

Programme Specification for Undergraduate Programmes

Leading to:

BEng Computer Systems Engineering

BEng Computer Systems Engineering with Professional Development

Applicable for all undergraduate students **starting at FHEQ Level 4** in 2019



Version No.	Date	Notes – QA USE ONLY	AO
2019/20 v0.1	April 2019	Major modification to programme. Introduction of Common First Year in Engineering and changes to content in second and third year of programme.	JP
2019.20 v0.2	July 2019	Major modifications approved by College Education Committee. Block codes to be allocated.	JP
2019.20 v0.3	19 July 2019	Route code assigned.	JP
2019.20 v0.4	7 August 2019	Block codes added for Common First Year in Engineering. Subsequent years to be added later.	JP
2019.20 v0.5	30 August 2019	EE1607 recoded as EE1623 due to credit change from 10 to 20.	JP
2019.20 v0.6	11 September 2019	Confirmation of accreditation by the Institution of Engineering and Technology. This programme is accredited to partial CEng level for the 2019 intake.	JP

Undergraduate Programme	
1. Awarding institution	Brunel University London
2. Teaching institution(s)	Brunel University London
3. Home college/department/division	College of Engineering, Design and Physical Sciences/ Dept of Electronic and Computer Engineering / Electronic and Electrical Engineering/
4. Contributing college/department/division /associated institution	LBIC for Alternative Foundation Year (See section 25) Department of Mathematics; Department of Civil Engineering, Department of Mechanical and Aerospace Engineering, Department of Chemical Engineering
5. Programme accredited by	Institution of Engineering and Technology
6. Final award(s) and FHEQ Level of Award	BEng (Honours) Computer Systems Engineering (FHEQ level 6) BEng (Honours) Computer Systems Engineering with Professional Development (FHEQ level 6)
7. Programme titles	BEng Computer Systems Engineering
8. Programme type (Single honours/joint)	Single Honours
9. Normal length of programme (in months) for each mode of study	36 months FT; 48 months Sandwich Where students commence their programme in an Alternative Level in LBIC, the normal length stated above will vary as follows: Foundation Year - September commencement: + 12 months Foundation Year - January commencement: + 9 months
10. Maximum period of registration for each mode of study	Normal or standard duration (as defined above in 9) plus 3 years
11. Variation(s) to September start	None for Standard Levels;
12. Modes of study	Full-time / Thick Sandwich
13. Modes of delivery	Standard
14. Intermediate awards. titles and FHEQ Level of Award	BEng (Ordinary) Computer Systems Engineering (FHEQ level 6) BEng (Ordinary) Computer Systems Engineering with Professional Development (FHEQ level 6) DipHE Computer Systems Engineering (FHEQ level 5) DipHE Computer Systems Engineering with Professional Development (FHEQ level 5)

	CertHE Computer Systems Engineering (FHEQ level 4)
15. UCAS Code	GH56 (Full time) / GH5P (Thick S/W)
16. JACS / HECoS Code	H600 / 100162
17. Route Code	H900UECOSYEN
18. Relevant subject benchmark statements and other external and internal reference points used to inform programme design	<p>UK Quality Code for Higher Education QAA Subject Benchmark Statement (Engineering) IET accreditation policy and guidance Brunel University London 2030 Brunel Placement Learning Policy, as published under the 'Placements' section of the 'Managing Higher Education Provision with Others' page.</p> <p><u>Useful Pdf links:-</u> Engineering Benchmark Statement Engineering Council "The Accreditation of Higher Education Programmes" Framework for Higher Education Qualifications Brunel's Programme Approval Policy</p>
19. Admission Requirements	<p>Details of entry requirements are provided on the University's and College website.</p> <p>Levels of English for non-native speakers are outlined on Brunel International's language requirements pages.</p>
20. Other relevant information (e.g. study abroad, additional information on placements)	Optional work placement year is available after completion Level 5 BEng (thick sandwich mode) leading to the award of BEng Electronic and Electrical Engineering with Professional development
21. Programme regulations not specified in Senate Regulation 2. Any departure from regulations specified in Senate Regulation 2 must be stated here and approved by Senate.	<p>No more than 20 credits of E is allowable at each level</p> <p>To achieve a D- grade or better in any module students must achieve a minimum grade of E- in assessment elements weighted 30% or above</p>
22. Further information about the programme is available from the College website.	BEng Computer Systems Engineering

23. EDUCATIONAL AIMS OF THE PROGRAMME

The Computer Engineering programme at Brunel University London is part of the Brunel Engineering Curriculum portfolio. As such, its aim is to produce graduates that are creative, knowledgeable, have perspective and are professional in their approach.

