

Undergraduate Programme Specification

BEng (Hons) in Building Services Engineering

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	Bachelor of Engineering (Hons) in Building Services Engineering		
Final Award	Bachelor of Engineering (Hons) in Building Services Engineering		
Awarding Body	Glasgow Caledonian University		
School	School of Science and Engineering		
Department	Construction and Built Environment		
Mode of Study	Full-time (suspended) Part-time		
Location of Delivery	Glasgow Campus		
UCAS Code	K242		
Accreditations (PSRB)	CIBSE		
Period of Approval	From:	November 2021	To: November 2026

2. EDUCATIONAL AIMS OF 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: <i>Year 1 (SCQF 7)</i> 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 Science and Engineering 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 Accreditation of Higher Education Programmes (AHEP), published in August 2020. 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.

Science and Mathematics

The study of engineering requires a substantial grounding in engineering principles, science and mathematics commensurate with the level of study. On successful completion of an approved or accredited programme, an individual will be able to:

C1 Apply knowledge of mathematics, statistics, natural science and engineering principles to the solution of complex problems. Some of the knowledge will be at the forefront of the particular subject of study.

Engineering Analysis

Engineering analysis involves the application of engineering concepts and tools to analyse, model and solve problems. At higher levels of study engineers will work with information that may be uncertain or incomplete. On successful completion of an approved or accredited programme, an individual will be able to:

C2 Analyse complex problems to reach substantiated conclusions using first principles of mathematics, statistics, natural science and engineering principles

C3 Select and apply appropriate computational and analytical techniques to model complex problems, recognising the limitations of the techniques employed.

C4 Select and evaluate technical literature and other sources of information to address complex problems

Design and Innovation

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 commensurate

with the level of study. On successful completion of an approved or accredited programme, an individual will be able to:

C5 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 and safety, diversity, inclusion, cultural, societal, environmental and commercial matters, codes of practice and industry standards.

C6 Apply an integrated or systems approach to the solution of complex problems.

The Engineer and Society

Engineering activity can have a significant societal impact and engineers must operate in a responsible and ethical manner, recognise the importance of diversity, and help ensure that the benefits of innovation and progress are shared equitably and do not compromise the natural environment or deplete natural resources to the detriment of future generations. On successful completion of an approved or accredited programme, an individual will be able to:

C7 Evaluate the environmental and societal impact of solutions to complex problems and minimise adverse impacts

C8 Identify and analyse ethical concerns and make reasoned ethical choices informed by professional codes of conduct

C9 Use a risk management process to identify, evaluate and mitigate risks (the effects of uncertainty) associated with a particular project or activity

C10 Adopt a holistic and proportionate approach to the mitigation of security risks

C11 Adopt an inclusive approach to engineering practice and recognise the responsibilities, benefits and importance of supporting equality, diversity and inclusion.

Engineering Practice

The practical application of engineering concepts and tools, engineering and project management, teamwork and communication skills. Engineers also require a sound grasp of the commercial context of their work, specifically the ways an organisation creates, delivers and captures value in economic, social, cultural or other contexts. On successful completion of an approved or accredited programme, an individual will be able to:

C12 Use practical laboratory and workshop skills to investigate complex problems

C13 Select and apply appropriate materials, equipment, engineering technologies and processes, recognising their limitations

C14 Discuss the role of quality management systems and continuous improvement in the context of complex problems

C15 Apply knowledge of engineering management principles, commercial context, project and change management, and relevant legal matters including intellectual property rights

C16 Function effectively as an individual, and as a member or leader of a team

C17 Communicate effectively on complex engineering matters with technical and non-technical audiences

C18 Plan and record self-learning and development as the foundation for lifelong learning/CPD.

3. LEARNING OUTCOMES

The programme provides opportunities for students to develop and demonstrate knowledge and understanding, qualities, skills and other attributes. The programme outcome statements are

presented below and a module map which illustrates the relationship between the programme outcome statements and modules is shown in Section 11. The learning outcomes listed below have been developed from 3 main sources:

- The QAA Benchmark Statements for Engineering (2006)
- The Engineering Council document titled 'The Accreditation of Higher Education Programmes', August 2020. This is part of the UK-SPEC documentation that now regulates the profession
- Generic GCU learning outcome requirements which require these outcomes to be specified under the 4 main headings as listed below. This classification into 4 categories is in alignment with the general learning outcomes identified by UK-SPEC, but is not in alignment with the specific learning outcomes.

The Engineering Council document is a fundamental support and reference document to this Programme Specification and contains the programme specific learning outcomes in much greater detail, especially in relation to knowledge, understanding and engineering abilities.

