BEng (Hons) Design Engineering; BEng (Hons) Design Engineering with Foundation Year

Programme Specification

1. Programme title	BEng (Hons) Design Engineering BEng (Hons) Design Engineering with Foundation Year
2. Awarding institution	Middlesex University
3a. Teaching institution **3b. Language of study**	Middlesex University (Hendon) English
4a. Valid intake dates **4b. Mode of study** **4c. Delivery method**	Sept FT/PT/TKSW ☒ On-campus/Blended ☐ Distance Education
5. Professional/Statutory/Regulatory body	
6. Apprenticeship Standard	
7. Final qualification(s) available	BEng Design Engineering DipHE Design Engineering CertHE Design Engineering
8. Year effective from	2023/24

9. Criteria for admission to the programme

Admission to the BEng (Hons) Design Engineering programme will require 112 UCAS points including 80 points from at least two science or numerate based subjects and GCSE English and Maths at grade 4 or above.

In addition, Middlesex University general entry requirements apply as outlined in the university's regulation B2. Applicants whose first language is not English are required to achieve 6.0 in IELTS overall (with a minimum of 5.5 in each component) or an

equivalent qualification recognised by Middlesex University. The equivalence of qualifications from outside UK will be determined according to NARIC guidelines.

We welcome applicants with a wide variety of educational experience including: A/AS levels, AVCE, BTEC National Diploma, Access Certificates, Scottish Highers, Irish Leaving Certificates (Higher Level), International Baccalaureate and a large number of equivalent home and overseas qualifications. Application from mature applicants with suitable life skills and experiences are also welcomed.

Please refer to the programme specification for the Foundation Year for criteria for admission to the BEng Design Engineering with Foundation Year programme – Foundation Year in Computing and Engineering .

10. Aims of the programme

This programme aims to produce professional and competent Design Engineers capable of carrying out engineering projects, playing an active role in formulating, modelling and prototyping to meet the challenges and opportunities in a variety of practical projects.

Design in this programme is seen essentially as a practice both in the sense as an approach to problem solving and as a working method. Students will develop core design capabilities, apply engineering design methods and project management techniques, develop prototypes and models relevant to different stages of the engineering design process, evaluate and optimise design solutions and manufacturing processes throughout the course.

This programme explores the principles underlying the design and implementation of up-to-date engineering systems needed in a variety of problem domains and provides the opportunity of realising such systems.

11. Programme outcomes*

A. Knowledge and understanding	**Teaching/learning methods**
On completion of this programme the successful student will have knowledge and understanding of: 1. Scientific principles and related engineering disciplines to enable the modelling and analyse complex engineering systems, processes and products and collect and analyse data and draw conclusions for the innovative solution of unfamiliar or novel engineering design problems using future developments and technologies. 2. Concepts, principles and theories of the design process and an appreciation of their limitations.	Students gain knowledge and understanding through a combination of lectures, seminars, exercise classes, design build and test projects, forensic deconstruction, CAE and IT workshops, laboratory classes, industrial visits, group and individual project work, experimenting, constructing, analysing, assessing and discussing and self-study. **Assessment methods** Students' knowledge and understanding is assessed by technical reports, coursework assignments, essays, presentations, and practical in- class tests.

3. The application of a systems approach to solving complex engineering problems within the context of Design Engineering. 4. Analytical techniques and engineering science relevant to Design Engineering. 5. The issues involved in systems engineering and the range of approaches used in industry to manage the resulting complexity. 6. Developing new technologies and applications relevant to Design Engineering. 7. Current commercial, management and business practices and their limitations relating to engineering and to new product development. 8. Professional and ethical responsibilities of engineers. 9. The role and limitations of common ICT tools and limitations to common ICT tools and ability to specify requirements for computer- based engineering design tools to solve unfamiliar problems. 10. Characteristics of particular materials, equipment, processes and products.	
B. Skills On completion of this programme the successful student will be able to: 1. Analyse and solve engineering problems using appropriate techniques and through critical thinking. 2. Model and analyse relevant engineering systems. 3. Fully engage with the design process. 4. Select and apply appropriate computer based methods for solving design engineering problems. 5. Fully evaluate external influences on the design process. 6. Design innovative systems, components or processes. 7. Plan, manage and undertake a design project, team or individual, including establishing user needs and technical specification, concept generation and	**Teaching/learning methods** Students develop a range of skills through a wide variety of teaching, learning and assessment strategies. Skills development takes place using practice-based workshop sessions combining lectures with seminars and laboratories and through individual or group projects, simulation and testing, problem solving activities, modelling tools to industry-standard hardware prototyping, technical presentations and through report and project writing. **Assessment methods** Students' skills are assessed by a combination of practical assignments, group and individual presentations, laboratory exercises, production of design documentation and specific demonstration of work and in part, class tests, dialogue in

