GLASGOW CALEDONIAN UNIVERSITY

Programme Specification Pro-forma (PSP)

1. GENERAL INFORMATION

1.	**Programme Title:**	**BEng(Hons)/MEng** Electrical and Electronic Engineering Electrical and Electronic Engineering (Sandwich)
2.	**Final Award:**	BEng (Hons) Electrical and Electronic Engineering BEng (Hons) Electrical and Electronic Engineering (Sandwich) MEng Electrical and Electronic Engineering MEng Electrical and Electronic Engineering (Sandwich)
3.	**Exit Awards:**	CertHE & DipHE Electronic Technologies BEng Electrical and Electronic Engineering BEng Electrical and Electronic Engineering (Sandwich)
4.	**Awarding Body:**	Glasgow Caledonian University
5.	**Period of Approval:**	Sept 2021 - Aug 2026
6.	**School:**	School of Computing, Engineering and Built Environment
7.	**Host Department:**	Department of Electrical and Electronic Engineering
8.	**UCAS Code:**	H610 (BEng) H611 (MEng) H701 (GCU Pathways)
9.	**PSB Involvement:**	The Institution of Engineering and Technology (IET)
10.	**Place of Delivery:**	GCU
11.	**Subject Benchmark Statement:**	QAA Engineering (Oct 2019) and EC^{UK} UK_SPEC
12.	**Dates of PSP Preparation/Revision:**	December 2020

2. EDUCATIONAL AIMS OF THE PROGRAMME

2.1 Programme Background and Philosophy

The aim of the BEng and MEng Electrical and Electronic Engineering programme is to develop well rounded graduate engineering professionals with:

- Defining (technical) skills grounded in the design and development of electronic products and systems.
- Strong enabling (soft and business related) skills.
- A keen sense of personal, professional, social and environmental responsibility.

The BEng programme outcomes correspond with the engineer as technical specialist (supporting the need for technology “innovators”) with technical expertise enhanced in selected niche areas.

A BEng(Hons) exit award from an institution accredited by the IET (Institution of Engineering and Technology) provides partial fulfillment of the competence and commitment required for the registration of Chartered Engineers (CEng). The MEng exit award fully provides the educational requirements for CEng registration. There is an expectation that MEng students will be fully equipped to exercise leadership, initiative, personal responsibility and decision making in complex and unpredictable situations.

The programme is designed to encourage student creative thinking, to develop design visualization skills, expand knowledge, confidence and professional values, so that students can move into a successful career in innovative product design where electronics is the key.

2.2 General ims of the rogramme

The programme aims to:

- provide a broad education by an integrated study of vocational and academic disciplines.
- provide students the benefits of a common first year. A first year provides opportunities to explore specialist options within the general theme of Electrical and Electronic Engineering as well as those that are core to their understanding of an engineering discipline.
- provide experience of, and the opportunity to transfer to a range of specialist areas.
- create in the student an ability to think clearly, rationally, logically, and in a pragmatic manner and to be able to exercise responsibility.
- equip the student with a range of analytical methods for use in engineering applications and product design within the electronic engineering specialism.
- provide such principles and practice as will allow the student to acquire an understanding of engineering practices to cope adequately with current and emerging technologies within the electronic engineering specialism
- develop the students' ability to contribute to the specification, design, testing, commissioning, modification, manufacture, maintenance and de-commissioning of engineering systems, products and processes.
- develop fully the student's abilities in the use of computer technologies, computer aided engineering tools and relevant aspects of information technology.
- to extend, enhance and improve the judgement of the student in decision making by extension of analytical, creative and intellectual skills.
- equip the student with problem solving strategies to enable the application of knowledge in a flexible manner.
- provide significant exposure to team based projects and problem based learning, and opportunities to develop the students' interpersonal and key soft skills.
- make the student aware of the social impact of engineering including ethical and environmental consequences and considerations.
- integrate the expertise of staff gained from research, consultancy and scholarly activity into the programme delivery as appropriate.
- sustain existing, and seek further industrial partnerships that provide access to design-oriented case studies and projects, work experience and real world problems.
- emphasise market and business realities.

MEng Graduates will have in addition to the BEng:

- the ability to integrate their knowledge and understanding of mathematics, science, computer-based methods, design, the economic, social and environmental context, and engineering practice to solve a substantial range of engineering problems, some of a complex nature.
- acquired much of this ability through involvement in individual and group projects, and
- greater degree of industrial involvement than those in Bachelor's degree programmes.

3. INTENDED LEARNING OUTCOMES

The programme learning outcomes are derived from the following sources:

- The Educational Aims of the Programme.
- QAA Engineering Benchmark Statements (Oct 2019).
- Scottish Credit and Qualifications Framework.
- Engineering Council UK Standard for Professional Engineering Competence (UK-SPEC).

The programme provides opportunities for students to develop and demonstrate knowledge and understanding, skills, qualities and other attributes in the following areas:

3A Knowledge and understanding;

A1 Apply knowledge of mathematics, statistics, natural science and engineering principles to broadly-defined problems. Some of the knowledge will be informed by current developments in the subject of study.

A2 Select and apply appropriate computational and analytical techniques to model broadly-defined problems, recognising the limitations of the techniques employed.

3B Practice: Applied knowledge, skills and understanding;

B1 Apply an integrated or systems approach to the solution of complex problems.

B2 Use practical laboratory and workshop skills to investigate complex problems.

B3 Select and apply appropriate materials, equipment, engineering technologies and processes, recognising their limitations.

B4 Discuss the role of quality management systems and continuous improvement in the context of complex problems.

B5 Apply knowledge of engineering management principles, commercial context, project and change management, and relevant legal matters including intellectual property rights.

3C Generic cognitive skills;

C1 Analyse complex problems to reach substantiated conclusions using first principles of mathematics, statistics, natural science and engineering principles.

C2 Select and evaluate technical literature and other sources of information to address complex problems.

C3 Design solutions for complex problems that meet a combination of societal, user, business and customer needs as appropriate. This will involve consideration of applicable health & safety, diversity, inclusion, cultural, societal, environmental and commercial matters, codes of practice and industry standards.

3D Communication, numeracy and ICT skills

D1 Communicate effectively on complex engineering matters with technical and non-technical audiences.

D2 Apply their skills in problem solving, communication, information retrieval, working with others and the effective use of general IT facilities.

3E Autonomy, accountability and working with others.

E1 Evaluate the environmental and societal impact of solutions to complex problems and minimise

adverse impacts

E2 Identify and analyse ethical concerns and make reasoned ethical choices informed by professional codes of conduct

E3 Use a risk management process to identify, evaluate and mitigate risks (the effects of uncertainty) associated with a particular project or activity

E4 Adopt an inclusive approach to engineering practice and recognise the responsibilities, benefits and importance of supporting equality, diversity and inclusion

E5 Function effectively as an individual, and as a member or leader of a team

E6 Plan and record self-learning and development as the foundation for lifelong learning/CPD.

Please refer to the Curriculum Map on page 14 as to how these competencies are integrated into the modules listed in Section 4.

Strategy for Learning

The SfL for this programme has been designed to meet the overall aims of the programme as well as the specific learning outcomes expected of students. The teaching approach is student centred, practical and participative and has been designed to move away from the traditional teacher centred paradigm to a more active, student driven, independent model of learning.

Students are encouraged to take a broad view of their education and to participate in competitions, engage in external visits, attend lectures by external speakers and participate in employer led events as well as attending scheduled classes, using online resources and undertaking independent study.

A range of delivery methods are used on the programme including: lectures; group-based tutorials and seminars (both tutor and student led); group based practical exercises in the electronic design laboratories (supervised and directed); problem based learning scenarios and case studies; directed study; coursework assignments (individual and group-based) and supervised projects (in all programme levels).

