Course Specification

A. Course Information			
Final award title(s)	**BEng (Hons) Building Services Engineering**		
Intermediate exit award title(s)	N/A		
UCAS Code		**Course Code(s)**	**Full time: 2072 Part time: 2090, 5304**
	London South Bank University		
School	☐ ASC ☐ ACI ☒ BEA ☐ BUS ☐ ENG ☐ HSC ☐ LSS		
Division	Civil and Building Services Engineering		
Course Director	Dr Shazia Ali		
Delivery site(s) for course(s)	☒ Southwark ☐ Havering ☐ Other: please specify		
Mode(s) of delivery	☒Full time ☒Part time ☒other please specify		
Length of course/start and finish dates			

Mode	Length years	Start - month	Finish - m
Full time	3 years	September	July
Part time	4.5 years	September	January

Is this course generally suitable for students on a Tier 4 visa?	Please complete the International Office questionnaire Full time (2072): Yes Part time (2090): No	
Approval dates:	Course(s) validated	August 2018
	Course specification last updated and signed off	August 2022
Professional, Statutory & Regulatory Body accreditation	Chartered Institution of Building Services Engineers (CIBSE); Energy Institute (EI)	
Reference points:	Internal	Corporate Strategy 2020-2025 Academic Quality and Enhancement Website School Strategy LSBU Academic Regulations
	External	- Engineering Council, Accreditation of Higher Education Programmes (Third Edition 2014); - CIBSE and Energy Institute for EPA and On-the-Job training programme

		- Industrial Advisory Panel for programme support QAA Quality Code for Higher Education 2018 Framework for Higher Education Qualifications Subject Benchmark Statements (Engineering 2019) PSRB Competitions and Markets Authority SEEC Level Descriptors 2021

B. Course Aims and Features	
Distinctive features of course	LSBU has almost 70 years' expertise in running Building Services Engineering courses and it produces around 50% of graduates in the industry. Our BEng (Hons) course is designed to equip students with the technical, management and communication skills needed to be an effective leader of teams and innovator in the design of building services and energy conservation in buildings. UK buildings are currently responsible for about 45% of the country's total energy consumption and CO_2 emissions. Energy conservation and sustainability therefore form an increasingly important theme in our courses. The first year of the course starts with the development of communication and professional skills alongside the fundamental scientific principles that support the mechanical and electrical building services. Subsequently it provides an introduction to the basic building services such as water services, heating, ventilation and an appreciation of the space planning and safety in buildings. An introduction to the use of commercial software packages is given within the Construction Skills module and further practice of these packages is facilitated within the coursework of the Heating and Ventilation module. In the second year (Level 5) the modules provide advanced mathematics and scientific principles and in-depth study of the systems used in building services such as air conditioning, refrigeration and electrical services. Project and Business Management are also introduced at this stage of the course. The module of Intergraded Building Design provides the opportunity for the students to practice their knowledge in building services systems, develop skills in understanding and communicating with other professionals in the built environment whenever possible and further develop their skills in the use of commercial software packages. The Project and Business Management module, including some innovation and enterprise topics, introduces the development of a business plan. A number of topics cut across both the business and project management areas such as risk management, budgeting, cash flow and other financial considerations in running a business.

	In the fourth year, the emphasis is on sustainability. A specialisation option is offered in the final stages of the course between mechanical and electrical routes. Two modules are common and these are Energy Control & Management and Passive Building Design. The mechanical option offers the study of advanced heat transfer and dynamic thermal performance of buildings, in depth study of low energy systems and resources. The electrical option focuses on lighting, electrical systems and distribution. The final stage of the course is dedicated to the self- managed work done under tutor supervision for the Design Project module. The module culminates the knowledge and skills developed during the course. The projects may be research or design based but with the same theme of energy savings and sustainability. As a BEng course, this course encourages students to acquire a deeper understanding of the essential facts, concepts, theories and principles of mechanical and electrical engineering and its underpinning science and mathematics. These core mathematic, scientific and management skills are needed to meet the requirements of Chartered Engineer status.
Course Aims	The general aim of the course is to develop the students' technical, management, innovation and communication skills in accordance with the requirements of a Chartered Engineer; the emphasis being on developing skills appropriate to a multidisciplinary, integrated building services, sustainability and energy engineering environment. Chartered engineers will be expected to have good technical and management competence, with critical self-awareness and confidence in applying appropriate design solutions. They will be forward looking and able to make independent decisions based on professional judgment. They will be expected to rise to positions of top management and to lead the industry. They will require good analytical and communication skills, to be able to lead design teams, departments and companies, whilst also being able to work independently. The course is specifically relevant to those wishing to join the Chartered Institution of Building Services Engineers (CIBSE) and/or the Energy Institute (EI). With regard to CIBSE the course provides the management, design and technical skills for those working within the building services industry. The interests of the Energy Institute are represented by the emphasis on energy management, low energy design and an awareness of the relationship of buildings to energy resource and supply issues. The BEng (Hons) Building Services Engineering aims to: 1. Produce graduate Building Services Engineers satisfying the academic requirements at BEng (Hons) leading towards becoming a Chartered Engineer.

