectively individually and/or within a team
- D8 Make effective use of a wide range of information resources, such as those offered to them by the university.
- D9 Progress to research work, or work at an advanced level within an academic or commercial setting.

MSc Engineering (Electronics and Communications)

			Programme Learning Outcomes (as defined in section 1 and below)																									
			Knowledge & Understanding					Individual Skills					Practical Skills					Transferable Skills										
Module titles	Code		A11ecm	A6	A12ecm	A13ecm	A15	A16	A17	A18	B7	B9ecm	B10ecm	B11ecm	B12	C8	C9	C10	C3	C4	C11	D1	D2	D7	D3	D8	D9	
Level 4	Computer Programming for Electronics Engineers	4ELE0049		X								X		X		X												
	Electrical and Electronic Theory	4ENT1026	X	X							X	X					X											
	Electronic Engineering Practice	4ENT1113			X							X	X					X	X				X					
	Engineering Applications of Mathematics	4PAM1033	X															X							X	X		
Level 5	Digital Design & Embedded Systems	5ELE0060		X	X							X				X			X									
Level 6	Microelectronics & VLSI	6ENT1027					X					X		X			X											
Level 7	Digital Signal Processing and Applications	7ENT1113	X		X		X							X		X	X	X		X		X		X	X			
	Digital Mobile Communication Systems	7ENT1054	X		X	X				X		X	X	X		X	X	X		X		X		X		X		
	Biometric Systems and Speech Processes	7ENT1119	X			X							X		X	X	X	X		X		X		X		X		
	Advanced Reconfigurable Systems & Applications	7ENT1003	X		X	X						X	X			X	X	X		X		X		X		X		
	Sustainable Business of Engineering	7ENT1106		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		
	Information Theory and Data Processing	7ENT1105	X			X						X	X			X	X	X		X		X		X		X		
	Broadband Networks and Data Communications	7ENT1050	X			X		X		X			X	X		X	X	X		X		X		X		X		
	Individual Masters Project	7ENT1078	X									X				X	X	X	X	X	X	X	X	X	X	X	X	X

Key to Programme Learning Outcomes for Electronics and Communications

Knowledge and Understanding e.g.

- A11ecm The advanced theoretical issues and their practical implementations that underlie recent developments in Electronics and Communications Engineering.
- A6 The product definition and systems design process.
- A12ecm A range of hardware components and architectures that are used in modern systems appropriate to Electronics and Communications Engineering.
- A13ecm A range of algorithms and/or protocols and their strengths and weaknesses that are suitable for designing systems appropriate to Electronics and Communications Engineering.
- A15 The physical principles underlying the design of the hardware components used in optical systems.
- A16 The engineering challenges inherent in a variety of data communication applications.
- A17 Understanding of business practice and the limitations within an engineering specialisation
- A18 Understand the roles in an engineering team and personal responsibilities

Intellectual Skills e.g.

- B7 Plan and carry out a significant piece of independent investigative or development work as part of their project.
- B9ecm Select appropriate hardware components and platforms for use in systems appropriate to Electronics and Communications Engineering.
- B10ecm Design systems appropriate to Electronics and Communications Engineering by selecting appropriate equipment, configurations, protocols and algorithms.
- B11ecm Evaluate the performance of systems appropriate to Electronics and Communications Engineering by theoretical analysis and/or simulation.
- B12 Develop skills in ethical operations and show insight on the commercial and social context.

Practical Skills

- C8 Apply appropriate analytical and modelling techniques to electrical and electronic engineering problems.
- C9 Perform experimental laboratory work and draw conclusions.
- C10 Use computer-based engineering tools.
- C3 Prepare technical documentation.
- C4 Evaluate the design of appropriate systems, components or processes.
- C11 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.
- D7 Carry out independent investigations to determine the state of knowledge and research in a subject area.
- D3 Work effectively individually and/or within a team
- D8 Make effective use of a wide range of information resources, such as those offered to them by the university.
- D9 Progress to research work, or work at an advanced level within an academic or commercial setting.

Section 2

Programme management

Relevant QAA subject benchmarking statements	Engineering
Type of programme	Taught Postgraduate
Date of validation/last periodic review	November 18
Date of production/ last revision of PS	March 2019
Relevant to level/cohort	Level 7 entering September 2019 Level 4 entering January 2020
Administrative School	School of Engineering and Computer Science

Table 3 Course structure

Course details		
Course code	Course description	JACS/HECOS
ENENGAEMSC	MSc Engineering (Aerospace)	H400/100115
ENENGAUMSC	MSc Engineering (Automotive)	H330/100201
ENENGMNMSC	MSc Engineering (Manufacturing)	H700/100209
ENENGMCMSC	MSc Engineering (Mechanical)	H300/100190
ENENGENMSC	MSc Engineering (Electronics)	H600/100165
ENENGECSMSC	MSc Engineering (Electronics and Communications)	H610 and H640/100163