GCU's SfL is underpinned by a model comprised of ten design principles. The following are examples of how SfL manifests itself within the programme. The themes of the Common Good also are attributed to the examples below:

Engaged Learning:

- The programme has a project module in each year of study;
- The integrated projects in the first three years are group based encouraging team working across disciplines
- A range of effective and accessible forms of academic support, including academic advisors and academic development tutors are available to students on the programme;
- Students have been involved in the course development process and will continue to be involved in the development of the programme;
- Students are encouraged to broaden their range of skills, knowledge and strengths by participating in external competitions and events and to apply these experiences to their studies.

Divergent Thinking:

- Project modules in each year provide the opportunity for students to engage with open ended problems and projects both individually and in teams;
- Students are encouraged to use collaboration tools to aid learning. The tools used include both Web 2.0 collaboration tools such as social media, blogging, wiki and GCULearn.

Personalised Learning:

- Learning technology is recognised as being central to implementing the GCU Strategy for Learning. By combining classroom-based approaches with technology-enhanced learning the programme aims to help students develop the independent and lifelong learning skills which are essential for success in the workplace and throughout life. Members of the programme team have high levels of technical competence and are additionally supported by the school's Learning Technologists which has enabled them to embed blended and online learning across the curriculum. GCULearn is used

to provide materials in different formats to engage with different learning styles e.g. video tutorials, ebooks, podcasts;
- Several modules make use of social media tools, blogs and wiki;
- A variety of assessment methods are used across the curriculum
- Opportunities for personalised learning are included in the curriculum such as open project briefs where students select topics individually whilst still satisfying the learning outcomes in a module

Inclusive and Accessible Learning:
- Modules have been written with reference to GCU LEAD's Flexible, Accessible and Inclusive Curriculum and so use a blended-learning approach which is accessible to all students. They incorporate 'real-life' scenarios where possible, make extensive use of problem-based and project-based work, use a variety of individual, group learning, face-to-face and/or virtual methods of delivery and incorporate materials in a variety of formats to cater for different learning styles;
- Online Managing Diversity course will be made available to students through the GCULearn portal.

Broader and Deeper Learning:
- The Integrated Engineering Studies modules provide opportunities for multi- and inter-disciplinary group working;
- The Integrated Engineering Studies modules have been designed to develop team building and team working skills, as well as to encourage the use of reflective practices;
- All Integrated Engineering Studies modules incorporate peer assessment;
- The importance of timely, high quality and constructive formative feedback in a variety of forms is recognised by the programme team. A number of team members are Caledonian Scholars and are working on projects in this area and modules have been written with respect to the Feedback for Future Learning's 8 Feedback Principles;
- Students attend specialist lectures/talks given by industry representatives. These lectures offer students the opportunity to increase their awareness of the broader context of their discipline and interact with industrial speakers.

Flexible Learning:
- Students may defer their choice of specialism until the end of second year.
- The programme provides flexible learning by allowing students to transfer between the differing specialist areas available to the students, - Digital Systems and Mechatronics.
- Students have the option of spending a semester abroad within the third year of all routes.
- There is a sandwich option available if students wish to spend a year on placement.

Global learning:
- Exchange and Erasmus opportunities are available to students;
- Students are given the opportunity to participate in global competitions: Freescale Cup, TI Innovation challenge,

Real Word Problem Solving:
- The Integrated Engineering Studies in Levels 2 & 3 specify that students are expected to address problems set by external companies or organisation
- Various modules in the programme offers opportunities for problem solving with the setting of real world project briefs by industry partners or real clients or simulated project briefs informed by real world situations;

Entrepreneurship and Employability:
- Student are provided with opportunities to consider how their specialist knowledge and skills can be channelled into new situations and applications e.g. in the IES modules, a self-initiated project is planned and implemented.
- Students attend talks by guest speakers such as business start-up, funding and enterprise agencies;
- Students attend industrial visits and employer led activities such as CV writing workshops, interview technique classes and employability events
- Modules offer opportunities for students to self-reflect on their skills and design output and prepare for employability.

Responsible Leadership and Professionalism
- Reflection activities are embedded within many modules, notably the Integrated Engineering Studies modules.
- The understanding of standards of professional ethics, behaviours and work activities are embedded within modules at each level of study.
- All student are encouraged to take responsibility and leadership of their assigned roles within the

Integrated Engineering Studies modules.

TRANSFERABLE SKILLS

Students will also develop the following transferable skills which are taken from GCU Employability Assets List:

D1 Specialist knowledge and application.
D2 Critical thinking and problem solving.
D3 Critical analysis.
D4 Communication skills, written, oral and listening.
D5 Numeracy.
D6 Effective Information retrieval and research skills.
D7 Computer literacy.
D8 Self-confidence, self-discipline & self-reliance (independent working).
D9 Awareness of strengths and weaknesses.
D10 Creativity, innovation & independent thinking.
D11 Knowledge of international affairs.
D12 Appreciating and desiring the need for continuing professional development.
D13 Reliability, integrity, honesty and ethical awareness
D14 Entrepreneurial, independence and risk-taking.
D15 Ability to prioritise tasks and time management (organising and planning work).
D16 Interpersonal skills, team working and leadership.
D17 Presentation skills.
D18 Commercial awareness

Accreditation of Higher Education Programmes Version 3 (AHEP3).

The outcomes of the programme have been taken from the Institution of Engineering and Technology (IET) Learning Outcomes Handbook Incorporating UK-SPEC for Bachelors and MEng Degree Programmes, revised 2014. The outcomes are those recommended for programmes which lead to both partial and full Chartered Engineering status. Appendix 1 maps modules to the AHEP3 programme learning outcomes. Appendix 2 summarises the AHEP3 programme learning outcomes graduates from accredited programmes must achieve.

4. PROGRAMME STRUCTURES AND REQUIREMENTS, LEVELS, MODULES, CREDITS AND AWARDS

EEE Year 1 / SCQF Level 7

Module Code	*Module Title*	*Trimester*	*Credits*
M1H326673	Mathematics 1	A/B	20
M1H326689	Engineering Science	A	20
M1H626685	IoT Systems 1	A/B	20
M1H626678	Engineering for Society	A	20
M1H326677	Mechanical Principles	B	20
M1H626680	Electrical Principles	B	20
Exit Award – Certificate of Higher Education (CertHE) in Electronic Technologies			**120**

EEE Year 2 / SCQF Level 8

Module Code	*Module Title*	*Trimester*	*Credits*
M2H326684	Mathematics 2	A/B	20
M2G620493	Software Development for Engineers	A	20
M2H623525	Analogue and Digital Electronics	A	20
M2H623625	Integrated Engineering Studies 2	A	10
M2H624585	Electrical Distribution Systems	B	10
M2H623629	Digital and Programmable Systems 1	B	20
Optional modules[3] (choose 1 from):			
M2H622325 M2H020497	Control and Instrumentation Systems or Signals and Electronic Systems	B B	20 20
Exit Award – Diploma of Higher Education (DipHE) in Electronic Technologies			**240**

EEE Year 3 / SCQF Level 9			
Module Code	*Module Title*	*Trimester*	*Credits*
M3H623544	Digital and Programmable Systems 2	A	20
M3H623517	Communications Engineering	A	20
M3H623554	Integrated Engineering Studies 3	B	20
M3H723623	Engineering Operations and Management	B	20
Optional modules - Trimester A[3] (choose 1 from):			
M3H620587	Signals and Electronic Systems Design	A	20
M3H606414	Control Engineering 3	A	20
Optional modules - Trimester B[3] (choose 1 from):			
M3H623538	Modelling and Data Analysis	B	20
M2H721926	Engineering Design and Analysis 2	B	20
M3H323616	European Exchange Placement[1] (optional)	B	60
Exit Award – BEng Electrical and Electronic Engineering			**360**