A: Knowledge and understanding;

- A1 Mathematics and Physics as deemed relevant for Chartered Engineers
- A2 Fundamental concepts, principles and theories of Electrical, Mechanical & Control Engineering, Thermodynamics and Fluid Mechanics
- A3 Principles of IT and Communications relevant to a Chartered Engineer
- A4 Principles of Design & Design techniques specific to the design of building services systems, utilising appropriate codes of practice
- A5 Characteristics of Engineering Materials and Components
- A6 Management and Business practices, including professional and ethical responsibilities and health and safety
- A7 Commissioning and Operation of Building Services Installations

B: Practice: Applied knowledge, skills and understanding;

- B1 Ability to select and apply appropriate mathematical methods for modelling and analysing engineering problems
- B2 Use of scientific principles in the development of engineering solutions to practical problems
- B3 Use of scientific principles in the modelling and analysis of engineering systems, processes and products
- B4 Ability to select and apply appropriate computer based methods for modelling and analysing engineering problems
- B5 Analysis of systems, processes and components requiring engineering solutions
- B6 Creation of new designs through synthesis of ideas from a wide range of sources
- B7 Ability to produce solutions to problems through the application of engineering knowledge and understanding

C: Generic cognitive skills;

- C1 Skill in the use of appropriate mathematical methods for modelling and analysing discipline specific engineering problems.
- C2 Use of relevant test and measurement equipment and experimental lab work
- C3 Use of engineering IT tools
- C4 Design of a system, component or process
- C5 Practical testing of design ideas in the laboratory or through simulation or design & build with technical analysis/appraisal and critical review/evaluation of the results, specifications etc

C6 Project management + ability to operate in commerce/industry in a range of situations

D: Communication, numeracy and ICT skills

- D1 Manipulation of, sorting and presentation of data in various ways
- D2 Use of general IT skills
- D3 Use of scientific evidence based methods in the solution of problems
- D4 Use of creativity and innovation in problem solving
- D5 Effective communication
- D6 The engineering approach to the solution of problems
- D7 Teamwork and leadership
- D8 Managing one's own learning and development including management and organisational skills/ time & resource management

E: Autonomy, accountability and working with others.

- E1 Knowledge of International Issues regarding building services engineering
- E2 Reliability, Integrity, honesty and ethical awareness
- E3 Ability to prioritise tasks and time management
- E4 Interpersonal skills, team working and leadership
- E5 Operate effectively in a group to achieve an effective policy or technical solution(s)
- E6 Planning, monitoring, reviewing and evaluating own learning and development

Engineering Applications (EA1 and EA2)

Engineering Applications are a requirement for all engineering graduates. EA1 and EA2 are an integral part of the programme and are discussed in detail in the Student Handbook. The main objective in emphasising applications is to provide relevant links between engineering education and its application in industry and practice. This contributes towards the establishment of a firm foundation and structure for future and professional development thus enabling graduates working at a professional level to appreciate and be responsive to the appropriate technological environment, with the business expertise needed in industrial based companies.

EA1 experience of all students will be carefully reviewed on entry to the programme and tuition in the relevant areas provided as necessary. It is expected that the majority of students, who are all part-time and have normally completed an HNC, will have already satisfied most of the criteria.

The EA2 objectives (and contributions to EA1 objectives) are provided within the framework of all modules by maintaining a practical approach to taught material and by relating subjects to real applications whenever possible and appropriate.

Teaching and learning methods used to enable learning outcomes to be achieved consist of the following:

- Lectures, seminars, tutorials, laboratories, industrial visits, individual projects, artefact/process studies, peer assisted study sessions, visiting industrialist lectures and computer applications activities.

Assessment methods used to demonstrate achievement of learning outcomes consist of the following:

- Formal unseen examinations, major & minor course-works, class tests, poster displays, student oral presentations, computer-based exercises and completion of log books.

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: <https://www.gcu.ac.uk/study/courses/beng-hons-building-services-engineering-glasgow>

All students entering the programme are required to adhere to the [GCU Code of Student Conduct](#).

