



**SCHOOL OF BUILT AND NATURAL
ENVIRONMENT**

PROGRAMME SPECIFICATION DOCUMENT

**BENG (Hons) BUILDING SERVICES
ENGINEERING**

ACADEMIC YEAR 2018-19

CONTENTS

1	GENERAL INFORMATION.....	3
2	EDUCATIONAL AIMS OF THE PROGRAMME	4
2.1	Introduction.....	4
2.2	Mission Statement for the Degree.....	6
2.3	Raison D’Etre for the Programme	6
2.4	Standards and Expectations of the Programme.....	7
3	INTENDED LEARNING OUTCOMES	11
3.1	Knowledge & Understanding.....	11
3.2	Intellectual Abilities	11
3.3	Practical Skills	12
3.4	General Transferable Skills	12
4	PROGRAMME STRUCTURES AND REQUIREMENTS, LEVELS MODULES, CREDITS AND AWARDS	13
5	SUPPORT FOR STUDENTS AND THEIR LEARNING	15
6	CRITERIA FOR ADMISSION.....	16
6.1	Normal Entry Requirements.....	16
6.2	Admissions Policy - General.....	17
6.3	Admissions Policy - First Year (Level 1).....	17
6.4	Admissions Policy - DIRECT Entry	17
6.5	Students with an unclassified degree in the discipline.....	18
6.6	Mature Students and Wider Access	18
6.7	Progression Through the Programme.....	18
7	METHODS FOR EVALUATING AND IMPROVING THE QUALITY AND STANDARDS OF TEACHING AND LEARNING.....	19

7.1	Mechanisms for Review and evaluation of teaching, learning, assessment, the curriculum and outcome standards	19
7.2	Committees with responsibility for monitoring and evaluating quality and standards.....	19
7.3	Staff development priorities	19
8	REGULATION OF ASSESSMENT	20
8.1	Assessment rules and Honours classification	20
8.2	Role of External Assessors	21
9	INDICATORS OF QUALITY AND STANDARDS.....	21
10	KEY SOURCES OF INFORMATION.....	21
11	MAPPING	21

This document updated on 26th June 2018

1 GENERAL INFORMATION

1.1	Awarding Institution:	Glasgow Caledonian University
1.2a	Teaching Institution:	Glasgow Caledonian University
1.2b	Work Based Learning:	Not applicable
1.3a	Programme Accreditations:	Chartered Institute of Building Service Engineers (CIBSE) – to 2018 Energy Institute (IE) – to 2018
1.3b	Programme Commencement:	Part-Time 1994 Full-Time 2011
1.3c	Most Recent Programme Approval:	March 2016
1.4	Final Award:	BEng (Hons) in Building Services Engineering
1.5	Programme Title:	BEng (Hons) in Building Services Engineering
1.6	UCAS Code:	K242
1.7	Subject Benchmark Statement:	Engineering
1.8	Date of PS preparation/revision	Academic year 2018-19

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 management.

Competitiveness of organisations increasingly depends upon the ability to acquire knowledge and to make effective use of new technologies. They therefore require staff with both specific and multidisciplinary knowledge and expertise. This requirement is addressed by the BEng degree programme which aims to produce engineers with a broad understanding of current technology within the context of modern industrial practice as well as with a sound understanding of traditional engineering. Students graduating with this degree will have the specialist knowledge that should enable them to contribute towards specific design work and to lead teams of engineers working within the discipline of Building Services Engineering. They should also understand and appreciate the business environment within which they are operating.

Because of the acknowledged importance of both the electrical and mechanical subjects, an attempt is made to provide an appropriate balance with respect to both these disciplines. Also included are all the other subject areas, such as mathematics, Information Technology, management studies, health and safety, industrial studies etc that one would expect to find in a broad-based engineering degree.

Learning and teaching strategies will be developed and implemented, appropriate to students' needs to enable all students to participate fully in the programme.

At each level of the programme:

Level 1 (SHE1)

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.