Optional year in industry **EEE BEng Year 3 / SCQF Level 9**			
Module Code	*Module Title*	*Trimester*	*Credits*
M3H721925	Industrial Practice[2]	A/B	60
Exit Award – BEng Electrical and Electronic Engineering			**420**

EEE Year 4 / SCQF Level 10			
Module Code	*Module Title*	*Trimester*	*Credits*
MHH623549	Honours Project Engineering	A/B	40
MHH623541	Digital Signal Processing	A	20
Optional modules - Trimester A[3] (choose 1 from):			
MHH623542	Digital Design and Computer Architecture	A	20
MHH113285	Computer Aided Engineering	A	20
Optional modules - Trimester B[3] (choose 2 from):			
MHH623546	Intelligent Robotics and Mechatronics	B	20
MMH623520	Wireless Communications	B	20
MHH123523	Computer Aided Design 2	B	20

MHH622747	Control Engineering 4	B	20
Exit Award – BEng (Hons) Electrical and Electronic Engineering			**480**

EEE Year 5 / SCQF Level 11 (MEng)			
Module Code	**Module Title**	***Trimester***	***Credits***
MMH723842	MEng Team Project	A/B	45
MMN223676	Strategy and Innovation	A	15
Optional modules - Trimester A[3] (choose 1 from):			
MMH626242	Advanced Telecommunications	A	15
MMH120620	Control Systems	A	15
Optional modules - Trimester B[3] (choose 3 from):			
MMH623545	Image Processing and Machine Vision	B	15
MMI123176	Real Time DSP	B	15
MMH623670	Condition Monitoring	B	15
MMH624198	Distributed Instrumentation	B	15
Exit Award – MEng Electrical and Electronic Engineering			**600**

	Notes:
1.	***Student Exchange (Optional).*** After successful completion of Level 3 Trimester 1 students may be eligible to undertake an optional study exchange during Trimester 2 at an appropriate host Institution outwith the UK, provided the agreed programme of activity is equivalent to the curriculum and intended student experience normally undertaken in Level 3 Trimester 2. Successful completion of the study exchange is credit bearing to 60 credits.
2.	***Industrial Placement Year (Optional) Exit Award.*** Students opting to undertake placement do so in the academic session after Level 3 studies. Assessment is via the additional 60 SCOTCAT level 3 credit module, M3H721925 Industrial Practice. Successful completion of that module gives (Sandwich) in the final exit award obtained by the student.
3.	***Optional modules.*** Only specific combinations of optional modules are possible (due to pre-requisites). The availability of a particular module depends on the number of students taking the module.

5. SUPPORT FOR STUDENTS AND THEIR LEARNING

- Student Induction
- Student Support and Counselling
- IT Support
- Academic Support
  - Module Leaders, Module Tutors, Module Handbooks, managed learning environments
- Personal Development Planning
- Personal Tutor

6. CRITERIA FOR ADMISSION

Candidates must be able to satisfy the general admissions requirements of Glasgow Caledonian University

Programme Admission Requirements:

Year 1 entry BEng:

Expected entry standards are for 4 Scottish Higher Grades at BBBC or above. Essential subject areas are Mathematics (Higher) at B plus English (National 5) at grade C. Recommended subjects include

Physics (Higher), Technological Studies (Higher), English (Higher) or Chemistry (Higher).

Year 1 entry MEng:

Expected entry standards are for 4 Scottish Higher Grades at ABBB or above. Essential subject areas are Mathematics (Higher) at B plus English (national 5) at grade C. Recommended subjects include Physics (Higher), Technological Studies (Higher), English (Higher) or Chemistry (Higher).

Year 1 entry BEng (Hons) Electrical and Electronic Engineering (GCU Pathways) (H701):

The minimum entry requirements are:

SQA Higher: BB (must include Maths or a Science) or equivalent

GCU Pathways students enrol on the BEng (Hons) Electrical and Electronic Engineering (GCU Pathways) at Glasgow Caledonian University. Over two years, they study either an HND Electronics, HND Electrical Engineering (enhanced) or HND Mechatronics at Glasgow Kelvin College or City of Glasgow College while preparing for Year 3 and 4 / SCQF Level 9 and 10 (for Honours) of the degree at GCU.

GCU Pathway Progression Requirements:
Students who successfully pass their HND Electronics, HND Electrical Engineering or HND Mechatronics with Graded Units of BB and pass Engineering Mathematics 1, 2, 3, 4 and 5. (H7K0 33, H7K1 34, H7K2 34, H7K3 35 & H7K4 35) can progress to Level 3 of the BEng (Hons) Electrical and Electronic Engineering programme. Attendance and a pass at Maths Summer School is compulsory for those without Engineering Mathematics 5 (H7K4 35).

Knowledge of principles of programmable systems (one or two of the following units is required: DG5A 35: High Level Language: External I/O Transfer, DG5C 35: MCU/MPU I/O Hardware Control. Any of the following units is desirable: DG52 35: Programmable Logic Devices, DG4X 35: Microprocessor and Microcontroller Technology).

Flexible Entry - Credit Transfer and RPL:

The University's RPL Guidance Document will be adhered to for all applicants. An applicant may wish to offer RPL or a combination of this and a formal qualification, or experience, which demonstrate that the applicant possesses appropriate knowledge and skill equivalent to the specified entrance requirements, or can be deemed to have a reasonable expectation of fulfilling the objectives of the programme, may be accepted for admission.

Entry with Advanced Standing:

Entry to year 2:

Appropriate HNC is considered for advanced entry into year 2: 15 credit HNC Electrical or Electronic Engineering with B in Graded Unit. Must include Engineering Maths 1 (H7K0 33), 2 (H7K1 34), 3 (H7K2 34) and 4 (H7K3 35). Attendance and pass at Maths Summer School is essential for those without Engineering Maths 3 (H7K2 34) and 4 (H7K3 35).

Knowledge of principles of programmable systems is desirable (units such as DG59 34: MCU/MPU Assembly Language Programming, DG58 34: High Level Engineering Software).

Entry to year 3:

Appropriate HND or Unclassified degree qualifications are considered for advanced entry into year 3: HND in Electrical and/or Electronic Engineering or equivalent with a minimum grade B in the graded units must include Mathematics for Engineering Units 1, 2 and 3 (DG4H 33, DG4L 34, DG4P 35) or

Engineering Mathematics 1, 2, 3, 4 and 5 (H7K0 33, H7K1 34, H7K2 34, H7K3 35 and H7K4 35). Attendance and pass at Maths Summer School is essential for those without Mathematics for Engineering 3 (DG4P 35) or Engineering Mathematics 5 (H7K4 35).

Knowledge of principles of programmable systems (one or two of the following units is required: DG5A 35: High Level Language: External I/O Transfer, DG5C 35: MCU/MPU I/O Hardware Control. Any of the following units is desirable: DG52 35: Programmable Logic Devices, DG4X 35: Microprocessor and Microcontroller Technology).