evaluation, embodiment and detail design work, verification and review. 8. Evaluate technical risk with an awareness of the limitations of possible solutions. 9. Use relevant laboratory and test equipment. 10. Create CAD models and make physical models and prototypes. 11. Interface different technologies to develop integrated systems. 12. Apply engineering design techniques taking into account of a selection of commercial and industrial constraints. 13. Apply and integrate knowledge and understanding of other engineering and non-engineering disciplines to support engineering design activities. 14. Communicate effectively in writing, verbally, graphically and through presentations to groups. 15. Apply mathematical methods, computer models, and a scientific approach to solving problems in engineering design. 16. Demonstrate leadership skills and the ability to work effectively as a member of a team. 17. Write computer programmes and use CAE software and general IT tools and provide technical documentation. 18. Learn independently and to adopt a critical approach in investigation. 19. Use technical literature and other information sources effectively including electronic media.	workshops, presentations, and reports reflecting research undertaken at all levels of study. Typically, each module involves a variety of assessment techniques to take into account students' differing learning styles. Formative feedback / assessment (both individual and generic) is given prior to submission of work for summative assessment. Summative feedback is issued generally with returned assessed coursework, or by email, or online. Verbal feedback is also given by tutors.

12. Programme structure (levels, modules, credits and progression requirements)

12. 1 Overall structure of the programme

Please refer to the programme specification for the Foundation Year for the modules to be taken during the foundation year of the BEng Design Engineering with Foundation Year programme – Foundation Year in Computing and Engineering

The BEng Design Engineering programme can be taken in three modes: (a) full-time, (b) part-time and (c) thick-sandwich mode (TKSW). In full-time mode, the programme will take three years to complete; in part-time mode, the programme will take a minimum of six years to complete; and in TKSW mode the programme will take a minimum of four years to complete. The programme is structured into three academic levels (Level 4, Level 5 and Level 6).

Each module is worth 30 credit points and the students need to gain 120 credit points to progress to the next level. In part-time mode, the students will take a maximum of 60 credit points in any academic year (which is defined to be the period from September to the following September). In TKSW mode the students will spend a year on a placement module after having completed the first two academic levels, and then resume their studies by taking the specified level 6 modules. Even though the placement module is credit-rated (worth 120 credit points) it does not affect to the number of credits needed for the students to gain their honours degree award. However, it leads to a certificate of industrial achievement in its own right indicating the credit points gained.

All modules in the BEng Design Engineering programme are compulsory and students need 360 credit points to graduate with honours. If on completion of their studies the students fail to obtain the 360 credit points required by the BEng programme, they may be eligible for graduating with non-honours, i.e. an ordinary degree, if they have obtained 300 credit points, of which at least 60 credit points are at Level 5 and at least 60 credit points are at Level 6.

The structure of the full-time/TKSW mode is given below:

Year 1				
AY	**PDE1800** Design Engineering Projects - 1 [30]	**PDE1801** Fundamentals of Electronics [30]	**PDE1802** Programming Paradigms for Physical Computing [30]	**PDE1803** Engineering Mathematics and its Applications [30]
Year 2				
AY	**PDE2800** Engineering in Context [30]	**PDE2801** Control Systems [30]	**PDE2804** Computer Aided Engineering [30]	**PDE2805** Design Engineering Projects - 2 [30]
Year 3	**PDE3250** - Industrial Placement (compulsory for TKSW only) [120]			

Year 3/4		
Term 1	**PDE3804** Engineering Innovation [30]	**PDE3803** System Design, Validation and Optimisation [30]
Term 2	**PDE3800** Major Project [60]	

