

Programme Specification for Postgraduate Programme Leading to: MSc Advanced Engineering Design



Applicable for all postgraduate students starting in 2021

Version No.	Date	Notes – QA USE ONLY	QA
2021-22 v1	26 July 2021	Minor modification to programme: MN5508 added as an option for 2021/22 onwards.	JP

Postgraduate Taught 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 Mechanical and Aerospace Engineering
4. Contributing college/department/division /associated institution	BPC for Alternative Pre-Masters (see section 25)
5. Programme accredited by	The Institution of Mechanical Engineers (IMechE). The Institution of Engineering and Technology (IET)
6. Final award(s) and FHEQ Level of Award	MSc Advanced Engineering Design FHEQ level 7
7. Programme title	MSc Advanced Engineering Design
8. Programme type (Single honours/joint)	N/A
9. Normal length of programme (in months) for each mode of study	12 months (FT); 24 months (PT)
10. Maximum period of registration for each mode of study	FT – 1 year (equivalent to 52 weeks) PT – 2.5 years (equivalent to 30 months from the 1st October) entry Where students commence their programme at LBIC, the normal length stated above will vary as follows: June commencement + 4 months
11. Variation(s) to September start	January from 2021 – FT only See document “Validated Programme Element Specification for LBIC Generic Pre-Masters (with and without work placement) for Alternative Level entry points
12. Modes of study	Full Time/Part Time
13. Modes of delivery	Standard
14. Intermediate awards, titles and FHEQ Level of Award	PGDip in Advanced Engineering Design - FHEQ Level 7 PGCert in Advanced Engineering Design - FHEQ Level 7
15. UCAS Code	N/A
16. HECoS Code	100182
17. Route Code	H150PAENGDES
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.
19. Admission Requirements	For current admission requirements for this programme click here .
20. Other relevant information (e.g. study abroad, additional information on placements)	N/A
21. Programme regulations not specified in Senate Regulation 3. Any departure from regulations specified in Senate Regulation 3 must be stated here and approved by Senate.	N/A
22. Further information about the programme is available from:	Course webpage

23. EDUCATIONAL AIMS OF THE PROGRAMME

The educational aim of this programme is to further educate engineering and pure science graduates in advanced theory and skills so that they will have the expertise to become advanced designers, design team leaders or researchers in engineering design working in a computer assisted environment.

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 7	Category (K = knowledge and understanding, C = cognitive (thinking) skills, S = other skills and attributes)	Learning Outcome	Masters Only	Associated Assessment Blocks Code(s)	Associated Study Blocks Code(s)	Associated Modular Blocks Code(s)
	K 1	Advanced theoretical framework and associated tools and principles involved in complex engineering product design and development.				MN5562 MN5561 MN5557 EE5510 DM5563 MN5552
	K 2	The theory needed to carry out a comprehensive advanced analysis involving structural design and Finite Element Analysis methods				MN5562 MN5561
	K 3	Modelling and analysis of engineering design products.				MN5562 MN5566 MN5561 MN5508
	K 4	Principles and theoretical framework of Mechanism Synthesis and Analysis.				MN5562 MN5566
	K 5	Human and other Factors in Engineering and their applications in product design and development.				MN5566 DM5563 MN5565 MN5508
	K 6	The principles of Mechanical-Electrical interaction Systems and Digital Control.				EE5510 MN5552 MN5566
	K 7	The principles and theoretical framework of manufacturing system design and modelling				MN5502 MN5562 MN5566 DM5563 EE5510 MN5508
	K 8	The constraints faced by the industry				MN5557 MN5566 MN5502
	K 9	Research methods in engineering relevant to the design of complex products.	X			MN5566 MN5565
	C 1	Plan, organise and execute a project involving design of a complex engineering product drawing knowledge and skills from several of the traditional engineering disciplines.				MN5566 MN5502 MN5565 MN5508
	C 2	Devise a product development methodology in a CAD environment with due consideration for human factors and various design methods.				MN5562 MN5561 MN5557 MN5566 DM5563
	C 3	Initiate a the design of a Mechanical/Electronic artefact from an outline specification				MN5566 MN5552 MN5565

C 4	Systematically evaluate and analyse appropriate techniques for solution of engineering design problems.				MN5562 MN5561 EE5510 DM5563 MN5508
C 5	Able to analyse sustainability of a design and make informed decisions about sustainable manufacture of the product				MN5557 MN5566 MN5502 MN5565
C 6	Carry out a directed objective research on an advanced engineering design project.				MN5566 MN5565
C 7	Demonstrate self-direction and apply independent thinking skills.				MN5562 MN5561 MN5557 MN5566 MN5565
S 1	Present succinctly to various audiences (using a range of media) rational and reasoned arguments that address technical issues related to complex engineering products.				MN5566 MN5565
S 2	Use appropriate information technology to aid problem solving.				MN5562 MN5561 MN5566 MN5502
S 3	Work as a member of a team and demonstrate conflict solving and leadership skills, while working at a professional or equivalent level.				MN5557 MN5566 MN5508
S 4	Effectively gather, analyse and synthesise technical information from a range of sources.				MN5557 MN5566 MN5565
S 5	Manage time and resources.				MN5557 MN5566 MN5565 MN5508

