Course Specification

A. Course Information				
Final award title(s)	BSc (Hons) Computer Systems Engineering (Top-up)			
Intermediate exit award title(s)	N/A			
UCAS Code	H655		**Course Code(s)**	5793
	London South Bank University			
School	☐ ASC ☐ ACI ☐ BEA ☐ BUS ☒ ENG ☐ HSC ☐ LSS			
Division	Electrical and Electronic Engineering			
Course Director	Dr Zhanfang Zhao			
Delivery site(s) for course(s)	☒ Southwark ☐ Havering ☐ Other:			
Mode(s) of delivery	☒Full time ☐Part time			
Length of course/start and finish dates	**Mode** / **Length years** / **Start - month** / **Finish - month** Full time / 1 / Sep / June			
Is this course generally suitable for students on a Tier 4 visa?	Yes Students are advised that the structure/nature of the course is suitable for those on a Tier 4 visa but other factors will be taken into account before a CAS number is allocated.			
Approval dates:	Course(s) validated	November 2021		
	Course Review date	November 2026		
	Course specification last updated and signed off	September 2023		
Professional, Statutory & Regulatory Body accreditation	Non-accredited top-up course			
Reference points:	Internal	Corporate Strategy 2020-2025 Academic Quality and Enhancement (AQE) Website School Strategy LSBU Academic Regulations		
	External	QAA Quality Code for Higher Education 2018 Framework for Higher Education Qualifications QAA Subject Benchmark Statement for Engineering (October 2019) UK Standard for Professional Engineering Competence (UK-SPEC, Third Edition)		

		The Accreditation of Higher Education Programmers- UK Standards for Professional Engineering Competence (AHEP3 2014)
B. Course Aims and Features		
Distinctive features of course	The BSc(Hons) Top-up in Computer Systems Engineering degree is designed to allow suitably qualified students to top up their existing qualification to an honours degree. The course accepts students with successful Engineering Foundation Degree, HND graduates or those holding an equivalent qualification. It is distinctive in that it enables students with a HND or foundation degree in related course to enhance their knowledge in key areas of interest. It builds on the course taught at HND level, in areas of Computer System Engineering and develops and extends knowledge and understanding further, coupled with the required software tools that together enable graduates to tackle complex and challenging projects in the broader Engineering world, at a graduate level. Students benefit from an established academic team that maintains a strong research output. The course has significant laboratory-based practical teaching to support the rigorous lecture material. The course covers computer hardware and software engineering, embedded systems and the internet of things, computer architecture and operating systems, cybersecurity and cryptograph, and Artificial intelligence It will equip students to develop knowledge and analytical skills, key to the successful study of engineering, to open up further career and educational opportunities and will prepare for further engineering study at postgraduate level. The curriculum of this course will enable graduates to gain specialist skills in hardware and software and to obtain the theoretical and practical knowledge to work at the forefront of all the major areas of computer systems engineering. The best aspect about this course is that it leads to the same level of qualification as for students taking a traditional three-year course and it offers a thorough grounding in the necessary skills to open up a flexible career in computer systems engineering. Successful completion of the BSc(Hons) Top-up course would allow graduates access to our suite of postgraduate taught master's degrees and potentially the option to pursue Membership of the relevant professional body and ultimately registration as an Incorporated or Chartered Engineer.	
Course Aims	The course shares modules with other BEng (Honours) engineering course in the division, the aim to produce engineering graduates who have demonstrated the following abilities: • Systematic understanding of key aspects of their field of study, including acquisition of coherent and detailed knowledge, at least some of which is at, or informed by, the forefront of defined aspects of a discipline. • Ability to deploy accurately established techniques of analysis	