International Student Entry:

In addition to the above qualifications overseas students whose first language is not English also require to demonstrate that they hold evidence of competence by means of:

IELTS score of 6 with no elements less than 5.5

TOEFL Overall score of 90 with the following minimum element scores:
- Listening 19
- Reading 20
- Speaking 21
- Writing 20

Glasgow Caledonian University leads the way in widening access to higher education. As part of the University's mission to promote the common good, we work with schools, children and families in the local community to raise educational aspirations in young people and their families. The Contextualised Admissions Policy aims to build on this work and recognise the different student leaner journeys. The policy aims to recognise and acknowledge that not all applicants have an equal opportunity to demonstrate their full academic potential and will take into consideration the context and circumstance in which a student has achieved his/her academic grades. For details please access the policy here: https://www.gcu.ac.uk/aes/documentsandpolicies/

7. METHODS FOR EVALUATING AND IMPROVING THE QUALITY AND STANDARDS OF TEACHING AND LEARNING

Mechanisms for review and evaluation of teaching, learning, assessment, the curriculum and outcome standards:

- Annual Programme Monitoring Process
- Annual Module Monitoring Process
- Module Feedback Questionnaire
- External Examiner(s) Reports
- Annual monitoring (required by Professional and/or Statutory Bodies)
- Enhancement-led Internal Subject Review (ELISR)
- Enhancement-led Institutional Review (ELIR)
- Programme Board
- Accreditation Reviews by the Institution of Engineering and Technology (IET)

Committees with responsibility for monitoring and evaluating quality and standards:

- Student-Staff Consultative Group (SSCG)
- Programme Board (PB)
- School Board
- Assessment Board (AB)
- University Learning and Teaching Sub-Committee (LTSC)
- University Academic Policy and Practice Committee (APPC)
- University Senate

Mechanisms for gaining student feedback on the quality of teaching and their learning

experience:

- Student-Staff Consultative Group (SSCG)
- Student representation on Programme Board (PB)
- Student representation on School Board
- Module Feedback Questionnaire
- GCULearn
- Open access to members of Programme Team e.g. Module Leaders, Programme Leader, Academic Advisor, Year Tutor

Staff development priorities include:

- Postgraduate Certificate in Academic Practice
- Continuous Professional Development (CPD)
- Performance and Development Annual Review (PDAR)
- Peer support for teaching
- Mentoring scheme for new teaching staff
- Conference and seminar attendance and presentation
- Research Excellence Framework (REF) submission
- Membership of Higher Education Academy (HEA)
- Membership of and involvement with Professional Bodies (e.g. IET, IEEE)
- Research
- Regular Subject Quality Group and Programme Board meetings
- Seminar programme with visiting lecturers
- Institutional learning and teaching workshops

8. ASSESSMENT REGULATIONS

Students should expect to complete their programme of study under the Regulations that were in place at the commencement of their studies on that programme, unless proposed changes to University Regulations are advantageous to students.

The Glasgow Caledonian University Assessment Regulations which apply to this programme, dependent on the year of entry and with the approved exceptions can be found at:
GCU Assessment Regulations

- With effect from September 2022, Exceptions Case no. 215 will apply to this programme: A maximum of 30 credits in a Bachelors degree programme can be compensated.

- Classification of Honours Award as described in Section 19.7.1 does not apply to this programme.

  The following classification scheme will be applied:

  The award of Honours will normally be made on the basis of an overall amalgamated aggregate of a student's performance in the modules studied at Level 3 and Level 4 of their programme irrespective of the actual level of any particular module studied at these levels. This final overall amalgamated aggregate will be determined from:

  i) a 25% weighting obtained from an aggregate of the marks for the modules studied at Level 3 of their programme.
  and
  ii) a 75% weighting obtained from an aggregate of the marks for the modules studied at Level 4 of their programme.

  In the case of the amalgamated aggregate falling within the profiling boundaries defined in Section 19.8 the profiling will be based on a calculation set of the Level 4 results only and will follow the model criteria for profiling as defined in Section 19.8.3.

- Progression to Final Year of Integrated Masters (MEng)
  The Integrated Masters award is directly tied to the full satisfaction of the Academic Requirements of the relevant professional body associated with the programme. Entry to the final year of the Integrated Masters will require an average mark in year 4 results only of 50% or greater with module pass marks applied where modules are not passed at first attempt or compensated. If this criterion is not met, the student will be eligible to exit with a BEng. If they have met the university assessment regulations for a BEng Honours award. All modules must be passed before progression to Integrated Masters.

9. INDICATORS OF QUALITY AND STANDARDS

Internal Indicators

- Details of approval, development events and Enhancement Led Internal Subject Reviews organised by the School/University
- Annual Programme Monitoring and development of the Programme Improvement Plan
- School Module Management Committee annual report on module performance
- Prizes awarded by the School for outstanding performance

External Indicators

- Professional/Statutory Body accreditation visits and reports (Institution of Engineering and Technology)
- Quality Assurance Agency Institutional Review (ELIR)
- External Examiner Reports

10. INFORMATION ABOUT THE PROGRAMME

Key information about the programme can be found in:

- Definitive Programme Document
- Programme Handbook
- Module Handbook
- University Website http://www.gcu.ac.uk
- School Website http://www.gcu.ac.uk/cebe/
- GCULearn
- University Prospectus
- Module Catalogue
- Departmental publications

This specification provides a concise summary of the main features of the programme and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if he/she takes full advantage of the learning opportunities that are provided. More detailed information on the learning outcomes, content and teaching, learning assessment methods of each module can be found in the University Module catalogue which can be accessed from the University website. The accuracy of the information in this document is reviewed by the University and may be checked by the Quality Assurance Agency for Higher Education.

A curriculum map is attached (Appendix 1) showing how the outcomes are being developed and assessed within the programme. This relates the modules from Section 4 to the outcomes in Section 3.

An additional curriculum map is attached (Appendices 2-3) showing how the AHEP3 (Accreditation of Higher Education Programmes) version 3 learning outcomes are being developed and assessed within the programme.

DATE: DECEMBER 2020

Appendix 1 - Curriculum Map for MEng/BEng Electrical and Electronic Engineering

The curriculum map links the modules (Section 4) to the Outcomes listed in Section 3

PSMAP

This map provides both a design aid to help academic staff identify where the programme outcomes are being developed and assessed within the course. It also provides a checklist for quality assurance purposes and could be used in approval, accreditation and external examining processes. This also helps students monitor their own learning, and their personal and professional development as the course progresses. The map shows only the main measurable learning outcomes which are assessed. There are additional learning outcomes (e.g. attitudes and behaviour) detailed in the module specifications which are developed but do not lend themselves to direct measurement

	Modules		**Programme outcomes**																
	Code	Title	A1	A2	B1	B2	B3	B4	B5	C1	C2	C3	D1	D2	E1	E2	E3	E4	E5	E6
SCQF 7	M1H326673	Mathematics 1	X			X				X										
	M1H326677	Mechanical Principles	X	X	X	X	X		X	X	X			X						
	M1H626680	Electrical Principles	X	X		X	X			X				X						
	M1H326689	Engineering Science	X		X	X	X			X	X			X						
	M1H626685	IoT Systems 1	X	X		X				X	X	X	X	X	X	X		X		X
	M1H626678	Engineering for Society	X		X	X	X		X	X	X	X	X	X	X	X		X	X	X
SCQF 8	M2H326684	Mathematics 2	X	X						X										
	M2G620493	Software Development for Engineers	X	X	X	X			X		X	X		X				X		X
	M2H623525	Analogue and Digital Electronics	X	X	X	X				X				X						
	M2H623625	Integrated Engineering Studies 2					X		X		X	X	X	X	X	X	X	X	X	X
	M2H624585	Electrical Distribution Systems	X	X			X			X	X			X					X	
	M2H623629	Digital and Programmable Systems 1	X	X	X	X	X		X	X	X	X		X						
	M2H622325	Control and Instrumentation Systems (option)	X	X		X	X			X	X									
	M2H020497	Signals and Electronic Systems (option)	X	X	X	X				X				X						
SCQF 9	M3H623544	Digital and Programmable Systems 2	X		X	X	X		X		X	X		X						
	M3H623517	Communications Engineering	X	X	X	X	X			X	X		X	X						
	M3H606414	Control Engineering 3 (option)	X	X		X	X				X									
	M3H620587	Signals and Electronic Systems Design (option)	X	X	X	X	X	X	X	X	X	X		X						
	M3H623554	Integrated Engineering Studies 3					X		X		X	X	X	X	X	X		X	X	X
	M3H723623	Engineering Operations and Management	X	X			X	X	X		X		X	X				X		X
	M3H623538	Modelling and Data Analysis (option)	X	X		X				X		X		X						
	M2H721926	Engineering Design and Analysis 2 (option)	X	X	X		X			X	X	X		X					X	
	M3H323616	European Exchange Placement (optional)	X		X			X	X		X	X	X	X	X	X		X	X	X
	M3H721925	Industrial Practice (optional)			X	X	X		X	X	X	X	X	X			X	X	X	X
SCQF 10	MHH623549	Honours Project	X		X	X	X			X	X	X	X	X		X	X	X	X	X
	MHH623541	Digital Signal Processing	X	X	X	X				X				X						
	MHH623542	Digital Design and Computer Architecture (option)	X	X	X	X	X		X	X	X	X		X						
	MHH113285	Computer Aided Engineering (option)								X		X								
	MHH623520	Wireless Communications (option)	X	X		X				X			X	X				X		X
	MHH623546	Intelligent Robotics and Mechatronics (option)	X		X	X			X	X	X	X		X			X			
	MHH123523	Computer Aided Design 2 (option)	X	X								X		X						
	MHH622747	Control Engineering 4 (option)	X	X	X					X		X		X						

