BEng Hons Electronic Engineering

Programme Specification

1. Programme title	BEng Hons Electronic Engineering
2. Awarding institution	Middlesex University
3. Teaching institution	Middlesex University (Hendon, DBI)
4. Details of accreditation by professional/statutory/regulatory body	
5. Final qualification	BEng Hons Electronic Engineering DipHE Electronic Engineering CertHE Electronic Engineering
6. Year of validation **Year of amendment**	2019/20
7. Language of study	English
8. Mode of study	Full-time / TKSW

9. Criteria for admission to the programme

Admission to the BEng (Hons) Electronic 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 C 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.

10. Aims of the programme

This programme aims to produce professional and competent Electronic Engineers capable of playing an active role in formulating, meeting the challenges and opportunities arising in contemporary industrial and commercial practice. Students will develop core electronics design capabilities, which are developed and enhanced progressively through the course on our industry gauge equipment. This programme explores the principles underlying the design and implementation of up-to-date analogue and digital systems needed in a variety of problem domains and provides the opportunity of realising such systems. The programme will engage the students in the process of learning through practice-based individual as well as group activities and projects enabling them to develop their team-working and communication skills which are required in the industry. This programme provides an optional placement year where students can further enhance their skills by working in the industry.

11. Programme outcomes*

A. Knowledge and understanding

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 problems using future developments and technologies.
2. Concepts, principles and theories of the design process and an appreciation of their limitations.
3. The application of a systems approach to solving complex engineering problems within the context of Electronic Engineering.
4. Analytical techniques and engineering science relevant within the context of Electronic Engineering.

Teaching/learning methods

Students gain knowledge and understanding through a variety of teaching, learning and assessment strategies. The delivery method includes staff-led interactive workshops to discuss theoretical material, which are supported by guided practice-based laboratory activities, delivered either online or on campus, to apply the learnt theories by ways of simulations and experiments. Students gain their understanding through a combination of workshops, laboratory activities, seminar discussions, small group and individual exercises and assignments, and individual projects. Throughout their studies, students are encouraged to undertake independent study both to supplement and consolidate what is being learned, and to broaden their individual knowledge and understanding of the subject. Critical evaluation and selection of techniques and solutions engage the students in relating theory to practice.

Assessment methods

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 Electronic 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 tools to solve unfamiliar problems. 10. Characteristics of particular materials, equipment, processes and products.	Students' knowledge and understanding is assessed by means of a wide variety of techniques including coursework assessment, laboratory experimentation, analysis and synthesis tasks, and tests, problem-solving exercises, modelling and simulation tasks, seminar work (including presentations, formal reports of work undertaken or work-in-progress, dialogue) all of which are framed at progressively more complex systems-based content. Typically, each module involves a variety of assessment techniques to take into account students' differing learning styles.
B. Skills Cognitive & Thinking skills (1-6), Practical skills (7-13), and Graduate skills (14-19) 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 electronic engineering problems. 5. Fully evaluate external influences on the design process. 6. Design innovative systems, components or processes. 7. Plan, manage and undertake a project, team or individual, including establishing user needs and technical specification, concept	**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.

generation and 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 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 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. 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.	**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 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				
Year 1				
AY	**PDE1110** Computing and Electronic Engineering Skills and Projects 1 [30]	**PDE1120** Fundamentals of Electronics and Communication Engineering [30]	**PDE1130** Programming Paradigms for Physical Computing and Internet of Things (IoT) [30]	**PDE1140** Practical Applications of Mathematics for Engineering [30]
Year 2				
AY	**PDE2110** Electronic Engineering Projects 2 [30]	**PDE2111** Analog Electronics [30]	**PDE2102** Digital System Design [30]	**PDE2103** Signal Processing and Communication s [30]
Year 3	**PDE3250** - Thick Sandwich Placement (compulsory for TKSW only) [120]			
Year 3/4				
Term 1	**PDE3111** System-on-Chip Design and Implementation [30]		**PDE3114** System Design and Validation [30]	
Term 2	**PDE3112** Major Project [60]			

12.2 Levels and modules		
Level 4 (1)		
COMPULSORY	OPTIONAL	PROGRESSION REQUIREMENTS

Students must take all of the following: PDE1110 Computing and Electronic Engineering Skills and Projects 1 [30] PDE1120 Fundamentals of Electronics and Communication Engineering [30] PDE1130 Programming Paradigms for Physical Computing and Internet of Things (IoT) [30] PDE1140 Practical Applications of Mathematics for Engineering [30]	N/A	Students must pass all level 4 modules to progress.
Level 5 (2)		
COMPULSORY	OPTIONAL	PROGRESSION REQUIREMENTS
Students must take all of the following: PDE2110 Electronic Engineering Projects 2 [30] PDE2111 Analog Electronics [30] PDE2102 Digital System Design [30] PDE2103 Signal Processing and Communications [30]	N/A	TKSW -To progress on to a placement year students must pass all modules. Full-time mode: To progress onto level 6, students must pass all modules.
Level 6 (3) TKSW mode only		
COMPULSORY	OPTIONAL	PROGRESSION REQUIREMENTS

