

## Programme Specification Pro-forma (PSP)

**1. GENERAL INFORMATION**

<b>1. Programme Title:</b>	BEng (Hons) in Building Services Engineering
<b>2. Final Award:</b>	BEng (Hons) in Building Services Engineering
<b>3. Exit Awards:</b>	BEng (Hons); BEng; DipHE; CertHE
<b>4. Awarding Body:</b>	Glasgow Caledonian University
<b>5. Period of Approval:</b>	September 2021
<b>6. School:</b>	Computing, Engineering and Built Environment
<b>7. Host Department:</b>	CEEM
<b>8. UCAS Code:</b>	K242
<b>9. PSB Involvement:</b>	CIBSE
<b>10. Place of Delivery:</b>	Glasgow
<b>11. Subject Benchmark Statement:</b>	Engineering
<b>12. Dates of PSP Preparation/Revision:</b>	Academic year 2021-2022

**2. EDUCATIONAL AIMS OF THE PROGRAMME****2.1 Introduction**

The BEng (Hons) in Building Services Engineering is a programme which provides students with the opportunity to study within the broad discipline of Building Services Engineering (sometimes called Environmental Engineering) by part-time or full-time study mode up to Honours level. It provides students with an invaluable means to enhance their knowledge and to improve their opportunities for career development. It also provides industry in the central belt of Scotland with a facility for up-grading the educational base within a wide range of organisations from design consultancies and specialist equipment manufacturers to hospital and local council facilities managements.

At each level of the programme:

*Year 1 (SCQF 7)*

Foundation for study of the discipline, establishment of the “ground rules”. An outline knowledge of the scope and main areas of the discipline, an understanding of the main theories, principles and concepts.

Students will be able to:

- use their knowledge of the subject and its techniques to evaluate a range of arguments and solutions to problems and issues of a routine nature.
- apply their discipline related and transferable skills in contexts which have well defined criteria.
- undertake further learning in a structured and managed environment.

*Year 2 (SCQF 8)*

Coverage of the core areas of the discipline in preparation for professional placement. A knowledge and understanding of the scope and main areas of the discipline and its interaction with related areas/disciplines, familiarity and understanding of the essential theories, concepts and awareness of major issues within the discipline.

Students will be able to use their knowledge, understanding and skills to:

- critically evaluate evidence-based arguments and identify solutions to clearly defined problems of a routine nature.
- apply their discipline related and transferable skills in contexts where the task and criteria for decisions are generally well defined but where responsibility and initiative is required.

### *Year 3 (SCQF 9)*

Introduction to key specialist areas of the discipline. A broad and comparative knowledge of the general scope of the different areas and applications, and interactions with related areas/disciplines. Critical understanding of the essential theories, principles and concepts of the discipline, and the ways in which these are developed.

Students will be able to use their knowledge, understanding and skills to:

- both identify problems and issues and formulate, evaluate and apply evidence and arguments.
- apply their discipline and transferable skills to contexts where criteria and the scope of the task may be well defined but where personal responsibility and decision making is also required.

### *Year 4 (SCQF 10)*

Further extend knowledge of the specialist areas of the discipline. A systematic, extensive and comparative knowledge and understanding of the discipline, and its links to related areas/disciplines.

A critical understanding of the established theories, principles and concepts of a number of advanced and emerging issues at the forefront of the discipline.

Students will be able to use their knowledge, understanding and skills:

- in the systematic assessment of a wide range of concepts, ideas and data.
- in identifying and analysing complex problems and issues, demonstrating originality and creativity in formulating, evaluating and applying evidence-based solutions and arguments.
- to apply their discipline related and transferable skills in contexts where there is a requirement for:

# the exercise of personal responsibility and initiative

# decision-making in complex and unpredictable contexts

# the ability to undertake further developments of a professional nature.

## 2.2 Raison D’Etre for the Programme

The BEng (Hons) in Building Services Engineering is offered as a programme at Glasgow Caledonian University to meet the requirements of three distinct professional/academic groups. These groups, listed below, form the constituency that together benefit from the Programme’s existence.