	Code	Title	A1	A2	B1	B2	B3	B4	B5	C1	C2	C3	D1	D2	E1	E2	E3	E4	E5	E6
SCQF 11	MMH723842	MEng Team Project				X					X	X	X	X	X			X	X	X
	MMN223676	Strategy and Innovation	X		X			X	X	X	X	X	X	X	X	X	X	X	X	X
	MMH626242	Advanced Telecommunications (option)	X	X	X	X	X	X	X	X	X	X	X	X		X			X	X
	MMH120620	Control Systems (option)	X	X						X		X		X						
	MMH623545	Image Processing and Machine Vision (option)	X		X	X					X			X		X				
	MMI123176	Real Time DSP	X	X		X				X	X	X		X						
	MMH623670	Condition Monitoring	X	X		X	X		X	X		X		X			X			
	MMH624198	Distributed Instrumentation	X	X	X	X	X	X	X	X	X	X	X	X					X	X

ASSESSMENT LOADING MATRIX

SCQF Level 7									
Module Code	**Module Title**	**Trimester**	**Credits**	**Assessment Weighting**					
				Cw1	**Cw2**	**Cw3**	**Exam1 (Exams Office)**	**Ex2 (Exams Office)**	**Ex3 (Class Test)**
M1H326673	Mathematics 1	A/B	20	50			50		
M1H326689	Engineering Science	A	20	50	50				
M1H626685	IoT Systems 1	A/B	20	50	50				
M1H626678	Engineering for Society	A	20	70	20	10			
M1H326677	Mechanical Principles	B	20	100					
M1H626680	Electrical Principles	B	20	100					
EXIT AWARD: Certificate of Higher Education									

SCQF Level 8									
Module Code	**Module Title**	**Trimester**	**Credits**	**Assessment Weighting**					
				Cw1	**Cw2**	**Cw3**	**Exam1 (Exams Office)**	**Ex2 (Exams Office)**	**Ex3 (Class Test)**
M2H326684	Mathematics 2	A/B	20	30			70		
M2G620493	Software Development for Engineers	A	20	50			50		
M2H623525	Analogue and Digital Electronics	A	20	25	25		50		
M2H623625	Integrated Engineering Studies 2	A	10	70	30				
M2H624585	Electrical Distribution Systems	B	10	50			50		
M2H623629	Digital and Programmable Systems 1	B	20	25	25		50		
M2H622325	Control and Instrumentation Systems	B	20	30			70		
M2H020497	Signals and Electronic Systems	B	20	7	23		70		
EXIT AWARD: Diploma of Higher Education									

SCQF Level 9									
Module Code	**Module Title**	**Trimester**	**Credits**	**Assessment Weighting**					
				Cw1	**Cw2**	**Cw3**	**Exam1 (Exams Office)**	**Ex2 (Exams Office)**	**Ex3 (Class Test)**
M3H623544	Digital and Programmable Systems 2	A	20	25	25		50		
M3H623517	Communications Engineering	A	20	20			70		10
M3H623554	Integrated Engineering Studies 3	B	20	60	20	20			
M3H723623	Engineering Operations and Management	B	20	15	15		70		
M3H620587	Signals and Electronic Systems Design	A	20	15	15		70		
M3H606414	Control Engineering 3	A	20	30			70		
M3H623538	Modelling and Data Analysis	B	20	25	25		50		
M2H721926	Engineering Design and Analysis 2	B	20	15	15		70		
EXIT AWARD: Bachelors Degree									

SCQF Level 10									
Module Code	**Module Title**	**Trimester**	**Credits**	**Assessment Weighting**					
				Cw1	**Cw2**	**Cw3**	**Exam1 (Exams Office)**	**Ex2 (Exams Office)**	**Ex3 (Class Test)**
MHH623549	Honours Project Engineering	A/B	40	70	15	15			
MHH623541	Digital Signal Processing	A	20	15	15		70		
MHH623542	Digital Design and Computer Architecture	A	20	50			50		
MHH113285	Computer Aided Engineering	A	20						
MHH623546	Intelligent Robotics and Mechatronics	B	20	25	25		50		
MMH623520	Wireless Communications	B	20	20	10		70		
MHH123523	Computer Aided Design 2	B	20	20	60	20			
MHH622747	Control Engineering 4	B	20				70		30
EXIT AWARD: Bachelors Degree with Honours									

SCQF Level 11									
Module Code	**Module Title**	**Trimester**	**Credits**	**Assessment Weighting**					
				Cw1	**Cw2**	**Cw3**	**Cw4**	**Ex1 (Exams Office)**	**Ex2 (Class Test)**
MMH723842	MEng Team Project	A/B	45	15	15	50	20		
MMN223676	Strategy and Innovation	A	15	50				50	
MMH626242	Advanced Telecommunications	A	15	15	15			70	
MMH120620	Control Systems	A	15	50				50	
MMH623545	Image Processing and Machine Vision	B	15	25	25			50	
MMI123176	Real Time DSP	B	15	30				70	
MMH623670	Condition Monitoring	B	15	30	20			50	
MMH624198	Distributed Instrumentation	B	15	70	30				
EXIT AWARD: Bachelors Degree with Honours									

Appendix 2

Table 1.1 – AHEP 3 Curriculum Map for BEng(Hons)/MEng Electrical and Electronic Engineering - BEng EEE (P02866)

