Undergraduate Programme Specification
BEng(Hons) Engineering (Design and Manufacture)

This specification provides a summary of the main features of the programme and learning outcomes that a student might reasonably be expected to achieve and demonstrate where full advantage is taken of all learning opportunities offered. Further details on the learning, teaching and assessment approach for the programme and modules can be accessed on the University website and Virtual Learning Environment, GCU Learn. All programmes of the University are subject to the University's Quality Assurance processes.

1. GENERAL INFORMATION				
Programme Title	BEng(Hons) Engineering (Design and Manufacture)			
Final Award	BEng(Hons) Engineering (Design and Manufacture) – Graduate Apprenticeship			
Awarding Body	Glasgow Caledonian University			
School	School of Computing, Engineering and Built Environment			
Department	Department of Mechanical Engineering			
Mode of Study	Full-time			
Location of Delivery	Glasgow Campus			
UCAS Code				
Accreditations (PSRB)	Institution of Mechanical Engineers (IMechE) Institution of Engineering and Technology (IET) Institute of Measurement and Control (InstMC)			
Period of Approval	From:	September 2021	To:	August 2026

2. EDUCATIONAL AIMS OF PROGRAMME

2.1 Programme Philosophy

To produce multi-disciplinary professional Graduate Apprentice (GA) engineers with a bias toward mechanical engineering, who have the required knowledge and understanding of specific mechanical engineering principles, integrated with an understanding of general engineering, design, manufacturing and business, reinforced with good personal, inter-personal, team-working and project management skills, to enable them to perform effectively in any appropriate environment. This will be reinforced through significant formal integration of Work-Based Learning opportunities and Academic Assessment as negotiated with employers at each level.

2.2 General Aims of the Programme

- To create in the student an ability to think clearly and logically.
- To equip the student with a range of analytical methods for use in engineering applications.
- To provide such principles and practice as will allow the student to acquire an understanding of engineering to cope adequately with technological change.
- To develop the students' ability to contribute to the specification, design, testing, commissioning, modification, manufacture and maintenance of engineering artefacts and systems both generally and within the context of an employer's business.
- To develop fully the student's abilities in the use of computer aided engineering and relevant aspects of information technology.
- To make the student aware of the ethics, social, economic, and environmental impact of engineering.
- To extend, enhance and improve the judgement of the student in decision making by extension of analytical, creative and intellectual skills.
- To integrate the expertise of staff gained from research, consultancy and scholarly activity into the programme materials where appropriate.
- To develop the students' interpersonal skills to enable effective communication and team working and operate within project management roles.
- To provide a broad education by an integrated study of vocational and academic disciplines.
- To integrate the programme with the student's developing experiential learning and training as part of an apprenticeship with his employer.
- To integrated a Work-Based Learning culture to deepen and broaden the academic understanding within the context of employer focussed activities.

2.3 BEng(Honours) Graduates will gain the following specialist knowledge, abilities and skills.

- A knowledge of the range and use of analytical methods available for the design, specification, manufacture and monitoring of mechanical engineering systems.
- The ability to analyse and evaluate the performance, life cycle and operational characteristics of a range of mechanical engineering equipment.
- A strong theoretical understanding in mechanical engineering, enabling the student to respond positively to technological development and innovation.
- Ability to utilise modern advanced computer-aided design, simulation and analysis techniques in the solution of engineering problems in a mechanical engineering environment.

- An awareness and appreciation of the practical issues involved in the design, specification, manufacturing technologies, maintenance and commissioning of mechanical equipment and associated systems.
- An awareness of the social, regulatory and environmental impact of engineering solutions to the production, distribution, and utilisation of mechanical engineering equipment.
- Knowledge of the latest developments in the subject area through the inclusion of research material where appropriate based on research, consultancy and other scholarly activity.
- Draw together technical, project management and business skills developed during the programme and apply them to a Work-Based design or manufacturing project.

3. LEARNING OUTCOMES

The programme provides opportunities for students to develop and demonstrate knowledge and understanding, skills, qualities and other attributes in the following areas:
[these outcomes are then mapped to AHEP_4 Learning Outcomes as required by the QAA benchmark statement for Engineering – See Tables PSMAP1 to PSMAP3.]

