



| A. Course Information | | | |
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| 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 2090, 5304 |
| | London South Bank University | | |
| School | <input type="checkbox"/> ASC <input type="checkbox"/> ACI <input checked="" type="checkbox"/> BEA <input type="checkbox"/> BUS <input type="checkbox"/> ENG <input type="checkbox"/> HSC <input type="checkbox"/> LSS | | |
| Division | Civil and Building Services Engineering | | |
| Course Director | Dr Alex Paurine | | |
| Delivery site(s) for course(s) | <input checked="" type="checkbox"/> Southwark <input type="checkbox"/> Havering <input type="checkbox"/> Other: please specify | | |
| Mode(s) of delivery | <input checked="" type="checkbox"/> Full time <input checked="" type="checkbox"/> Part time <input type="checkbox"/> other please specify | | |
| Length of course/start and finish dates | Mode | Length years | Start - month |
| | Full time | 3 years | September |
| | Part time | 4.5 years | September |
| | | | Finish - month |
| | | | July |
| | | | 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 / Subject to validation | August 2018 | |
| | Course specification last updated and signed off | September 2019 | |
| Professional, Statutory & Regulatory Body accreditation | Chartered Institution of Building Services Engineers (CIBSE); Energy Institute (EI) | | |
| Reference points: | Internal | Corporate Strategy 2015-2020 Academic Quality and Enhancement Manual 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 | |

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| | | <p>QAA Quality Code for Higher Education 2018 Framework for Higher Education Qualifications Subject Benchmark Statements (Dated) PSRB Competitions and Markets Authority SEEC Level Descriptors 2016</p> |
| B. Course Aims and Features | | |
| <p>Distinctive features of course</p> | <p>LSBU has almost 70 years' expertise in running Building Services Engineering courses and it produces around 50% of graduates in the industry.</p> <p>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.</p> <p>UK buildings are currently responsible for about 45% of the country's total energy consumption and CO₂ emissions. Energy conservation and sustainability therefore form an increasingly important theme in our courses.</p> <p>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.</p> <p>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.</p> <p>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.</p> <p>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</p> | |

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| | <p>resources. The electrical option focuses on lighting, electrical systems and distribution.</p> <p>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.</p> <p>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.</p> |
| <p>Course Aims</p> | <p>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.</p> <p>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.</p> <p>The BEng (Hons) Building Services Engineering aims to:</p> <ol style="list-style-type: none"> 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 |

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| | <p>introduce new ideas based on a rigorous and analytical approach to data and systems.</p> <ol style="list-style-type: none"> 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. |
| <p>Course Learning Outcomes</p> | <p>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.</p> <p>a) Students will have knowledge and understanding of:</p> <p>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.</p> <p>b) Students will develop their intellectual skills such that they are able to:</p> <p>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.</p> <p>c) Students will acquire and develop practical skills such that they are able to:</p> <p>C1 Use relevant test and measurement equipment. C2 Carry out experimental laboratory work.</p> |

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| | <p>C3 Use engineering IT tools (including programming language where appropriate).</p> <p>C4 Research for information in order to develop ideas further.</p> <p>C5 Carry out a process to test design ideas.</p> <p>Page 5 of 10</p> <p>C6 Apply engineering techniques taking account of industrial and commercial constraints.</p> <p>C7 Manage projects.</p> <p>d) Students will acquire and develop transferrable skills such that they are able to:</p> <p>D1 Manipulate and sort data.</p> <p>D2 Present data in a variety of ways.</p> <p>D3 Solve problems using methods based on scientific evidence.</p> <p>D4 Use creativity and innovation in problem solving.</p> <p>D5 Use IT effectively.</p> <p>D6 Work with limited or contradictory information.</p> <p>D7 Communicate effectively.</p> <p>D8 Manage time and resources effectively.</p> <p>D9 Work effectively as part of a team.</p> <p>D10 Continue lifelong learning.</p> |
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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.

http://www.lsbu.ac.uk/_data/assets/pdf_file/0008/84347/academic-regulations.pdf

F. Entry Requirements

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

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)

| Year 1 | | Year 2 | | Year 3 | |
|---|------------|--|---|--|------------------------------------|
| Semester 1 | Semester 2 | Semester 1 | Semester 2 | Semester 1 | Semester 2 |
| Engineering Mathematics (L4) BEA-4-450 (C) | | Advanced Eng Maths (L5) BEA-5-460 (C) | Thermo-fluids Eng L(5) BEA-5-461 (C) | Light & Electr Sys BEA-6-470 (O) | El Pr Sys & Distr BEA-6-472 (O) |
| Construction Practice (L4) BEA-4-485 (C) | | | | / | / |
| Introduction to Building Services Engineering (L4) BEA-4-455 (C) | | Electrical Services In Buildings L(5) BEA-5-466 (C) | R AC&HP L(5) BEA-5-462 (C) | Energy Management and Controls (L6) BEA_6_473 (C) | |
| Building Services Engineering Principles L(4) BEA-4-451 (C) | | | | Passive Building Design L(6) BEA-6-474 (C) | |
| Internal Environment & Comfort L(4) BEA-4-456 (C) | | Integrated Building Design L(5) BEA-5-464 (C) | | Major Project (L6) BEA-6-476 (C) | |
| Heating & Ventilation Systems (L4) BEA-4-457 (C) | | Project and Business Management L(5) BEA-5-465 (C) | | | |