	CEng				Science and Mathematics			Engineering analysis				Design					
	Code	Title	Trimester	Credits	SM1p	SM2p	SM3p	EA1p	EA2p	EA3p	EA4p	D1p	D2p	D3p	D4p	D5p	D6p
Level 1	M1H323910	Mathematics 1A	A	10		X											
	M1H321924	Mechanical Principles A	A	10	X	X		X	X								
	M1H623526	Electrical Principles and Circuit Theory	A	20	X			X						X			
	M1H324194	Engineering Applications	A/B	20											X		X
	M1H623547	Principles of Programmable Systems A	A	10	X		X			X					X		
	M1H623617	Integrated Engineering Studies 1	B	20	X		X	X			X	X	X	X			X
	M1H323565	Mathematics 1B	B	10		X											
	M1H121922	Engineering Materials	B	10	X												
	M1H623548	Principles of Programmable Systems B	B	10	X		X	X	X	X				X			
Level 2	M2H323566	Mathematics 2A	A	10		X											
	M2G620493	Software Development for Engineers	A	20		X			X	X	X	X	X	X	X	X	
	M2H623525	Analogue and Digital Electronics	A	20	X	X		X	X	X	X						
	M2H623625	Integrated Engineering Studies 2	A	10								X	X		X	X	X
	M2H323567	Mathematics 2B	B	10		X											
	M2H624585	Electrical Distribution Systems	B	10	X	X		X	X								
	M2H623629	Digital and Programmable Systems 1	B	20	X	X		X	x	X	X			X	X		
	M2H622325	Control and Instrumentation Systems (M)	B	20			X										
	M2H020497	Signals and Electronic Systems (D/T)	B	20	X	X		X	x	X	X						
Level 3	M3H623544	Digital and Programmable Systems 2	A	20	X	X	X			X	X		X				
	M3H623517	Communications Engineering (D/T)	A	20	X	X		X	X	X	X						X
	M3H620587	Signals and Electronic Systems Design (D/T)	A	20	X	X		X	X	X	X		X	X			
	M3H623554	Integrated Engineering Studies 3	B	20								X	X		X	X	X
	M3H723623	Engineering Operations and Management	B	20		X			X	X							X
	M3H623538	Modelling and Data Analysis (D/T)	B	20	X	X	X	X	X	X							
	M3H323616	European Exchange Placement (optional)	B	60													
	MHH113285	Computer Aided Engineering (M)	A	20				X				X	X	X			
	M3H606414	Control Engineering 3 (M)	A	20		X	X		X								
	M2H721926	Engineering Design and Analysis 2 (M)	B	20	X	X	X	X	X	X	X					X	
	M3H721925	Industrial Practise (optional)	A/B	60				X			X	X	X	X	X	X	X
					SM1p	SM2p	SM3p	EA1p	EA2p	EA3p	EA4p	D1p	D2p	D3p	D4p	D5p	D6p
Level 4	MHH623549	Honours Project Engineering	A	40			X	X			X		X				X
	MHH623541	Digital Signal Processing	A	20	X	X		X	X	X	X						
	MHH623542	Digital Design and Computer Architecture (D/T)	A	20	X	X	X	X	X	X	X			X	X		
	MHH623520	Wireless Communications (T)	B	20		X	X	X	X	X							X
	MHH620659	System Level Design (D/T)	B	20	X	X	X	X	X	X	X		X	X	X		
	MHH623546	Intelligent Robotics and Mechatronics (D/M)	B	20	X	X	X			X	X			X	X		
	M3H120320	Engineering Design and Analysis 3 (M)	A	20	X	X	X	X	X	X	X					X	
	MHH123523	Computer Aided Design 2 (M)	B	20			X		X					X			
	MHH622747	Control Engineering 4 (M)	B	20	X	X	X	X	X	X	X		X				

Appendix 2

Table 1.1 – AHEP 3 Curriculum Map for BEng(Hons)/MEng Electrical and Electronic Engineering - BEng EEE (P02866) (Continued)

	CEng		Economic, legal, social, ethical and environmental context						Engineering practice								
	Code	Title	ET1p	ET2p	ET3p	ET4p	ET5p	ET6p	EP1p	EP2p	EP3p	EP4p	EP5p	EP6p	EP7p	EP8p	EP9p
Level 1	M1H323910	Mathematics 1A															
	M1H321924	Mechanical Principles A								X							
	M1H623526	Electrical Principles and Circuit Theory									X						
	M1H324194	Engineering Applications							X	X		X			X		
	M1H623547	Principles of Programmable Systems A	X			X					X	X					
	M1H623617	Integrated Engineering Studies 1	X	X	X	X				X	X	X		X		X	X
	M1H323565	Mathematics 1B															
	M1H121922	Engineering Materials								X	X						
	M1H623548	Principles of Programmable Systems B							X								
Level 2	M2H323566	Mathematics 2A															
	M2G620493	Software Development for Engineers									X	X	X				
	M2H623525	Analogue and Digital Electronics									X						
	M2H623625	Integrated Engineering Studies 2	X	X		X	X	X		X		X					X
	M2H323567	Mathematics 2B															
	M2H624585	Electrical Distribution Systems								X		X					
	M2H623629	Digital and Programmable Systems 1							X	X	X	X					
	M2H622325	Control and Instrumentation Systems (M)												X			
	M2H020497	Signals and Electronic Systems (D/T)									X						
Level 3	M3H623544	Digital and Programmable Systems 2		X					X	X	X	X		X			
	M3H623517	Communications Engineering (D/T)					X			X	X	X					
	M3H620587	Signals and Electronic Systems Design (D/T)		X						X	X	X		X			
	M3H623554	Integrated Engineering Studies 3	X	X		X	X	X		X		X					X
	M3H723623	Engineering Operations and Management		X	X				X								
	M3H623538	Modelling and Data Analysis (D/T)									X					X	
	M3H323616	European Exchange Placement (optional)															
	MHH113285	Computer Aided Engineering (M)															
	M3H606414	Control Engineering 3 (M)								X		X					
	M2H721926	Engineering Design and Analysis 2 (M)							X	X		X					X
	M3H721925	Industrial Practise (optional)					X	X	X	X	X	X	X			X	
			ET1p	ET2p	ET3p	ET4p	ET5p	ET6p	EP1p	EP2p	EP3p	EP4p	EP5p	EP6p	EP7p	EP8p	EP9p
Level 4	MHH623549	Honours Project Engineering						X				X					
	MHH623541	Digital Signal Processing									X						
	MHH623542	Digital Design and Computer Architecture (D/T)		X					X	X	X	X				X	
	MHH623520	Wireless Communications (T)									X					X	
	MHH620659	System Level Design (D/T)	X	X					X	X	X	X				X	
	MHH623546	Intelligent Robotics and Mechatronics (D/M)		X	X			X	X		X	X				X	
	M3H120320	Engineering Design and Analysis 3 (M)							X	X		X					
	MHH123523	Computer Aided Design 2 (M)														X	
	MHH622747	Control Engineering 4 (M)															

Appendix 2

Table 1.2 – AHEP 3 Curriculum Map for BEng(Hons)/MEng Electrical and Electronic Engineering - MEng EEE (P02868)

