

Programme Specification for Undergraduate Programmes

Leading to:

BEng Electronic and Electrical Engineering

BEng Electronic and Electrical Engineering (Artificial Intelligence)

BEng Electronic and Electrical Engineering (Computer Systems)

BEng Electronic and Electrical Engineering (Communication Systems)

BEng Electronic and Electrical Engineering (Energy Systems)

BEng Electronic and Electrical Engineering with Placement

BEng Electronic and Electrical Engineering (Artificial Intelligence) with Placement

BEng Electronic and Electrical Engineering (Computer Systems) with Placement

BEng Electronic and Electrical Engineering (Communication Systems) with Placement

BEng Electronic and Electrical Engineering (Energy Systems) with Placement

Applicable for all undergraduate students starting at FHEQ Level 4 in 2020

Version No.	Date	Notes – QA USE ONLY	AO
2020.21 V1.0	19 August 2020	Programme updated for a September 2020 start.	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 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) Electronic and Electrical Engineering (FHEQ level 6) BEng (Honours) Electronic and Electrical Engineering (Artificial Intelligence) (FHEQ level 6) BEng (Honours) Electronic and Electrical Engineering (Computer Systems) (FHEQ level 6) BEng (Honours) Electronic and Electrical Engineering (Communication Systems) (FHEQ level 6) BEng Electronic and Electrical Engineering (Energy Systems) with Placement (FHEQ level 6) BEng (Honours) Electronic and Electrical Engineering with Placement (FHEQ level 6) BEng (Honours) Electronic and Electrical Engineering (Artificial Intelligence) with Placement (FHEQ level 6) BEng (Honours) Electronic and Electrical Engineering (Computer Systems) with Placement (FHEQ level 6) BEng (Honours) Electronic and Electrical Engineering (Communication Systems) with Placement (FHEQ level 6) BEng Electronic and Electrical Engineering (Energy Systems) with Placement (FHEQ level 6)
7. Programme title	BEng Electronic and Electrical Engineering BEng Electronic and Electrical Engineering (Artificial Intelligence) BEng Electronic and Electrical Engineering (Computer Systems) BEng Electronic and Electrical Engineering (Communication Systems) BEng Electronic and Electrical Engineering (Energy Systems) with Placement (FHEQ level 6)

8. Programme type (Single honours/joint/major minor)	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 Foundation Year n 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 length of programme (as defined above in 9) + 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 and titles with FHEQ Level of Award	BEng (Ordinary) Electronic and Electrical Engineering (FHEQ level 6) BEng (Ordinary) Electronic and Electrical Engineering with Placement (FHEQ level 6) DipHE Electronic and Electrical Engineering (FHEQ level 5) DipHE Electronic and Electrical Engineering with Placement (FHEQ level 5) CertHE Electronic and Electrical Engineering (FHEQ level 4) BEng Engineering (Electronic and Electrical) (FHEQ level 6) BEng Engineering (Electronic and Electrical – Artificial Intelligence) (FHEQ level 6) BEng Engineering (Electronic and Electrical – Computer Systems) (FHEQ level 6) BEng Engineering (Electronic and Electrical – Communication Systems) (FHEQ level 6) BEng Engineering (Electronic and Electrical – Energy Systems) (FHEQ level 6) BEng Engineering (Electronic and Electrical) with Placement (FHEQ level 6) (FHEQ level 6) BEng Engineering (Electronic and Electrical – Artificial Intelligence) with Placement (FHEQ level 6) BEng Engineering (Electronic and Electrical – Computer Systems) with Placement (FHEQ level 6) BEng Engineering (Electronic and Electrical – Communication Systems) with Placement (FHEQ level 6) BEng Engineering (Electronic and Electrical – Energy Systems) with Placement (FHEQ level 6)
15. UCAS Code	H600 (Full time) / H602 (Thick S/W)
16. JACS / HECoS Code	H600 / 100163
17. Route Code	BEng Electronic and Electrical Engineering: H600UEELELEN BEng Electronic and Electrical Engineering (Artificial Intelligence): H600UEEEEA BEng Electronic and Electrical Engineering (Computer Systems) H600UEEEECPSY BEng Electronic and Electrical Engineering (Communication Systems) H600UEEEECOSY BEng Electronic and Electrical Engineering (Energy Systems) H600UEEEENS

<p>18. Relevant subject benchmark statements and other external and internal reference points used to inform programme design</p>	<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>
<p>19. Admission Requirements</p>	<p>Details of entry requirements are provided on the University's and College website. Levels of English for non-native speakers are outlined on Brunel International's language requirements pages.</p>
<p>20. Other relevant information (e.g. study abroad, additional information on placements)</p>	<p>Optional work placement year is available after completion of Level 5 BEng (thick sandwich mode) leading to the award of BEng Electronic and Electrical Engineering with Placement</p>
<p>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>	<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>
<p>22. Further information about the programme is available from the College website.</p>	<p>BEng Electronic and Electrical Engineering</p>

23. EDUCATIONAL AIMS OF THE PROGRAMME

The Electronic and Electrical 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 will therefore provide students with the opportunity to develop the knowledge, understanding, cognitive and technical skills to work and research in electronic and electrical engineering. The programme focus on analogue and digital electronics, power and communication systems. Graduates will be able to design, integrate, and develop technological solutions for the generation of electronic and electrical engineering systems. The programme provides a coherent curriculum through which problem solving, professional development and transferable skills required to work in electronic and electrical engineering and related industries are developed. The sandwich programme provides an enhanced awareness of the industry as well as enhanced professional and personal development.