The structure of the part-time mode is given below:

Year 1		
AY	**PDE1802** Programming Paradigms for Physical Computing [30]	**PDE1803** Engineering Mathematics and its Applications [30]
Year 2		
AY	**PDE1800** Design Engineering Projects - 1 [30]	**PDE1801** Fundamentals of Electronics [30]
Year 3		
AY	**PDE2800** Engineering in Context [30]	**PDE2804** Computer Aided Engineering [30]
Year 4		
AY	**PDE2801** Control Systems [30]	**PDE2805** Design Engineering Projects - 2 [30]
Year 5		
AY	**PDE3804** Engineering Innovation [30]	**PDE3803** System Design, Validation and Optimisation [30]
Year 6		
AY	**PDE3800** Major Project [60]	

12.2 Levels and modules

Level 4 (1)		
COMPULSORY	OPTIONAL	PROGRESSION REQUIREMENTS
Students must take all of the following: **PDE1800** Design Engineering Projects - 1 [30] **PDE1801** Fundamentals of Electronics [30] **PDE1802** Programming Paradigms for Physical Computing [30] **PDE1803** Engineering Mathematics and its Applications [30]	There are no optional modules.	Students must pass all level-4 modules to progress to level-5 full-time or part-time mode of study.
Level 5 (2)		
COMPULSORY	OPTIONAL	PROGRESSION REQUIREMENTS
Students must take all of the following: **PDE2800** Engineering in Context [30] **PDE2801** Control Systems [30] **PDE2804** Computer Aided Engineering [30] **PDE2805** Design Engineering Projects - 2 [30]	There are no optional modules.	TKSW -To progress on to a placement year students must pass all modules. Full-time/Part-time mode: To progress onto level 6, students must pass all level-5 modules.
Level 6 (3) TKSW mode only		
COMPULSORY	OPTIONAL	PROGRESSION REQUIREMENTS
TKSW mode only Students must take: **PDE3250** Industrial Placement [120]	N/A	N/A

Level 6 (3)		
COMPULSORY	OPTIONAL	PROGRESSION REQUIREMENTS
Students must take all of the following: **PDE3804** Engineering Innovation [30] **PDE3803** System Design, Validation and Optimisation [30] **PDE3800** Major Project [60]	There are no optional modules.	In order to graduate with an honours degree i.e. with a BEng Hons Design Engineering award, students must have achieved 360 credit points, or to graduate with an ordinary degree, 300 credit points with a minimum of 60 credit points at Level 6

12.3 Non-compensatable modules	
Module level	**Module code**
6	PDE3800

13. Information about assessment regulations

This programme will run in line with general University Regulations:
https://www.mdx.ac.uk/__data/assets/pdf_file/0031/623758/Regulations-2021-22-V1.12.pdf

All modules will require that you complete an amount of coursework as part of your assessment. Coursework can include written work, such as essays, exercises, laboratory logbooks, projects, dissertations, portfolios of written work etc., however it can also include non-written work such as demonstrations, presentations, viva, etc.

The University has a 1-20 grading scale, with grade 1 being the highest grade. Level 4 modules, which do not contribute to the final classification are awarded a Y grade (ungraded pass).

To pass a module, the overall module grade should be a minimum grade of 16. Due to professional body requirements grade 18s are non-compensable.

For additional information on assessment and how learning outcomes are assessed please refer to the individual module narratives for this programme.

14. Placement opportunities, requirements and support (if applicable)

Students on the TKSW mode take a placement (36 to 48 weeks) at the end of year 2. A dedicated Employability Advisor helps in the search for an appropriate employer and

provides students with appropriate Placement. They also provide students with appropriate guidance and support in preparation for, during and after placement. The placement forms the basis for an assessed report based on the organisation. At the start of the placement, students are allocated an individual supervisor who provides support and advice for the duration of the project.

Students following a TKSW placement year are supported through the process of securing a placement, which includes the legal and QAA requirements for placement learning, via tutorial support and the University Placement office.

Students that complete the placement on TKSW mode will receive an additional qualification referred to as Diploma of Industrial Studies.

15. Future careers / progression

As a BEng Design Engineering graduate you will have excellent career prospects; the range of potential employers will be vast across the private, public and not-for-profit sectors.