	and enquiry within a discipline. • Conceptual understanding that enables them: ▪ To devise and sustain arguments, and/or to solve problems, using ideas and techniques, some of which are at the forefront of a discipline. ▪ To describe and comment upon particular aspects of current research, or equivalent advanced scholarship, in the discipline. • Appreciation of the uncertainty, ambiguity and limits of knowledge. • Ability to manage their own learning and to make use of scholarly reviews and primary sources (for example, refereed research articles and/or original materials appropriate to the discipline). • Ability to apply the methods and techniques that they have learned to review, consolidate, extend and apply their knowledge and understanding, and to initiate and carry out projects. • Be able to critically evaluate arguments, assumptions, abstract concepts and data (that may be incomplete), to make judgments, and to frame appropriate questions to achieve a solution - or identify a range of solutions - to a problem. • Know how to communicate information, ideas, problems and solutions to both specialist and non-specialist audiences. • Have the qualities and transferable skills necessary for employment requiring: ▪ The exercise of initiative and personal responsibility. ▪ Decision-making in complex and unpredictable contexts. ▪ The learning ability needed to undertake appropriate further training of a professional or equivalent nature. • Be able to apply a professional engineering approach in their activities including innovation and enterprise. • Be able to apply a thorough understanding of relevant science and mathematics to the analysis and design of technical solutions to improve quality of life. **Specific to BSc Top-up (Hons) Computer Systems Engineering (CSE)** The BSc Top-up (Hons) Computer Systems Engineering course aims to produce graduates who have acquired and can use a broad base of active knowledge in the field of computer engineering and the skills necessary to update, extend and deepen it for career development or further study; this includes: • Digital, analogue and particularly hybrid electronic systems. • Present trends in computer hardware and software engineering. • The theory and applications of networking, computing algorithms, computer architectures and systems resource management.
Course Learning Outcomes	**Program Specific Learning Outcomes** This course is designed to meet the learning outcomes specified by the Engineering Council in the UK Standard for Professional Engineering Competence (UK-SPEC): **1. Knowledge and Understanding**

	Engineering is underpinned by science and mathematics and other associated disciplines as defined by the relevant professional engineering institutions. Students will need the following knowledge understanding and abilities: **A1**: Knowledge and understanding of scientific principles and methodology necessary to underpin their education in their engineering discipline, to enable appreciation of its scientific and engineering context, and to support their understanding of relevant historical, current, and future developments and technologies. **A2**: Knowledge and understanding of mathematical and statistical methods necessary to underpin their education in their engineering discipline and to enable them to apply mathematical and statistical methods, tools and notations proficiently in the analysis and solution of engineering problems **A3**: Ability to apply and integrate knowledge and understanding of other engineering disciplines to support study of their own engineering discipline. **2. Intellectual Skills** Engineering analysis involve the application of engineering concepts and tools to the solution of engineering problems. Students must be able to demonstrate: **B1**: Understanding of engineering principles and the ability to apply them to analyse key engineering processes. **B2**: Ability to identify, classify and describe the performance of systems and components through the use of analytical methods and modelling techniques. **B3**: Ability to apply quantitative and computational methods in order to solve engineering problems and to implement appropriate action **B4**: Understanding of, and ability to apply, an integrated or systems approach to solving engineering problems. **3. Practical Skills** This involves the practical application of engineering skills, combining theory and experience, and the use of other relevant knowledge and skills. Students must be able to demonstrate: **C1**: Understanding of contexts in which engineering knowledge can be applied (e.g. operations and management, application and development of technology, etc). **C2**: Extensive knowledge of characteristics of particular materials, equipment, processes, or products. **C3**: Ability to apply relevant practical and laboratory skills including ability to communicate their work to technical and non-technical audiences. **C4**: Understanding of the use of technical literature and other information sources. **C5**: Awareness of nature of intellectual property and knowledge of relevant legal and contractual issues. **C6**: Understanding of appropriate codes of practice and industry standards. **C7**: Awareness of quality issues and their application to continuous improvement.

	C8: Ability to work with technical uncertainty. **4. Transferable Skills** Design is the creation and development of an economically viable product, process or system to meet a defined need. It involves significant technical and intellectual challenges and can be used to integrate all engineering understanding, knowledge and skills to the solution of real problems and complex problems. Further to this, students need the skills to manage their activities and to be aware of the various legal and ethical constraints under which they are expected to operate. Students will need the knowledge, understanding and skills to: **D1:** Understand and evaluate business customer and user needs, including considerations such as the wider engineering context public perception and aesthetics. **D2:** Investigate and define the problem, identifying any constraints including environmental and sustainability limitations; ethical, health, safety, security and risk issues, intellectual property; code of practice and standards. **D3:** Apply advanced problem-solving skills, technical knowledge and understanding, to establish rigorous and creative solutions that are fit for purpose for all aspects of the problem including production, operation, maintenance and disposal **D4:** Plan and manage the design process, including cost drivers, and evaluate outcomes. Work individually and as part of a team and show understanding of, and the ability to work in, different roles within an engineering team. **D5:** Know and understand management techniques that may be used to achieve engineering objectives along with the commercial, economic and social context of engineering processes **D6:** Be aware of relevant economic, legal, social, ethical and environmental context for engineering activities.

