MEng Computer Systems Engineering

Programme Specification

1. Programme title	MEng Computer Systems Engineering
2. Awarding institution	Middlesex University
3. Teaching institution	Middlesex University (Hendon)
4. Details of accreditation by professional/statutory/regulatory body	
5. Final qualification(s) available	MEng Computer Systems Engineering BEng (Hons) Computer Systems Engineering DipHE Computer Systems Engineering CertHE Computer Systems Engineering
6. Year of validation / last review	2019/2020
Year of amendment	
7. Language of study	English
8. Mode of study	Full Time/TKSW

9. Criteria for admission to the programme

Admission to the MEng Computer Systems 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.

University policies supporting students with disabilities apply, as described in the University Regulations, 'Information for students with disabilities'.

10. Aims of the programme

This programme aims to produce practitioners in computer systems engineering with an advanced level of expertise in designing and implementing a computer-based system with real-time response, on-time and within-budget. More specifically, the programme aims to explore advanced concepts, principles and practices underlying the design and implementation of up-to-date real-world computer-based systems including those operating at Internet scale. The programme takes a practice-based approach and it has a focus on complex real-time systems where students are introduced to the development of advanced hardware and software facilitating real-time performance. The programme makes use of a variety of innovative learning activities and assessment strategies to engage the students in the learning process and help them develop confident interpersonal and communication skills, advanced problem solving and group/team work skills as required by the industry. This programme provides an optional placement year where students can further enhance their skills by working in the industry.

MEng graduates will possess highly marketable skills, and an advanced level of expertise in design, implementation and testing of systems, permitting entry to advanced specialist areas within the computer systems engineering sector. They will be prepared for careers in the sector and will have an advanced level of knowledge and a range of advanced skills in demand by Industry. They will appreciate new and emergent trends, the standards required of a professional practitioner and will be capable of designing, implementing and testing complex computer-based systems using industry-standard platforms and development tools and have a range of advanced practical skills in demand and highly valued by the computer systems engineering sector.

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. A comprehensive selection of the laws, principles and concepts of mathematics (including logic, discrete and real-valued mathematics) underpinning the development of computer- and scalable network-based systems needed within the computer systems engineering discipline; 2. A comprehensive range of computational, engineering and scientific principles needed to analyse, model, simulate and implement computer systems, products and processes and to draw conclusions from the result of collecting data required to solve unfamiliar,	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

innovative or novel design problems using emergent or new technologies; 3. Criteria of quality and performance relevant to contexts involving complex computer systems engineering design, construction or operation; the proposal or development, and application, of such criteria; 4. The relevance and ramifications of a range of professional, legal, managerial, business, organisational, ethical, social and sustainability considerations relevant to the practice of the computer based systems professional; 5. The significance, role and function of computer systems engineering practitioners within society and the operational, material environment within which they will be expected to practise; 6. An extensive range of business, organisational and management techniques relevant to those engaging in enterprise and the production of computer systems, products and processes; 7. A comprehensive range of the principles, processes and methods of design and how to apply these in the design of novel systems and processes and in unfamiliar scenarios; 8. Use of a systems approach to solving complex computer systems engineering problems and techniques to evaluate the limitations of such solutions in practice;	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. At MEng level, the emphasis is on deepening, extending and consolidating knowledge and understanding gained in Level 6 studies; project work involves incorporation of significant industrial input and provide the opportunity of demonstrating innovation in design and implementation taking into account contemporary developments in technology. **Assessment methods** 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 On completion of this programme the successful student will be able to: 1. Use a systems approach to define and investigate computer systems problems; apply relevant scientific and engineering principles appropriate for the analysis and solution of a wide range of design and technical problems arising out of both well-defined and underdetermined scenarios 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 design projects, simulation and testing, problem solving activities, modelling tools to industry-standard hardware prototyping, technical

through critical thinking investigate new and emerging technology; 2. Integrate an in-depth understanding of computer systems engineering, related subjects, mathematics, design and business practice to formulate solutions to unfamiliar complex computer systems engineering problems arising; 3. Acquire and critically evaluate technical information, concepts, arguments, assumptions, and evidence derived from a wide range of sources including research, current and emergent developments in computer systems engineering; abstract from such information, correctly apply those concepts and restate arguments and evidence in a variety of ways appropriate for given design or analytical ends or purposes; 4. Identify and solve a wide range of technical problems creatively in problem-solving or design contexts which are at the forefront of computer systems development; deal with and problems arising creatively in the face of incomplete information; 5. Analyse computer systems, devices and components and relate such analysis to the design of new systems and processes and to modify an existing system, component or process; evaluate the performance of existing systems and components through empirical and analytical methods and modelling techniques, and to investigate new and emerging technologies. 6. Adopt an integrative systems approach to design and problem solving which defers to economical, ethical, social, and human-computer interaction principle; design a new computer system or adapt a system to provide for a new or changed operational need; 7. Use specialist digital, wireless, network equipment safely and effectively and a range of specialist software and hardware development environments	presentations and through report and project writing. At MEng level, the acquisition and development of a wide range of skills involves increased complexity of co-design, analysis and hardware design tasks and a critical appreciation of the limitations of proposed project solution and typically involve the opportunity of receiving, reflecting and responding to industrial input. **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, and 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.