	2. Produce graduates who are trained in the core discipline of Building Services Engineering with emphasis on design and application and the progress of technology through innovation, creativity and change. 3. Develop graduate's knowledge of mathematics, applied science and engineering methods and also of economics, finance and sustainability in support of the overall aim of the course. 4. Promote the development of research skills, analysis and evaluation of data and the ability to draw conclusions and introduce new concepts and ideas. 5. Promote the development of presentation and communication skills and the ability to argue rationally, draw conclusions and introduce new ideas based on a rigorous and analytical approach to data and systems. 6. Develop students' problem-solving and practical and transferable skills expected of a graduate who will lead multidisciplinary teams with technical, commercial and management staff in industrial and other occupations. 7. Produce graduates capable of leading the profession of Energy and Building Services Engineering in the context of modern practice and sustainable development by introducing and promoting advanced techniques and methods and by developing and extending current technologies. 8. Produce engineers who will have the core competencies and enthusiasm to continue lifelong learning and development.
Course Learning Outcomes	**Course learning outcomes are summarised here and mapped to individual modules in Appendix A. AHEP3 learning outcomes are mapped to individual modules in Appendix B.** **a) Students will have knowledge and understanding of:** A1 Appropriate mathematical methods. A2 Science appropriate to Building Services Engineering. A3 Principles of Information Technology and Communication relevant to building services engineering. A4 General principles of design. A5 Design techniques specific to Building Services Engineering. A6 Management and business practices (including finance, law, marketing, personnel and quality). A7 Professional and ethical responsibilities including the global and social context of engineering. A8 Codes of practice and the regulatory framework requirements for safe operation. **b) Students will develop their intellectual skills such that they are able to:** B1 Analyse systems, processes and components requiring engineering solutions. B2 Select and apply appropriate mathematical methods for modelling and analysing engineering problems. B3 Use scientific principles in the development of engineering solutions to practical problems.

	B4 Use scientific principles in the modelling and analysis of engineering systems and processes. B5 Select and apply appropriate computer-based methods for modelling and analysing problems in building services. B6 Create new processes or systems through synthesis of ideas from a wide range of sources. B7 Undertake technical and commercial risk evaluation. c) **Students will acquire and develop practical skills such that they are able to:** C1 Use relevant test and measurement equipment. C2 Carry out experimental laboratory work. C3 Use engineering IT tools (including programming language where appropriate). C4 Research for information in order to develop ideas further. C5 Carry out a process to test design ideas. Page 5 of 10 C6 Apply engineering techniques taking account of industrial and commercial constraints. C7 Manage projects. **d) Students will acquire and develop transferrable skills such that they are able to:** D1 Manipulate and sort data. D2 Present data in a variety of ways. D3 Solve problems using methods based on scientific evidence. D4 Use creativity and innovation in problem solving. D5 Use IT effectively. D6 Work with limited or contradictory information. D7 Communicate effectively. D8 Manage time and resources effectively. D9 Work effectively as part of a team. D10 Continue lifelong learning.

C. Teaching and Learning Strategy

A Knowledge and understanding

Mathematical methods, science relevant to building services engineering, the basic principles of systems, the codes of practice and regulatory framework and the principles of management are taught in specific classes by formal lectures. Laboratory work is used to further reinforce science and system performance. A3, A4 and A5 are introduced in class and subsequently applied in the design application modules.

B Intellectual skills

B1 through to B4 are supported throughout the curriculum by tutorial sessions, guided private study, laboratory reports and design projects. B5 and B6 are developed at level 5 and Level 6 through design project work. The principles of B7 are introduced in the Project Management & Business Management module at Level 5 as well as the Energy Management & Controls at level 6.

C Practical skills

C1, C2 and C5 are developed with the laboratory work which forms part of about 20% of the modules throughout the curriculum. C3 is taught and applied at all three levels through mainly the coursework project and Intergraded Building Design module. C4, C6 and C7 are developed by the open-ended design projects at all three levels and particularly with the final Major Project.

D Transferrable skills

Transferable skills D1 to D4 are taught, developed and assessed in the Construction Practice module and further developed with the coursework of modules such as that of the Heating and Ventilation (level 4), Intergraded Building Design (level 5) and the Major Project module at level 6.

D. Assessment

A Knowledge and understanding

The understanding of the knowledge base of scientific principles A1, A2 and A6 will be through unseen written examinations and in-class tests. Competency in A3, A4, A5, A7 and A8 will be demonstrated through design and project work.

B Intellectual skills

Written examinations and also laboratory reports and design projects are the main means of assessing B1 to B4**.** Design projects provide the means of assessing B5 and B6 with the Major Project at Level 6 allowing the student to evidence knowledge and understanding of B7

C Practical skills

All aspects of practical skills are assessed through laboratory work and reports and the design project work. All projects are marked for the critical approach to problem solving and project management with the Major Project giving evidence of the Level 6 attainment.

D Transferrable skills

Transferable skills are assessed at level 4 in the Construction Practice module as well as the experimental work and laboratory reports together with the design project work, throughout the curriculum. The Major Project provides the evidence of attainment of all transferable skills at Level 6.