C. Teaching and Learning Strategy

General Learning Outcomes (UK-SPEC)
Knowledge and Understanding:
Graduates must be able to use a combination of general and specialist engineering knowledge and understanding to optimise the application of existing and emerging technology. They must maintain and extend a sound theoretical approach in enabling the introduction and exploitation of new and advancing technology. They should be able to engage in the creative and innovative development of engineering technology and continuous improvement systems.

Teaching and learning strategies:
Acquisition of knowledge and understanding is in the main through lectures, the associated handouts and supporting material on the Virtual Learning Environment (VLE). Lectures, tutorials and laboratory practical include analysis and/or design methods for which problems will be set to enhance students learning supported by associated problem-solving sessions, which reinforce the lecture content. Tutorials, coursework and tests provide written or verbal feedback to enhance and develop students learning. There is a substantial amount of self-directed learning through individual and/or group project work.
The course is designed to provide a broad foundation in the science and engineering of

computers, and digital systems with emphasis on theory, analysis, and design. The course also develops analytical, computer, and applied skills that will enable students to analyse, design and test digital and computer systems, architectures, networks, and processes.

Assessment

Assessment is through examinations and practical work and assignments using logbooks and formal reports.

Unseen examination questions and coursework, which use knowledge and understanding of mathematics and sciences to undertake:

- analysis and modelling of science and/or engineering problems relevant to computer systems engineering course to achieve A1 and A2,
- synthesis to offer solutions to engineering problems relevant to computer systems engineering to achieve A3.

Laboratory work to meet the requirements of the course, which involves:

- critical analysis of how theoretical solutions are arrived at, to achieve A1,
- proficient analysis and presentation of data using relevant methods and tools, to achieve A2.

A substantial BSc project which involves the student going through the process of applying and integrating their knowledge of a range of engineering disciplines i.e. the process of engineering problem analysis to synthesize a solution in order to demonstrate that student has met A1, A2 and A3.

Intellectual Skills:

Graduates must be able to apply appropriate theoretical and practical methods and tools to the analysis and solution of computer engineering problems. They must be able to identify potential projects and opportunities, to conduct appropriate research, and undertake design and development of engineering solutions and further to manage implementation of design solutions and evaluate their effectiveness. They must be able to demonstrate cognitive skills such as conceptualisation and critical thinking, problem solving, research and enquiry, synthesis and creativity, analysis and evaluation.

Teaching and learning strategies:

Acquisition of Intellectual Skills is developed through lectures, tutorial, individual and team problem- based work. In private study, students will develop skills by writing laboratory reports, and tackling problems set by the tutor/laboratory instructor or in past examinations and projects. Computer laboratory sessions are embedded in modules and projects, where students are taught the appropriate tools to solve engineering problems. The course teaches tools, which span the hardware and software spectrum, and are fundamental to engineering to effectively organize information and manage design complexity. Familiarity with commonly used tools, the ability to deploy them in appropriate situations, and the ability to use them effectively are important Intellectual skills. Acquisition of Intellectual Skills is also gained through the specialist level 6 modules as well as the individual project. Students are encouraged to attend the seminars/events such as those organised by the School of Engineering and to attend presentations from invited speakers on relevant to computer engineering topics.

Assessment

Unseen examination questions and coursework, which allow students to demonstrate that they have met B1 and B2. Laboratory work to meet the requirements of the computer systems engineering course, which involve experiments and demonstrations of the relevant scientific principles (B1, B2). An individual project, which involves the student using engineering analysis, that would be assessed by a combination of a formal report and a presentation and would demonstrate completion of B1, B2, B3 and B4.

Practical skills:
Graduates must possess practical engineering skills and must be able to provide technical and commercial leadership. They must be able to plan for effective project implementation and further plan, budget, organise, direct and control tasks, people and resources. They must be able to lead teams and develop staff to meet changing technical and managerial needs, to bring about continuous improvement through quality management.