effectively in the analysis, design, test and implementation of digital, mobile and wireless systems and processes; 8. Conduct experiments, simulation and modelling tasks with minimal guidance, and report effectively on findings; 9. Use technical literature effectively and conduct a specialist literature review; plan and conduct a technical investigation using a wide range of technical literature; 10. Co-design and develop complex systems using a range of high-level software, hardware description languages; design and implement a range of algorithms in a range of appropriate industry-standard programming languages, to initialise, control and configure hardware and to implement network communication applications; analyse and develop a range of high-performance Internet-based communication platforms and applications; 11. Plan, commission, research, manage and sustain individual and team project activity and report on findings and results in a defensible fashion relying on minimal supervision: establish end-user or system needs; production of design detail, construction of product or process and their evaluation, verification; production of a critical design and implementation review; defer to a wide range of commercial or industrial constraints in such work and in the evaluation of technical work show appreciation of the limitations of proposed solutions; 12. Create and critically evaluate a range of complex computer-based systems, applications or processes typically involving the substantive integration of hardware and software elements and fulfilling a given set of requirements akin to those found in industry; document design and analytical work effectively and appropriately; test design ideas in a practical environment	

and analyse and evaluate these; adapt and generate an innovative design for computer systems, products and components in order to fulfil new needs. 13. Work effectively both autonomously in individual activity, and co-operatively as a member of a group or project-team and manage time and other resources; practise decision making in complex and unpredictable design and problem-solving contexts; 14. Apply mathematical skills and understanding to tasks requiring modelling, system analysis and problem-solving; 15. Learn effectively for life-long personal and career development and to reflect on progress of learning; demonstrate leadership skills and initiative; 16. Communicate effectively and explain complex technical information, concepts, arguments, design information effectively, using a variety of media, and wide range of methods appropriate to a given type of audience or communication objective; 17. Conduct research effectively, drawing on a wide variety of sources (including libraries, the Internet and electronic catalogues) under minimal direction, and be proficient in the use of referencing sources of information; 18. Deploy general design, implementation and test principles or techniques appropriate for the development of particular computer system product or process and apply a scientific approach to problem solving;	

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 [30]	**PDE1140** Practical Applications of Mathematics for Engineering [30]
Year 2				
A Y	**PDE2100** Computer Systems Engineering Projects 2 [30]	**PDE2101** Engineering Software Development [30]	**PDE2102** Digital System Design [30]	**PDE2103** Signal Processing and Communications [30]
Year 3	**PDE3250** - Industrial Placement (compulsory for TKSW only) [120]			
Year 3/4				
Term 1	**PDE3111** System-on-Chip Design and Implementation [30]		**PDE3113** Internetworking Systems and Development [30]	
Term 2	**PDE3112** Major Project [60]			
Year 4/5				
Term 1	**PDE4804** Advanced Topics in Communication Systems [30]		**Option 1** **PDE4810** Machine Learning [30] / **Option 2** **PDE4805** Virtualization and Cloud Computing [30]	
Term 2	**PDE4400** Team Project [60]			

12.2 Levels and modules		
Level 4		
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 [30] PDE1140 Practical Applications of Mathematics for Engineering [30]	N/A	Students must pass all level 4 modules to progress.
Level 5		
COMPULSORY	OPTIONAL	PROGRESSION REQUIREMENTS
Students must take all of the following: PDE2100 Computer Systems Engineering Projects 2 [30] PDE2101 Engineering Software Development [30] PDE2102 Digital System Design [30] PDE2103 Signal Processing and Communications [30]	N/A	<u>TKSW</u> mode: To progress onto a placement year students must pass all modules. <u>Full time mode:</u> To progress onto level 6 on the MEng. students must usually achieve at least a 2.1 overall profile.
Level 6 TKSW mode only		
COMPULSORY	OPTIONAL	PROGRESSION REQUIREMENTS