Level 2 (SHE2)

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.

Level 3 (SHE3)

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.

Level 4 (SHEH)

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 MISSION STATEMENT FOR THE DEGREE

To produce Building Services Engineers with a sound understanding of engineering principles, specialist knowledge of the engineering and technological disciplines most closely associated with Building Services, a good knowledge of the industry and the constraints within which Building Services Engineers operate, the ability to undertake design work resulting in solutions that comply with the latest ideas on sustainability and in a manner that gives due consideration to consequences in the widest context, good personal skills and a positive attitude towards lifelong learning and professional development.

2.3 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 Board 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 were originally itemised specifically in the Engineering Council document 'UK Standard for Professional Engineering Competence UK-SPEC (2004)'. Learning outcomes from this document have subsequently been updated and are specified in the document 'Accreditation of HE Programmes' (AHEP, May 2014). These criteria are used to regulate the learning experience on the GCU degree.

2.4 STANDARDS AND EXPECTATIONS OF THE PROGRAMME

The BEng programme is a part-time 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). Learning Outcomes have subsequently been updated to reflect the Learning Outcomes specified in the document 'Accreditation of HE Programmes (AHEP) (May 2014). 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 (updated –May 2014)

Graduates from BEng (Hons) Building Services Engineering taught at GCU should achieve the following learning outcomes, which comply with the learning outcomes specified in AHEP(3rd edition 2014) for BEng (Honours) degrees. The various outcomes are sub-divided into six broad categories.

Science and Mathematics (SM)

Engineering is underpinned by science and mathematics, and other associated disciplines, as defined by the relevant professional engineering institution(s). Graduates will need:

- *SM1b - 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.*
- *SM2b - 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.*
- *SM3b - Ability to apply and integrate knowledge and understanding of other engineering disciplines to support study of their own engineering.*

Engineering Analysis (EA)

Engineering analysis involves the application of engineering concepts and tools to the solutions of engineering problems. Graduates will need:

- *EA1b - Understanding of engineering principles and the ability to apply them to analyse key engineering processes.*
- *EA2 - Ability to identify, classify and describe the performance of systems and components through the use of analytical methods and modelling techniques.*
- *EA3b - Ability to apply quantitative and computational methods in order to solve engineering problems and to implement appropriate action.*
- *EA4b - Understanding of, and the ability to apply, an integrated or systems approach to solving engineering problems.*

Design (D)

Design at this level 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 need the knowledge, understanding and skills to:

- *D1 - Understand and evaluate business, customer and user needs, including considerations such as the wider engineering context, public perception and aesthetics.*
- *D2 - 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.*
- *D3b - Work with information that may be incomplete or uncertain and quantify the effect of this on the design.*
- *D4 - 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.*
- *D5 - Plan and manage the design process, including cost drivers, and evaluate outcomes.*
- *D6 - Communicate their work to technical and non-technical audiences.*

Economic, legal, social, ethical and environmental context (EL)

Engineering activity can have impacts on the environment, on commerce, on society and on individuals. Graduates therefore need the skills to manage their activities and to be aware of the various legal and ethical constraints under which they are expected to operate, including:

- *EL1 - Understanding of the need for a high level of professional and ethical conduct in engineering and a knowledge of professional codes of conduct.*
- *EL2 - Knowledge and understanding of the commercial, economic and social context of engineering processes.*
- *EL3 - Knowledge and understanding of management techniques, including project management, that may be used to achieve engineering objectives.*
- *EL4 - Understanding of the requirement for engineering activities to promote sustainable development and ability to apply quantitative techniques where appropriate.*
- *EL5 - Awareness of relevant legal requirements governing engineering activities, including personnel, health & safety, contracts, intellectual property rights, product safety and liability issues.*
- *EL6 - Knowledge and understanding of risk issues, including health and safety, environmental and commercial risk, and of risk assessment and risk management techniques.*

Engineering Practice (P)