To support students in this activity during their students are encouraged to develop a commercial approach to design engineering via supported live projects with industrial partners and industrial placements. They undertake contextual studies into the nature and contexts of the profession. They interact with a variety of guest lecturers with professional backgrounds. They are supported in developing their exit portfolio, a CV and a career entry plan.

Through these experiences they come to understand design in a commercial context, the nature of the design industries and to plan for their own career entry and development.

16. Particular support for learning (if applicable)

The Faculty's Teaching and Learning approach is used across the programme to promote autonomy and practice-based learning which are in line with the University's general strategy.

In support of the students' learning experience:

- All new students go through an induction programme and some have early diagnostic numeric and literacy testing before starting their programme. Library and Student Support (LSS) provides workshops for those students needing additional support in these areas.
- Students are allocated a personal email account and secure online storage.
- New and existing students are given module handbooks for each module they study. Copies of all module handbooks can be found on MyLearning, a web-based online learning platform where learning materials are provided to further support learning.
- Additionally each student will receive a free core e-book for each module they study.

- Extensive library facilities are available on all campuses. MyUniHub pages are available as learning resources.
- Students can access advice and support on a wide range of issues from the UniHelp Student Information Desk.
- Placements are supported by Placement Offices and Faculty academics; please refer to section 14 of this programme specification
- High-quality specialist network, software, digital and wireless laboratories equipped with industry standard software, hardware and tools as appropriate, for practice-based teaching as well as self-study. Middlesex University is a Cisco Local Academy and Arm, Opnet and Xilinx University partners, Huawei approved 5G training centre, LABVIEW Academy.
- Teaching staff are available for each subject offering personal academic advice and help if needed. Staff availability for this purpose is posted outside staff office doors.
- Students are also allocated Personal Tutors for support and guidance throughout the entire duration of the Programme
- Productive and informed support from technical staff is also available as well as support can be provided by Graduate Academic Assistants (GAAs) and Student Learning Assistants (SLAs)
- Formative feedback is given throughout the modules at appropriate stages and on completion of student coursework
- Research activities of academic staff feed into the teaching programme, which can provide individual students with ad-hoc opportunities to work with academics on some aspect of research.

Middlesex University encourages and supports students with disabilities. Some practical aspects of Science and Technology programmes may present challenges to students with particular disabilities. Students are encouraged to visit our campuses at any time to evaluate facilities and talk in confidence about their needs. If we know students' individual needs we will be able to provide for them more easily. For further information contact the Disability Support Service (email: disability@mdx.ac.uk).

17. HECos code(s) (or other relevant coding system)	100182 – engineering design
18. Relevant QAA subject benchmark(s)	Engineering

19. Reference points

The following reference points were used in designing the programme:

- QAA Engineering subject benchmark statement (2019)
- QAA Framework for Higher Education Qualifications in England, Wales and Northern Ireland;
- Middlesex University Regulations;
- Middlesex University Learning and Quality Enhancement Handbook;
- UK Standard for Professional Engineering Competence;
- Chartered Engineer and Incorporated Engineer Standard, Engineering Council

UK, 2014;
- The Accreditation of Higher Education Programmes, Engineering Council UK, 2014;
- IED Engineering Design Specific Learning Outcomes for EC(UK) Accredited Degree Programmes.
- QAA guidelines for programme specifications
- QAA Code of Practice for the assurance of academic quality and standards in HE
- University policy on equal opportunities.

Please note programme specifications provide a concise summary of the main features of the programme and the learning outcomes that a typical student might reasonably be expected to achieve if s/he takes full advantage of the learning opportunities that are provided. More detailed information about the programme can be found in the rest of your programme handbook and the university regulations.

Curriculum map for *BEng Hons Design Engineering*

This section shows the highest level at which programme outcomes are to be achieved by all graduates, and maps programme learning outcomes against the modules in which they are assessed.