A: Knowledge and understanding;
A1: Knowledge and understanding of scientific and mathematical principles and methodology necessary to underpin their education in their engineering discipline and to enable them to apply mathematical methods, tools and notations proficiently in the analysis and solution of engineering problems.
A2: The engineering principles, concepts, and theories relevant to their own engineering discipline and other engineering disciplines and an awareness of developing technologies related to their own engineering specialism.
A3: The analytical methods, modelling techniques, computer models and software tools relevant to their engineering discipline in order to solve engineering problems.
A4: Structured design processes and methodologies and a systems approach to engineering problems and product design.
A5: The commercial and economic context of engineering activity and the management techniques, which may be used to achieve engineering objectives within that context.
A6: The framework of relevant legal requirements, codes of practice, quality issues and industrial standards governing engineering activity and product design.
A7: The multi-disciplinary nature of product engineering, the need for a high level of professional and ethical conduct in engineering practice, and, the requirement for engineering activities to promote sustainable development.

B: Practice: Applied knowledge, skills and understanding;
B1: Demonstrate proficiency in the use of specialist equipment, development tools, materials and processes employed in design and manufacturing systems.
B2: Exercise safe working practices and demonstrate proficiency in workshop and laboratory skills.
B3: Use and manage a structured design process in the creation and development of an economically viable product.
B4: Demonstrate a critical appreciation of the complexity and interaction of managerial, technical and environmental issues in the modern workplace.
B5: Manage sustainable and ethical product design within companies and across supply chains.
B6: Apply project management and business practices appropriately.

B7: Operate and act responsibly, adhere to professional codes of practice and industrial standards, taking account of the need to progress environmental, social and economic outcomes simultaneously.
B8: Specialist knowledge in design and manufacturing engineering and its application.
B9: Critical thinking and problem solving applied to design and manufacturing engineering.
B10: Critical analysis.
B11: Effective information retrieval and research skills.
B12: Commercial awareness.

C: Generic cognitive skills;
C1: Apply mathematical methods and scientific and engineering principles proficiently in the analysis, synthesis, performance assessment, critical appraisal and evaluation of design and manufacturing systems.
C2: Select and apply appropriate analytical and computer-based methods for modelling and analysing engineering problems.
C3: Select and apply appropriate computer software tools to the synthesis, implementation, evaluation, analysis and solution of electronic problems and systems.
C4: Investigate and define a problem and identify constraints including environmental and sustainability, health and safety and risk assessment issues.
C5: Apply a systems approach to the analysis and solution of engineering problems and the design of manufactured products.
C6: Use imagination, creativity and innovation, through synthesis of ideas, to provide products and services whilst exercising professional judgment and methods to resolve dilemmas arising from ethical, sustainability and financial constraints.
C7: Apply management techniques to achieve engineering objectives within a commercial and economic context.

D: Communication, numeracy and ICT skills
D1: Communication skills; written, oral and listening.
D2: Numeracy as applied to the solution of engineering problems.
D3: Computer literacy as applied to the solution of engineering problems.
D4: Presentation skills.

E: Autonomy, accountability and working with others.
E1: Self-confidence, self-discipline & self-reliance (independent working).
E2: Awareness of strengths and weaknesses.
E3: Creativity, innovation & independent thinking.
E4: Appreciating and desiring the need for continuing professional development.
E5: Reliability, integrity, honesty and ethical awareness.
E6: Entrepreneurial, independence and risk-taking.
E7: Ability to prioritise tasks and time management (organising and planning work).
E8: Interpersonal skills, team working and leadership.

4. LEARNING AND TEACHING METHODS

The programme provides a variety of learning and teaching methods. Programme and Module specific guidance will provide detail of the learning and teaching methods specific to each module.

Across the programme the learning and teaching methods and approaches may include the following:

- Lectures
- Seminars
- Practical classes
- Placements
- Simulation experiences
- Groupwork
- Flipped classroom approaches
- Online learning

The above approaches may be delivered either in person or online as appropriate and determined at module level by the Module Leader.

5. ASSESSMENT METHODS

The programme provides a variety of formative and summative assessment methods. Programme and Module specific guidance will provide detail of the assessment methods specific to each module.

