Programme Specification for Undergraduate Programme Leading to:
BEng Mechanical Engineering
BEng Mechanical Engineering with Placement

*Applicable for all undergraduate students **starting at Level 4** in 2020/21*

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*
V1	*15 March 2021*	*Level 6 Block Codes added for 2021/22.*	*BT*

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 Department of Mechanical and Aerospace Engineering Mechanical 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	Institution of Mechanical Engineers (IMechE)
6. Final award(s) and FHEQ Level of Award	BEng (Hons) Mechanical Engineering (FHEQ level 6) BEng Mechanical Engineering with Placement (FHEQ level 6)
7. Programme title	BEng (Hons) Mechanical 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 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. Intermediate awards, titles and FHEQ Level of Award	CertHE Mechanical Engineering (FHEQ level 4) DipHE Mechanical Engineering (FHEQ level 5) DipHE Mechanical Engineering with Placement (FHEQ level 5) BEng (Ord) Mechanical Engineering (FHEQ level 6) BEng (Ord) Mechanical Engineering with Placement (FHEQ level 6)
15. UCAS Code	FT: H303; SW: H304
16. HECoS Code	100190 (Mechanical Engineering)
17. Route Code	H300UEMECENG
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:- the Engineering Benchmark Statement (http://www.qaa.ac.uk/en/Publications/Documents/Subject-benchmark-statement-Engineering-.pdf) the Framework for Higher Education Qualifications (http://www.qaa.ac.uk/en/Publications/Documents/qualifications-frameworks.pdf) Engineering Council: UK-Spec (https://www.engc.org.uk/ukspec) 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) Brunel's Programme Approval Policy (http://www.brunel.ac.uk/about/quality-assurance/documents/pdf/Programme-Approval-Policy.pdf)
19. Admission Requirements	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.
20. Other relevant information (e.g. study abroad, additional information on placements)	• 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.	Variation to SR2.16 – Level 6 Major Individual Project (30 credits) instead of 40 credits. Approved by Senate 23 September 2020.
22. Further information about the programme is available from the College website.	Course webpage: https://www.brunel.ac.uk/study/undergraduate/Mechanical-Engineering-BEng .

23. EDUCATIONAL AIMS OF THE PROGRAMME

The Mechanical 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 their 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 mechanical engineering 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 or Civil 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

5					
	K [SM1b]	A comprehensive synthesis and systematic understanding of the principles, concepts and theories underpinning the study of mechanical engineering.			ME2610 ME2611 ME2613 ME2614 ME2616 ME2617
	K [SM2b]	Comprehensive knowledge and critical understanding of fundamentals of mathematical and statistical methods underpinning the education in mechanical engineering.			ME2610 ME2613 ME2616
	K [SM3b]	Ability to use other engineering disciplines and evaluate critically the appropriateness of different approaches in order to support the study for mechanical engineering.			ME2610 ME2614 ME2616 ME2617
	K, C [EA1b]	Systematic understanding of engineering principles and the ability to apply them to undertake critical analysis of key mechanical engineering processes.			ME2611 ME2614 ME2616 ME2617
	C [EA2]	Ability to use analytical methods and modelling techniques for the understanding and assessment of systems in mechanical engineering.			ME2610 ME2611 ME2616 ME2617
	C [EA3b]	Ability to apply quantitative and computational methods for the analysis and modelling of systems and structures for mechanical engineering.			ME2610 ME2613 ME2614 ME2617
	K, C [EA4b]	Systematic understanding of, and the ability to apply, an integrated or systems approach to solving complex mechanical engineering problems.			ME2610 ME2611 ME2613 ME2616
	K, C [D2]	Systematic understanding and appraisal of the mechanical engineering problem using a review of related literature and technical reports, including quality, environmental, health and safety issues. Evaluation and simplification of the problem and validation of the results.			ME2611 ME2615
	S [D3b]	Critical assessment and analysis of results with appreciation of uncertainty, ambiguity and limits of knowledge in mechanical engineering projects.			ME2611 ME2614 ME2615 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,			ME2611 ME2615