Programme learning outcomes

Knowledge and understanding		Skills	
A1	Scientific principles and related engineering disciplines to enable the modelling and analyse complex engineering systems, processes and products and collect and analyse data and draw conclusions for the innovative solution of unfamiliar or novel engineering problems using future developments and technologies.	B1	Analyse and solve engineering problems using appropriate techniques and through critical thinking.
A2	Concepts, principles and theories of the design process and an appreciation of their limitations.	B2	Model and analyse relevant engineering systems
A3	The application of a systems approach to solving complex engineering problems within the context of Design Engineering.	B3	Fully engage with the design process.
A4	Analytical techniques and engineering science relevant within the context of Design Engineering.	B4	Select and apply appropriate computer based methods for solving design engineering problems.
A5	The issues involved in systems engineering and the range of approaches used in industry to manage the resulting complexity.	B5	Fully evaluate external influences on the design process.
A6	Developing new technologies and applications relevant to Design Engineering.	B6	Design innovative systems, components or processes.
A7	Current commercial, management and business practices and their limitations relating to engineering and to new product development	B7	Plan, manage and undertake a project, team or individual, including establishing user needs and technical specification, concept generation and evaluation, embodiment and detail design work, verification and review.
A8	Professional and ethical responsibilities of engineers.	B8	Evaluate technical risk with an awareness of the limitations of possible solutions.
A9	The role and limitations of common ICT tools and limitations to common ICT tools and ability to specify requirements for computer-based engineering tools to solve unfamiliar problems.	B9	Use relevant laboratory and test equipment.

A10	Characteristics of particular materials, equipment, processes and products.	B10	Create CAD models and make physical models and prototypes.
		B11	Interface different technologies to develop integrated systems.
		B12	Apply engineering techniques, taking into account of a selection of commercial and industrial constraints.
		B13	Apply and integrate knowledge and understanding of other engineering and non- engineering disciplines to support engineering activities.
		B14	Communicate effectively in writing, verbally, graphically and through presentations to groups.
		B15	Apply mathematical methods, computer models, and a scientific approach to solving problems in engineering.
		B16	Demonstrate leadership skills and the ability to work effectively as a member of a team.
		B17	Write computer programmes and use CAE software and general IT tools and provide technical documentation.
		B18	Learn independently and to adopt a critical approach in investigation.
		B19	Use technical literature and other information sources effectively including electronic media.

Programme outcomes																											
A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	B1	B2	B3	B4	B5	B6	B7	B8	B9	B10	B11	B12	B13	B14	B15	B16	B17	B18	B19
Highest Level Achieved by all graduates																												
6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6

Module Title	Module code by Level	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	B1	B2	B3	B4	B5	B6	B7	B8	B9	B10	B11	B12	B13	B14	B15	B16	B17	B18	B19
Design Engineering Projects - 1 [30]	PDE1800							Y	Y			Y	Y	Y	Y		Y	Y		Y	Y			Y	Y	Y	Y	Y	Y	Y
Fundamentals of Electronics [30]	PDE1801		Y		Y					Y	Y	Y	Y		Y		Y		Y	Y	Y					Y			Y	Y
Programming Paradigms for Physical Computing [30]	PDE1802		Y		Y					Y	Y	Y	Y		Y				Y	Y		Y			Y	Y	Y	Y	Y	Y
Engineering Mathematics and its Applications [30]	PDE1803				Y							Y	Y		Y		Y			Y				Y		Y		Y	Y	Y
Engineering in Context [30]	PDE2800		Y			Y		Y	Y		Y					Y				Y			Y	Y	Y		Y		Y	Y
Control Systems [30]	PDE2801	Y			Y	Y				Y		Y	Y		Y		Y	Y		Y		Y			Y	Y		Y		Y
Computer Aided Engineering [30]	PDE2804	Y	Y	Y		Y		Y	Y	Y	Y	Y	Y	Y	Y					Y	Y		Y		Y	Y	Y	Y	Y	Y
Design Engineering Projects - 2 [30]	PDE2805		Y	Y			Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y			Y		Y	Y	Y	Y	Y	Y	Y	Y	Y
Industrial Placement	PDE3250					Y		Y	Y			Y	Y	Y				Y					Y		Y	Y	Y		Y	
Engineering Innovation [30]	PDE3804		Y			Y		Y	Y							Y			Y				Y		Y		Y		Y	Y
System Design, Validation and Optimisation [30]	PDE3803		Y		Y		Y	Y	Y									Y	Y				Y		Y				Y	Y
Major Project [60]	PDE3800	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y		Y	Y	Y