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.

| Year 1 | | Year 2 | | Year 3 | | Year 4 | | Year 5 |
|---|--|--|---|---|-------------------------------|---|------------------------------------|-------------------------------------|
| Semester 1 | Semester 2 | Semester 1 | Semester 2 | Semester 1 | Semester 2 | Semester 1 | Semester 2 | Semester 1 |
| Engineering Mathematics (L4) BEA-4-450 (C) | | Internal Environ & Comfort L(4) BEA-4-456 (C) | Heating & Ventilation Systems (L4) BEA-4-457 (C) | Advanced Eng Maths (L5) BEA-5-460 (C) | R AC&HP L(5) BEA-5-462 (C) | Light & Electr Sys BEA-6-470 (O) | El Pr Sys & Distr BEA-6-472 (O) | Major Project (L6) BEA-6-476 (C) |
| Construction Practice (L4) BEA-4-455 (C) | | | | | | H&MT Appl BEA-6-471 (O) | Th Energy Syst BEA-6-475 (O) | |
| Introduction to Building Services Engineering (L4) BEA-4-456 (C) | Building Services Engineering Principles (L4) BEA-4-451 (C) | Electrical Services In Buildings L(5) BEA-5-466 (C) | Thermo-fluids Eng. L(5) BEA-5-461 (C) | Integrated Building Design L(5) BEA-5-464 (C) | | Energy Management and Controls BEA_6_473 (C) | | |
| | | | | Project and Business Management L(5) BEA-5-465 (C) | | Passive Building Design L(6) BEA-6-474 (C) | | |

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 |

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|-----------|--|---|----|-----|-------|----------|
| 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
- Appendix B: Learning Outcomes. AHEP3 Mapping
- Appendix C: Educational Framework (undergraduate courses)
- Appendix D: Terminology

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 Buildings | 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 | C1 | 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 Mathematics (L4) - | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Building Services Engineering Principles (L4) | c | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Construction Practice (L4) | c | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Introduction to building services engineering L(4) | c | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Internal env & comfort L(4) | c | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| YEAR 2 | Heating & ventilation systems (L4) | c | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Advanced Mathematics (L5) | c | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Thermofluids Engineering L(6) | c | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Electrical services in Buildings L(6) | c | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Refrigeration, Air Conditioning and Heat Pump Engineering L(5) | c | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Integrated building design L(5) | c | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Project and business management L(5) | c | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Lighting and Electrical L(6) | o | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Heat and Mass Transfer Applications L(6) | o | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | YEAR 3 | Power Systems 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 |
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| Curricula informed by employer and industry need | <p><u>Outcomes focus and professional/employer links</u> 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.</p> | <p>The curriculum design is informed by CIBSE and EI and the Industrial Advisory Panel at LSBU. Teaching staff on the course are LSBU staff</p> |
| Embedded learning development | <p><u>Support for transition and academic preparedness</u> 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.</p> | <p>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.</p> |
| High impact pedagogies | <p><u>Group-based learning experiences</u> 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.</p> | <p>There is a Group Project in Construction Practice B, in Heating & Ventilation systems and Intergraded Building Design.</p> <p>Due to the nature of the scheme, group-based learning is also encouraged in topics such as Mathematics.</p> <p>All modules at all level concerning labs and projects are positively</p> |

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| | | 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 / | <u>Authentic learning and assessment tasks</u> Live briefs, projects or equivalent authentic workplace learning experiences and/or assessments enable students, for example, to | The major project introduces the students to working on a live brief as |

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| Assessment for learning | 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. | 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 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 | Student writing skills are taught and assessed in the module of Construction Practice and further developed at all levels. These skills are needed to produce the lab reports and project reports that form part of the modules' assessments. |

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| | <p>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.</p> | |
| High impact pedagogies | <p><u>Multi-disciplinary, interdisciplinary or interprofessional group-based learning experiences</u></p> <p>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.</p> | <p>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.</p> |
| Assessment for learning | <p><u>Variation of assessment</u></p> <p>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.</p> | <p>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</p> |
| Curricula informed by employer and industry need | <p><u>Career management skills</u></p> <p>Courses should provide support for the development of career management skills that enable student to be familiar with and understand 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</p> | <p>As noted above the course is informed by CIBSE and EI and the Industrial Advisory Board at LSBU.</p> |

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| | be designed to inform the development of excellence and professionalism . | |
| 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.

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| 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 |

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| 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 learning |
| 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 |

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| 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 |