E. Academic Regulations

The University's Academic Regulations apply for this course. Any course specific protocols will be identified here.

https://www.lsbu.ac.uk/__data/assets/pdf_file/0008/84347/Academic_Regulations_2021-2022.pdf

F. Entry Requirements

Applicants for admission to the course should normally possess one of the following qualificatio

GCSE passes in six subjects (grade C or above), including English Language and Physics. The University will accept a pass in the Key Skills qualification at Level 2 in place of GCSE English Language. Additionally, applicants must possess one of the following:

- A Level BBC or;
- BTEC National Diploma DDM or;
- Access to Engineering qualifications with 15 Distinctions and 30 Merits including Maths and Physical Science credit or;
- Equivalent level 3 qualifications worth 128 UCAS points
- Level 3 qualifications must include Maths and Physics
- Applicants must hold 5 GCSEs A-C including Maths and English or equivalent (reformed GCSEs grade 4 or above).

Advanced Entry:

Students with higher qualifications may be admitted, at the discretion of the course director, directly to later years of the course.

Credit for prior learning (APL)
Applicants may be able to use their learning from work or other life experiences to gain academic credit towards their course of study. Applicants need to demonstrate that their learning is equivalent to formal learning on the course and produce satisfactory evidence. If an applicant has gained a qualification from a professional body or another institution this may be credited towards the University qualification via our transfer credit scheme.

G. Course structure(s)

Course overview

Building Services Engineering at London South Bank University is studied at undergraduate level at HND and BEng (Hons) levels. The HND was deliberately designed using many of the original BEng modules to facilitate 'ladders and bridges' between the courses and opportunities were taken to lecture HND and BEng students together where appropriate. External examiners and accreditation panels have expressed general approval with the operation of mixed classes since first used in 1999.

Professional recognition is an important, if not essential, attribute of the course. This is governed by the Engineering Council AHEP for Incorporated (IEng) and Chartered (CEng) Engineers. Students completing a BEng (Hons) are required to undertake further learning to meet the academic requirements of CEng such as an accredited MSc. Alternatively, students may undertake an independent personal development route outside of the University. The BEng (Hons) course contains two routes: a Mechanical Services route and Electrical Services route.

All Level 5 modules are common to both routes and contain a broad mixture of mechanical and electrical services together with management and supporting maths and science. 120 credits must be fulfilled at each level. Of the Level 6 modules, two (40 credits) are dedicated to the specialist route with the remainder being a mix of mechanical and electrical and management. 120 credits must be fulfilled at level 6, where 40 of them are fully dedicated to the Major Project. Details of module content may be derived from individual module guides.

Course overview

The course is delivered in two modes of study:
the full time mode, code: 2072 and
the part time mode, code: 2090.
Both are delivered on a semester pattern; each semester is 15 weeks in duration.

The two tables below show the modules delivered in each term for each year for the full time and part
time respectively. The level of the module is indicated in brackets, e.g.(L4). The 'three character – number-3 digit number' under each module gives the reference code of the module. The letter 'C' or 'O' in brackets by the side of the module code indicates whether the module is CORE or OPTIONAL.

Delivery Schedule for the full time BEng(Hons) Building Services Engineering (2072)

The full time course is delivered over 3 years. Students study 6 X 20 credit-modules in each year, as shown below. Note that the Major Project is a double module (40 credits)

<table>
<tr><th colspan="2">Year 1</th><th colspan="2">Year 2</th><th colspan="2">Year 3</th></tr>
<tr><th>Semester 1</th><th>Semester 2</th><th>Semester 1</th><th>Semester 2</th><th>Semester 1</th><th>Semester 2</th></tr>
<tr><td colspan="2">Engineering Mathematics (L4)
BEA-4-450 (C)</td><td rowspan="2">Advanced Eng Maths
(L5)
BEA-5-460 (C)</td><td rowspan="2">Thermo-fluids Eng
L(5)
BEA-5-461 (C)</td><td rowspan="2">Lighting & Electrical Systems
BEA-6-470 (O)
/
Heat & Mass Transfer Application
BEA-6-471 (O)
L(6)</td><td rowspan="2">Electrical Power Systems & Distribution
BEA-6-472 (O)
/
Thermal Energy Systems
BEA-6-475 (O)
L(6)</td></tr>
<tr><td colspan="2">Construction Practice (L4)
BEA-4-485 (C)</td></tr>
<tr><td>Introduction to Building Services Engineering (L4)
BEA-4-455 (C)</td><td>Building Services Engineering Principles L(4)
BEA-4-451 (C)</td><td>Electrical Services In Buildings L(5)
BEA-5-466 (C)</td><td>R AC&HP
L(5)
BEA-5-462 (C)</td><td colspan="2">Energy Management and Controls (L6)
BEA_6_473 (C)
Passive Building Design L(6)
BEA-6-474 (C)</td></tr>
<tr><td>Internal Environment & Comfort
L(4)
BEA-4-456 (C)</td><td>Heating & Ventilation Systems (L4)
BEA-4-457 (C)</td><td colspan="2">Integrated Building Design L(5)
BEA-5-464 (C)
Project and Business Management
L(5)
BEA-5-465 (C)</td><td colspan="2">Major Project (L6)
BEA-6-476 (C)</td></tr>
</table>

Delivery Schedule for the part time BEng(Hons) Building Services Engineering (2090)

The part time course is delivered over 4.5 years (5 semesters). Students study 2 X 20 credit-modules in each semester, as shown below. Note that the Major Project is a double module (40 credits). The course will run one day per week for 4 years. The 5th year semester 1 is dedicated to the self- managed / tutor supported major project. The students will be expected to have 5

meetings with their tutor; they will have to arrange the meetings with their tutor at a time that suits both parties.