MEng EEE (P02868)																								
	CEng				Science and Mathematics						Engineering analysis						Design							
	Code	Title	Trimes	Credits	SM1M	SM2M	SM3M	SM4M	SM5M	SM6M	EA1m	EA2m	EA3m	EA4m	EA5m	EA6m	D1m	D2m	D3m	D4m	D5m	D6m	D7m	D8m
Level 1	M1H323910	Mathematics 1A	A	10		X			X															
	M1H321924	Mechanical Principles A	A	10	X	X			X		X	X			X									
	M1H623526	Electrical Principles and Circuit Theory	A	20	X						X								X					
	M1H324194	Engineering Applications	A/B	20																X		X		
	M1H623547	Principles of Programmable Systems A	A	10	X		X													X		X		
	M1H623617	Integrated Engineering Studies 1	B	20	X		X	X		X	X			X			X	X	X			X		X
	M1H323565	Mathematics 1B	B	10		X			X															
	M1H121922	Engineering Materials	B	10	X																			
	M1H623548	Principles of Programmable Systems B	B	10	X		X		X		X	X	X						X					
Level 2	M2H323566	Mathematics 2A	A	10		X			X															
	M2G620493	Software Development for Engineers	A	20		X						X	X	X			X	X		X	X			X
	M2H623525	Analogue and Digital Electronics	A	20	X	X		X	X		X	X	X	X	X	X								
	M2H623625	Integrated Engineering Studies 2	A	10													X	X		X	X	X		X
	M2H323567	Mathematics 2B	B	10		X			X															
	M2H624585	Electrical Distribution Systems	B	10	X	X			X			X												
	M2H623629	Digital and Programmable Systems 1	B	20	X	X			X		X	X	X	X		X			X	X			X	
	M2H622325	Control and Instrumentation Systems (M)	B	20			X		X		X	X												
	M2H020497	Signals and Electronic Systems (D/T)	B	20	X	X		X	X		X	X	X	X	X	X								
Level 3	M3H623544	Digital and Programmable Systems 2	A	20	X	X	X						X	X				X						X
	M3H623517	Communications Engineering (D/T)	A	20	X	X		X	X			X	X	X	X	X						X	X	
	M3H620587	Signals and Electronic Systems Design (D/T)	A	20	X	X			X		X	X	X	X		X		X	X				X	
	M3H623554	Integrated Engineering Studies 3	B	20													X	X		X	X	X		X
	M3H723623	Engineering Operations and Management	B	20		X				X		X	X			X						X		
	M3H623538	Modelling and Data Analysis (D/T)	B	20	X	X	X	X	X		X	X	X		X	X								
	M3H323616	European Exchange Placement (optional)	B	60																				
	MHH113285	Computer Aided Engineering (M)	A	20							X						X	X	X					
	M3H606414	Control Engineering 3 (M)	A	20		X	X	X	X			X												
	M2H721926	Engineering Design and Analysis 2 (M)	B	20	X	X	X		X		X	X	X	X							X		X	
	M3H721925	Industrial Practise (optional)	A/B	60							X			X	X		X	X	X	X		X		
					SM1M	SM2M	SM3M	SM4M	SM5M	SM6M	EA1m	EA2m	EA3m	EA4m	EA5m	EA6m	D1m	D2m	D3m	D4m	D5m	D6m	D7m	D8m
Level 4	MHH62354	Honours Project Engineering	A	40			X	X	X	X	X			X	X	X		X			X	X		
	MHH623541	Digital Signal Processing	A	20	X	X		X	X		X	X	X	X	X	X								
	MHH62354	Digital Design and Computer Architecture (D/T)	A	20	X	X	X	X	X		X	X	X	X	X	X			X	X			X	X
	MHH62352	Wireless Communications (T)	B	20		X	X	X	X		X	X	X		X	X						X	X	
	MHH62065	System Level Design (D/T)	B	20	X	X	X	X	X		X	X	X	X	X	X		X	X	X			X	X
	MHH62354	Intelligent Robotics and Mechatronics (D/M)	B	20	X	X	X	X	X				X	X		X			X	X			X	X
	M3H120320	Engineering Design and Analysis 3 (M)	A	20	X	X	X		X		X	X	X	X							X		X	
	MHH123523	Computer Aided Design 2 (M)	B	20			X	X	X			X												
	MHH62274	Control Engineering 4 (M)	B	20	X	X	X				X	X	X	X				X						
Level 5	MMH72384	MEng Team Project	A/B	45												X	X				X			
	MMH62354	Image Processing and Machine Vision	B	15	X	X							X	X					X	X				
	MMI123176	Real Time DSP	B	15	X	X						X	X						X	X				
	MMH12062	Control Systems	A	15		X	X	X	X		X	X				X			X			X		
	MMH624198	Distributed Instrumentation	B	15	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X			X	X	X
	MMH62367	Condition Monitoring	B	15		X	X	X			X	X	X				X		X					
	MMH626242	Advanced Telecommunications	A	15	X		X	X			X	X	X	X	X		X		X		X	X	X	X
	MMN223676	Strategy and Innovation	A	15						X				X	X		X	X	X			X		X

Appendix 2.

Table 1.2 – AHEP 3 Curriculum Map for BEng(Hons)/MEng Electrical and Electronic Engineering - MEng EEE (P02868) (Continued)

	CEng		onomic, legal, social, ethical and environmental conte							Engineering practice										
	Code	Title	ET1m	ET2m	ET3m	ET4m	ET5m	ET6m	ET7m	EP1m	EP2m	EP3m	EP4m	EP5m	EP6m	EP7m	EP8m	EP9m	EP10m	EP11m
Level 1	M1H323910	Mathematics 1A																		
	M1H321924	Mechanical Principles A									X									
	M1H623526	Electrical Principles and Circuit Theory										X								
	M1H324194	Engineering Applications								X	X		X			X				
	M1H623547	Principles of Programmable Systems A	X			X						X	X							
	M1H623617	Integrated Engineering Studies 1	X	X	X	X					X	X	X		X		X			
	M1H323565	Mathematics 1B																		
	M1H121922	Engineering Materials									X	X								
	M1H623548	Principles of Programmable Systems B								X										
Level 2	M2H323566	Mathematics 2A																		
	M2G620493	Software Development for Engineers										X	X	X						
	M2H623525	Analogue and Digital Electronics										X								
	M2H623625	Integrated Engineering Studies 2	X	X		X	X	X	X		X		X							X
	M2H323567	Mathematics 2B																		
	M2H624585	Electrical Distribution Systems									X		X							
	M2H623629	Digital and Programmable Systems 1								X	X	X	X							
	M2H622325	Control and Instrumentation Systems (M)									X	X	X		X					
	M2H020497	Signals and Electronic Systems (D/T)										X								
Level 3	M3H623544	Digital and Programmable Systems 2		X							X	X	X		X					
	M3H623517	Communications Engineering (D/T)						X			X	X	X							
	M3H620587	Signals and Electronic Systems Design (D/T)									X	X	X		X					
	M3H623554	Integrated Engineering Studies 3	X	X		X	X	X	X		X		X							X
	M3H723623	Engineering Operations and Management		X	X					X	X									X
	M3H623538	Modelling and Data Analysis (D/T)										X					X			
	M3H323616	European Exchange Placement (optional)																		
	MHH113285	Computer Aided Engineering (M)																		
	M3H606414	Control Engineering 3 (M)									X	X	X							
	M2H721926	Engineering Design and Analysis 2 (M)								X	X		X							
	M3H721925	Industrial Practise (optional)					X	X		X	X	X	X	X			X		X	X
			ET1m	ET2m	ET3m	ET4m	ET5m	ET6m	ET7m	EP1m	EP2m	EP3m	EP4m	EP5m	EP6m	EP7m	EP8m	EP9m	EP10m	EP11m
Level 4	MHH623549	Honours Project Engineering					X					X	X				X	X	X	X
	MHH623541	Digital Signal Processing										X								
	MHH623542	Digital Design and Computer Architecture (D/T)		X						X	X	X	X				X		X	
	MHH623520	Wireless Communications (T)										X					X	X	X	
	MHH620659	System Level Design (D/T)	X	X						X	X	X	X				X	X		
	MHH623546	Intelligent Robotics and Mechatronics (D/M)		X						X		X	X				X	X		
	M3H120320	Engineering Design and Analysis 3 (M)								X	X		X							X
	MHH123523	Computer Aided Design 2 (M)																	X	
	MHH622747	Control Engineering 4 (M)																		
Level 5	MMH72384	MEng Team Project										X	X							X
	MMH62354	Image Processing and Machine Vision	X							X		X	X				X			
	MMI123176	Real Time DSP								X		X	X				X			
	MMH120620	Control Systems															X	X		
	MMH624198	Distributed Instrumentation		X	X				X		X	X	X		X	X	X	X	X	X
	MMH62367	Condition Monitoring						X			X	X					X	X		
	MMH626242	Advanced Telecommunications	X	X						X	X	X	X		X	X	X	X	X	X
	MMN223676	Strategy and Innovation	X	X	X	X	X		X	X			X	X	X	X			X	X

APPENDIX 2 – AHEP 3

A.1 Degree Output Standards

The Engineering Council[UK] publish the United Kingdom Standard for Professional Engineering Competence (UK-SPEC)[1], which defines the threshold standards of competence and commitment required for the registration of Chartered Engineers and Incorporated Engineers. Under UK-SPEC the decision to accredit a degree programme as satisfying the educational requirements for CEng or IEng registration will be made on the basis of the programme delivering learning outcomes that have been specified by the accrediting professional body.

A.2 General Learning Outcomes

Graduates from accredited programmes must achieve the following five broad categories of learning outcomes (Table 2.1). The learning outcomes are expressed in terms of underpinning science and mathematics, engineering analysis, design, economic, social and environmental context and engineering practice.

[1] "UK Standard for Professional Engineering Competence (UK-SPEC)", Engineering Council [UK]

Appendix 3:

Table 2.1 EC[UK] UK_SPEC Programme Learning Outcomes - AHEP 3

Graduates from accredited programmes must satisfy the general and specific learning outcomes as detailed below.