	C [D5]	Systematic planning and management of the design process, including cost drivers, and evaluate outcomes.			ME2611 ME2615
	S [D6]	Effective communication of technical material, in the form of written reports and oral presentations, and time management.			ME2610 ME2613 ME2614 ME2615 ME2617
	K [EL1]	Understanding of the need for a high level of professional and ethical conduct in engineering and a knowledge of professional codes of conduct.			ME2612 ME2614
	K [EL2]	Knowledge and understanding of the commercial, economic and social context of engineering processes.			ME2612
	K [EL3b,EL6]	Knowledge and understanding of management techniques, including project management, that may be used to achieve engineering objectives. Knowledge and understanding of risk issues, including health and safety, environmental and commercial risk, and of risk assessment and risk management techniques			ME2612
	K [EL4]	Understanding of the requirement for engineering activities to promote sustainable development and ability to apply quantitative techniques where appropriate.			ME2612 ME2616
	K, C [P2]	Comprehensive understanding of the characteristics of materials and processes for mechanical engineering.			ME2611 ME2614
	C, S [P3]	Ability to apply relevant practical and laboratory skills, including data acquisition and interpretation of experimental data.			ME2610 ME2613 ME2614 ME2615 ME2616 ME2617
	K, C [P4]	Understanding of the use of technical literature and other information sources for design.			ME2612
	K,S [P6]	Understanding of appropriate codes of practice and industry standards			ME2611 ME2612
	C [P8]	Ability to work with technical uncertainty.			ME2612 ME2615
	C [P11]	Understanding of, and the ability to work in, different roles within an engineering team.			ME2612 ME2616
	S [G1]	Plan the project with identifiable objectives/milestones and timescale, and complete the project under given time and resource constraints. Effectively communicate the ideas and results within a written report and/or oral form.			ME2610 ME2612 ME2615

	S [G2]	Self-awareness of one's own skills as a coach or mentor and how these may be improved, thus understanding the employability qualities necessary for work requiring the exercise of initiative, professionalism and personal responsibility.			ME2612
	S [G3b]	Plan the project with identifiable objectives/milestones and timescale, and complete the project under given time and resource constraints. Effectively communicate the ideas and results within a written report and/or oral form.			ME2612
	S [G4]	Effectively and professionally manage the design process as part of a team.			ME2612 ME2615
	S	Adapt to the change in expectations and environments found during an industrial placement. ('with Placement' awards)			ME2555
6					
	K, C [SM1b]	A comprehensive synthesis and understanding of the principles, concepts and theories underpinning the study of mechanical engineering.			L6-9 ME3621 ME3618 ME3622 ME3623 ME3624
	K, C [SM2b]	Fundamentals of mathematical and statistical methods underpinning the education in mechanical engineering.			L6-9 ME3621 ME3618 ME3619 ME3623 ME3624
	K [SM3b]	Ability to apply and integrate knowledge and understanding of other engineering disciplines to support study of their own engineering discipline and the ability to evaluate them critically and to apply them effectively.			ME3618 ME3622 ME3623 ME3624
	K, C [EA1b]	Understanding of engineering principles and the ability to apply them to undertake critical analysis of key mechanical engineering processes.			L6-9 ME3621 ME3623 ME3624
	K, S [EA2]	Ability to use analytical methods and modelling techniques for the understanding and assessment of systems in mechanical engineering.			L6-9 ME3621 ME3622 ME3623
	K, C, S [EA3b]	Use of alternative approaches, with understanding of their limitations, for the quantitative analysis and modelling of systems and structures for mechanical engineering.			ME3621 ME3618 ME3622 ME3624
	C	Systematic application of appropriate techniques that may include theories,			L6-9

	[EA4b]	formulae, data, and experimental and/or numerical techniques to solve in an integrated manner mechanical engineering problems presented by the project.			
	C [EA6]	Ability to extract and evaluate pertinent data and to apply engineering analysis techniques in the solution of unfamiliar problems.			L6-9
	K [D1]	Systematic understanding the multi-disciplinary nature of sustainability and stakeholder dynamics.			ME3619 ME3623
	K, S [D2]	Systematic understanding and appraisal of the mechanical engineering problems using a review of related literature and technical reports, including quality, environmental, health and safety issues.			L6-9 ME3619 ME3623
	C [D3b]	Critical assessment and analysis of results with appreciation of uncertainty, ambiguity and limits of knowledge in mechanical engineering projects.			L6-9 ME3621 ME3622 6-11 ME3623
	K, C, S [D4]	Comprehensive knowledge of principles in the engineering design process, including objectives and methods to identify design requirements and apply formulae, data and experimental and/or numerical techniques for design problems.			L6-9 ME3619 ME3624
	C, S [D6]	Effective communication of technical material, in the form of written reports and oral presentations, and time management.			L6-9 ME3621 ME3622 ME3619 ME3623 ME3624
	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.			ME3619 ME3624
	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.			ME3621 ME3619