Teaching and learning strategies:
Acquisition of practical skills is acquired during the practical laboratory sessions. Students should learn to record laboratory activity to document and keep track of all design activities, conducted experiments, and measured/observed results. The laboratory experience, in most of the modules, should also assist students in learning practical issues such as: proper use of computers and test equipment, building electrical and electronic circuits and systems, building and testing software, understanding processes and issues associated with product development. Laboratory experiences capitalise on this interest to provide a foundation for other important elements of practical activity. The course offers carefully planned practical assignments in a laboratory setting which help
students develop confidence in their technical ability. Laboratory experiences should help students develop the expertise needed to build new products. Computing laboratory exercises allow students to develop skills in course design, coding and testing. Further development of these skills is acquired in the individual project.

Assessment
Laboratory work to meet the requirements of the computer systems engineering course, which involve experiments and demonstrations of the relevant engineering practice. This is assessed by logbooks and coursework assignments. C1, C2, C3, C4 and C8). An individual project that would be assessed by a combination of a formal report, a presentation, a viva voce examination and would demonstrate completion of C1, C4, C5, C6, C7 and C8.

General Transferable Skills:
Graduates must be able to demonstrate effective interpersonal skills and further to demonstrate a personal commitment to professional standards, recognising obligations to society, the profession and the environment. Computer systems engineering graduates must have developed transferable skills, additional to those set out in the other learning outcomes, that will be of value in a wide range of situations, including the ability to:

- Apply their skills in problem solving, communication, working with others, information retrieval and the effective use of general IT facilities.
- Plan self-learning and improve performance, as the foundation for lifelong learning/CPD.
- Monitor and adjust a personal course of work on an on-going basis.
- Exercise initiative and personal responsibility, which may be as a team member or leader.

Those additional general skills are applied and described in individual modules and can be seen on module descriptors where they are applicable.

Teaching and learning strategies:
Acquisition of general transferable skills is achieved through communication of knowledge in formal reports. These constitute a part of the assessment for most modules on the course. One aspect of this is ensuring that students possess a set of transferable skills such as communication, teamwork, and presentation skills. Students can use these skills in any occupation and can convey from one type of work to another without retraining. Additionally, students acquire library and research skills as well as professional skills such as time management, project management, information literacy, information management, career development, self-awareness, and keeping up-to-date with innovations in the field. From a motivational perspective, students receive formative feedback on these skills in the context of computer systems engineering and in a way that highlights their relevance and importance to the discipline.

Assessment

A substantial individual project which involves the student going through the process of making design choices made in the context of D1 and D2 and further considering his/her work in the context of Economic, Legal, Social, Ethical and Environmental concerns (D5 and D6). Normally the project would be assessed by a combination of a formal report and a presentation/viva voce examination and would demonstrate completion of D3 and D4. Laboratory work which involves some choices in how solutions are arrived at (D3). Open-ended examination questions (D2). Coursework which allow students to demonstrate that they have met D2 and D3. Coursework which requires the student to consider the context of Economic, Legal, Social, Ethical and Environmental concerns as part of a problem relevant to the computer systems engineering course (D5 and D6).

Teaching and Learning overview

The course is made up of several modules (see section G below) and each module is delivered through a combination of lectures, tutorials, practical workshops, computing workshops etc all of which amounts to directed teaching (classroom contact). There is a variance in the makeup of the number of hours dedicated to lectures, workshops etc but the total number of study hours attracted by each module is dependent on the module weighting in credits. Typically, a 20-credit module, attracts 200 hours (1 credit is equal to 10 hours) of learning which constitutes both directed learning and independent learning.

Further, teaching and learning in this course ensures that graduates have the capacity to meet the needs of employers behaving as an agent of change, producing graduates who are prepared to move into employment with skills and expectations that benefit their employers. Graduates must be able to keep abreast with changes, and a key requirement of this course is equipping students with the mechanisms for achieving this. Lifelong learning is considered in this course, which can foster such attitudes with novel approaches to teaching and learning that continually question and challenge situations and by highlighting opportunities for advances. Final year modules, including the project, can challenge students by exercises that seek to explore new avenues.