Across the programme the assessment methods may include the following:

- Written coursework (essays, reports, case studies, dissertation, literature review)
- Oral coursework (presentations, structured conversations)
- Practical Assessment (Placement, VIVA, Laboratory work)
- Group work
- Blogs and Wikis
- Portfolio Presentations
- Formal Examinations and Class Tests

The above assessments may be delivered either in person and online as appropriate and determined at module level by the Module Leader.

6. ENTRY REQUIREMENTS

Specific entry requirements for this programme can be found on the prospectus and study pages on the GCU website at this location: www.gcu.ac.uk/study

The Course webpage specific to this Programme is: GA EDM

All students entering the programme are required to adhere to the GCU Code of Student Conduct.

7. PROGRAMME STRUCTURE AND AVAILABLE AND FINAL EXIT AWARDS[1]

The following modules are delivered as part of this programme:

Module Code	Module Title	Core or Optional	SCQF Level	Credit Size	Coursework %	Examination %	Practical %
M1H326688	Engineering Science	C	7	20	100	-	-
M1H326674	Mathematics 1	C	7	20	50	50	-
M1H326679	Mechanical Principles	C	7	20	100	-	-
M1H626681	Electrical Principles	C	7	20	100	-	-
M1H130308	Integrated Engineering Studies 1 (IES1)	C	7	20	100	-	-
M1H326682	Modern Engineering Practice	C	7	20	100	-	-
M2H326686	Mathematics 2	C	8	20	50	50	-
M2H324808	Thermodynamics & Fluid Mechanics	C	8	20	30	70	-
M2H624806	Control and Instrumentation Systems	C	8	20	30	70	-
M2H330273	Integrated Engineering Studies 2 (IES2)	C	8	20	100	-	-
	Computer Aided Engineering Stream Modules						
M2H726030	Manufacture & Materials 2	O	8	20	100	-	-
M2H724807	Engineering Design and Analysis 2	O	8	20	30	70	-
	Control & Instrumentation Stream Modules						
M2H726030	Manufacture & Materials 2 (Option)	O	8	20	100	0	-
M2H626267	Analogue and Digital Electronics (Option)	O	8	20	50	50	-
M2H7248-7	Engineering Design and Analysis 2	O	8	20	30	70	-
	Electrical Power Engineering Design Stream Modules						
M2H626267	Analogue and Digital Electronics	O	8	20	50	50	-
M2H626266	Electrical Distribution System	O	8	20	50	50	-
M3H724811	Engineering Operations Management	C	9	20	30	70	-
M3J923150	Energy Conversion Technologies	C	9	20	30	70	-
M3H624797	Integrated Engineering Studies 3 [1]	C	9	20	100	-	-

[1] Periodically, programmes and modules may be subject to change or cancellation. Further information on this can be found on the GCU website here: www.gcu.ac.uk/currentstudents/essentials/policiesandprocedures/changesandcancellationtoprogrammes

	Computer Aided Engineering Stream Modules						
M3H124814	Engineering Design & Analysis 3	O	9	20	30	70	-
MHH124813	Computer Aided Engineering	O	9	20	100	-	-
M3H724815	Manufacture & Materials 3	O	9	20	30	-	-
	Control & Instrumentation Stream Modules						
M3H124814	Engineering Design & Analysis 3	O	9	20	30	70	-
M3H627229	Control Engineering 3	O	9	20	100	-	-
M3W226254	Instrumentation	O	9	20	50	50	-
	Electrical Power Engineering Design Stream Modules						
M3H623070	Power Electronic Systems 3	O	9	20	30	70	-
M3H627229	Control Engineering 3	O	9	20	100	-	-
M3H625943	Electrical Machines	O	9	20	30	70	-
MHH624821	Honours Project (Engineering)	C	10	40	100	-	-
	Computer Aided Engineering Stream Modules						
MHH124819	Engineering Design & Analysis 4	O	10	20	30	70	-
MHH126676	Simulation for Design and Manufacture	O	10	20	100		-
MHH127231	Computer Aided Design 2	O	10	20	100		-
MHH325993	Design Process, Assembly and Manufacture (Option)	O	10	20	30	70	-
MHH325992	Renewable Energy Equipment Design (Option)	O	10	20	30	70	-
	Control & Instrumentation Stream Modules						
MHH124813	Computer Aided Engineering	O	10	20	100	-	-
MHW226260	Applied Instrumentation Systems	O	10	20	50	50	-
MHH622747	Control Engineering 4	O	10	20	30	70	-
MHW226259	Systems Health Management	O	10	20	50	50	-
	Electrical Power Engineering Design Stream Modules						
MHH630298	Power Systems Analysis	O	10	20	30	70	-
MHH623513	Renewable Power Integration	O	10	20	30	70	-
MHH622747	Control Engineering 4 (Option)	O	10	20	30	70	-
MHH630295	Power System Protection and Automation (Option)	O	10	20	30	70	-
MHH625270	HV and Condition Assessment	O	10	20	30	70	-