<table>
<tr><th colspan="2">Year 1</th><th colspan="2">Year 2</th><th colspan="2">Year 3</th><th colspan="2">Year 4</th><th>Year</th></tr>
<tr><th>Semester 1</th><th>Semester 2</th><th>Semester 1</th><th>Semester 2</th><th>Semester 1</th><th>Semester 2</th><th>Semester 1</th><th>Semester 2</th><th>Semeste</th></tr>
<tr><td colspan="2">Engineering Mathematics (L4)
BEA-4-450 (C)</td><td rowspan="2">Internal Environ & Comfort L(4)
BEA-4-456 (C)</td><td rowspan="2">Heating & Ventilation Systems (L4)
BEA-4-457 (C)</td><td>Advanced Eng Maths (L5)
BEA-5-460 (C)</td><td>R AC&HP L(5)
BEA-5-462
(C)</td><td>Light & Electr Sys
BEA-6-470 (O)
/
Heat & Mass Transfer Application (O)
L(6)</td><td>Electrical Power Systems & Distribution
BEA-6-472 (O)
/
Thermal Energy Systems
BEA-6-475 (O)
L(6)</td><td rowspan="3">Major Project (
BEA-6-4
(C)</td></tr>
<tr><td colspan="2">Construction Practice (L4)
BEA-4-455 (C)</td><td colspan="2">Integrated Building Design L(5)
BEA-5-464 (C)</td><td colspan="2">Energy Management and Controls
BEA_6_473 (C)</td></tr>
<tr><td>Introduction to Building Services Engineering (L4)
BEA-4-456 (C)</td><td>Building Services Engineering Principles (L4)
BEA-4-451 (C)</td><td>Electrical Services In Buildings L(5)
BEA-5-466 (C)</td><td>Thermo-fluids Eng. L(5)
BEA-5-461 (C)</td><td colspan="2">Project and Business Management L(5)
BEA-5-465 (C)</td><td colspan="2">Passive Building Design L(6)
BEA-6-474 (C)</td></tr>
</table>

Placements information n/a

H. Course Modules

Module Code	Module Title	Level	Credit value	Semester	Assessment EX/CW	Core / Optional
BEA-4-450	**Engineering Mathematics**	4	20	1 - 2	50/50	Core
BEA-4-511	**Construction Practice B**	4	20	1 - 2	0/100	Core
BEA-4-451	**Building Services Engineering Principles**	4	20	1	100/0	Core
BEA-4-455	**Introduction to Building Services Engineering**	4	20	2	0/100	Core
BEA-4-456	**Internal Environment & Comfort**	4	20	1	70/30	Core
BEA-4-457	**Heating & Ventilation Systems**	4	20	2	50/50	Core

BEA-5-460	**Advanced Engineering Mathematics**	5	20	1	70/30	Core
BEA-5-461	**Thermo-fluids Engineering**	5	20	2	100/0	Core
BEA-5-466	**Electrical Services**	5	20	1	70/30	Core
BEA-5-462	**Refrigeration Air Conditioning and Heat Pumps**	5	20	2	70/30	Core
BEA-5-464	**Intergraded Building Design**	5	20	1-2	50/50	Core
BEA-5-465	**Project and Business Management**	5	20	1-2	50/50	Core
	Common:					
BEA-6-476	**Design Project**	6	40	1	0/100	Core
BEA-6-474	**Passive Building Design**	6	20	1-2	0/100	Core
BEA-6-473	**Energy Management and Control**	6	20	1-2	70/30	Core
	Electrical option:					
BEA-6-470	**Lighting and Electrical Systems**	6	20	1	70/30	Optional
BEA-6-472	**Electrical Power Systems and Distribution**	6	20	2	70/30	Optional
	Mechanical option:					
BEA-6-471	**Heat and Mass Transfer Applications**	6	20	1	50/50	Optional
BEA-6-475	**Thermal Energy Systems**	6	20	2	50/50	Optional

I. Timetable information

Timetables will be made available to students when they register.
Students will be notified by email of any changes to the timetable

J. Costs and financial support

Information on tuition fees/financial support can be found by clicking on the following link – http://www.lsbu.ac.uk/courses/undergraduate/fees-and-funding or http://www.lsbu.ac.uk/courses/postgraduate/fees-and-funding

Information on living costs and accommodation can be found by clicking the following link- https://my.lsbu.ac.uk/my/portal/Student-Life-Centre/International-Students/Starting-at-LSBU/#expenses

List of Appendices

Appendix A: Curriculum Map

This map provides a design aid to help course teams identify where course outcomes are being developed, taught and assessed within the course. It also provides a checklist for quality assurance purposes and may be used in validation, accreditation and external examining processes. Making the learning outcomes explicit will also help students to monitor their own learning and development as the course progresses