This is the practical application of engineering skills, combining theory and experience, and use of other relevant knowledge and skills. This can include::

- *P1 - Understanding of contexts in which engineering knowledge can be applied (eg operations and management, application and development of technology, etc).*
- *P2 - Knowledge of characteristics of particular materials, equipment, processes or products.*
- *P3 - Ability to apply relevant practical and laboratory skills.*
- *P4 - Understanding of the use of technical literature and other information sources.*
- *P5 - Knowledge of relevant legal and contractual issues.*
- *P6 - Understanding of appropriate codes of practice and industry standards.*
- *P7 - Awareness of quality issues and their application to continuous improvement.*
- *P8 - Ability to work with technical uncertainty.*
- *P11 - Understanding of, and the ability to work in, different roles within an engineering team.*

Additional general Skills (G)

Graduates must have developed transferable skills, additional to those set out in the other outcomes, that will be of value in a wide range of situations, including the ability to:

- *G1 - Apply their skills in problem solving, communication, working with others, information retrieval, and the effective use of general IT facilities.*
- *G2 - Plan self-learning and improve performance, as the foundation for lifelong learning/CPD.*
- *G3 - Plan and carry out a personal programme of work, adjusting where appropriate.*
- *G4 - Exercise initiative and personal responsibility, which may be as a team member or leader.*

3 INTENDED 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’, May 2014. This relates to the UK-SPEC documentation that now regulates the profession
- Generic GCU learning outcome requirements however 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.

3.1 KNOWLEDGE & UNDERSTANDING

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

3.2 INTELLECTUAL ABILITIES

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

3.3 PRACTICAL SKILLS

<i>Programme Outcome</i>	
<i>C1.</i>	<i>Skill in the use of appropriate mathematical methods for modelling and analysing discipline specific engineering problems.</i>
<i>C2.</i>	<i>Use of relevant test and measurement equipment and experimental lab work.</i>
<i>C3.</i>	<i>Use of engineering IT tools</i>
<i>C4.</i>	<i>Design of a system, component or process.</i>
<i>C5.</i>	<i>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.</i>
<i>C6.</i>	<i>Project management + ability to operate in commerce/industry in a range of situations</i>

3.4 GENERAL TRANSFERABLE SKILLS

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

Teaching, Learning and Assessment

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 PROGRAMME STRUCTURES AND REQUIREMENTS, LEVELS MODULES, CREDITS AND AWARDS

BEng (Hons) Building Services Engineering (Part Time) – Programme Structure

Year 1				
Module Title	Level	Credits	Semester	Code
Thermo-Fluid Science	2	20	B	M2H321917
Electrical Principles & Circuit Theory	1	20	A	M1H623526
Building Services Design Software	1	20	AB	M1K223962
Engineering Mathematics	1	10	B	M1H323563
Control Eng Principles & Apps	2	20	AB	M2H621952
Year 2				
Module Title	Level	Credits	Semester	Code
Mathematics 2A	2	10	A	M2H323566
Mathematics 2B	2	10	B	M2H323567
Applied Thermo - Fluids	2	20	A	M2H321916
Computer Aided Design	2	10	A	M2H102878
Electrical Systems	2	10	B	M2H624225
Materials & Mechanical Engineering Design	3	20	B	M3H302924
The Engineer as Manager	3	20	B	M3H113323
Year 3				
Module Title	Level	Credits	Semester	Code
Heating & Air Conditioning 1	3	20	A	M3H221915
Building Services Eng. Design 1	3	20	A	M3H221914
Energy in Buildings	3	30	B	M3K224786
The Engineer and the Environment	3	20	B	M3H113325
Year 4				
Module Title	Level	Credits	Semester	Code
Heating & Air Conditioning 2	4 (H)	20	A	MHH221911
Energy Efficiency & Design Studies	4 (H)	20	AB	MHH221946
The Engineer in Business	4 (H)	20	AB	MHH123180
Building Services Eng. Design 2	4 (H)	20	B	MHH221913
Project - BEng	4 (H)	40	AB	MHK202935