	K, S [EL3]	Knowledge and understanding of management techniques, including project and change management, that may be used to achieve engineering objectives, their limitations, and how they may be applied appropriately.			L6-9 ME3619 ME3623
	K, S [EL4]	Systematic application of methods in the analysis, planning, resourcing, progressing, monitoring and control of mechanical engineering projects in a sustainable and, if possible, in a quantitative way.			ME3619
	K, S [EL5]	Systematic understanding and appraisal of the role of mechanical engineering in industry and commerce, including legal, health and safety requirements, quality issues as well as the role of the professional mechanical engineer and regulatory bodies.			ME3619
	C [EL6]	Systematic understanding of the role of mechanical engineering in industry and commerce, including legal, health and safety requirements, as well as risk assessment and risk management techniques.			L6-9 ME3619
	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.			L6-9
	K [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.			ME3622 L6-9
	C,S [P3]	Ability to apply relevant practical and laboratory skills, including data acquisition and interpretation of experimental data.			ME3621 ME3624
	K [P4]	Systematic understanding of the background to the problem using a review of related literature and technical reports.			L6-9 ME3618 ME3619
	K, S [P6]	Systematic understanding of the role of mechanical engineering in industry and commerce, including legal, health and safety requirements, quality issues as well as the role of the professional mechanical engineer and regulatory bodies.			L6-9 ME3622 ME3619
	C [P7]	Awareness of quality issues and their application to continuous improvement.			ME3619

	C [P8]	Critical assessment, analysis and interpretation of results for mechanical engineering projects.			L6-9 ME3621 ME3619
	K, C [P11b]	Systematic understanding the roles within an engineering team and the ability to exercise initiative and personal responsibility, which may be as a team member or leader.			ME3619 ME3624
	S [G1]	Apply their skills in problem solving, communication, information retrieval, working with others and the effective use of general IT facilities.			L6-9 ME3621 ME3619
	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 ME3618 ME3623
	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 ME3621
	S [G4]	Exercise initiative and personal responsibility, which may be as a team member or leader.			L6-9 ME3619

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 mechanical 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: : ME2615 Elements of Engineering Design Project
FHEQ L6: L6-9 Major Individual Project; ME3618 Mechatronics and Control Engineering;

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 were 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 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)	**Optional modular block codes, titles and credits**
Level 4 Progression and Award Requirements As per Senate Regulation 2	

Level 5	
Compulsory study block codes, titles and credits ME2554 Mechanical Engineering Pre-placement (0 credits)	**Optional study block codes, titles and credits** None
Compulsory modular block codes, titles and credits 15 Credit Blocks: 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 ME2615 Elements of Engineering Design Project ME2616 Thermodynamics and Heat Transfer ME2617 Dynamics of Machines	**Optional modular block codes, titles and credits** None
Level 5 Progression and Award Requirements As per Senate Regulation 2	

Level 5 – Sandwich Placement	
Compulsory modular block codes, titles and credits This block is only a requirement for the 'with Placement' awards. ME2555 Work Placement (120) Core: Block	**Optional modular block codes, titles and credits** None
Level 5 Placement Progression and Award Requirements As per Senate Regulation 2 For BEng Mechanical Engineering with Placement, ME2555 will contribute 25% of the Level 5 profile and 8.3% of the overall degree calculation. Module ME2555 must be undertaken between Levels 5 and 6. 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 Mechanical Engineering, ME2555 will contribute 25% of the Level 5 profile.	

Level 6	
Compulsory modular block codes, titles and credits All assessment blocks are 15 credits unless otherwise specified 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 relevant to mechanical engineering. ME3621 Applied Fluid Mechanics ME3618 Mechatronics and Control Engineering ME3622 Mechanical Engineering Structures ME3619 Sustainable Engineering Management and Practice Core Block ME3623 Design of Engineering Systems ME3624 Intro to AI Applications in Engineering	**Optional modular block codes, titles and credits**
Level 6 Progression and Award Requirements As per Senate Regulation 2 For BEng Mechanical Engineering with Placement, ME2555 will contribute 8.33% of the overall degree weighting.	

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.