Independent Learning

The number of hours of independent learning required is dependent on the nature of the module. Generally, the number of hours of independent learning required increases from your Level 5 to Level 6 modules.

Subject-related and generic resources

These include the Perry Library, the electrical circuit lab, electronics lab, Computer networking and communication lab and other computer labs for software development.

The core and optional reading lists are supplied at the end of each module guide produced by the module leader. A copy of the module guide will be made available on the Virtual Learning Environment, VLE (Moodle) and the reading lists can also be accessed through LSBU Library website (http://www1.lsbu.ac.uk/library/).

Learning Support

To support students in their learning journey, academic and support staff are available during the normal operating hours of the University via prior appointment. Academic staff also operate surgery sessions where no prior appointments are needed. The University buildings and library are open from 8am to 9pm during term time, while the library operates for an extended period during examinations. Some specialist workshops/computing spaces etc are not accessible outside the normal operating hours of 9am to 5pm, unless timetabled

for use in a module.

All students are allocated to a Personal tutor when they begin their study at LSBU and the personal tutor is the one who students would typically see about **any** problems or issues they face, not just academic ones (most academic problems will probably be dealt with by module teachers or Course Directors). Students are advised to establish contact with their personal tutor from the beginning of their studies, evidenced by keeping a record of at least two meetings per semester.

Teaching staff

Most modules are delivered by full-time academic staff from within the parent division where the course resides and often by staff from other areas within the School of engineering or University where expertise lies. The primary aim is that each module is taught by a single member of staff, which most likely is the module leader (support teaching may be needed depending on the nature/size of the module etc, sub grouped in multiple tutorials or laboratory sessions). Occasionally, PG students or part-time teaching or research staff may support certain sessions, and, in such cases, the relevant tutors are trained, and care is taken to ensure the quality of the provision.

D. Assessment

University keeps an assessment and examinations procedure; a current version can be accessed at http://www.lsbu.ac.uk/ data/assets/pdf_file/0010/84349/assessment-and-examination-procedure.pdf Coursework in modules can be either formative or summative and the details are usually made available in the module guide and explained to students by the module leader at the beginning of the semester. The module guide will also provide details about the weightage of these assessment components and when the relevant brief will be made available, including submission instructions and deadlines.

Each module has two main assessment *components*, usually, the **Examination** and the **Coursework**. Each module may have several assessment *subcomponents*; these may consist of assignments, mini tests, quizzes, essays, laboratory reports, logbooks and examinations of various kinds such as Phase tests. The assessment components for each module are specifically defined and kept up to date in the current Module Guides. Note that a component is not necessarily a single piece of work - several pieces of coursework (often referred to as a portfolio) may constitute a single component of the module assessment. To pass a module, students must obtain an overall **module mark of no less than 40%** and a minimum **threshold** mark of **30% in each component.** The weighting of each component in calculating the overall module mark is given in the Module Guide, and the module leader will often cover the details of this at the beginning of the module.

Formative assessment normally provides students with feedback to enable them to improve their learning and performance prior to completing a formally assessed piece of summative work. Hence, summative assessment normally describes any piece of work that contributes towards a module mark. Normally, as a summative assessment, an end-of-semester examination take the form of a 2 or 3-hour unseen paper. Formative assessment typically includes discussions in classroom, tutorials exercises, simulation exercises, workshop or computing exercises, questions and answer sessions, peer discussions, observations, reflection on learning, presentation rehearsals.

Progression means moving on from one year to the next, during the studies. Students need to complete (pass) all modules taken/studied at that level by obtaining the minimum component marks and the minimum module marks. Occasionally, with the discretion of the exam board, students may be allowed to progress with an outstanding module(s) and the

course director will explain them in detail about this. It is important that students understand how progression works and what the rules are. The rules about progression and what happens if they fail modules are carefully set out (along with all the other University rules) in the Student Handbook, a copy of which is handed to them during enrolment. The rules about referrals, repeats and extenuating circumstances are defined by the University's Academic Regulations for Taught Programmes and are described in the Student Handbook and included in the course guide. For BSc Top-up course, the progression means graduate from the course. Exit awards do not exist for this course.

After graduation, students may choose to join MSc degree programme.

E. Academic Regulations

The University's Academic Regulations apply for this course

School specific protocols also apply for this course.