BEng (Hons) Building Services Engineering (Full Time) – Programme Structure

Year 1				
Module Title	Level	Credits	Semester	Code
Applied Mathematics 1	1	20	AB	M1G121961
Professional Orientation & Practice	1	20	AB	M1K203077
Fluid Mechanics and Thermodynamics	1	20	AB	M1H120901
Structural Mechanics (stats & Dyn)	1	20	AB	M1H120822
Electrical Principles & Circuit Theory	1	20	A	M1H623526
Environmental Physics and design	1	20	AB	M1K902905
Year 2				
Module Title	Level	Credits	Semester	Code
Thermodynamics & Fluid Mechanics	2	20	A	M2H323512
Engineering Design & Analysis 2	2	20	B	M2H721926
Mathematics 2A	2	10	A	M2H323566
Mathematics 2B	2	10	B	M2H323567
Integrated Engineering Studies 2	2	10	A	M2H623625
Control Engineering Principles & Apps	2	20	AB	M2H621952
Applied Thermo-Fluids	2	20	AB	M2H321916
Electrical Systems	2	10	B	M2H624225
Year 3				
Module Title	Level	Credits	Semester	Code
Heating and Air Conditioning 1	3	20	A	M3H221915
Building Services Engineering Design 1	3	20	A	M3H221914
Computer Aided Design	3	20	AB	M3H102879
Energy in Buildings	3	30	B	M3K224786
The Engineer and the Environment	3	20	B	M3H113325
and one of the following 2 modules – for CEng or IEng routes				
Casework & Design (for CEng route)	2	20	AB	M2K102913
Project - Unclassified (for IEng route)	3	20	AB	M3K202923
Year 4				
Module Title	Level	Credits	Semester	Code
Heating and Air Conditioning 2	4 (H)	20	A	MHH221911
Energy Efficiency & Design Studies	4 (H)	20	AB	MHH221946
The Engineer in Business	4 (H)	20	AB	MHH123180
Building Services Engineering Design 2	4 (H)	20	B	MHH221913
Project - BEng	4 (H)	40	AB	MHK202935

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.

5 SUPPORT FOR STUDENTS AND THEIR LEARNING

- Induction programme for orientation, study skills and CIT.
- Student Handbook, Module Handbooks and Module Descriptors.
- Extensive on-site library with access to other local and national library resources.
- Study skill packages.
- Academic Advisors.
 - First Year: Dr Mark Phillipson
 - Second Year: Dr Robert Hoare
 - Third Year: Dr Marek Maletka
 - Fourth Year: Dr Krystyna Curtis
- The School operates an 'open-door' policy. All students can utilise the core programme team as personal tutors to advise on pastoral or academic issues.
- Programme Organiser provides a single point of contact for students to raise programme operational issues.
- Visiting lecturers invited from industry and commerce to contribute to programme delivery.
- Access to Student Support Services.
- Directed studies point students towards key resources which they study out-with direct contact time (this is a key element for part-time students).
- Computer Assisted Learning employed.

- Student project work developed in close consultation with industry and commerce.
- Professional Liaison Group to develop bonds between the programme and the profession.
- Artefacts laboratory and site visits to promote the development of applications.
- Opportunities to transfer between engineering programmes.

6 CRITERIA FOR ADMISSION

6.1 NORMAL ENTRY REQUIREMENTS

Part Time Study: Normal entry requirements are as follows:

All applicants would normally be expected to be employed in the building services industry and to have some relevant work experience.