	Engineering Mathematics	Construction Practice	Building Services Engineering Principles	Introduction to Building Services Engineering	Thermal Environment & Comfort	Heating & Ventilation Systems	Advanced Engineering Mathematics	Thermo-fluids Engineering	Refrigeration. Air Cond. & Heat Pumps	Electrical Services in Building	Integrated Building Design	Project & Business Management	Energy Management & Controls	Passive Building Design	Major Project	Lighting & Electrical Systems	Electrical Power Systems & Distribution	Heat & Mass Transfer Applications	Thermal Energy Systems
/ Level							5	5	5	5	5	5	6	6	6	6	6	6	6
PLO / Credits							20	20	20	20	20	20	20	20	40	20	20	20	20
A1	TDA		DA				TDA						DA			D	D	D	D
A2			TDA		TDA	DA		TDA	DA	DA			DA	D		TDA	DA	TDA	DA
A3		TDA			DA	DA					TDA	DA		TDA	DA			DA	
A4		TDA				TDA				TDA	TDA				DA				
A5		TD				DA				TDA	TDA			TDA	DA	TDA			TDA
A6												TDA	TDA						
A7		TDA			D				TDA				TDA	D	DA				D
A8				TD	TD				TDA			TD							
B1			TDA			TDA	DA	D	TDA			TDA				TDA	TDA		DA
B2	TDA		TDA					TD					TDA						DA
B3	TD		TDA		TDA	TDA			TDA	TDA	D		TDA	D	DA	DA	DA		DA
B4			TDA			TDA		TDA	DA	TDA			TDA			DA	DA	TDA	DA
B5		TD				D				TDA	TDA				DA	TBA		DA	DA
B6											DA				DA				
B7				TDA								TDA	DA	DA					
C1					TDA				TDA	TDA						TDA	TDA		
C2					TDA				TDA	TDA						TDA	TDA		
C3		TDA				D					TDA	TDA		TDA	DA			DA	TD
C4				DA	DA						DA		DA		DA				D
C5		TDA												DA	DA				

C6				TDA					TDA					DA					TDA
C7						DA						TDA			DA				
D1	TDA					DA	TDA		DA			D	DA		DA				
D2	TDA						TDA						DA						DA
D3			TDA	TDA			TD		TDA	TDA					DA		TDA	TDA	DA
D4											TDA	TDA		TDA	DA				
D5		TDA									TDA	TDA		TDA	DA				
D6				DA						TDA	DA				DA				
D7		TDA				DA					DA	D			DA			DA	
D8		TDA									DA	TDA			DA			DA	
D9			TDA	D		DA			D		D	DA							
D10	TDA	TDA	TDA				TDA				DA								

Appendix B: Learning Outcomes AHEP3 Mapping

YEAR	COURSES	D or C	SM1b	SM2b	SM3b	EA1b	EA2	EA3b	EA4b	D1	D2	D3b	D4	D5	D6	EL1	EL2	EL3	EL4	EL5	EL6	P1	P2	P3	P4	P5	P6	P7	P8	P11	G1	G2	G3	G4
YEAR 1	Engineering Mathematicss (L4) -	c		✓																														
	Building Services Engineering Principles (L4)	c	✓	✓		✓																	✓											
	Construction Practice (L4)	c						✓			✓			✓	✓	✓		✓		✓	✓					✓				✓	✓	✓	✓	✓
	Introduction to building services engineering L(4)	c	✓		✓						✓				✓	✓	✓			✓		✓								✓				✓
	Internal env & comfort L(4)	c	✓							✓													✓	✓	✓									
	Heating & ventilation systems (L4)	c				✓	✓		✓																✓					✓				✓
YEAR 2	Advanced Mathematics (L5)	c		✓																														
	Thermofluids Engineering L(5)	c	✓			✓	✓																											
	Electrical services in Buildings L(5)	c				✓	✓	✓																✓	✓	✓	✓		✓					
	Refrigeration, Air Conditioning and Heat Pump Engineering L(5)	c				✓	✓		✓		✓		✓	✓					✓		✓			✓	✓									
	Integrated building design L(5)	c			✓		✓	✓	✓		✓				✓											✓		✓		✓	✓			✓
	Project and business management L(5)	c						✓		✓		✓		✓	✓		✓	✓	✓											✓	✓			✓
YEAR 3	Lighting and Electrical L(6)	o					✓			✓									✓		✓			✓	✓		✓							
	Heat and Mass Transfer Applications L(6)	o				✓	✓																✓								✓			✓
	Power Sysems L(6)	o						✓				✓								✓				✓			✓		✓					
	Thermal Energy Systems L(6)	o										✓	✓				✓											✓	✓	✓	✓			✓
	Energy Management and Controls (L6)	c		✓		✓						✓					✓						✓					✓	✓					
	Passive Building Design L(6)	c	✓		✓		✓	✓	✓										✓				✓											
	Major Project (L6)	c				✓	✓	✓	✓	✓	✓		✓	✓	✓	✓		✓			✓				✓				✓			✓	✓	

Appendix C: Embedding the Educational Framework for Undergraduate Courses

This appendix to the course specification document enables course teams to evidence how their courses meet minimum expectations, at what level where appropriate, as the basis for embedding the Educational Framework in all undergraduate provision at LSBU.