F. Entry Requirements

In order to be considered for entry to the BSc CSE Top-up FT course applicants will be required to have the following qualifications:

Full-Time Students

- HND, Foundation Degree in related subject, or
- Equivalent L5 qualification worth 240 credits in related subject.
- An overseas qualification assessed by UK ENIC as equivalent to at least BTEC HND in a closely-related subject **and** an IELTS score of 6.5 or equivalent.

G. Course structure(s)

Course overview

- The LSBU academic year is organised into two semesters. Each semester consists of 15 weeks (12 teaching weeks, 1 revision week and 2 exam weeks) of attendance by students.
- The BSc CSE Top-up course is made up of 120 credits. The course is made up of several modules, all modules attract 20 credits.
- The BSc Top-up in CSE programme is offered as full-time spread across 2 semesters (1 year).
- The detailed structure is shown below.

	Semester 1	Semester 2
YEAR 1	Computer Architecture and Operating Systems (EEE_5_CAO)	Embedded Systems and The Internet of Things (EEE_6_ESI)
	Cybersecurity and Cryptography (EEE_6_CSC)	Artificial Intelligence and Signal Processing (EEE_6_ASP)
	Computer Systems and Software Engineering (EEE_6_CSE)	BSc Project

H. Course Modules						
Module Code	**Module Title**	**Level**	**Sem**	**Credit value**	**Assessment**	
					CW %	**EX %**
EEE_5_CAO	Computer Architecture and Operating Systems	5	1	20	40	60
EEE_6_CSE	Computer Systems and Software Engineering	6	1	20	50	50
EEE_6_CSC	Cybersecurity and Cryptography	6	1	20	40	60
EEE_6_ASP	Artificial Intelligence and Signal Processing	6	2	20	40	60
EEE_6_ESI	Embedded Systems and The Internet of Things	6	2	20	40	60
EEE_6_PRJ	BSC Project L6	6	2	20	100	

I. Timetable information

Full-time students are usually timetabled between 9am and 6pm and the teaching spans out typically across 3 to 4 days in a week, with Wednesday afternoon, where possible, reserved for extracurricular activities.

The timetables are made available to students at least 2 weeks before commencement of the semester. Students are however advised to check their timetables via MyLSBU, more frequently, in the early weeks of the semester, where there are usually some changes to rooms and/or re-arrangement of sessions.

Any changes to the timetable after the start of the term are also circulated by the respective module leaders and course directors.

J. Costs and financial support

Course related costs

- The course fee is the fee published by the university's fee office. Field trips and placement activities, where organised, may cost extra and are not compulsory to attend but students are advised to utilise the opportunities where possible.

- Cost of books and other learning materials is also not included in the course fee. Learning resources are usually made available through VLE (Moodle) and the library holds copies of books recommended as core reading.
-

Tuition fees/financial support/accommodation and living costs

- 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: Educational Framework
Appendix C: 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.

Modules			**Course outcomes**																			
Level	**Title**	**Code**	A1	A2	A3	B1	B2	B3	B4	C1	C2	C3	C4	C5	C6	C7	C8	D1	D2	D3	D4	D5	D6
5	Computer Architecture and Operating Systems	EEE_5_CAO	TA	TA	TA	TA	TA	TA		TA	TA	TA	TA		TA		TA		TA	TA	TA	TA	TD
6	Computer Systems and Software Engineering	EEE_6_CSE	TA		TA	TA	TA	TA		TD	TD	TD						TA	TA	TA	TA		TD
6	Cybersecurity and Cryptography	EEE_6_CSC	TA	TA	TA	TA	TD	TA	TD		TA	TA	TD		TA				TA	TA	TA		TD
6	Artificial Intelligence and Signal Processing	EEE_6_ASP	TA	TA	TA	TA	TA	TA	TD	TA	TD	TA	TA			TD			TA	TA	TA		
6	Embedded Systems and The Internet of Things	EEE_6_ESI	TA	TA	TA	TA	TA	TA	TA	TA	TA	TA	TA	TA	TA	TA	TA	TA	TA		TA	TA	
6	BSc Project	EEE_6_PRJ	TA	TA	TA	TA	TA	TA	TA	TA	TA	TA	TA	TA	TA			TA	TA	TA	TA	TA	TA

Appendix B: Embedding the Educational Framework for Undergraduate Courses

The Educational Framework at London South Bank University is a set of principles for curriculum design and the wider student experience that articulate our commitment to the highest standards of academic knowledge and understanding applied to the challenges of the wider world.

