

Programme Specification for Undergraduate Programme



Leading to:

BEng Automotive Engineering

BEng Automotive Engineering with Placement

Applicable for all undergraduate students **starting at FHEQ Level 4** in 2020/20

Version No.	Date	Notes – QA USE ONLY	QAO
2020-21 v0.1	1 October 2020	Programme specification for 2020 entrants. Awaits mapping of level 4 blocks against learning outcomes and codes for level 6.	JP

Undergraduate Programme	
1. Awarding institution	Brunel University London
2. Teaching institution(s)	Brunel University London
3. Home college / department / division / associated institution	College of Engineering, Design and Physical Sciences / Department of Mechanical and Aerospace Engineering
4. Contributing college / department / division / associated institution	Department of Mathematics; Department of Civil Engineering, Department of Electronic and Electrical Engineering, Department of Chemical Engineering
5. Programme accredited by	Institute of Mechanical Engineers (IMechE)
6. Final award(s) and FHEQ Level of Award	BEng Automotive Engineering, (FHEQ level 6) BEng Automotive Engineering with Placement (FHEQ level 6)
7. Programme title	BEng Automotive 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 Foundation Year in LBIC, the normal length stated above will vary as follows: Foundation September commencement: + 12 months Foundation 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
12. Modes of study	Standard
13. Modes of delivery	Full Time, Thick Sandwich
14. Other / intermediate awards, titles and FHEQ Level of Award	CertHE Automotive Engineering (FHEQ level 4) DipHE Automotive Engineering (FHEQ level 5) DipHE Automotive Engineering with Placement (FHEQ level 5) BEng (Ord) Automotive Engineering (FHEQ level 6) BEng (Ord) Automotive Engineering with Placement (FHEQ level 6)
15. UCAS Code	FT: HH30; SW: HHN1
16. HECoS Code	100201 (Automotive Engineering)
17. Route Code	H330UEAUTOEN
18. Relevant subject benchmark statements and other external and internal reference points used to inform programme design	UK Quality Code for Higher Education QAA Subject Benchmark Statement (Engineering) Brunel 2030 Brunel Placement Learning Policy, as published under the 'Placements' section of the Managing Higher Education Provision with Others page. Useful Pdf links:-

	<p>the Engineering Benchmark Statement http://www.qaa.ac.uk/en/Publications/Documents/Subject-benchmark-statement-Engineering-.pdf</p> <p>the Framework for Higher Education Qualifications http://www.qaa.ac.uk/en/Publications/Documents/qualifications-frameworks.pdf</p> <p>Engineering Council: UK-Spec (https://www.engc.org.uk/ukspec)</p> <p>The Institution of Mechanical Engineers: Academic Accreditation Guidelines (https://www.imeche.org/docs/default-source/tapd/acd001-annex-1-academic-accreditation-guidelines.doc?sfvrsn=4)</p> <p>Brunel's Programme Approval Policy http://www.brunel.ac.uk/about/quality-assurance/documents/pdf/Programme-Approval-Policy.pdf</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)	<ul style="list-style-type: none"> • The programme of study will involve visits to Mechanical engineering industry, timetabled outside the above programme of study. • A number of individual projects at Level 6 are expected to be on topics suggested and partly supervised by industry. • Industrial placement takes place in a mechanical related industry.
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>Variation to SR2.16 – Level 6 Major Individual Project (30 credits) instead of 40 credits. Approved by Senate 23 September 2020.</p>
22. Further information about the programme is available from:	<p>Course website: https://www.brunel.ac.uk/study/undergraduate/Automotive-Engineering-BEng</p>

23. EDUCATIONAL AIMS OF THE PROGRAMME

The Automotive 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 produce graduates with knowledge and understanding of the subject and its applications. The graduates, equipped with analytical and computational skills, design, and transferable skills, will be able to play leading professional roles in the automotive and related industries, show initiative, take responsibility and able to making decisions in complex and unpredictable situations. The programme also aims to develop new areas of teaching in response to the needs of industry and community.