	Learning/teaching strategies and methods to enable learning outcomes to be achieved, including formative assessments
	<p>Knowledge</p> <p>The teaching starts with formal lectures on MN5566 (design experience – part one) including design methodology, hands-on experience on modelling and analysis CAE software packages, and hands-on experience on motor control and model making in the workshops. Advanced mechanical engineering knowledge in a CAE environment is provided by the modules MN5562 Computer Aided Engineering1 and MN5561 Computer Aided Engineering 2. MN5557 Sustainable Design and Manufacture provides needed knowledge and skills for detailed design of a product and ensuring its sustainable position on the market. MN5502 Manufacturing System Design and Economics and MN5508 and DM5563 Human Factors in Design modules provide the additional knowledge to develop high quality products at optimal cost. The dissertation project, MN5565, draws on this knowledge to carry out investigation and building on the knowledge on a specific area. Thus the modules are designed to have synergy towards achieving the educational aim of the programme.</p> <p>K1 to K7 are gained through formal lectures, seminars and tutorials and time-tabled laboratory classes. Further enhancement is given by additional material in the design studio.</p> <p>K8 is gained through the module MN5566 Design Experience which in its second part is a group project with a company. The students will be involved in the design and development of an engineering product for the industry. K9 is gained through a major dissertation project carried out either in industry or within the School. The project must contain some 'value-added' component that demonstrated the creation or development of new knowledge.</p> <p>Cognitive</p> <p>Cognitive skills are developed through the teaching and learning programme developed above. MN5566 Design Experience module has been developed specially to develop C1 to C3. The project will be carried out under close supervision with timetabled contact hours with the supervisors. Presentations, seminars, discussions and industrial lectures augmented by the self-learning materials in the design studio make this a special learning experience backed up by MN5508 project management.</p>

	<p>Assignments and laboratory exercises will augment the development of analytical and design skills C4 and C5 in a supportive learning environment.</p> <p>In addition to the tutorial hours built into the module specifications, special 'surgeries' in the design studio will be held for students needing help outside of the main teaching.</p> <p>MN5565 Dissertation module is the main route for acquiring C6. The projects generally will form specific parts of the research activities pursued by the various research groups in companies or in the school. This will provide sufficient sources and coherence for the students to thrive in their research. Students will be encouraged to publish their works in reputed conferences and journals.</p> <p>C7 will be acquired through all activities described in this section.</p> <p>Practical/Professional./Transferrable</p> <p>S1, S2 and S3 are developed and reinforced through MN5566 Design Experience module. S2 is taught in MN5562 Computer Aided Engineering 1 and MN5561 Computer Aided Engineering 2 modules and MN5502 Manufacturing System Design and Economics module.</p> <p>S4 is specifically developed and reinforced through MN5566 Design Experience module, MN5557 Sustainable Design and Manufacture and the dissertation project work (MN5565).</p> <p>S5 pervades most of the modules.</p>
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	<p>Summative assessment strategies and methods to enable learning outcomes to be demonstrated.</p>
	<p>Knowledge</p> <p>Assessments are carried out through written assignment, project-work and examinations. The specific ways in which each area is assessed is spelled out in the appropriate module specification.</p> <p>Cognitive</p> <p>The project reports of the Design Experience (MN5566) module are the primary method for the assessment of C1, C2 and C3. The Guidelines for Marking Reports spell out the descriptors for assessing the attainment of each student. This integrating project will link several modules.</p> <p>Analysis and problem solving skills (C4 and C5) will be assessed through carefully planned laboratory class work and written assignments.</p> <p>The main dissertation project (MN5565) will assess C6 and C7 to a great extent. Various research methods and knowledge gained through the modules will have great influence on the outcome of the dissertation project. The Guidelines for Marking Dissertations spell out the descriptors for assessing the attainment of each student.</p> <p>Practical/Professional./Transferrable</p> <p>The assessment of the group project module, MN5566 Design Experience, has several parts. One part assesses the weekly progress in which they make presentations to report, analyse and evaluate work done and to plan the work to be done. To facilitate this timetabled contact hours are allocated for this module. This assessment will assess S1 to S3. S4 is assessed as part of the dissertation (MN5565) and the viva voce examination.</p>

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 C- 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 C- or better, but not necessarily all elements, then the block itself is core.

e.g. AB5500 Project (40)
Core: Block

Where only some elements of assessments are required to be passed at C- 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 C- or better, but must D- or better in order to be eligible for the final award.