TKSW mode only Students must take PDE3250 Thick Sandwich Placement	N/A	N/A
Level 6 (3)		
COMPULSORY	OPTIONAL	PROGRESSION REQUIREMENTS
Students must take all of the following: PDE3111 System-on-Chip Design and Implementation [30] PDE3114 System Design and Validation [30] PDE3112 Major Project [60]	N/A	

12.3 Non-compensatable modules (note statement in 12.2 regarding FHEQ levels)	
Module level	**Module code**
6	PDE3112

13. Information about assessment regulations

Information on how the University formal assessment regulations work, including details of how award classifications are determined, can be found in the University Regulations at

https://www.mdx.ac.uk/about-us/policies/university-regulations

All modules will require that your 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

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.

Placements will be dependent on employer availability taking into account any Covid-19 related restrictions.

15. Future careers / progression

As a BEng Electronic 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. The breadth of opportunities available after completing an electronics engineering degree is immense. Careers range from electronics or associated industries such as robotics, mechatronics, automation etc. within the UK, as well as to Europe and the overseas market. To support students in this activity during their studies students are encouraged to develop a commercial approach to engineering via projects with industrial partners and industrial placements. Middlesex University is a Cisco Local Academy and Arm, Opnet and Xilinx University partners, Huawei approved 5G training center, LABVIEW Academy with students having access to high-quality specialist digital and wireless laboratories equipped with industry standard software, hardware and tools. Students undertake contextual studies into the nature and contexts of the profession. Students interact with a variety of guest lecturers with professional background from both academia and industry. They are supported in developing their exit portfolio, a CV and a career entry plan. Through these experiences students come to understand engineering in a commercial context, the nature of the engineering 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 center, LABVIEW Academy. Access to campus-based facilities will depend on Covid-19 related restrictions in place at the time, and in some instances online facilities may be used instead.
- 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. JACS code (or other relevant coding system)	H610
18. Relevant QAA subject benchmark group(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.

20. Other information

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 Electronic 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 Electronic Engineering.	B3	Fully engage with the design process.
A4	Analytical techniques and engineering science relevant within the context of Electronic Engineering.	B4	Select and apply appropriate computer based methods for solving electronic 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 Electronic 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																											
A 1	A 2	A 3	A 4	A 5	A 6	A 7	A 8	A 9	A 10	B 1	B 2	B 3	B 4	B 5	B 6	B 7	B 8	B 9	B 10	B 11	B 12	B 13	B 14	B 15	B 16	B 17	B 18	B 19
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
Computing and Electronic Engineering Skills and Projects 1 [30]	PDE1110		Y		Y			Y	Y		Y	Y	Y	Y	Y		Y	Y	Y	Y	Y			Y	Y	Y	Y	Y	Y	Y
Fundamentals of Electronics and Communication Engineering [30]	PDE1120		Y		Y					Y	Y	Y	Y		Y		Y		Y	Y						Y			Y	Y
Programming Paradigms for Physical Computing and Internet of Things (IoT) [30]	PDE1130		Y		Y					Y	Y	Y	Y		Y				Y	Y		Y			Y	Y	Y	Y	Y	Y
Practical Applications of Mathematics for Engineering [30]	PDE1140				Y							Y	Y		Y		Y			Y				Y		Y		Y	Y	Y

Electronic Engineering Projects 2 [30]	PDE2110		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
Analog Electronics [30]	PDE2111	Y	Y	Y	Y	Y	Y			Y		Y	Y		Y		Y			Y	Y					Y		Y	Y	Y	Y
Digital System Design [30]	PDE2102	Y	Y	Y	Y	Y	Y			Y		Y	Y		Y		Y			Y	Y					Y		Y	Y	Y	Y
Signal Processing and Communications [30]	PDE2103	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		
System-on-Chip Design and Implementation [30]	PDE3111		Y	Y			Y			Y		Y	Y		Y		Y	Y		Y		Y			Y	Y		Y	Y	Y	Y
System Design and Validation [30]	PDE3114	Y	Y	Y	Y	Y				Y			Y			Y	Y	Y							Y	Y					
Major Project [60]	PDE3112	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	Y	Y