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 [SM3b]	Knowledge, understanding, skills gathering and comprehension of the specific engineering disciplines relevant to engineering, including systems, mechanics and materials.			TBC
	K/C [SM1b]	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)			TBC
	K/C [SM2b]	Knowledge and understanding of the fundamental mathematical and statistical principles that underpin basic calculations in engineering			TBC
	K/C [EA3b]	Apply a systems approach to identify the problems and apply core engineering principles to their analysis			TBC
	C [EA2, EA4b]	Ability to formulate basic problems, apply and demonstrate mathematical methods together with computational tools in the analysis of engineering problems			TBC
	C [EA1b]	Ability to apply and demonstrate scientific principles to relevant engineering applications, collect, manipulate and interpret data (e.g. labs)			TBC
	K/S [P2]	Knowledge and understanding in the use of computer tools in solving basic engineering problems			TBC

	S [EL3b]	Basic knowledge of management, entrepreneurship and safety culture			TBC
	S [D6,G1]	Effective communication of technical material, ethics demonstration, in the form of written reports and oral presentations			TBC
	S [P11b]	Working effectively as a member of a team; managing time and resources to given constraints			TBC
	S [D3b, P3, P8]	Safely operate laboratory and workshop equipment, obtain data and assess measurement error			TBC

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	K [SM1b]	A comprehensive synthesis and understanding of the principles, concepts and theories underpinning the study of automotive engineering.			ME2610 ME2611 ME2613 ME2614 ME2618 ME2616 ME2617
	K [SM2b]	Knowledge and critical understanding of fundamentals of mathematical and statistical methods underpinning the education in aerospace engineering.			ME2610 ME2613 ME2618
	K [SM3b]	Ability to use other engineering disciplines and evaluate critically the appropriateness of different approaches in order to support the study for automotive engineering.			ME2610 ME2614 ME2618 ME2616 ME2617
	K, C [EA1b]	Understanding of engineering principles and the ability to apply them to undertake critical analysis of key automotive engineering processes.			ME2611 ME2614 ME2618 ME2616 ME2617
	C [EA2]	Ability to use analytical methods and modelling techniques for the understanding and assessment of systems in automotive engineering.			ME2610 ME2611 ME2618 ME2616 ME2617
	C [EA3b]	Use of alternative approaches, with understanding of their limitations, for the quantitative analysis and modelling of systems and structures for automotive engineering.			ME2610 ME2613 ME2614 ME2618 ME2617
	K, C [EA4b]	Understanding of, and the ability to apply, an integrated or systems approach to solving complex automotive engineering problems.			ME2610 ME2611 ME2613 ME2618

	K [D1]	Understanding the business and customer needs			ME2612 ME2618
	K [D2]	Understanding design process methods applied to engineering components and systems.			ME2611
	K,C [D3b]	Work with information that may be incomplete or uncertain, quantify the effect of this on the design and, where appropriate, use theory or experimental research to mitigate deficiencies,			ME2611 ME2614 ME2618 ME2617
	K, C [D4]	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.			ME2611 ME2618
	K, C [D5]	Plan and manage the design process, including cost drivers, and evaluation of the outcomes, including a comprehensive understanding of the engineering materials and their applications in manufacturing processes for automotive engineering.			ME2611 ME2618
	S [D6]	Effective communication of technical material, in the form of written reports and oral presentations, and time management.			ME2610 ME2619 ME2614 ME2616 ME2617
	K [EL1b,EL3b,EL6b, P4, P6, P8,P11b]	Understanding of the role of automotive engineering in industry and commerce, including legal, health and safety requirements, quality issues as well as the role of the professional engineer and industry regulatory bodies.			ME2612
	K [EL2, EL4]	Application of methods in the analysis, planning, resourcing, progressing, monitoring and control of automotive engineering projects in a sustainable and, if possible, in a quantitative way.			ME2612 ME2618
	K, C [P2]	Comprehensive understanding of the characteristics of materials and processes for automotive engineering.			ME2611 ME2614 ME2618