Full-Time Masters and FHEQ Level 7 – FOR FULL-TIME ROUTES ONLY

Compulsory assessment block codes, titles and credit

September Start

MN5562 Computer Aided Engineering 1 (15 credits)
MN5561 Computer Aided Engineering 2 (15 credits)
MN5557 Sustainable Design and Manufacture (15 credits)
MN5566 Design Experience (30 credits)
MN5502 Manufacturing Systems Design and Economics (15 credits)
MN5565 Dissertation project (60 credits)

January Start

Spring Term

MN5557 Sustainable Design and Manufacture
MN5566 Design Experience (30 credits)
MN5562 Computer Aided Engineering 1

Autumn Term

MN5566 Design Experience 2 (15 credits)
MN5561 Computer Aided Engineering 2 (15 credits)
MN5502 Manufacturing Systems Design and Economics (15 credits)

Optional assessment block codes, titles and credits

September Start

Autumn Term

MN5508 Project management (15 credits)
DM5563 Human Factors in Design (15 credits)

Spring Term

EE5510 Design of Mechatronic Systems (15 credits)
MN5552 Robotics & Manufacturing Automation (15 credits)
MN5610 Advanced Measurement Systems and Data Analysis (15 credits)

January Start

Spring Term

MN5508 Project management (15 credits)

Autumn Term

EE5510 Design of Mechatronic Systems (15 credits)
MN5552 Robotics & Manufacturing Automation (15 credits)
MN5610 Advanced Measurement Systems and Data Analysis (15 credits)

Part-Time Masters and FHEQ Level 7 – FOR PART-TIME ROUTES ONLY	
<p>Compulsory assessment block codes, titles and credit</p> <p><u>September Start</u></p> <p><u>Year 1</u></p> <p>MN5562 Computer Aided Engineering 1 (15 credits) MN5561 Computer Aided Engineering 2 (15 credits) MN5566 Design Experience 1 (15 credits)</p> <p><u>Year 2</u></p> <p>MN5566 Design Experience 2 (15 credits) MN5502 Manufacturing Systems Design and Economics (15 credits) MN5557 Sustainable Design and Manufacture (15 credits) MN5565 Dissertation (60 credits)</p> <p><u>January Start</u></p> <p><u>Year 1</u></p> <p><u>Spring Term</u></p> <p>MN5566 Design Experience 1 (15 credits) MN5502 Manufacturing Systems Design and Economics (15 credits) MN5557 Sustainable Design and Manufacture (15 credits)</p> <p><u>Year 2 (based on academic year)</u></p> <p><u>Autumn Term</u></p> <p>MN5562 Computer Aided Engineering 1 (15 credits) MN5561 Computer Aided Engineering 2 (15 credits) MN5566 Design Experience 1 (15 credits)</p> <p><u>Spring Term</u></p> <p>MN5566 Design Experience 1 (15 credits) MN5502 Manufacturing Systems Design and Economics (15 credits) MN5557 Sustainable Design and Manufacture (15 credits) MN5565 Dissertation (60 credits)</p>	<p>Optional assessment block codes, titles and credits</p> <p><u>September Start</u></p> <p><u>Year 1</u></p> <p><u>Autumn Term</u></p> <p>MN5508 Project management (15 credits) DM5563 Human Factors in Design (15 credits)</p> <p><u>Spring Term</u></p> <p>EE5510 Design of Mechatronic Systems (15 credits) MN5552 Robotics & Manufacturing Automation (15 credits) MN5610 Advanced Measurement Systems and Data Analysis (15 credits)</p> <p><u>Year 2</u></p> <p><u>Autumn Term</u></p> <p>MN5508 Project management (15 credits) DM5563 Human Factors in Design (15 credits)</p> <p><u>Spring Term</u></p> <p>EE5510 Design of Mechatronic Systems (15 credits) MN5552 Robotics & Manufacturing Automation (15 credits) MN5610 Advanced Measurement Systems and Data Analysis (15 credits)</p> <p><u>January Start</u></p> <p><u>Year 1</u></p> <p><u>Spring Term</u></p> <p>EE5510 Design of Mechatronic Systems (15 credits) MN5552 Robotics & Manufacturing Automation (15 credits) MN5610 Advanced Measurement Systems and Data Analysis (15 credits)</p> <p><u>Year 2 (based on academic year)</u></p> <p><u>Autumn Term</u></p> <p>MN5508 Project management (15 credits) DM5563 Human Factors in Design (15 credits)</p> <p><u>Spring Term</u></p> <p>EE5510 Design of Mechatronic Systems (15 credits) MN5552 Robotics & Manufacturing Automation (15 credits) MN5610 Advanced Measurement Systems and Data Analysis (15 credits).</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.