7. PROGRAMME STRUCTURE AND AVAILABLE AND FINAL EXIT AWARDS¹						
The following modules are delivered as part of this programme: 13BSVENG_P09G1						
Module Code	Module Title	Core or Optional	SCQF Level	Credit Size	Coursework %	Examination %
Year 1						
M2H823551	Energy Resources, Generation and Utilisation	C	8	20	30	70
M1H626680	Electrical Principles	C	7	20	100	
M1K227068	Building Services Drawing and Design Software	C	7	20	50, 50	
M1H323563	Engineering Mathematics	C	7	10	30	70
M2H621952	Control Eng Principles & Apps	C	8	20	50, 50	
Year 2						
M2H326684	Mathematics 2	C	8	20	50	50
M2H326996	Applied Thermo – Fluids	C	8	20	40	60
M2H624585	Electrical Distribution Systems	C	8	10	50	50
M3H123717	Project and Programme Management Principles	C	9	20	100	
M3H327004	Materials & Mechanical Engineering Design	C	9	20	40	60
Year 3						
M3H226999	Heating & Air Conditioning 1	C	9	20	40	60
M3H227000	Building Services Engineering Design 1	C	9	20	50	50
M3K227059	Energy in Buildings	C	9	30	50, 50	
M3H127085	The Engineer and the Environment	C	9	20	40	60
Year 4						
MHH227001	Heating & Air Conditioning 2	C	10	20	40	60
MHH221946	Energy Efficiency & Design Studies	C	10	20	40, 60	
MHH123180	The Engineer in Business	C	10	20	50, 50	
MHH227002	Building Services Engineering Design 2	C	10	20	50	50
MHK227003	Project - BEng	C	10	40	10, 20, 70	

¹ Periodically, programmes and modules may be subject to change or cancellation. Further information on this can be found on the GCU website here:

<https://www.gcu.ac.uk/currentstudents/essentials/policiesandprocedures>

The following modules are delivered as part of this programme: 13BSVENG_F09G1 (Currently suspended for new intake)						
Module Code	Module Title	Core or Optional	SCQF Level	Credit Size	Coursework %	Examination %
Year 1						
M1G121961	Applied Mathematics 1	C		20		70, 30
M1K203077	Professional Orientation & Practice	C		20	50, 50	
M1H120901	Fluid Mechanics and Thermodynamics	C		20	40	60
M1H120822	Structural Mechanics (statics & Dynamics)	C		20	20, 10	70
M1H623526	Electrical Principles & Circuit Theory	C		20	40, 60	
M1K902905	Environmental Physics and design	C		20	40, 30, 30	
Year 2						
M2H326684	Mathematics 2	C	8	20	50	50
M2H326996	Applied Thermo – Fluids	C	8	20	40	60
M2H630297	Electrical Distribution Systems	C	8	20	50	50
M2H721926	Engineering Design & Analysis 2	C	8	20	30	70
M2H621952	Control Engineering Principles & Apps	C	8	20	50, 50	
M2H823551	Energy Resources, Generation and Utilisation	C	8	20	30	
Year 3						
M3H226999	Heating & Air Conditioning 1	C	9	20	40	60
M3H227000	Building Services Engineering Design 1	C	9	20	50	50
M3H127056	Computer Aided Design	C	9	10	50, 50	
M3K227059	Energy in Buildings	C	9	30	50, 50	
M3H127085	The Engineer and the Environment	C	9	20	40	60
and one of the following 2 modules for CEng or IEng routes						
M3K127005	Casework and engineering laboratory (for CEng route)	C	9	20	50, 50	
M3K202923	Project - Unclassified (for IEng route)	C	9	20	50, 20	10, 20
Year 4						
MHH227001	Heating & Air Conditioning 2	C	10	20	40	60
MHH221946	Energy Efficiency & Design Studies	C	10	20	40, 60	
MHH123180	The Engineer in Business	C	10	20	50, 50	
MHH227002	Building Services Engineering Design 2	C	10	20	50	50
MHK227003	Project - BEng	C	10	40	10, 20, 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 programme²:

Certificate of Higher Education in Building Services Engineering - *achieved upon successful completion of 120 credits*

Diploma of Higher Education in Building Services Engineering - *achieved upon successful completion of 240 credits*

Bachelor of Engineering in Building Services Engineering - *achieved upon successful completion of 360 credits*

Bachelor of Science with Honours in Building Services Engineering - *achieved upon successful completion of 480 credits*

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:

<https://www.gcu.ac.uk/aboutgcu/services-and-facilities/qualityassuranceandenhancement/regulations-and-policies>

In addition to the GCU Assessment Regulations noted above, this programme is subject to Programme Specific Regulations in line with the following approved Exceptions.

PROGRAMME EXCEPTION(S) (CASE No 53a):

The Honours Classification for BEng (Hons) Building Services Engineering is calculated using only the 120 credits undertaken in the final year of study for full-time and Year 4 + Year 5 for the part-time programmes. Classification can be achieved based on the average mark as below:

First Class: 70% and above

Second Class Upper: 60% to 69%

Second Class Lower: 50% to 59%

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.

Third Class: 40% to 49%

APPROVED EXCEPTIONS (CASE No 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.

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.

<i>Version Number</i>	<i>Changes/Updates</i>	<i>Date Changes/Updates made</i>	<i>Date Effective From</i>
1.0	PSP transferred to updated template	July 2026	July 2026