- | | |
|---------------|---|
| Year 1 | HNC award, with evidence of a firm grasp of the curriculum, or an equivalent in a relevant subject area. |
| Year 2 | HND award, with evidence of a firm grasp of the curriculum, or an equivalent in a relevant subject area. |
| Year 3 | Students with a suitable HND main gain entry to year 3, but would be asked to do additional modules to enable them to acquire 120 credits at level 3. |
| Year 4 | No direct entry (other than transfer from equivalent BEng programmes) |

Full Time Study: Normal entry requirements are as follows:

- | | |
|---------------|---|
| Year 1 | Students will be required to obtain 4 passes at Scottish Higher level with grades of BBBC (or an equivalent). One of these passes should be in Mathematics. English is a preferred subject. |
| Year 2 | HNC award, with evidence of a firm grasp of the curriculum, or an equivalent in a relevant subject area |
| Year 3 | HND award, with evidence of a firm grasp of the curriculum, or an equivalent in a relevant subject area |
| Year 4 | No direct entry (other than transfer from equivalent BEng programmes) |

6.2 ADMISSIONS POLICY - GENERAL

The admissions policy will be as flexible as is commensurate with the maintenance of standards. Entry to building services programmes at the university will be treated in a holistic manner, all possible options being considered and the most appropriate chosen to suite the circumstances of the student.

All students starting the BEng programme will be given the opportunity to attend an induction day. Included in this will be a lecture giving an overview of the technical content of the programme, a lecture on how the university functions, a tour of university facilities, an introduction to the university library facilities and instruction in their use, an introductory class on basic computing skills and a class to encourage the development of study skills.

6.3 ADMISSIONS POLICY - FIRST YEAR (LEVEL 1)

It will not be standard practice to interview all students applying for the programme, but an invitation will be given to all applicants to come along to the university for an informal discussion about the programme and for a tour of the facilities. In the event that the potential of a candidate is not apparent from the application form, the applicant will be informed that an interview is required and the visit to the university will be used to provide the opportunity for this.

In assessing a candidates potential, priority will be given to students with good mathematical, communication and technical skills.

6.4 ADMISSIONS POLICY - DIRECT ENTRY

It will be an important part of the admissions policy of the programme to market and promote direct entry to the programme. Every application will be considered on its merits and the appropriate entry point identified. Although it is traditional for students to start a programme of study in September/October at the beginning of the academic year (semester A), the modularised teaching schedule allows entry at the start of semester B with no difficulty. For this programme, entry at the start of semester B will be considered to be a **normal** entry point.

The option of allowing students to start before either semester A or semester B as appropriate gives the programme a much improved degree of flexibility. In many cases, for example, it will not be possible to give a student applicant exemption from a complete level of the programme on the basis of prior learning. In such a case, it may be appropriate to give the student exemption from the modules from one semester. This might imply a semester B entry point to the programme.

In some special cases, direct entrants might be asked to do a slightly modified set of modules in the first year of study on the programme to improve the match between the material on the

programme and the student's prior learning. In such a case, the student would be given, and asked to sign, a personal study plan.

6.5 STUDENTS WITH AN UNCLASSIFIED DEGREE IN THE DISCIPLINE

The former BSc unclassified degree programme in Building Services Engineering taught at GCU is no longer offered. However, students who have graduated from this course (or any equivalent course) would be given access to year 3 of the full-time or part-time degree programmes. In addition to this, some module exemptions may be offered. The focus would be on ensuring that the student was suitably prepared for the Honours year.

6.6 MATURE STUDENTS AND WIDER ACCESS

Students will normally be deemed 'mature' if they are 23+ years of age and they have a post school experience relevant to the area of study that they apply for. Clearly, since the programme is for a part-time mode of study, many applicants would come into this category and would be accepted onto the programme on the basis of the normal entry requirements given above. Other mature students who do not strictly meet the normal entry requirements may be admitted onto the programme on the basis of Wider Access. This policy would be adopted if the prospective student was thought to be capable of satisfactorily completing the programme and the numbers in this category were not too large.

Effort will be made by the programme management team to ensure that mature students accepted onto the programme on the basis of Wider Access get adequate tutorial assistance, especially in the early part of their studies. This may involve scheduling additional classes.