TKSW mode only Students must take PDE3250 Industrial Placement	N/A	N/A
Level 6		
COMPULSORY	OPTIONAL	PROGRESSION REQUIREMENTS
Students must take all of the following: PDE3111 System-on-Chip Design and Implementation [30] PDE3113 Internetworking Systems and Development [30] PDE3112 Major Project [60]	N/A	Student must pass ALL modules and usually achieve at least a 2.1 overall to progress to level 7.
Level 7		
COMPULSORY	OPTIONAL	PROGRESSION REQUIREMENTS
Students must take all of the following: PDE4804 Advanced Topics in Communication Systems PDE4400 Team Project	Students must also choose at least 1 from the following: PDE4810 Machine Learning PDE4805 Virtualization and Cloud Computing	N/A

12.3 Non-compensatable modules	
Module level	**Module code**
6	PDE3112
7	PDE4400

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

MEng Computer Systems Engineering graduates 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 a computer systems engineering degree is immense. Careers range from computing systems or associated industries such as computer design, wireless networking, design automation, robotics, embedded systems, machine intelligence 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 and communication systems 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 backgrounds 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. Our graduates have followed a wide range of career paths, some of them are currently working for companies such as: McLaren Automative, GoMedia Services Ltd., Imagine Software Ltd., MarQuest Ltd, Innovery S.p.A, CDW, etc

16. Particular support for learning (if applicable)

The Faculty's Teaching and Learning approach is used across the programme to promote learner 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) provide 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'll 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)	H650
18. Relevant QAA subject benchmark group(s)	Computing/Engineering

19. Reference points

The following reference points were used in designing the programme:

- QAA Engineering subject benchmark statement (2019)
- QAA Computing 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;
- UK Standard for Professional Engineering Competence; The Accreditation of Higher Education Programmes, Engineering Council UK, 2014
- 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 MEng Computer Systems 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	A comprehensive selection of the laws, principles and concepts of mathematics, (including logic, discrete and real-valued mathematics) underpinning the development of computer-and scalable network-based systems needed within the computer systems engineering discipline.	B1	Use a systems approach to define and investigate computer systems problems; apply relevant scientific and engineering principles appropriate for the analysis and solution of a wide range of design and technical problems arising out of both well-defined and underdetermined scenarios and through critical thinking investigate new and emerging technology
A2	A comprehensive range of computational and scientific principles needed to analyse, model, simulate and implement computer systems, products and processes and to draw conclusions from the result of collecting data needed for the solution of unfamiliar problems or of innovative or novel design problems using emergent or new technologies.	B2	Integrate an in-depth understanding of computer systems engineering, related subjects, mathematics, design and business practice to formulate solutions to unfamiliar complex computer systems engineering problems arising;
A3	Criteria of quality and performance relevant to contexts involving complex computer systems engineering design, construction or operation; the proposal or development, and application, of such criteria.	B3	Acquire and critically evaluate technical information, concepts, arguments, assumptions, and evidence derived from a wide range of sources including research, current and emergent developments in computer systems engineering; abstract from such information, correctly apply those concepts and restate arguments and evidence in a variety of ways appropriate for given design or analytical ends or purposes;
A4	The relevance and ramifications of a range of professional, legal, managerial, business, organisational, ethical, social and sustainability considerations relevant to the practice of the computer based systems professional.	B4	Identify and solve a wide range of technical problems creatively in problem-solving or design contexts which are at the forefront of computer systems development;

			deal with issues and problems arising creatively in the face of incomplete information
A5	The significance, role and function of computer systems engineering practitioners within society and the operational, material environment within which they will be expected to practise.	B5	Analyse computer systems, devices and components and relate such analysis to the design of new systems and processes and to modify an existing system, component or process; evaluate the performance of existing systems and components through empirical and analytical methods and modelling techniques, and to investigate new and emerging technologies.
A6	An extensive range of business, organisational and management techniques relevant to those engaging in enterprise and the production of computer systems, products and processes.	B6	Adopt an integrative systems approach to design and problem solving which defers to economical, ethical, social, and human-computer interaction principle; design a new computer system or adapt a system to provide for a new or changed operational need;
A7	Comprehensive range of the principles, processes and methods of design and how to apply these in the design of novel systems and processes and in unfamiliar scenarios.	B7	Use specialist digital, wireless, network equipment safely and effectively; and a range of specialist software and hardware development environments effectively in the analysis, design, test and implementation of digital, mobile and wireless systems and processes.
A8	Use of a systems approach to solving complex computer systems engineering problems and to evaluate the limitations of such solutions in practice.	B8	Conduct experiments, simulation and modelling tasks with minimal guidance, and report effectively on findings.
		B9	Use technical literature effectively and conduct a specialist literature review; plan and conduct a technical investigation using a wide range of technical literature.
		B10	Co-design and develop complex systems using a range of high-level software, hardware description languages; design and implement a range of algorithms in a range of appropriate industry-standard programming languages, to initialise, control and configure hardware and to implement network communication applications; analyse and develop a range of high-performance Internet-based communication platforms and applications.