Dimension of the Educational Framework	Minimum expectations and rationale	How this is achieved in the course
Curricula informed by employer and industry need	Outcomes focus and professional/employer links All LSBU courses will evidence the involvement of external stakeholders in the curriculum design process as well as plan for the participation of employers and/or alumni through guest lectures or Q&A sessions, employer panels, employer-generated case studies or other input of expertise into the delivery of the course provide students with access to current workplace examples and role models. Students should have access to employers and/or alumni in at least one module at level 4.	The curriculum design is informed by CIBSE and EI and the Industrial Advisory Panel at LSBU. Teaching staff on the course are LSBU staff
Embedded learning development	Support for transition and academic preparedness At least two modules at level 4 should include embedded learning development in the curriculum to support student understanding of, and familiarity with, disciplinary ways of thinking and practising (e.g. analytical thinking, academic writing, critical reading, reflection). Where possible, learning development will be normally integrated into content modules rather than as standalone modules. Other level 4 modules should reference and reinforce the learning development to aid in the transfer of learning.	These expectations are achieved in the Construction Practice B Module in which academic writing is introduced and in Introduction to Building Services System, which can be seen as an introduction to analytical thinking.
High impact pedagogies	Group-based learning experiences The capacity to work effectively in teams enhances learning through working with peers and develops student outcomes, including communication, networking and respect for diversity of perspectives relevant to **professionalism** and **inclusivity**. At least one module at level 4 should include an opportunity for group working. Group-based learning can also be linked to assessment at level 4 if appropriate. Consideration should be given to how students are allocated to groups to foster experience of diverse perspectives and values.	There is a Group Project in Construction Practice B, in Heating & Ventilation systems and Intergraded Building Design. Due to the nature of the scheme, group-based learning is also encouraged in topics such as Mathematics.

		All modules at all level concerning labs and projects are positively impacting on the experience
Inclusive teaching, learning and assessment	<u>Accessible materials, resources and activities</u> All course materials and resources, including course guides, PowerPoint presentations, handouts and Moodle should be provided in an accessible format. For example, font type and size, layout and colour as well as captioning or transcripts for audio-visual materials. Consideration should also be given to accessibility and the availability of alternative formats for reading lists.	Students work in diverse groups in labs and project. Inclusion is guaranteed with the mix of different cohorts during the lectures
Assessment *for* learning	<u>Assessment and feedback to support attainment, progression and retention</u> Assessment is recognised as a critical point for at risk students as well as integral to the learning of all students. Formative feedback is essential during transition into university. All first semester modules at level 4 should include a formative or low-stakes summative assessment (e.g. low weighted in final outcome for the module) to provide an early opportunity for students to check progress and receive prompt and useable feedback that can feed-forward into future learning and assessment. Assessment and feedback communicates high expectations and develops a commitment to **excellence**.	Short in class formative tests are used to check the progress of the students.
High impact pedagogies	<u>Research and enquiry experiences</u> Opportunities for students to undertake small-scale independent enquiry enable students to understand how knowledge is generated and tested in the discipline as well as prepare them to engage in enquiry as a highly sought after outcome of university study. In preparation for an undergraduate dissertation at level 6, courses should provide opportunities for students to develop research skills at level 4 and 5 and should engage with open-ended problems with appropriate support. Research opportunities should build student autonomy and are likely to encourage **creativity** and problem-solving. Dissemination of student research outcomes, for example via posters, presentations and reports with peer review, should also be considered.	At all levels there are opportunities for the learners to get ready to undertake their individual research project at the end of the degree.

Curricula informed by employer and industry need / Assessment *for* learning	<u>Authentic learning and assessment tasks</u> Live briefs, projects or equivalent authentic workplace learning experiences and/or assessments enable students, for example, to engage with external clients, develop their understanding through situated and experiential learning in real or simulated workplace contexts and deliver outputs to an agreed specification and deadline. Engagement with live briefs creates the opportunity for the development of student outcomes including **excellence**, **professionalism**, **integrity** and **creativity**. A live brief is likely to develop research and enquiry skills and can be linked to assessment if appropriate.	The major project introduces the students to working on a live brief as well as several laboratory assignments.
Inclusive teaching, learning and assessment	<u>Course content and teaching methods acknowledge the diversity of the student cohort</u> An inclusive curriculum incorporates images, examples, case studies and other resources from a broad range of cultural and social views reflecting diversity of the student cohort in terms of, for example, gender, ethnicity, sexuality, religious belief, socio-economic background etc. This commitment to **inclusivity** enables students to recognise themselves and their experiences in the curriculum as well as foster understanding of other viewpoints and identities.	This diversity is guaranteed with a successful mix of full-time and part-time students on group project work where the lecturers encourage the learners to share their knowledge.
Curricula informed by employer and industry need	<u>Work-based learning</u> Opportunities for learning that is relevant to future employment or undertaken in a workplace setting are fundamental to developing student applied knowledge as well as developing work-relevant student outcomes such as networking, **professionalism** and **integrity**. Work-based learning can take the form of work experience, internships or placements as well as, for example, case studies, simulations and role-play in industry-standards settings as relevant to the course. Work-based learning can be linked to assessment if appropriate.	The majority of students on the course are part-time and working in the building services industry where they will have many opportunities to network and undertake work based learning. The successful mix of full-time and part-time students enable full time students to network and benefit from the experiences of the part time students.
Embedded learning development	<u>Writing in the disciplines: Alternative formats</u> The development of student awareness, understanding and mastery of the specific thinking and communication practices in the discipline is fundamental to applied subject	Student writing skills are taught and assessed in the module of Construction Practice and further developed at