6.7 PROGRESSION THROUGH THE PROGRAMME

The conditions and regulations that apply to progression through the programme are given in the document 'University Regulations for Assessments within Undergraduate Programmes'. These regulations indicate that all decisions relating to progression are made by the Assessment Board for the programme. The Assessment Board will convene twice per year, once in May/June at the end of semester B, and again after the re-sit examinations which will be scheduled for August.

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

7.1 MECHANISMS FOR REVIEW AND EVALUATION OF TEACHING, LEARNING, ASSESSMENT, THE CURRICULUM AND OUTCOME STANDARDS

- Module reviews (feedback questionnaires and staff report)
- Annual module and programme reviews by subject groups and programme boards
- Periodic review and revalidation involving external panel members
- Programme accreditation by professional body (CIBSE)
- External Assessors reports

7.2 COMMITTEES WITH RESPONSIBILITY FOR MONITORING AND EVALUATING QUALITY AND STANDARDS

- Student Staff Consultative Group(s)
- Programme Board
- Subject Group(s)
- Departmental Board
- Faculty Academic Quality and Standards Committee
- University Academic Quality and Standards Committee
- University Learning and Teaching Committee
- Assessment Board

7.3 STAFF DEVELOPMENT PRIORITIES

- Staff Development and Performance Review (SDPR) scheme and institutional staff development courses
- Support and encouragement for scholarly activity and continuing professional development
- School research groups
- Institutional learning and teaching workshops
- Regular research forums for staff and students

8 REGULATION OF ASSESSMENT

8.1 ASSESSMENT RULES AND HONOURS CLASSIFICATION

- Assessment and award details are provided in the University Assessment Regulations, with an abbreviated version included in the Student Handbook.
- The minimum pass mark is an overall 40% for each module of study. Each module has either a mixture of exam and course-work with appropriate weighting, or is based entirely on continuous assessment.
- To qualify for the award of an Honours Degree, students must complete all the programme requirements and obtain (or gain exemption by direct entry or by accreditation of prior learning, APEL) 480 SCOTCAT credit points. This would normally equate to 120 credits at each of levels 1, 2, 3 and 4 (H). The university now allows some relaxation in the distribution of credits between levels. This may be taken into account when assessing prior learning.
- The aggregate marks required to get certain categories of award are listed below:

First Class	Above 70%
Upper Second Class	60% - 69%
Lower Second Class	50% - 59%
Third Class	40% - 49%

- The award classification is based on the aggregate mark achieved in level 4 (SHEH) modules only. Alternatively a 'profiling method' may be used as discussed in the University Assessment Regulations. The student would receive the highest award indicated by the 2 alternative methods.
- Students may exit after year 3 and receive an unclassified BEng award if 360 credit points have been achieved at the appropriate levels (including any exemptions or APEL).
- Students who enter year 3 of the programme by direct entry from another institution must complete 120 credits at the appropriate level to be eligible for the award of unclassified BEng.
- Students who transfer to the BEng from the BSc Building Services Engineering taught at GCU, having received an unclassified degree, can be awarded BEng Building Services Engineering if they complete the 3 modules for the modified year 3 of study on the BEng programme specified for this group of students in the articulation documentation (Appendix A). This award would only be made if the student decides to exit after level 3 or does not qualify for an Honours award. Note that is not possible for direct entrants from another institution to get any GCU award without achieving 120 credits at GCU.

8.2 ROLE OF EXTERNAL ASSESSORS

External Assessors are appointed to Assessment Boards. The key duties of the External Assessors are:

- to ensure that the standard of any award is comparable to the standards of similar awards conferred by Universities in the United Kingdom
- to moderate the work of Internal Assessors
- to attend the meetings of the Assessment Boards and ensure that decisions are consistent with policies and regulations of the University and best practice in higher education
- to report annually to Senate on the standards attained by students and on any other related and appropriate matters.