The main objectives of the Programme therefore are to meet the separate requirements of the three professional/academic groups and to satisfy quality and performance criteria dictated by these groups as necessary. The requirements of each of the three groups are considered to be of equal importance. The primary objectives are:

- To meet the requirements of the local and national Building Services Engineering profession and industry by educating engineers, technicians and managers working within the industry up to a level that would enable them by further study and professional development to progress to full Chartered Engineer status.
- To meet the educational standards and requirements that apply to an Honours degree and which are set by and monitored by Glasgow Caledonian University (GCU), the School of the Built and Natural Environment (BNE) and ultimately the Scottish Higher Education Funding Council (SHEFC). A key document is the University Handbook of Procedures for Academic Quality Assurance.
- To meet the professional/educational requirements that are specified and monitored by the Engineering Council (EC) and the Chartered Institute of Building Services Engineers (CIBSE). These requirements are itemised specifically in the Engineering Council document ‘UK Standard for Professional Engineering Competence UK-SPEC (2004)’, which is an important reference document for this programme.

## 2.4 Standards and Expectations of the Programme

The BEng programme is a programme dedicated to the professional development of engineers who have already chosen a career related to the building services industry. It is essential that these students get an educational experience that is relevant, that enhances their overall understanding of industry and which trains them to approach problem-solving and design work from a wide perspective and with a sound analytical

understanding. The aim of the course is, therefore, to produce graduates with a broad-based multidisciplinary training which will give them a good appreciation of the economic and social environment within which business and industry exist. They will gain experience of the technical, commercial and human constraints which determine organisational performance. Successful completion of this programme will equip the graduate with the multidisciplinary skills demanded of managers and engineers in modern industries.

This statement is in line with current thinking within the Engineering Council UK to support broad-based engineering programmes as originally outlined in the UK Standard for Professional Engineer Competence (May 2004). The following criteria are extracted from CEng accreditation requirements for qualifying honours degree programmes. These standards and expectations for professional competence accurately represent the Programme Board's intentions for students graduating from the BEng (Hons) Building Services Engineering taught at Glasgow Caledonian University. Note however that the various competences are gained through a mixture of education and professional development. Students would need some period of experience at the appropriate level within the industry to fully achieve the competences indicated.

### **General Learning Outcomes**

**Knowledge and Understanding:** they must be able to demonstrate their knowledge and understanding of essential facts, concepts, theories and principles of their engineering discipline, and its underpinning science and mathematics. They must have an appreciation of the wider multidisciplinary engineering context and its underlying principles. They must appreciate the social, environmental, ethical, economic and commercial considerations affecting the exercise of their engineering judgement.

**Intellectual Abilities:** they must be able to apply appropriate quantitative science and engineering tools to the analysis of problems. They must be able to demonstrate creative and innovative ability in the synthesis of solutions and in formulating designs. They must be able to comprehend the broad picture and thus work with an appropriate level of detail.

**Practical skills:** they must possess practical engineering skills acquired through, for example, work carried out in laboratories and workshops; in industry through supervised work experience; in individual and group project work; in design work; and in the development and use of computer software in design, analysis and control. Evidence of group working and of participation in a major project is expected. However, individual professional bodies may require particular approaches to this requirement.

**General transferable skills:** they must have developed transferable skills that will be of value in a wide range of situations. These are exemplified by the Qualifications and Curriculum Authority Higher Level Key Skills and include problem solving, communication, and working with others, as well as the effective use of general IT facilities and information retrieval skills. They also include planning self-learning and improving performance, as the foundation for lifelong learning/CPD.

### **Specific Learning Outcomes in Engineering**

Graduates from BEng (Hons) Building Services Engineering taught at GCU should achieve the following five learning outcomes, defined by broad areas of learning.