BEng Electronic and Electrical Engineering (Artificial Intelligence) programme graduates will be able to display an in-depth knowledge on principles of artificial intelligence and apply these principles and techniques on electronic and electrical based artificial intelligence prototype.

BEng Electronic and Electrical Engineering (Computer Systems) programme graduates will be able to display an in-depth knowledge on scientific and economic trade-offs in design and implementation of computer systems and apply their implementation skills to the production of such artefacts.

BEng Electronic and Electrical Engineering (Communication Systems) programme graduates will be able to display an in-depth knowledge and skills on communication systems and apply them on an individual programme of work.

BEng Electronic and Electrical Engineering (Energy Systems) programme graduates will be able to display an in-depth knowledge and skills on energy systems and apply them on an electrical energy based individual programme of work.

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 & 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, understanding, skills gathering and comprehension of the specific engineering disciplines relevant to Electronic and Electrical engineering, including systems, mechanics and materials.			EE1620 BE1603 BE1604 BE1605
	K/C	Knowledge of the fundamental scientific principles that underpin an education relevant to engineering and demonstrating their application (e.g. basic energy and mass balance and fundamentals of thermodynamics and fluid mechanics)			EE1620 BE1601 BE1603 BE1604 BE1605
	K/C	Knowledge and understanding of the fundamental mathematical and statistical principles that underpin basic calculations in engineering			BE1601
	K/C	Apply a systems approach to identify the problems and apply core electronic and electrical engineering principles to their analysis			BE1602 EE1620
	C	Ability to formulate basic problems, apply and demonstrate mathematical methods together with computational tools (Matlab, Excel) in the analysis of engineering problems			BE1601 EE1620 BE1604 BE1605
	C	Ability to apply and demonstrate scientific principles to relevant engineering applications, collect, manipulate and interpret data (e.g. labs)			BE1602 EE1620
	K/S	Knowledge and understanding in the use of computer tools in solving basic engineering problems (e.g. Matlab, Excel, etc.)			BE1601 BE1602 EE1620
	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 EE1620 BE1604
	S	Working effectively as a member of a team; managing time and resources to given constraints			BE1602

	S	Safely operate laboratory and workshop equipment, obtain data and assess measurement error			EE1620 BE1604 BE1605
5					
	K/C	Knowledge and critical understanding of well-established scientific principles and methodology necessary to underpin their education in electronic and electrical engineering, to enable appreciation of its scientific and engineering context, and to support their understanding of historical, current and future developments and technologies			EE2640, EE2602, EE2603, EE2604, EE2607
	K/C	Knowledge and understanding of well-established mathematical principles necessary to underpin their education in electronic and electrical engineering and to enable them to apply mathematical methods, tools and notations proficiently in the evaluation of solutions to engineering problems.			EE2640, EE2602, EE2603, EE2604, EE2607
	K/C	Understanding of engineering principles and a systems approach to engineering problems, and the ability to apply them to evaluate key engineering processes.			EE2640, EE2602, EE2603, EE2604, EE2607
	C	Ability to identify, classify and describe the performance of systems and components through the use of analytical methods and modelling techniques.			EE2640, EE2602, EE2603, EE2604, EE2607
	C	Ability to apply quantitative methods and computer software relevant to the engineering discipline, in order to analyse information and propose solutions to problems arising from that analysis.			EE2602, EE2604, EE2607, EE2641
	K, C, S	Ability to undertake a design process taking into consideration a range of factors and an understanding of different needs and constraints.			EE2604, EE2641
	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			EE2641, EE2642
	S	Demonstrate competence in a range of practical Engineering and communication skills			EE2640, EE2602, EE2603, EE2604, EE2607, EE2641
	K/S	Demonstrate awareness of environmental and sustainability limitations; ethical, health, safety,			EE2602, EE2641, EE2642

		security and risk issues; intellectual property; codes of practice and standards;			
	S	Ability to adapt to professional behaviour and organisational expectations (with Placement)			EE2555
	S	Successfully engage in self-directed, informal learning (with Placement)			EE2555
	C	Analyse issues encountered in an employment context from an academic perspective (with Placement)			EE2555
	K	Knowledge and understanding of a company, organisation or business (in general or in particular) (with Placement)			EE2555
	K	Knowledge and understanding of an appropriate profession or professions and working in a professional environment (with Placement)			EE2555
6					
	C	Ability to apply and integrate knowledge and understanding of other engineering disciplines to support study of electronic and electrical 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.			EE3099, EE3040, EE3049, EE3623, EE3052, EE3621, EE3624
	C	Ability to identify, classify and critically analyse performance of systems and components through the use of analytical methods and modelling techniques.			EE3099, EE3622, EE3040, EE3049, EE3623, EE3621, EE3624
	C	Ability to apply quantitative methods and/or computer software relevant to Electronic and electrical Engineering, in order to solve engineering problems with uncertainty.			EE3622, EE3623, EE3621, EE3624, EE3040
	K, S	Ability to undertake a design process taking into consideration a range of factors and an understanding of different needs, constraints and uncertainty.			EE3099, EE3621, EE3624, EE3040, EE3622
	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	Demonstrate independence and competence in practical Engineering skills			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

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, 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 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.