9 INDICATORS OF QUALITY AND STANDARDS

- The University Quality Assurance procedures provide the checks and balances for evaluating the performance and standards of achievements of both students and staff.
- Each programme is required to provide an Annual Programme Analysis (APA) report.
- Academic Subject Groups are required to monitor module performance.
- Each programme is periodically reviewed according to University procedures.
- Accreditation by Chartered Institute of Building Services Engineers.
- External Assessors appointed by the University Senate to moderate/review examination papers and student scripts and student assessment materials and report annually.
- Student prizes/awards by Institutions/Agencies/Industry.

10 KEY SOURCES OF INFORMATION

- Programme Review Document.
- Student Handbook.
- Annual Programme Analysis (APA) Statement.
- External Assessors' Annual Reports.
- University Handbook.
- University Assessment Regulations.
- SARTOR (1997) and UK-SPEC (2004).

11 MAPPING

The following table (Fig.1) correlates the Engineering Benchmark statements with the programme outcomes as they relate to each Module.

MODULE MAP (PART-TIME)

MODULES	Codes	P R O G R A M M E O U T C O M E S																											
		A1	A2	A3	A4	A5	A6	A7	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	C5	C6	D1	D2	D3	D4	D5	D6	D7	D8
YEAR 1																													
Thermo Fluid Sci	M2H321917	X	X						X	X	X				X							X	X			X	X		X
Elec. Prin. & Circuit	M1H623526	X	X						X	X	X				X		X					X	X			X	X		X
Build Serv Des Sfw.	M1K223962			X																		X	X			X			X
Engineering Maths	M1H323563	X																				X	X			X			X
Control Eng Prin	M2H621952	X	X						X	X	X		X		X		X			X		X	X			X	X		X
YEAR 2																													
Mathematics 2A	M2H323566	X																				X	X			X			X
Mathematics 2B	M2H323567	X																				X	X			X			X
App. Thermo.	M2H321916		X					X	X	X	X		X		X		X					X	X			X	X		X
CAD	M2H102878			X	X							X	X	X	X	X		X				X	X			X	X		X
Elec Systems	M2H624225		X						X	X	X	X	X		X		X	X	X	X		X	X			X	X		X
Mat & Mech Eng	M3H302924	X	X		X	X			X	X	X		X		X		X					X	X			X	X		X
Engineer as Mgr	M3H113323			X			X															X	X	X		X		X	X
YEAR 3																													
Heat & Air Con 1	M3H221915		X					X	X	X	X		X		X	X	X	X				X	X			X	X		X
Build Serv Eng Des 1	M3H221914		X						X	X	X	X	X		X	X						X	X			X	X		X
Energy in Bldgs	M3K224786		X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X		X	X	X		X	X	X	X	X
Eng & Environment	M3H113325	X								X	X											X	X	X		X			X
YEAR 4																													
Heat & Air Con 2	MHH221911		X					X	X	X	X		X	X	X	X		X				X	X		X	X	X		X
Energy & Design	MHH221946		X		X	X			X	X	X	X	X		X	X		X				X	X		X	X	X		X
Eng in Business	MHH123180						X															X	X	X		XX		X	X
Build Serv Eng Des 2	MHH221913		X		X				X	X	X	X	X	X	X	X		X				X	X			X	X		X
Project	MHK202935		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X		X	X	X	X	X

Fig.1 Module Mapping – Part-Time Programme Outcomes and Benchmarks (See code identification on next page)

Knowledge & Understanding of:

- A1. Mathematics and Physics as deemed relevant for Chartered Engineers (E)
- A2. Fundamental concepts, principles and theories of Electrical, Mechanical & Control Engineering, Thermodynamics and Fluid Mechanics (E)
- A3. Principles of IT and Communications relevant to an Chartered Eng. (E)
- A4. Principles of Design & Design techniques specific to the design of Building Services Systems, utilising appropriate codes of practice (E)
- A5. Characteristics of Engineering Materials and Components
- A6. Management and Business practices, including professional and ethical responsibilities etc.
- A7. Commissioning and Operation of Building Services Installations.

Intellectual Abilities

- 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.