The Educational Framework reflects our status as University of the Year for Graduate Employment awarded by *The Times and The Sunday Times Good University Guide 2018* and builds on our 125 year history as a civic university committed to fostering social mobility through employability and enterprise, enabling our students to translate academic achievement into career success.

There are four key characteristics of LSBU's distinctive approach to the undergraduate curriculum and student experience:

- Develop students' professional and vocational skills through application in industry-standard facilities
- Develop our students' graduate attributes, self-awareness and behaviours aligned to our EPIIC values
- Integrate opportunities for students to develop their confidence, skills and networks into the curriculum
- Foster close relationships with employers, industry, and Professional, Statutory and Regulatory Bodies that underpin our provision (including the opportunity for placements, internships and professional opportunities)

The dimensions of the Educational Framework for curriculum design are:

- **informed by employer and industry** needs as well as professional, statutory and regulatory body requirements
- **embedded learning development** for all students to scaffold their learning through the curriculum taking into account the specific writing and thinking requirements of the discipline/profession
- **high impact pedagogies** that enable the development of student professional and vocational learning through application in industry-standard or authentic workplace contexts
- **inclusive teaching, learning and assessment** that enables all students to access and engage the course
- **assessment *for* learning** that provides timely and formative feedback

All courses should be designed to support these five dimensions of the Educational Framework. Successful embedding of the Educational Framework requires a systematic approach to course design and delivery that conceptualises the student experience of the curriculum as a whole rather than at modular level and promotes the progressive development of understanding over the entire course. It also builds on a well-established evidence base across the sector for the pedagogic and assessment experiences that contribute to high quality learning.

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	Industrial Advisory boards, both at school level and division level, feeds into the curriculum design through its twice annually convened meeting. Students are encouraged to become student members of the professional body (IET) and the division pays for the membership to provide a sound start to their professional engagement. Alumni and employers are invited as guest speakers on the above module whose valuable inputs contribute to the student's ideas and activity which they later put use when competing on a national level in challenges such as the London Mayoral Challenge, Engineers without Borders etc.
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	At level 6 CD and project supervisor support the personal tutor system.

	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.	
High impact pedagogies	<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**. Consideration should be given to how students are allocated to groups to foster experience of diverse perspectives and values.	The following modules, encourage and allow students to work in small groups of 2 to 3 in various settings, and experiencing various learning techniques be it peer learning, or communication and networking with their buddies and respect their diversity and individual perspectives: • Computer systems and Software Engineering • Embedded systems and The internet of Things • Computer Architecture and Operating Systems Some module leaders, form groups where students are forced to work with random classmates in certain assignments and they are given a free choice to form groups for certain tasks.
Inclusive teaching, learning and assessment	<u>Accessible materials, resources and activities</u> All course materials and resources, including course guides, PowerPoint presentations, handouts and material available from VLE (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.	All teaching and learning materials are available as soft copies on the VLE in an appropriate accessible format. Module leaders also encourage students to approach them should they need the material in a different format. An example is notes with larger fonts for partially visually impaired students and printed material provided to DDS students.

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 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 communicate high expectations and develops a commitment to excellence.	The modules employ a range of course work assessments, categorised into formative or summative assessments that are integral to the learning and progression of all students. Formative assessments are important in the early years of a student's journey on the course as this will provide an opportunity to quickly act on the formative feedback obtained and work to address weaknesses which then helps them to progressively gain better marks in the later part of that assessment and other assessments. Also, due to the nature of the subjects studied, sometimes summative assessment are more suitable as it takes time for students to develop their understanding of complex concepts and then fully put them into practice or use, in either a classroom exercise or a work-place related case study. In situations where summative assessments are undertaken, formative feedback forms part of the scheduled contact time/meetings between the students and member of academic staff. Feedback for summative assessments is generally provided to students within the recommended timeframe as per the school/university regulations, which is currently two weeks after submission.