	C,S [P3]	Ability to apply relevant practical and laboratory skill, including data acquisition and interpretation of experimental data.			ME2613 ME2614 ME2616 ME2617
	K, S [P4]	Understanding of the use of technical literature and other information sources for design. Ability to develop writing skills.			ME2612
	K [P5]	Knowledge of relevant legal and contractual issues.			ME2612
	K,S [P6]	Understanding of appropriate codes of practice and industry standards.			ME2611 ME2612 ME2614
	K [P7,P8]	Awareness of quality issues and their application to continuous improvement and the ability to work with technical uncertainty.			ME2612 ME2618
	[P11b]	Knowledge of characteristics of particular equipment, processes or products, with extensive knowledge and understanding of a wide range of engineering materials and components.			ME2612 ME2616
	S [G1]	Basic information technology and communication (ITC) principles and writing skills relevant to automotive engineering.			ME2610 ME2612 ME2618
	S [G1,G2,G3b,G4]	Understanding of the role of automotive engineering in industry and commerce, including legal, health and safety requirements, quality issues as well as the role of the professional engineer and regulatory bodies.			ME2612
	S [G1,G2, G3b]	Understanding of the use of technical literature and other information sources for self-learning for conceptual automotive vehicle design. Monitor and adjust proper planning for automotive design.			ME2610 ME2612 ME2618
	S	Adapt to the change in expectations and environments found during an industrial placement. ('with Placement' awards.			L5-13

6					
	K [SM1b]	A comprehensive synthesis and systematic understanding of the principles, concepts and theories underpinning the study of automotive engineering.			L6-9 L6-3 L6-2 L6-4/5 L6-7 L6-13 L6-16
	K [SM2b]	Systematic understanding and knowledge of fundamentals of mathematical and statistical methods underpinning the education in automotive engineering.			L6-2 L6-9 L6-3 L6-4/5 L6-11 L6-13 L6-16
	K [SM3b]	Apply mathematical and engineering science analytical tools to problem solving for automotive engineering.			L6-2 L6-3 L6-4/5 L6-7 L6-13 L6-16
	K [EA1b]	Systematic understanding of engineering principles and the ability to apply them to undertake critical analysis of key mechanical engineering processes.			L6-2 L6-9 L6-3 L6-13 L6-16
	K,S [EA2]	Ability to identify, classify and describe the performance of systems and components through the use of analytical methods and modelling techniques.			L6-9 L6-7 L6-13
	K [EA3b]	Ability to apply quantitative and computational methods for the analysis and modelling of systems and structures for automotive engineering.			L6-2 L6-3 L6-4/5 L6-7 L6-13 L6-16
	K [EA4b]	Systematic application of appropriate techniques that may include theories, formulae, data, and experimental and/or numerical techniques to solve mechanical problems presented by the project.			L6-9
	K [D1]	Systematic understanding the multi-disciplinary nature of sustainability and stakeholder dynamics.			L6-7 L6-11 L6-13
	K, S [D2]	Systematic understanding and appraisal of the automotive problem using a review of related literature and technical reports, including quality, environmental, health and safety issues. Evaluation and simplification of the automotive problem and validation of the results.			L6-2 L6-9 L6-3 L6-7 L6-11 L6-13 L6-16

	C [D3b]	Critical assessment and analysis of results with appreciation of uncertainty, ambiguity and limits of knowledge in automotive engineering projects.			L6-9 L6-7 L6-11
	K, C, S [D4]	Comprehensive knowledge of principles of principles of the engineering design process, including objectives and methods to identify design requirements and apply formulae, data and experimental and/or numerical techniques for automotive vehicle design.			L6-2 L6-9 L6-3 L6-11 L6-16
	K, C [D5]	Systematic planning and management of the design process, including cost drivers, and evaluation of the outcomes.			L6-9
	S [D6]	Effective communication of technical material, in the form of written reports and oral presentations, and time management.			L6-2 L6-9 L6-3 L6-7 L6-11 L6-16
	K [EL1]	Systematic understanding of the need for a high level of professional and ethical conduct in engineering and knowledge of professional codes of conduct.			L6-11
	K [EL2]	Comprehensive knowledge of environmental, quality, health and safety issues and relevant regulations in engineering business and appreciate the multi-disciplinary nature of sustainability and stakeholder dynamics, to ensure ethical and professional conduct as practicing engineers.			L6-11 L6-13
	K, S [EL3b]	Systematic application of methods in the analysis, planning, resourcing, progressing, monitoring and control of automotive engineering projects in a sustainable and, if possible, in a quantitative way.			L6-9 L6-11