#### **Underpinning science and mathematics, and associated engineering disciplines, as defined by the relevant engineering institution**

- 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 historical, current, and future developments and technologies;
- Knowledge and understanding of mathematical principles 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;
- Ability to apply and integrate knowledge and understanding of other engineering disciplines to support study

of their own engineering discipline.

### **Engineering Analysis**

- Understanding of engineering principles and the ability to apply them to analyse key engineering processes;
- Ability to identify, classify and describe the performance of systems and components through the use of analytical methods and modelling techniques;
- Ability to apply quantitative methods and computer software relevant to their engineering discipline, in order to solve engineering problems;
- Understanding of and ability to apply a systems approach to engineering problems.

### **Design**

Design is the creation and development of an economically viable product, process or system to meet a defined need. It involves significant technical and intellectual challenges and can be used to integrate all engineering understanding, knowledge and skills to the solution of real problems. Graduates will therefore need the knowledge, understanding and skills to:

- Investigate and define a problem and identify constraints including environmental and sustainability limitations, health and safety and risk assessment issues;
- Understand customer and user needs and the importance of considerations such as aesthetics;
- Identify and manage cost drivers;
- Use creativity to establish innovative solutions;
- Ensure fitness for purpose for all aspects of the problem including production, operation, maintenance and disposal;
- Manage the design process and evaluate outcomes.

### **Economic, social, and environmental context**

- Knowledge and understanding of commercial and economic context of engineering processes;
- Knowledge of management techniques which may be used to achieve engineering objectives within that context;
- Understanding of the requirement for engineering activities to promote sustainable development;
- Awareness of the framework of relevant legal requirements governing engineering activities, including personnel, health, safety, and risk (including environmental risk) issues;
- Understanding of the need for a high level of professional and ethical conduct in engineering.

### **Engineering Practice**

Engineering practice competence requires practical application of engineering skills, combining theory and experience, and use of other relevant knowledge and skills. This can include:

- Knowledge of characteristics of particular materials, equipment, processes, or products;
- Workshop and laboratory skills;
- Understanding of contexts in which engineering knowledge can be applied (eg operations and management, technology development, etc);
- Understanding use of technical literature and other information sources;
- Awareness of nature of intellectual property and contractual issues;
- Understanding of appropriate codes of practice and industry standards;
- Awareness of quality issues;
- Ability to work with technical uncertainty.

4. PROGRAMME STRUCTURES AND REQUIREMENTS, LEVELS, MODULES, CREDITS AND AWARDS		
<b>BEng (Hons) Building Services Engineering (Part-Time)</b>		
<b>Year 1 (Entry into Year 1 with RPL of 90 credits)</b>		
Module Code	Module Title	Credit
M2H321917	Thermo-Fluid Science (SCQF 8)	20
M1H626680	Electrical Principles (SCQF 7)	20
M1K227068	Building Services Drawing and Design Software (SCQF7)	20
M1H323563	Engineering Mathematics (SCQF 7)	10
M2H621952	Control Eng Principles & Apps (SCQF 8)	20
<i>Exit Award – None</i>		SCQF 7 – 50 SCQF 8 – 40 Total – 90
<b>Year 2</b>		
Module Code	Module Title	Credit
M2H326684	Mathematics 2 (SCQF 8)	20
M2H326996	Applied Thermo – Fluids (SCQF 8)	20
M2H624225	Electrical Systems (SCQF 8)	10
M3H123717	Project and Programme Management Principles (SCQF 9)	20
M3H327004	Materials & Mechanical Engineering Design (SCQF 9)	20
<i>Exit Award – Certificate of Higher Education in Building Services Engineering (minimum 120 credits); Diploma of Higher Education in Building Services Engineering</i>		SCQF 8 – 50 SCQF 9 – 40 Total – 90
<b>Year 3</b>		
Module Code	Module Title	Credit
M3H226999	Heating & Air Conditioning 1 (SCQF 9)	20
M3H227000	Building Services Engineering Design 1 (SCQF 9)	20
M3K227059	Energy in Buildings (SCQF 9)	30
M3H127085	The Engineer and the Environment (SCQF 9)	20
<i>Exit Award – Bachelor of Engineering in Building Services Engineering</i>		SCQF 9 – 90 Total – 90
<b>Year 4</b>		
Module Code	Module Title	Credit
MHH227001	Heating & Air Conditioning 2 (SCQF 10)	20
MHH221946	Energy Efficiency & Design Studies (SCQF 10)	20
MHH123180	The Engineer in Business (SCQF 10)	20
MHH227002	Building Services Engineering Design 2 (SCQF 10)	20
MHK227003	Project - BEng (SCQF 10)	40
<i>Exit Award – Bachelor of Engineering with Honours in Building Services Engineering</i>		SCQF 10 – 120 Total – 120
<b>BEng (Hons) Building Services Engineering (Full-Time)</b>		
<b>Year 1 (SCQF 7) (Level currently suspended)</b>		
Module Code	Module Title	Credit
M1G121961	Applied Mathematics 1	20