		Summative assessments contribute with a lower weighting, to the final module mark. The weightings can range from 5 to 50% depending on the number and type of assessment components that form part of the course work for that specific module.
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. 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.	Students on this course are required to undertake small-scale independent enquiry- based study and contribute to either their individual projects/task or to a group/team project that they are part of.

Curricula informed by employer and industry need	Authentic learning and assessment tasks Live briefs, projects or equivalent authentic workplace learning experiences and/or assessments enable students, for example, to engage with	Students are invited to talks by alumni and the industrial advisory panel members, who often share their experiences and current issues in the industry, through case studies or presentations, relevant to the courses and this will help develop the understanding of

/ Assessment *for* learning	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.	students where they are able to see how their classroom knowledge can be transformed to provide solutions to problems in workplace.
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.	Due to the nature of the subject material, there will be little contribution based on cultural or social diversity among the students of the cohort. However, industry practices vary from country to country and since our student body is diverse and arrive from different countries, this then becomes contextual in their learning, for e.g. electrical earthing and bonding techniques/arrangements are traditionally different in different countries and are also industry specific, so what is applicable to land-based equipment is not relevant to off-shore equipment etc.

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,	Direct work-based learning is not part of this course. This course is mixed with other BEng courses in lectures and often contextually part-time students share their work aspects and how they relate to the classroom learning, which is an important experience to full-time students.

	simulations and role-play in industry-standards settings as relevant to the course. Work-based learning can be linked to assessment if appropriate.	Assignments where possible are designed to be based on case studies, which are close to real world scenarios and guest talks often feed into these.
Embedded learning development	Writing in the disciplines: Alternative formats 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 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.	The course offers varying assessment aspects which supports students attempts to adopt ways of thinking and practising, which is underpinned by knowledge and skills gained, the formative feedback provided and the opportunities to put them into practice. Students also undertake a variety of presentation techniques; they are generally required to assimilate information while performing a task in the laboratory or during a group discussion and quickly note it down as a running commentary in a logbook for formal presentation. Further, in their study, they are required to retrieve data from the information recorded which enables them to experience their own strengths and weaknesses associated with their personal style of recording information. In L6 modules, they are also required to make sound judgements based on assimilated information and obtained data to then disseminate the information to a specific target audience in a specified style such as a poster, presentation, formal report etc. to either a layman audience, a competent co-worker, a consultant, reviewer, or a professional body etc.

High impact pedagogies	Multi-disciplinary, interdisciplinary or interprofessional group-based learning experiences 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	Most of our student cohorts are very diverse and have varying entry qualifications and work in different sectors and are often working despite studying full-time. This already brings in a rich and diverse perspective to the teams who work either on lab-based exercises. The BSc project module is expected to shape the outputs, which requires strong inclusivity, communication and networking skills, to bring out the potential of each team member to the maximum benefit of the team.

	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.	
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. A 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.	The diversity and entry qualifications of the cohorts are considered when setting assessment, which are approved by external examiners and are overseen by academic quality review processes, both through LSBU's internal reviews as well as period review at times of accreditation by the professional body. Variation to standard agreed assessments are possible but should be approved by the relevant external examiner and relevant professional body accrediting the course, the IET in this case.
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 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**.	This course provides opportunities and support to enable students to gain general employability skills that are complemented with the help from University's employability office (such as career planning, Career fairs etc.).

Curricula informed by employer and industry need / Assessment *for* learning / High impact pedagogies	<u>Capstone project/dissertation</u> The level 6 BSc 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**.	The individual BSc project will provide an opportunity for students to integrate and synthesise the knowledge and skills gained throughout their course, which they are able to apply to real-world scenarios, be it research, or industry linked. This experience develops the student's professionalism, integrity and creativity and prepares them to challenges in the real world when they undertake employment.

Appendix C: Terminology

Within this document, the following terms are used with the meanings stated:

awarding body	a UK higher education provider (typically a university) with the power to award higher education qualifications such as degrees
awareness	is general familiarity, albeit bounded by the needs of the specific discipline
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
knowledge	is information that can be recalled
know-how	is the ability to apply learned knowledge and skills to perform operations intuitively, efficiently and correctly
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

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
Understanding	is the capacity to use concepts creatively, for example, in problem solving, design, explanations and diagnosis
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