Practical 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 lab or through simulation or design & build with technical analysis/appraisal and critical review/evaluation of the results – specification etc.
- C6. Project management + ability to operate in commerce/industry in a range of situations.

General Transferable 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.

MODULE MAP (FULL-TIME)

MODULES	Codes	P R O G R A M M E O U T C O M E S																											
		A1	A2	A3	A4	A5	A6	A7	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	C5	C6	D1	D2	D3	D4	D5	D6	D7	D8
YEAR 1																													
App. Maths.1	M1G121961	X							X													X	X			X			X
POP	M1K203077		X	X		X	X	X									X			X		X	X			X		X	X
Fluid Mech & Therm	M1H120901	X	X						X	X			X		X	X	X					X	X	X		X	X	X	X
Structural Mech	M1H120822	X	X						X	X			X		X	X	X					X	X			X		X	X
Elec. Prin. & Circuit	M1H623526	X	X						X	X	X				X		X					X	X			X	X		X
Env. Physics & Des.	M1K902905	X	X			X	X		X	X	X	X				X		X					X	X			X		
YEAR 2																													
Thermo & Fluids	M2H323512		X					X	X	X	X		X		X		X					X	X			X	X		X
Eng Des & Analys 2	M2H721926		X					X	X	X	X		X		X		X					X	X			X	X		X
Mathematics 2A	M2H323566	X																				X	X			X			X
Mathematics 2B	M2H323567	X																				X	X			X			X
IES	M2H623625		X	X		X	X	X									X			X		X	X			X		X	X
Control Eng Prin	M2H621952	X	X						X	X	X		X		X		X			X		X	X			X	X		X
App. Thermo.	M2H321916		X					X	X	X	X		X		X		X					X	X			X	X		X
Elec Systems	M2H624225		X						X	X	X	X	X		X		X	X	X	X		X	X			X	X		X
YEAR 3																													
Heat & Air Con 1	M3H221915		X					X	X	X	X		X		X	X	X	X				X	X			X	X		X
Build Serv Eng Des 1	M3H221914		X					X	X	X	X	X	X		X	X						X	X			X	X		X
Comp. Aided Des.	M3H102879			X	X	X		X	X	X	X	X	X	X	X	X		X	X			X	X	X	X	X	X	X	X
Energy in Bldgs	M3K224786		X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X		X	X	X	X	X	X	X	X	X
Eng & Environment	M3H113325	X								X	X											X	X	X		X			X
Casework & Design	M2K102913				X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Project BSc (opt)	M3K202923				X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
YEAR 4																													
Heat & Air Con 2	MHH221911		X					X	X	X	X		X	X	X	X			X			X	X			X	X	X	X
Energy & Design	MHH221946		X		X	X		X	X	X	X	X		X	X		X					X	X			X	X	X	X
Eng in Business	MHH123180						X														X	X	X			XX		X	X
Build Serv Eng Des 2	MHH221913		X		X			X	X	X	X	X	X	X	X	X		X				X	X			X	X		X
Project	MHK202935		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

Fig.1 Module Mapping – Full-Time Programme Outcomes and Benchmarks

Knowledge & Understanding of:

- A1. Mathematics and Physics as deemed relevant for Chartered Engineers (E)
- A2. Fundamental concepts, principles and theories of Electrical, Mechanical & Control Engineering, Thermodynamics and Fluid Mechanics (E)
- A3. Principles of IT and Communications relevant to an Chartered Eng. (E)
- A4. Principles of Design & Design techniques specific to the design of Building Services Systems, utilising appropriate codes of practice (E)
- A5. Characteristics of Engineering Materials and Components
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Intellectual Abilities

- B1. Ability to select and apply appropriate mathematical methods for modelling and analysing engineering problems.
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- 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.

Practical 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 lab or through simulation or design & build with technical analysis/appraisal and critical review/evaluation of the results – specification etc.
- C6. Project management + ability to operate in commerce/industry in a range of situations.

General Transferable 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.