	knowledge. This involves explicitly defining the features of disciplinary thinking and practices, finding opportunities to scaffold student attempts to adopt these ways of thinking and practising and providing opportunities to receive formative feedback on this. A writing in the disciplines approach recognises that writing is not a discrete representation of knowledge but integral to the process of knowing and understanding in the discipline. It is expected that assessment utilises formats that are recognisable and applicable to those working in the profession. For example, project report, presentation, poster, lab or field report, journal or professional article, position paper, case report, handbook, exhibition guide.	all levels. These skills are needed to produce the lab reports and project reports that form part of the modules' assessments.
High impact pedagogies	<u>Multi-disciplinary, interdisciplinary or interprofessional group-based learning experiences</u> Building on experience of group working at level 4, at level 5 students should be provided with the opportunity to work and manage more complex tasks in groups that work across traditional disciplinary and professional boundaries and reflecting interprofessional work-place settings. Learning in multi- or interdisciplinary groups creates the opportunity for the development of student outcomes including **inclusivity**, communication and networking.	Students are introduced group project work at level 4 (Construction Practice, Heating and Ventilation Systems). These skills are further developed at all levels and mainly in the laboratory.
Assessment *for* learning	<u>Variation of assessment</u> An inclusive approach to curriculum recognises diversity and seeks to create a learning environment that enables equal opportunities for learning for all students and does not give those with a particular prior qualification (e.g. A-level or BTEC) an advantage or disadvantage. An holistic assessment strategy should provide opportunities for all students to be able to demonstrate achievement of learning outcomes in different ways throughout the course. This may be by offering alternate assessment tasks at the same assessment point, for example either a written or oral assessment, or by offering a range of different assessment tasks across the curriculum.	There are a range of assessments on the course including as follows: Examinations and in class tests. Project reports, Laboratory Reports. Individual Presentations. Group Presentations
Curricula informed by employer and industry need	<u>Career management skills</u> Courses should provide support for the development of career management skills that enable student to be familiar with and understand	As noted above the course is informed by CIBSE and EI and the

	relevant industries or professions, be able to build on work-related learning opportunities, understand the role of self-appraisal and planning for lifelong learning in career development, develop resilience and manage the career building process. This should be designed to inform the development of **excellence** and **professionalism**.	Industrial Advisory Board at LSBU.
Curricula informed by employer and industry need / Assessment *for* learning / High impact pedagogies	<u>Capstone project/dissertation</u> The level 6 project or dissertation is a critical point for the integration and synthesis of knowledge and skills from across the course. It also provides an important transition into employment if the assessment is authentic, industry-facing or client-driven. It is recommended that this is a capstone experience, bringing together all learning across the course and creates the opportunity for the development of student outcomes including **professionalism**, **integrity** and **creativity**.	As per Individual Research Project

Appendix D: Terminology

This appendix provides a selection of definitions according to BEng(Hons) Building Services Engineering course and context to help prospective students who may not be familiar with terms used in higher education.

awarding body	a UK higher education provider (typically a university) with the power to award higher education qualifications such as degrees
bursary	a financial award made to students to support their studies; sometimes used interchangeably with 'scholarship'
collaborative provision	a formal arrangement between a degree-awarding body and a partner organisation, allowing for the latter to provide higher education on behalf of the former
compulsory module	a module that students are required to take
contact hours	the time allocated to direct contact between a student and a member of staff through, for example, timetabled lectures, seminars and tutorials
coursework	student work that contributes towards the final result but is not assessed by written examination
current students	students enrolled on a course who have not yet completed their studies or been awarded their qualification
delivery organisation	an organisation that delivers learning opportunities on behalf of a degree-awarding body
distance-learning course	a course of study that does not involve face-to-face contact between students and tutors
extracurricular	activities undertaken by students outside their studies
feedback (on assessment)	advice to students following their completion of a piece of assessed or examined work
formative assessment	a type of assessment designed to help students learn more effectively, to progress in their studies and to prepare for summative assessment; formative assessment does not contribute to the final mark, grade or class of degree awarded to students
higher education provider	organisations that deliver higher education

independent learning	learning that occurs outside the classroom that might include preparation for scheduled sessions, follow-up work, wider reading or practice, completion of assessment tasks, or revision
intensity of study	the time taken to complete a part-time course compared to the equivalent full-time version: for example, half-time study would equate to 0.5 intensity of study
lecture	a presentation or talk on a particular topic; in general lectures involve larger groups of students than seminars and tutorials
learning zone	a flexible student space that supports independent and social earning
material information	information students need to make an informed decision, such as about what and where to study
mode of study	different ways of studying, such as full-time, part-time, e-learning or work-based learning
modular course	a course delivered using modules
module	a self-contained, formally structured unit of study, with a coherent and explicit set of learning outcomes and assessment criteria; some providers use the word 'course' or 'course unit' to refer to individual modules
national teaching fellowship	a national award for individuals who have made an outstanding impact on student learning and the teaching profession
navigability (of websites)	the ease with which users can obtain the information they require from a website
optional module	a module or course unit that students choose to take
performance (examinations)	a type of examination used in performance- based subjects such as drama and music
professional body	an organisation that oversees the activities of a particular profession and represents the interests of its members
prospective student	those applying or considering applying for any programme, at any level and employing any mode of study, with a higher education provider