Students undertaking the programme on a full-time basis commencing in September of each year will undertake the modules in the order presented above. This may be subject to variation for students commencing the programme at other times of year (e.g. January) and/or undertaking the programme on a part-time or distance learning mode of delivery.
The following final and early Exit Awards are available from this programme[2]: **Certificate of Higher Education (CertHE) in Engineering (Design and Manufacture) – Higher Apprenticeship** - *achieved upon successful completion of 120 credits* **Diploma of Higher Education (DipHE) in Engineering (Design and Manufacture) – Higher Apprenticeship – (Stream Specialism) -** *achieved upon successful completion of 240 credits* **BEng Engineering (Design and Manufacture) – Graduate Apprenticeship – (Stream Specialism)** - *achieved upon successful completion of 360 credits* **BEng(Hons) Engineering (Design and Manufacture) – Graduate Apprenticeship – (Stream Specialism) -** *achieved upon successful completion of 480 credits*

[2] Please refer to the GCU Qualifications Framework for the minimum credits required for each level of award and the Programme Handbook for requirements on any specified or prohibited module combinations for each award.

8. ASSESSMENT REGULATIONS
Students should expect to complete their programme of study under the GCU Assessment Regulations that were in place at the commencement of their studies on that programme, unless proposed changes to University Regulations are advantageous to students. These can be found at: www.gcu.ac.uk/aboutgcu/supportservices/qualityassuranceandenhancement/regulationsandpolicies

A curriculum map is attached showing how the outcomes are being developed and assessed within the programme. This relates the modules from Section 4 to UK_Spec AHEP4.

DATE**:** **October 2023**

Curriculum Map for BEng(Hons) Engineering (Design and Manufacture)

PSMAP

The curriculum map links the modules (Section 4) to the Outcomes listed in Section 3 via the AHEP4 Output Standards required to ensure that the programme meets the
requirements of UK-Spec. To align with the current requirements of the IMechE, the tables below are presented as the requirements for IEng level satisfied by the BEng programme (Table PSMAP1), the requirements for CEng satisfied by the BEng(Hons) programme (Table PSMAP2) and the MEng learning outcomes for CEng that are satisfied as part of the BEng(Hons) (Table PSMAP3). NB: As required by the IMechE, modules are defined as core (c) or optional (o).

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.

Table PSMAP1: Partial CEng Learning Outcomes Satisfied by the BEng(H) Programme – Computer Aided Engineering Stream