The programme aims to produce graduates who can work creatively and professionally, based on know-how and perspective. The programme will therefore provide students with the opportunity to develop the knowledge, understanding, cognitive and technical skills to work and research in computer systems engineering. This programme focuses on embedded systems, computing, internet of things and autonomous systems themes. Graduates will be able to design, integrate, and develop technological solutions for the generation of computer engineering systems. The programme provides a coherent curriculum through which problem solving, professional development and transferable skills required to work in computer systems engineering and related industries are developed. The sandwich programme provides an enhanced awareness of the industry as well as enhanced professional and personal development.

24. PROGRAMME AND INTERMEDIATE LEARNING OUTCOMES

The programme provides opportunities for students to develop and demonstrate knowledge and understanding (K) cognitive (thinking) skills (C) and other skills and attributes (S) in the following areas:

Level	Category (K = knowledge and understanding, C = cognitive (thinking) skills, S = other skills and attributes)	Learning Outcome	Associated Assessment Blocks Code(s)	Associated Study Blocks Code(s)	Associated Modular Blocks Code(s)
4					
	K	Knowledge of scientific principles and methodology necessary to underpin their education in computer systems engineering, to enable appreciation of its scientific and engineering context, and to support their understanding of historical, current and future developments and technologies.			EE1623, EE1620
	K, C	Knowledge of mathematical principles necessary to underpin their education in computer systems engineering and to enable them to apply mathematical methods, tools and notations proficiently to evaluate engineering problems.			BE1601, EE1621, EE1622
	K/C	Apply a systems approach to identify the problems and apply core computer systems engineering principles to their analysis			BE1602, EE1620
	C	Ability to present, evaluate and interpret quantitative methods and computer software relevant to computer systems engineering.			EE1620, EE1621, EE1622
	C	Ability to present and evaluate knowledge and understanding of other engineering disciplines to support study of computer systems engineering.			BE1602, EE1620
	S	Demonstrate essential practical Engineering skills			BE1602, EE1620, EE1621, EE2xx3
	S	Basic knowledge of management, entrepreneurship and safety culture			BE1602

	S	Effective communication of technical material, ethics demonstration, in the form of written reports and oral presentations			BE1602
	S	Working effectively as a member of a team; managing time and resources to given constraints			BE1602
5					
		Knowledge and critical understanding of well-established scientific principles and methodology necessary to underpin their education in computer systems engineering, to enable appreciation of its scientific and engineering context, and to support their understanding of historical, current and future developments and technologies			EE2064, EE2601, EE2602, EE2xx4
	K, C	Knowledge and understanding of well-established mathematical principles necessary to underpin their education in computer systems engineering and to enable them to apply mathematical methods, tools and notations proficiently in the evaluation of solutions to engineering problems.			EE2064, EE2601, EE2602, EE2xx4
	K, C	Understanding of engineering principles and a systems approach to engineering problems, and the ability to apply them to evaluate key engineering processes.			EE2064, EE2601, EE2602, EE2xx4,
	C	Ability to identify, classify and describe the performance of systems and components through the use of analytical methods and modelling techniques.			EE2601, EE2602, EE2XX4, EE2064
	C	Ability to apply quantitative methods and computer software relevant to computer systems engineering, in order to analyse information and propose solutions to problems arising from that analysis.			EE2064, EE2602, EE2XX4, EE2606
	K, C, S	Ability to undertake a design process taking into consideration a range of factors and an understanding of different needs and constraints.			EE2064, EE2XX5, EE2XX2

	K	Detailed knowledge of characteristics of particular materials, equipment, processes, or products and understanding of contexts in which engineering knowledge can be applied and the use of technical literature and other information sources			EE2XX5, EE2XX2
	S	Demonstrate competence in a range of practical and communication skills			EE2XX5, EE2064, EE2601, EE2602, EE2XX4, EE2606
	K/S	Demonstrate awareness of environmental and sustainability limitations; ethical, health, safety, security and risk issues; intellectual property; codes of practice and standards;			EE2602, EE2XX5
	S	Ability to adapt to professional behaviour and organisational expectations (with Professional Development)			EE2555
	S	Successfully engage in self-directed, informal learning (with Professional Development)			EE2555
	C	Analyse issues encountered in an employment context from an academic perspective (with Professional Development)			EE2555
	K	Knowledge and understanding of a company, organisation or business (in general or in particular) (with Professional Development)			EE2555
	K	Knowledge and understanding of an appropriate profession or professions and working in a professional environment (with Professional Development)			EE2555
6					
	C	Ability to apply and integrate knowledge and understanding of other engineering disciplines to support study of computer systems engineering			EE3099
	K, C	Critical understanding of engineering principles and a systems approach to engineering problems, and the ability to apply them to critically analyse key engineering processes, and to work with uncertainty.			EE3xx2, EE3620, EE3619, EE3621 EE3099