regulated course	a course that is regulated by a regulatory body
regulatory body	an organisation recognised by government as being responsible for the regulation or approval of a particular range of issues and activities
scholarship	a type of bursary that recognises academic achievement and potential, and which is sometimes used interchangeably with 'bursary'
semester	either of the parts of an academic year that is divided into two for purposes of teaching and assessment (in contrast to division into terms)
seminar	seminars generally involve smaller numbers than lectures and enable students to engage in discussion of a particular topic and/or to explore it in more detail than might be covered in a lecture
summative assessment	formal assessment of students' work, contributing to the final result
term	any of the parts of an academic year that is divided into three or more for purposes of teaching and assessment (in contrast to division into semesters)
total study time	the total time required to study a module, unit or course, including all class contact, independent learning, revision and assessment
tutorial	one-to-one or small group supervision, feedback or detailed discussion on a particular topic or project
work/study placement	a planned period of experience outside the institution (for example, in a workplace or at another higher education institution) to help students develop particular skills, knowledge or understanding as part of their course
workload	see 'total study time'
written examination	a question or set of questions relating to a particular area of study to which candidates write answers usually (but not always) under timed conditions

Appendix E: Team Staff

- Alex Paurine BEng PhD CEng MIMEchE MInstR MCIBSE, is the course director of BEng (Hons) Building Services Engineering. He teaches Engineering Mathematics and is an active researcher on fire safety and sustainable energy systems. Alex worked as energy manager for Houses of Parliament and as a mechanical design engineer for a number of consulting companies, and keeps up-to-date links within the industry.
- Gordon Lowry BA PhD CEng FEI MIET SFHEA, is the course director of MSc programmes. He teaches electrical, power and control systems disciplines; he is an active researcher on electrical building services engineering, daylight modelling and the utilisation of building management systems in the analysis of building energy performance. He is a panel member of the Energy Institute.
- Rusdy Hartungi BSc PhD MCIHT AMBCA PR2 SFHEA, is the course director of HND Building Services Engineering. He teaches electrical and power disciplines as well as project business management. Rusdy's research interests are mainly in the area of power quality and energy in building. Prior to becoming an academic, Rusdy spent several years in the building services industry working for a multinational company as an engineer.
- Kika Yiakoumetti BSc MSc CENg MCIBSE SFHEA teaches thermal comfort, HVAC systems and building thermal performance. Her research is focused on solar energy and she is the link of the Industry Advisory Panel.
- Esmail Sauber BEng MSc PhD, teaches subjects in building services engineering area including mathematics and passive building design. His research activities span around building performance modelling, natural ventilation design and control and CFD simulation in the built environment.
- Navpreet Chohan BTEC BEng MSc teaches Construction Practice B with a sound knowledge of construction software, namely REVIT and BIM.
- Metkel Yebiyo BEng MSc PhD MCIBSE MIoR teaches refrigeration air conditioning and heat pumps engineering, being these disciplines the core of his research.
- Haydar Aygun, Stephen Dance and Luis Gomez de Agustina conform the Acoustics Group with the largest intake of acoustics students in the country. They focus on environmental and architectural acoustics teaching disciplines on internal environment and comfort.
- Aaron Gilich BEng MSc PhD MIoE CEng FHEA, teaches Energy Resource and Use Analysis and Environmental Management. His research focuses on the UK energy trilemma of delivering a low cost, low carbon, secure energy system, with two main projects, The Home Energy 4 Tomorrow (HE4T) and The Balanced Energy Network (BEN.
- Andy Ford BSc BEng CEng FCIBSE PPCIBSE is director of research and enterprise for the school. Andy is passionate about low energy design and innovation. Having run his own successful Consulting Engineering practice for many years he is now focused on the next generation. He worked as a consulting engineer in building physics
- Issa Chaer BEng PhD FInstR SFHEA, teaches Design applications, integrated building design and thermal energy systems. Issa has a research portfolio spanning over 15 years with evidence of significant contribution to the advancement of engineering knowledge at national and international levels
- Joy Zhihui Ye BEng MSc PhD MEI FHEA, teaches thermofluids engineering, thermal energy systems and passive building design. Her broad research interests are in energy, the indoor environment and the operational performance of buildings. She worked in heating networks for the private sector.
- Shazia Farman Ali BEng MSc PhD MEI FHEA, is the course director of BEng (Hons) Building Services Engineering. She teaches subjects in building services engineering area including engineering mathematics, heat and mass transfer applications, thermal energy systems and thermal environment and comfort. Shazia is an active researcher and her research activities span around thermal energy, renewable energy, heat transfer, numerical modelling and CFD simulation. Shazia has many years of work experience in nuclear power industry as an energy modeller.

• Carlos Gonzalo, DET, BEng, MSc, AFHEA, Apprenticeship Academic Lead of the School of Built Environment Architecture. Carlos has significant experience in both Further Education and Higher Education Apprenticeship Programmes. His MSc in Multidisciplinary Engineering makes him fit for purpose to work with both divisions of Building Services and Civil Engineering for which he teaches and leads modules such as Mathematics, Sustainable Construction and Renewable Energy Technologies. He is an active researcher currently focused on a novel technique for fire safety in cladding panels. He also has industry experience in his country (Spain) where he used to give approval for Built Environment and Industry Installations on behalf of the Council of his city.

Carlos leads the development of the academic part of the programmes and he allocates personal tutors for the apprentices of Building Services Engineering. The tutors from the teaching team are made up of experienced academics who will teach, support and guide apprentices on programme.