YEAR	COURSES	Level	Trimester	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14	C15	C16	C17	C18	Total per Course
YEAR 1	Mathematics 1 (M1H326674)	1	AB	✓	✓	✓																3
	Mechanical Principles (M1H326679)	1	B	✓	✓	✓									✓							4
	Electrical Principles (M1H626681)	1	B	✓		✓									✓							3
	Modern Engineering Practice (M1H326682)	1	AB					✓						✓	✓	✓			✓		✓	6
	Engineering Science (M1H626688)	1	A	✓	✓	✓																3
	Integrated Engineering Studies 1 (M1H130308)	1	ABC							✓	✓		✓	✓				✓	✓	✓	✓	8
YEAR 2	Mathematics 2 (M2H326686)	2	AB	✓	✓	✓																3
	Thermodynamics & Fluid Mechanics (M2H324808)	2	A	✓	✓	✓									✓							4
	Manufacture & Materials 2 (M2H726030)	2	A												✓	✓			✓			3
	Integrated Engineering Studies 2 (M2H330273)	2	ABC				✓	✓		✓	✓							✓	✓	✓	✓	8
	Control and Instrumentation Systems (M2H624806)	2	B	✓	✓	✓			✓						✓							5
	Engineering Design and Analysis 2 (M2H724807)	2	B	✓	✓	✓			✓						✓				✓			6
YEAR 3	Computer Aided Engineering (MHH124813)	4	A			✓									✓	✓						3
	Manufacture & Materials 3 (M3H724815)	3	B	✓											✓	✓	✓					4
	Engineering Design & Analysis 3 (M3H124814)	3	A	✓	✓	✓			✓						✓				✓			6
	Energy Conversion Technologies (M3J923150)	3	C	✓	✓	✓			✓													4
	Integrated Engineering Studies 3 (M3H624797)	3	ABC				✓	✓	✓	✓	✓			✓				✓	✓	✓	✓	10
	Engineering Operations Management (M3H724811)	3	B				✓	✓	✓			✓					✓	✓				6
YEAR 4	Project (MHH624821)	4	ABC	✓	✓	✓	✓	✓	✓		✓	✓	✓		✓	✓		✓		✓	✓	14
	Simulation for Design & Manufacture (MHH126676)	4	A	✓	✓	✓		✓	✓						✓	✓	✓	✓		✓	✓	11
	Engineering Design & Analysis 4 (MHH124819)	4	A	✓	✓				✓							✓						4
	Computer Aided Design 2 (MHH127231)	4	B	✓	✓	✓			✓			✓			✓							6
	Renewable Energy Equipment Design (MHH325992)	4	B	✓					✓						✓	✓						4
	Design Process, Assembly and Manufacture (MHH325993)	4	B			✓		✓	✓	✓						✓						5

Table PSMAP2: Partial CEng Learning Outcomes Satisfied by the BEng(Hons) Programme – Control and Instrumentation Stream

YEAR	COURSES	Level	Trimester	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14	C15	C16	C17	C18	Total per Course
YEAR 1	Mathematics 1 (M1H326674)	1	AB	✓	✓	✓																3
	Mechanical Principles (M1H326679)	1	B	✓	✓	✓									✓							4
	Electrical Principles (M1H626681)	1	B	✓	✓	✓									✓							4
	Modern Engineering Practice (M1H326682)	1	AB					✓						✓	✓	✓			✓		✓	6
	Engineering Science (M1H626688)	1	A	✓	✓	✓																3
	Integrated Engineering Studies 1 (M1H130308)	1	ABC							✓	✓		✓	✓				✓	✓	✓	✓	8
YEAR 2	Mathematics 2 (M2H326686)	2	AB	✓	✓	✓																3
	Thermodynamics & Fluid Mechanics (M2H324808)	2	A	✓	✓	✓									✓							4
	Manufacture & Materials 2 (M2H726030)	2	A												✓	✓			✓			3
	Analogue & Digital Electronics (M2H626267)	2	A	✓	✓	✓									✓							4
	Integrated Engineering Studies 2 (M2H330273)	2	ABC				✓	✓		✓	✓							✓	✓	✓	✓	8
	Control and Instrumentation Systems (M2H624806)	2	B	✓	✓	✓			✓						✓							5
	Engineering Design and Analysis 2 (M2H724807)	2	B	✓	✓	✓			✓						✓				✓			6
YEAR 3	Control Engineering 3 (M3H606414)	3	A	✓	✓	✓			✓						✓							5
	Instrumentation (M3W226254)	3	B	✓	✓	✓			✓						✓							5
	Engineering Design & Analysis 3 (M3H124814)	3	A	✓	✓	✓			✓						✓				✓			6
	Energy Conversion Technologies (M3J923150)	3	C	✓	✓	✓			✓													4
	Integrated Engineering Studies 3 (M3H624797)	3	ABC				✓	✓	✓	✓	✓			✓				✓	✓	✓	✓	10
	Engineering Operations Management (M3H724811)	3	B				✓	✓	✓			✓					✓	✓				6
YEAR 4	Project (MHH624821)	4	ABC	✓	✓	✓	✓	✓	✓		✓	✓	✓		✓	✓		✓		✓	✓	14
	Computer Aided Engineering (MHH113285)	4	A			✓									✓	✓						3
	Applied Instrumentation Systems (MHW226260)	4	A		✓	✓		✓	✓							✓				✓		6
	Control Engineering 4 (MHH622747)	4	B	✓	✓	✓		✓	✓							✓						6
	System Health Management (MHW226259)	4	B		✓				✓						✓				✓			4