Experienced engineers working in industry will deliver selected parts of the programme, ensuring students are exposed to the practicalities of the industry and understand more of the world of work. A group poster conference (part of BE1602) will take place towards the end of FHEQ L4, with a range of industrial specialists invited to examine the posters and talk with the students. Students will also have the opportunity to work on industry-related projects at FHEQ L6.

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; EE2641 Microcontroller Group Design Project

FHEQ L6: EE3099 Individual Project

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 Placement”), 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 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.

FHEQ Level 4

Compulsory assessment block codes, titles and credit	Optional assessment block codes, titles and credits
Compulsory study block codes, titles and credit volume	Optional Study block codes, titles and credit volume
Compulsory modular block codes, titles and credits BE1601 Engineering Mathematics & Programming (Core Block) – (20 credits) BE1602 Engineering Practice (Core Block) – (20 credits) BE1603 Engineering Systems and Energy – (30 credits) BE1604 Engineering Mechanics and Materials I – (15 credits) BE1605 Engineering Mechanics and Materials II – (15 credits) EE1620 Electronic Devices and Systems – (20 credits) 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

Level 4 Progression and Award Requirements**[As per Senate Regulation 2](#)**

NOTE: to achieve recognition of having completed an accredited degree, students must have a total of no more than 20 credits at grade E, at each level, in their profile.

FHEQ Level 5

Compulsory assessment block codes, titles and credits	Optional assessment block codes, titles and credits
N/A	N/A
Compulsory study block codes, titles and credit volume	Optional Study block codes, titles and credit volume
N/A	N/A

<p>Compulsory modular block codes, titles and credits (All modules are 20 credits unless otherwise specified)</p> <p>EE2640 Communication Systems</p> <p>EE2602 Digital Systems Design and Reliability Engineering</p> <p>EE2603 Electrical Engineering and Sustainability</p> <p>EE2604 Electronic Systems</p> <p>EE2607 Signals and Systems</p> <p>EE2641 Microcontroller Group Design Project (10 credits)</p> <p>EE2642 Professional Practices and business for Engineers (10 credits)</p> <p>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>	<p>Optional modular block codes, titles and credits</p>
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Level 5 Progression and Award Requirements

[As per Senate Regulation 2](#)

NOTE: to achieve recognition of having completed an accredited degree, students must have a total of no more than 20 credits at grade E, at each level, in their profile.

Level 5 – Sandwich Placement

<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</p> <p>EE2555 Work placement (120 credits) Core: Block</p>	<p>Optional modular block codes, titles and credits</p>

Level 5 Placement Progression and Award Requirements

[As per Senate Regulation 2](#)

For BEng Electronic and Electrical Engineering with Placement, EE2555 will contribute 25% of the Level 5 profile and 8.33% of the overall degree calculation.

FHEQ Level 6	
Compulsory assessment block codes, titles and credits	Optional assessment block codes, titles and credits
Compulsory study block codes, titles and credit volume	Optional study block codes, titles and credit volume
<p>Compulsory modular block codes, titles and credits (All modules are 20 credits unless otherwise specified)</p> <p>EE3099 Individual Project (40 credits) Core: Block EE3049 Advanced Electronics</p> <p>Although EE3099 is a compulsory module, the project topic worked on is chosen by the student, subject to staff approval</p> <p>Only for BEng Electronic and Electrical Engineering (Artificial Intelligence) EE3622 Artificial Intelligence Systems EE3099: Students need to choose a project to demonstrate their skills in artificial intelligent systems</p> <p>Only for BEng Electronic and Electrical Engineering (Computer Systems) EE3621 Embedded Systems EE3099: Students need to choose a project to demonstrate their skills in computer systems</p> <p>Only for BEng Electronic and Electrical Engineering (Communication Systems) EE3040 Digital Communication Systems EE3099: Students need to choose a project to demonstrate their skills in communication systems.</p> <p>Only for BEng Electronic and Electrical Engineering (Energy Systems) EE3624 Sustainable Electrical Energy Systems EE3099: Students need to choose a project to demonstrate their skills in energy systems.</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 (All modules are 20 credits unless otherwise specified)</p> <p>EE3622 Artificial Intelligence Systems EE3040 Digital Communication Systems EE3623 Robotics and Control Systems EE3052 Multimedia Digital Signal Processing EE3621 Embedded Systems EE3624 Sustainable Electrical Energy Systems</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>Level 6 Progression and Award Requirements</p> <p><u>As per Senate Regulation 2</u> For BEng Electronic and Electrical Engineering with Placement 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 20 credits at grade E, at each level, in their profile.</p> <p><small>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.</small></p>	