	K, S [EL4]	Systematic understanding of the requirement for engineering activities to promote sustainable development and ability to apply quantitative techniques where appropriate.			L6-11
	K, S [EL5]	Systematic understanding of the role of automotive engineering in industry and commerce, including legal, health and safety requirements, quality issues as well as the role of the professional automotive engineer and automotive regulatory bodies.			L6-11
	C [EL6]	Comprehensive knowledge and understanding of risk issues, including health and safety, environmental and commercial risk, risk assessment and risk management techniques and an ability to evaluate commercial risk.			L6-11
	K, S [P1]	Systematic understanding of the background to the problem using a review of related literature and technical reports. Appreciation of the context in which engineering knowledge is applied.			L6-2 L6-9 L6-3 L6-13 L6-16
	K, C [P2]	Comprehensive knowledge of characteristics of particular equipment, processes or products, with extensive knowledge and understanding of a wide range of engineering materials and components.			L6-2 L6-3 L6-7 L6-13 L6-16
	K [P3]	Ability to apply relevant practical and laboratory skills			L6-4/5 L6-13
	K [P4]	Systematic understanding of the background to the problem using a review of related literature and technical reports. Appreciation of the context in which engineering knowledge is applied.			L6-9 L6-4/5 L6-11 L6-13
	K [P5]	Comprehensive knowledge of relevant legal and contractual issues.			L6-11

	K, S [P6, P7,P8]	Systematic understanding of the role of automotive engineering in industry and commerce, including legal, health and safety requirements, quality issues as well as the role of the professional engineer and regulatory bodies.			L6-11
	K, S [P6]	Systematic understanding of appropriate codes of practice and industry standards.			L6-9 L6-7
	S [P11b]	Systematic understanding of appropriate codes of practice and industry standards.			L6-11
	S [G1]	Apply their skills in problem solving, communication, information retrieval, working with others and the effective use of general IT facilities			L6-2 L6-9 L6-9 L6-11 L6-16
	S [G2]	Self-awareness of one's own skills and how these may be improved, thus understanding the employability qualities necessary for work requiring the exercise of initiative, professionalism and personal responsibility.			L6-9 L6-4 L6-4/5
	S [G3b]	Comprehensive project planning with identifiable objectives/milestones and time scale, and complete the project under given time and resource constraints. Effectively communicate the ideas and results within a written report and/or oral form.			L6-9
	S [G4]	Exercise initiative and personal responsibility, which may be as a team member or leader.			L6-9 L6-11 L6-13

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

Study

Students will be introduced to subject material, including key concepts, information and approaches, through a mixture of standard lectures, tutorials and seminars, laboratory practicals, field work, self study and individual research reports. Supporting material will be provided via the University's e-Learning platform. The aim is to challenge students and inspire them to expand their own knowledge and understanding.

Work

Preparation for work will be achieved through the development of 'soft' skills such as communication, planning, management and team work. This will be supported by the University's central services, principally the Library and ASK teams. In addition, guest speakers from industry will provide a valuable insight into the real world of automotive engineering.

Play

Many of the practical activities in which the students engage develop into enjoyable experiences, for example working in teams for laboratory work and field work. Various engineering and technology societies, run by the students (with staff support) form the focus for many extra-curricular activities for all students within the Mechanical and Aerospace Engineering Department.

Grow

Students are encouraged to develop personal responsibility throughout the course. Many elements of coursework involve, and reward, the use of initiative and imagination. Students are guided into this through the use of one-to-one tutorials. This aids them in developing reflective skills. Students on the Placement route record their personal development as part of the placement assessment, and are assisted in this by their industrial placement tutor and employer.