Table PSMAP3: Partial CEng Learning Outcomes Satisfied by the BEng(Hons) Programme – Electrical Power Engineering Stream

YEAR	COURSES	Level	Trimester	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14	C15	C16	C17	C18	Total per Course
YEAR 1	Mathematics 1 (M1H326674)	1	AB	✓	✓	✓																3
	Mechanical Principles (M1H326679)	1	B	✓	✓	✓									✓							4
	Electrical Principles (M1H626681)	1	B	✓	✓	✓									✓							4
	Modern Engineering Practice (M1H326682)	1	AB					✓						✓	✓	✓			✓		✓	6
	Engineering Science (M1H626688)	1	A	✓	✓	✓																3
	Integrated Engineering Studies 1 (M1H130308)	1	ABC							✓	✓		✓	✓				✓	✓	✓	✓	8
YEAR 2	Mathematics 2 (M2H326686)	2	AB	✓	✓	✓																3
	Thermodynamics & Fluid Mechanics (M2H324808)	2	A	✓	✓	✓									✓							4
	Electrical Distribution Systems (M2H726030)	2	BC	✓	✓	✓			✓						✓							5
	Analogue & Digital Electronics (M2H626267)	2	A	✓	✓	✓									✓							4
	Integrated Engineering Studies 2 (M2H330273)	2	ABC				✓	✓		✓	✓							✓	✓	✓	✓	8
	Control and Instrumentation Systems (M2H624806)	2	B	✓	✓	✓			✓						✓							5
YEAR 3	Control Engineering 3 (M3H606414)	3	A	✓	✓	✓			✓						✓							5
	Power Electronic Systems 3 (M3H623070)	3	A	✓	✓	✓	✓								✓				✓			6
	Electrical Machines (M3H625943)	3	B	✓	✓	✓	✓		✓													5
	Energy Conversion Technologies (M3J923150)	3	C	✓	✓	✓			✓													4
	Integrated Engineering Studies 3 (M3H624797)	3	ABC				✓	✓	✓	✓	✓			✓				✓	✓	✓	✓	10
	Engineering Operations Management (M3H724811)	3	B				✓	✓	✓			✓					✓	✓				6
YEAR 4	Project (MHH624821)	4	ABC	✓	✓	✓	✓	✓	✓		✓	✓	✓		✓	✓		✓		✓	✓	14
	Power System Analysis (MHH630298)	4	A	✓	✓	✓			✓			✓								✓		6
	Renewable Power Integration (MHH626773)	4	A		✓	✓	✓	✓	✓			✓									✓	7
	Power System Protection and Automation (MHH630295) (Option)	4	B	✓	✓	✓			✓			✓		✓		✓				✓		8
	Control Engineering 4 (MHH622747) (Option)	4	B	✓	✓	✓		✓	✓							✓						6
	HV and Condition Assessment (MHH625270)	4	B	✓	✓	✓	✓	✓	✓			✓					✓					8

Mapping of GCU Learning Outcomes to AHEP4

The following tables map the GCU Learning Outcomes for the programme listed in Section 3 with the AHEP4 Learning Outcomes listed in Tables PSMAP1 to PSMAP3.