BEng

Science and Mathematics

SM1p	Knowledge and understanding of scientific principles and methodology necessary to underpin their education in their engineering discipline, to enable appreciation of its scientific and engineering context, and to support their understanding of relevant historical, current and future developments and technologies.
SM2p	Knowledge and understanding of mathematical and statistical methods necessary to underpin their education in their engineering discipline and to enable them to apply mathematical and statistical methods, tools and notations proficiently in the analysis and solution of engineering problems.
SM3p	Ability to apply and integrate knowledge and understanding of other engineering disciplines to support study of their own engineering discipline.

Engineering Analysis

EA1p	Understanding of engineering principles and the ability to apply them to analyse key engineering processes.
EA2p	Ability to identify, classify and describe the performance of systems and components through the use of analytical methods and modelling techniques.
EA3p	Ability to apply quantitative and computational methods in order to solve engineering problems and to implement appropriate action.
EA4p	Understanding of, and the ability to apply, an integrated or systems approach to solving engineering problems.

Design

D1p	Understand and evaluate business, customer and user needs, including considerations such as the wider engineering context, public perception and Aesthetics.
D2p	Investigate and define the problem, identifying any constraints including environmental and sustainability limitations; ethical, health, safety, security and risk issues; intellectual property; codes of practice and standards.
D3p	Work with information that may be incomplete or uncertain and quantify the effect of this on the design.
D4p	Apply advanced problem-solving skills, technical knowledge and understanding, to establish rigorous and creative solutions that are fit for purpose for all aspects of the problem including production, operation, maintenance and disposal.
D5p	Plan and manage the design process, including cost drivers, and evaluate Outcomes.
D6p	Communicate their work to technical and non-technical audiences.

Economic, legal, social, ethical and environmental context

ET1p	Understanding of the need for a high level of professional and ethical conduct in engineering and a knowledge of professional codes of conduct.
ET2p	Knowledge and understanding of the commercial, economic and social context of engineering processes.
ET3p	Knowledge and understanding of management techniques, including project management, that may be used to achieve engineering objectives.
ET4p	Understanding of the requirement for engineering activities to promote sustainable development and ability to apply quantitative techniques where appropriate.

ET5p	Awareness of relevant legal requirements governing engineering activities, including personnel, health & safety, contracts, intellectual property rights, product safety and liability issues.
ET6p	Knowledge and understanding of risk issues, including health & safety, environmental and commercial risk, and of risk assessment and risk management techniques.

Engineering Practice

EP1p	Understanding of contexts in which engineering knowledge can be applied (e.g. operations and management, application and development of technology, etc.).
EP2p	Knowledge of characteristics of particular materials, equipment, processes, or products.
EP3p	Ability to apply relevant practical and laboratory skills.
EP4p	Understanding of the use of technical literature and other information sources.
EP5p	Knowledge of relevant legal and contractual issues.
EP6p	Understanding of appropriate codes of practice and industry standards.
EP7p	Awareness of quality issues and their application to continuous improvement.
EP8p	Ability to work with technical uncertainty.
EP9p	Understanding of, and the ability to work in, different roles within an engineering team.

MEng

Science and Mathematics

SM1m	A comprehensive knowledge and understanding of scientific principles and methodology necessary to underpin their education in their engineering discipline, and an understanding and know-how of the scientific principles of related disciplines, to enable appreciation of the scientific and engineering context, and to support their understanding of relevant historical, current and future developments and technologies.
SM2m	Knowledge and understanding of mathematical and statistical methods necessary to underpin their education in their engineering discipline and to enable them to apply a range of mathematical and statistical methods, tools and notations proficiently and critically in the analysis and solution of engineering problems.
SM3m	Ability to apply and integrate knowledge and understanding of other engineering disciplines to support study of their own engineering discipline and the ability to evaluate them critically and to apply them effectively.
SM4m	Awareness of developing technologies related to own specialisation.
SM5m	A comprehensive knowledge and understanding of mathematical and computational models relevant to the engineering discipline, and an appreciation of their limitations.
SM6m	Understanding of concepts from a range of areas including some outside engineering, and the ability to evaluate them critically and to apply them effectively in engineering projects.

Engineering Analysis

EA1m	Understanding of engineering principles and the ability to apply them to undertake critical analysis of key engineering processes.
EA2m	Ability to identify, classify and describe the performance of systems and components through the use of analytical methods and modelling techniques.
EA3m	Ability to apply quantitative and computational methods, using alternative approaches and understanding their limitations, in order to solve engineering problems and to implement appropriate action.

EA4m	Understanding of, and the ability to apply, an integrated or systems approach to solving complex engineering problems.
EA5m	Ability to use fundamental knowledge to investigate new and emerging technologies.
EA6m	Ability to extract and evaluate pertinent data and to apply engineering analysis techniques in the solution of unfamiliar problems.

Design

D1m	Understand and evaluate business, customer and user needs, including considerations such as the wider engineering context, public perception and aesthetics.
D2m	Investigate and define the problem, identifying any constraints including environmental and sustainability limitations; ethical, health, safety, security and risk issues; intellectual property; codes of practice and standards.
D3m	Work with information that may be incomplete or uncertain, quantify the effect of this on the design and, where appropriate, use theory or experimental research to mitigate deficiencies.
D4m	Apply advanced problem-solving skills, technical knowledge and understanding to establish rigorous and creative solutions that are fit for purpose for all aspects of the problem including production, operation, maintenance and disposal.
D5m	Plan and manage the design process, including cost drivers, and evaluate outcomes.
D6m	Communicate their work to technical and non-technical audiences.
D7m	Demonstrate wide knowledge and comprehensive understanding of design processes and methodologies and the ability to apply and adapt them in unfamiliar situations.
D8m	Demonstrate the ability to generate an innovative design for products, systems, components or processes to fulfil new needs.

Economic, legal, social, ethical and environmental context

ET1m	Understanding of the need for a high level of professional and ethical conduct in engineering, a knowledge of professional codes of conduct and how ethical dilemmas can arise.
ET2m	Knowledge and understanding of the commercial, economic and social context of engineering processes.
ET3m	Knowledge and understanding of management techniques, including project and change management, that may be used to achieve engineering objectives, their limitations and how they may be applied appropriately.
ET4m	Understanding of the requirement for engineering activities to promote sustainable development and ability to apply quantitative techniques where appropriate.
ET5m	Awareness of relevant legal requirements governing engineering activities, including personnel, health & safety, contracts, intellectual property rights, product safety and liability issues, and an awareness that these may differ internationally.
ET6m	Knowledge and understanding of risk issues, including health & safety, environmental and commercial risk, risk assessment and risk management techniques and an ability to evaluate commercial risk.
ET7m	Understanding of the key drivers for business success, including innovation, calculated commercial risks and customer satisfaction.

Engineering Practice

EP1m	Understanding of contexts in which engineering knowledge can be applied (eg operations and management, application and development of technology, etc) with extensive knowledge and understanding of a wide range of engineering.
EP2m	Knowledge of characteristics of particular equipment, processes, or products, materials and components.
EP3m	Ability to apply relevant practical and laboratory skills.

EP4m	Understanding of the use of technical literature and other information sources.
EP5m	Knowledge of relevant legal and contractual issues.
EP6m	Understanding of appropriate codes of practice and industry standards.
EP7m	Awareness of quality issues and their application to continuous improvement.
EP8m	Ability to work with technical uncertainty.
EP9m	A thorough understanding of current practice and its limitations, and some appreciation of likely new developments.
EP10m	Ability to apply engineering techniques taking account of a range of commercial and industrial constraints.
EP11m	Understanding of different roles within an engineering team and the ability to exercise initiative and personal responsibility, which may be as a team member or leader.