M1K203077	Professional Orientation & Practice	20
M1H120901	Fluid Mechanics and Thermodynamics	20
M1H120822	Structural Mechanics (statics & Dynamics)	20
M1H623526	Electrical Principles & Circuit Theory	20
M1K902905	Environmental Physics and design	20
<b>Exit Award – Certificate of Higher Education in Building Services Engineering</b>		<b>120</b>
<b>Year 2 (SCQF 8) (Entry into Year 2 with RPL of 120 credits)</b>		
<b>Module Code</b>	<b>Module Title</b>	<b>Credit</b>
M2H326684	Mathematics 2	20
M2H326996	Applied Thermo – Fluids	20
M2H624225	Electrical Systems	10
M2H721926	Engineering Design & Analysis 2	20
M2H623625	Integrated Engineering Studies 2	10
M2H621952	Control Engineering Principles & Apps	20
M2H323512	Thermodynamics & Fluid Mechanics	20
<b>Exit Award – Diploma of Higher Education in Building Services Engineering</b>		<b>120</b>
<b>Year 3 (SCQF 9)</b>		
<b>Module Code</b>	<b>Module Title</b>	<b>Credit</b>
M3H226999	Heating & Air Conditioning 1	20
M3H227000	Building Services Engineering Design 1	20
M3K227059	Energy in Buildings	30
M3H127085	The Engineer and the Environment	20
M3H127056	Computer Aided Design	10
and one of the following 2 modules for CEng or IEng routes		
M3K127005	Casework and engineering laboratory (for CEng route)	20
M3K202923	Project - Unclassified (for IEng route)	20
<b>Exit Award – Bachelor of Engineering in Building Services Engineering</b>		<b>120</b>
<b>Year 4 (SCQF 10)</b>		
<b>Module Code</b>	<b>Module Title</b>	<b>Credit</b>
MHH227001	Heating & Air Conditioning 2	20
MHH221946	Energy Efficiency & Design Studies	20
MHH123180	The Engineer in Business	20
MHH227002	Building Services Engineering Design 2	20
MHK227003	Project - BEng	40
<b>Exit Award – Bachelor of Engineering with Honours in Building Services Engineering</b>		<b>120</b>

## 8. ASSESSMENT REGULATIONS

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

[GCU Assessment Regulations](#)

The Honours Classification is calculated based on the average marks of Year 4 modules only, as below:

First Class: 70% and above

Second Class Upper: 60% to 69%

Second Class Lower: 50% to 59%

Third Class: 40% to 49%

**APPROVED EXCEPTIONS CASE: 215**

Exception to the University Undergraduate Assessment Regulations, Section 13 Awarding of Credit for Modules, Subsection 13.2.1 Compensation

*A maximum of 30 credits in a Bachelors or integrated Masters degree programme can be compensated, and a maximum of 20 credits in a Masters degree other than the integrated Masters degree.*