	Knowledge and Understanding	**Mapping to AHEP4**
	Students will have a knowledge and understanding of:	
A1	Knowledge and understanding of scientific and mathematical principles and methodology necessary to underpin their education in their engineering discipline and to enable them to apply mathematical methods, tools and notations proficiently in the analysis and solution of engineering problems.	**C1, C2**
A2	The engineering principles, concepts, and theories relevant to their own engineering discipline and other engineering disciplines and an awareness of developing technologies related to their own engineering specialism.	**C1, C2**
A3	The analytical methods, modelling techniques, computer models and software tools relevant to their engineering discipline in order to solve engineering problems.	**C3**
A4	Structured design processes and methodologies and a systems approach to engineering problems and product design.	**C5, C6**
A5	The commercial and economic context of engineering activity and the management techniques, which may be used to achieve engineering objectives within that context.	**C15**
A6	The framework of relevant legal requirements, codes of practice, quality issues and industrial standards governing engineering activity and product design.	**C8**
A7	The multi-disciplinary nature of product engineering, the need for a high level of professional and ethical conduct in engineering practice, and, the requirement for engineering activities to promote sustainable development.	**C7**

	Professional and Practical Skills	**Mapping to AHEP4**
	Students will be able to:	
B1	Demonstrate proficiency in the use of specialist equipment, development tools, materials and processes employed in design and manufacturing systems.	**C12, C13**

B2	Exercise safe working practices and demonstrate proficiency in workshop and laboratory skills.	**C12**
B3	Use and manage a structured design process in the creation and development of an economically viable product.	**C5, C15**
B4	Demonstrate a critical appreciation of the complexity and interaction of managerial, technical and environmental issues in the modern workplace.	**C15**
B5	Manage sustainable and ethical product design within companies and across supply chains.	**C8**
B6	Apply project management and business practices appropriately.	**C15**
B7	Operate and act responsibly, adhere to professional codes of practice and industrial standards, taking account of the need to progress environmental, social and economic outcomes simultaneously.	**C5, C7, C8**
B8	Specialist knowledge in design and manufacturing engineering and its application.	**C13**
B9	Critical thinking and problem solving applied to design and manufacturing engineering.	**C4, C13**
B10	Critical analysis.	**C3, C4**
B11	Effective information retrieval and research skills.	**C4**
B12	Commercial awareness.	**C5, C15**

	Generic cognitive skills	**Mapping to AHEP4**
	Students will be able to:	
C1	Apply mathematical methods and scientific and engineering principles proficiently in the analysis, synthesis, performance assessment, critical appraisal and evaluation of design and manufacturing systems.	**C1**
C2	Select and apply appropriate analytical and computer based methods for modeling and analysing engineering problems.	**C3**
C3	Select and apply appropriate computer software tools to the synthesis, implementation, evaluation, analysis and solution of electronic problems and systems.	**C3**

C4	Investigate and define a problem and identify constraints including environmental and sustainability, health and safety and risk assessment issues.	**C5, C9**
C5	Apply a systems approach to the analysis and solution of engineering problems and the design of electronic products.	**C6**
C6	Use imagination, creativity and innovation, through synthesis of ideas, to provide products and services whilst exercising professional judgment and methods to resolve dilemmas arising from ethical, sustainability and financial constraints.	**C5, C13, C15**
C7	Apply management techniques to achieve engineering objectives within a commercial and economic context.	**C15**

	Communication, numeracy and ICT skills	**Mapping to AHEP 4**
D1	Communication skills; written, oral and listening.	**C17**
D2	Numeracy as applied to the solution of engineering problems.	**C1**
D3	Computer literacy as applied to the solution of engineering problems.	**C3**
D4	Presentation skills.	**C17**

	Autonomy, accountability and working with others.	**Mapping to AHEP4**
E1	Self-confidence, self-discipline & self-reliance (independent working).	**C16**
E2	Awareness of strengths and weaknesses.	**C18**
E3	Creativity, innovation & independent thinking.	**C13**
E4	Appreciating and desiring the need for continuing professional development.	**C18**
E5	Reliability, integrity, honesty and ethical awareness	**C8**
E6	Entrepreneurial, independence and risk-taking.	**C9**
E7	Ability to prioritise tasks and time management (organising and planning work).	**C15**
E8	Interpersonal skills, team working and leadership.	**C16, C17**

VERSION CONTROL (to be completed in line with AQPP processes) **Any changes to the PSP must be recorded below by the programme team to ensure accuracy of the programme of study being offered.**			
Version Number	*Changes/Updates*	*Date Changes/Updates made*	*Date Effective From*
1.0			