C	Ability to identify, classify and critically analyse performance of systems and components through the use of analytical methods and modelling techniques.			EE3xx2, EE3099, EE3620, EE3621, EE3xx4
C	Ability to apply quantitative methods and computer software relevant to the engineering discipline, in order to solve engineering problems with uncertainty.			EE3xx2, EE3619, EE3621, EE3xx4
K, C, S	Ability to undertake a design process taking into consideration a range of factors and an understanding of different needs, constraints and uncertainty.			EE3xx2, EE3621, EE3099, EE3xx4
K	Knowledge and understanding of the wider context of engineering processes and the need for a high level of professional and ethical conduct in engineering.			EE3099
K	Specialist knowledge of characteristics of particular materials, equipment, processes, or products and critical understanding of contexts in which engineering knowledge can be applied and the use of technical literature and other information sources			EE3099
S	Learn independently and manage time effectively in familiar and unfamiliar situations			EE3099
S	Use ICT Tools proficiently			EE3099
S	Effectively communicate ideas and results in a major technical report and oral presentation			EE3099
S	Learn independently and manage time effectively in familiar and unfamiliar situations			EE3099

Learning/teaching strategies and methods to enable learning outcomes to be achieved, including formative assessments

Modern teaching methodologies and technologies will be used to ensure maximum engagement from the students. Team learning exercises will provide students with training in communication skills and ability to work in teams as well as ability to hold a debate and justify choice of their design or solution to a set problem

In level 4, knowledge and understanding learning outcomes are achieved mainly through specific lectures and seminars, supported by problem sheets, weekly small group tutorials, CAL exercises and directed reading in textbooks. The material is reinforced through coursework or assignments as well as application in laboratory and workshop sessions. Cognitive skills are generally developed at the same time as knowledge and understanding and are therefore learned through the teaching and learning programme outlined above. Practical and transferable skills are mainly developed through a lab based activities.

In level 5, the knowledge and understanding learning outcomes continue to be achieved through lectures, seminars etc. The lectures are also supported by laboratory and workshop sessions linked to the lecture material. Cognitive skills are generally developed at the same time as knowledge and understanding and are therefore learned through the teaching and learning programme outlined above. The programming material in particular is developed through coursework assignments for the students to demonstrate their knowledge and understanding as well as practical application. A group design project is also used for the students to develop their cognitive skills relating to design and project learning outcomes as well as their general transferable skills.

In level 6, the knowledge and understanding LOs continue to be achieved through lectures, seminars etc. The individual project aims to develop the students' abilities in a wide range of skills, including research, technical knowledge and understanding, project planning and management, and communication skills via the written report and progress review meeting and demonstration.

The opportunity to think and work creatively will be given at all levels, particularly:

FHEQ L4: BE1602 Engineering Practice; EE1620 Electronic Devices and Systems

FHEQ L5: EE2602 Digital Systems Design and Reliability Engineering; EE2xx5 Microcontroller Group Design Project

FHEQ L6: EE3099 Individual Project; EE3620 Design of Internet of Things (option)

Summative assessment strategies and methods to enable learning outcomes to be demonstrated.

The assessment strategy is developed in mind to cover all needs and abilities of students and to help them to achieve the programme learning outcomes, to make studying more interactive for the students and to help them to benefit from continued professional development.

Testing of knowledge and understanding is through a combination of unseen examinations and assessed coursework including laboratory reports, individual and group assignment reports and presentations, coursework portfolios and project reports and presentations. Skills are also assessed in written reports, coursework, assignments, presentations and examinations as well as the final year project.

For the sandwich course ("with Professional Development"), knowledge and understanding is tested through a portfolio of evidence including a professional development record and an assignment answering questions about the company, organisation or business. The cognitive and other skills are recorded in the professional development record which is assessed, and as well are assessed by a technical/design/business report.

25. Programme Structure, progression and award requirements

Programme structures and features: levels, assessment blocks, credit and progression and award requirements

- **Compulsory block:** one which all students registered for the award are required to take as part of their programme of study. These will be listed in the left hand column;
- **Optional block:** one which students choose from an 'option range'. These will be listed in the right hand column;
- **A Core assessment** is an assessment identified within an assessment block or modular block (either compulsory or optional) which must be passed (at grade D- or better) in order to be eligible to progress and to be eligible for the final award. All core assessments must be specified on the programme specification next to the appropriate assessment or modular block:

Where students are expected to pass the block at D- or better, but not necessarily all elements, then the block itself is core.

e.g. AB3000 Project (40)

Core: Block

Where only some elements of assessments are required to be passed at D- or better, these will be identified by listing each element that is core

e.g. ABXXX1 Title (XX credits)

Core: 1 & 4

Where students are expected to pass all assessments in a block then this will be identified. By setting the assessment this way, students are also required to pass the block by default. This will be identified thus:

e.g. ABXXXX Title (XX credits)

Core: All, Block

- A **non-core assessment** does not have to be passed at grade D- or better, but must be better than a grade F, in order to progress and to be eligible for the final award.