		B11	Plan, commission, research, manage and sustain individual and team project activity and report on findings and results in a defensible fashion relying on minimal supervision: to establish end-user or system needs; production of design detail, construction of product or process and their evaluation, verification; production of a critical design and implementation review; defer to a wide range of commercial or industrial constraints in such work and in the evaluation of technical work show appreciation of the limitations of proposed solutions.
		B12	Create and critically evaluate a range of complex computer-based systems, applications or processes typically involving the substantive integration of hardware and software elements and fulfilling a given set of requirements akin to those found in industry; document design and analytical work effectively and appropriately; test design ideas in a practical environment and analyse and evaluate these; adapt and generate an innovative design for computer systems, products and components in order to fulfil new needs.
		B13	Work effectively both autonomously in individual activity, and co-operatively as a member of a group or project-team and manage time and other resources; practise decision making in complex and unpredictable design and problem-solving contexts;
		B14	Apply mathematical skills and understanding to tasks requiring modelling, system analysis and problem-solving;
		B15	Learn effectively for life-long personal and career development and to reflect on progress of learning; demonstrate leadership skills and initiative
		B16	Communicate effectively and explain complex technical information, concepts, arguments, design information effectively, using a variety of media, and wide range of

			methods appropriate to a given type of audience or communication objective;
		B17	Conduct research effectively, drawing on a wide variety of sources (including libraries, the Internet and electronic catalogues) under minimal direction, and be proficient in the use of referencing sources of information.
		B18	Deploy general design, implementation and test principles or techniques appropriate for the development of particular computer system product or process and apply a scientific approach to problem solving

BEng (Hons) Computer Systems Engineering Programme outcomes																								
A1	A2	A3	A4	A5	A6	A7	A8	B1	B2	B3	B4	B5	B6	B7	B8	B9	B10	B11	B12	B13	B14	B15	B16	B17	B18
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

MEng Computer Systems Engineering Programme outcomes																									
A1	A2	A3	A4	A5	A6	A7	A8	B1	B2	B3	B4	B5	B6	B7	B8	B9	B10	B11	B12	B13	B14	B15	B16	B17	B18
Highest level achieved by all graduates																									
7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7

Module Title	Module Code by Level	A1	A2	A3	A4	A5	A6	A7	A8	B1	B2	B3	B4	B5	B6	B7	B8	B9	B10	B11	B12	B13	B14	B15	B16	B17	B18
Computing and Electronic Engineering Skills and Projects 1	PDE1110	✓	✓	✓				✓	✓	✓		✓	✓	✓	✓	✓		✓		✓	✓	✓	✓	✓	✓	✓	✓

Fundamentals of Electronics and Communication Engineering	PDE1120			✓				✓		✓				✓		✓				✓		✓		✓	✓		
Programming Paradigms for Physical Computing and Internet of Things	PDE1130	✓	✓	✓				✓	✓	✓		✓	✓	✓	✓	✓				✓	✓	✓		✓	✓	✓	
Practical Applications of Mathematics for Engineering	PDE1140	✓	✓	✓				✓		✓	✓		✓			✓				✓		✓	✓	✓			
Computer Systems Engineering Projects 2	PDE2100			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Engineering Software Development	PDE2101		✓	✓				✓	✓	✓			✓		✓	✓			✓	✓	✓	✓				✓	
Digital System Design	PDE2102	✓	✓	✓				✓	✓	✓	✓			✓	✓	✓	✓		✓	✓	✓	✓	✓				✓
Signal Processing and Communications	PDE2103	✓	✓	✓				✓	✓	✓			✓	✓	✓	✓	✓		✓	✓	✓	✓	✓			✓	
Industrial Placement	PDE3250				✓	✓	✓			✓		✓	✓	✓		✓		✓		✓	✓	✓	✓	✓	✓	✓	✓
System-on-Chip-Design and Implementation	PDE3111	✓	✓	✓				✓	✓	✓	✓		✓		✓	✓	✓		✓	✓	✓	✓	✓				✓
Internetworking Systems and Development	PDE3113		✓	✓				✓	✓	✓		✓		✓	✓	✓	✓			✓	✓	✓				✓	
Major Project	PDE3112				✓	✓	✓			✓	✓	✓			✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓
Advanced Topics in Communication Systems	PDE4804	✓	✓	✓				✓	✓	✓		✓	✓	✓		✓	✓		✓		✓	✓	✓		✓	✓	✓
Virtualization and Cloud Computing	PDE4805			✓	✓	✓		✓	✓		✓	✓		✓		✓	✓	✓						✓	✓		✓
Machine Learning	PDE4810	✓	✓					✓	✓		✓	✓	✓				✓		✓	✓			✓			✓	
Team Project	PDE4400			✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓		✓	✓	✓	✓