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 creatively, including producing novel designs, will be given at all levels, particularly:

FHEQ L4: BE1602 Engineering Practice; ME1620 Mechanical Engineering Science

FHEQ L5: ME2618 Vehicle Design and Performance

FHEQ L6: L6-9 Major Individual Project; L6-4/5 Mechatronics and Control Engineering; L6-7 Vehicle Structures and FEA

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

To ensure any course related documentation is flexible and CMA compliant all assessments will be specified on module outlines as one of the following three:

- *Coursework*
- *In-person assessment*
- *Examination*

Every assessment type falls within these three categories.

Coursework

For example

- Essays – to develop skills in research (collecting, managing and interpreting evidence)
- Laboratory reports – to develop skills in interpretation of experimental, theoretical and computational findings and skills in communicating a systematic process and results
- Assignment to develop transferable skills
- Design labs – to develop and assess engineering design skills (including basic information, technology and computer aided design skills) and visual and written communication
- Individual major report - to develop advanced abilities in research and communication, further develop engineering design, development and/or analysis skills and assess knowledge and understanding
- Group reports – to develop team skills and assess understanding of the interactions between engineering design, development and analysis processes
- Project portfolios - to develop skills in gathering, integrating, evaluating and presenting information and data from a variety of sources

In-person assessment

Any assessment where the actions (verbal or non-verbal) of the student are being assessed in their presence and thus for which the student must be in attendance.

- Oral presentations – to develop and assess verbal presentation skills.

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 Year

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

Level 4

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

Compulsory modular block codes, titles and credits

Optional modular block codes, titles and credits

BE1601 Engineering Mathematics & Programming

(20) (Core)

BE1602 Engineering Practice (20)

BE1603 Engineering Systems and Energy (30)

BE1604 Engineering Mechanics and Materials I (15)

BE1606 Engineering Mechanics and Materials II (15)

ME1620 Mechanical Engineering Science (20)

Level 4 Progression and Award Requirements

[As per Senate Regulation 2](#)

Level 5

Compulsory study block codes, titles and credits

Optional study block codes, titles and credits

ME2554 Mechanical Engineering Pre-placement (0 credits)

None

Compulsory modular block codes, titles and credits

Optional modular block codes, titles and credits

15 Credit Blocks:

None

ME2610 Engineering Mathematics and Programming

ME2611 Design Process for Machine Elements, Manufacturing Processes, Materials and CAD

ME2612 Engineering Business Core: **Block**

ME2613 Fluid Mechanics

ME2614 Solid Mechanics and Intro to FEA

ME2616 Thermodynamics and Heat Transfer

ME2617 Dynamics of Machines

ME2618 Vehicle Design and Performance

Level 5 Progression and Award Requirements	
As per Senate Regulation 2	
Level 5 – Sandwich Placement	
Compulsory modular block codes, titles and credits	Optional modular block codes, titles and credits
This block is only a requirement for the 'with Placement' awards. L5-13 Work Placement (120) Core: Block	None
Level 5 Placement Progression and Award Requirements	
As per Senate Regulation 2	
For BEng Automotive Engineering with Placement, L5-13 will contribute 25% of the Level 5 profile and 8.3% of the overall degree calculation.	
Module L5-13 must be undertaken between Levels 5 and 6. Students must also register on the IMechE MPDS scheme. Students must also register on the IMechE MPDS scheme. if they wish for their placement year to be accredited by the IMechE. If a student does not register it will not affect the title of the award made by the University.	
For DipHE Automotive Engineering, L5-13 will contribute 25% of the Level 5 profile.	

Level 6	
Compulsory modular block codes, titles and credits	Optional modular block codes, titles and credits
All blocks are 15 credits unless otherwise specified	None
L6-9 Major Individual Project (30) Core: Block The student chooses the individual project topic in L6-9, subject to staff approval. The individual project topic must be directly relevant to automotive engineering.	
L6-2 Vehicle Dynamics and Aerodynamics L6-4/5 Mechatronics and Control Engineering L6-7 Vehicle Structures and FEA	
L6-11 Sustainable Engineering Management and Practice Core: Block	
L6-13 Vehicle Propulsion L6-18 Technologies for Future Transport	

Level 6 Progression and Award Requirements
As per Senate Regulation 2
For BEng Automotive Engineering with Placement, L5-13 will contribute 8.3% of the overall degree calculation

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.