Foundation Level

The foundation level structure available to international students is specified in document "Validated Programme Element Specification for LBIC Alternative Foundation Year in Engineering". This document also specifies the admission and progression requirements.

Level 4

Compulsory assessment block codes, titles and credit

Optional assessment block codes, titles and credits

N/A

Compulsory study block codes, titles and credit volume

Optional Study block codes, titles and credit volume

N/A

<p>Compulsory modular block codes, titles and credits (All modules are 20 credits unless otherwise specified) BE1601 Engineering Mathematics & Programming (Core Block) BE1602 Engineering Practice (Core Block) EE1623 Internet and Network Technologies EE1620 Electronic Devices and Systems EE1621 Introductory Programming for Engineers EE1622 Data and Information</p> <p><small>Please note: To achieve a D- grade or better in any module students must achieve a minimum grade of E- in assessment elements weighted 30% or above</small></p>	<p>Optional modular block codes, titles and credits</p>
<p>Level 4 Progression and Award Requirements</p> <p><u>As per Senate Regulation 2</u></p>	

<p>Level 5</p>	
<p>Compulsory assessment block codes, titles and credits N/A</p>	<p>Optional assessment block codes, titles and credits N/A</p>
<p>Compulsory study block codes, titles and credit volume N/A</p>	<p>Optional Study block codes, titles and credit volume N/A</p>
<p>Compulsory modular block codes, titles and credits (All modules are 20 credits unless otherwise specified)</p> <p>EE2064 Data Networks, Services and Security EE2601 Computer Architecture and Interfacing EE2602 Digital Systems Design and Reliability Engineering EE2XX4 Sensors and Automation</p> <p>EE2606 Object Oriented Systems and Programming EE2xx5 Microcontroller Group Design Project (10 credits) EE2XX2 Professional Practices and business for Engineers (10 credits)</p> <p><small>Please note: To achieve a D- grade or better in any module students must achieve a minimum grade of E- in assessment elements weighted 30% or above</small></p>	<p>Optional modular block codes, titles and credits</p>
<p>Level 5 Progression and Award Requirements</p> <p><u>As per Senate Regulation 2</u></p>	

FHEQ Level 5 – Sandwich Placement	
Compulsory assessment block codes, titles and credits N/A	Optional assessment block codes, titles and credits N/A
Compulsory study block codes, titles and credit volume N/A	Optional study block codes, titles and credit volume N/A
Compulsory modular block codes, titles and credits EE2555 Work placement (120 credits) Core: Block	Optional modular block codes, titles and credits
FHEQ Level 5 Placement Progression and Award Requirements	
<p>As per Senate Regulation 2</p> <p>For BEng (Honours) Computer Systems Engineering with Professional Development, EE2555 will contribute 25% of the Level 5 profile and 8.33% of the overall degree calculation</p>	

FHEQ Level 6	
Compulsory assessment block codes, titles and credits N/A	Optional assessment block codes, titles and credits N/A
Compulsory study block codes, titles and credit volume N/A	Optional study block codes, titles and credit volume N/A
Compulsory modular block codes, titles and credits (All modules are 20 credits unless otherwise specified) EE3621 Embedded Systems EE3099 Individual Project (40 credits) Core: Block Although EE3099 is a compulsory module, the project topic worked on is chosen by the student, subject to staff approval. Please note: To achieve a D- grade or better in any module students must achieve a minimum grade of E- in assessment elements weighted 30% or above	Optional modular block codes, titles and credits (All modules are 20 credits unless otherwise specified) E3xx2: Autonomous systems EE3xx4 Artificial Intelligent Systems EE3620 Design of Internet of Things EE3619 Advanced Computing Technologies Please note: To achieve a D- grade or better in any module students must achieve a minimum grade of E- in assessment elements weighted 30% or above

<p>Level 6 Progression and Award Requirements</p> <p>As per Senate Regulation 2</p> <p>Except for the following variation to Senate Regulation 2: no more than 20 credits of E is allowable at this level.</p> <p>For BEng (Honours) Computer Systems Engineering with Professional Development, EE2555 will contribute 8.33% of the overall degree calculation</p> <p>NOTE: to achieve recognition of having completed an accredited degree, students must have a total of no more than 30 credits at grade E in their profile.</p>

Please note: this specification provides a concise summary of the main features of the programme and the learning outcomes that a student might reasonably be expected to achieve and demonstrate if he/she takes full advantage of the learning opportunities that are provided. More detailed information on the learning outcomes, content and teaching, learning and assessment methods can be found in the modular block, assessment and study block outlines and other programme and block information. The accuracy of the information contained in this document is reviewed by the University from time to time and whenever a modification occurs.