Queen Mary
University of London

Programme Specification

Awarding Body/Institution	Queen Mary, University of London
Teaching Institution	Queen Mary, University of London
Name of Final Award and Programme Title	Bachelor of Engineering (BEng) Computer Systems Engineering with Industrial Experience
Name of Interim Award(s)	Cert HE, Dip HE, BSc(Eng)
Duration of Study / Period of Registration	4 years FT
QM Programme Code / UCAS Code(s)	H163
QAA Benchmark Group	Engineering
FHEQ Level of Award	Level 6
Programme Accredited by	
Date Programme Specification Approved	
Responsible School / Institute	School of Electronic Engineering & Computer Science

Schools which will also be involved in teaching part of the programme
N/A

Institution(s) other than Queen Mary that will provide some teaching for the programme
N/A

Programme Outline

This programme integrates electronic engineering and computer science to provide skills in many hardware and software aspects of computing, from the design of individual microprocessors, circuit design, to distributed-computer systems. The course prepares the student for a wide range of careers related to the computing industry, the Internetworking industry and the manufacturing industry.
The programme includes a year in industry between the second and final years of study.

Aims of the Programme

The accredited degrees form a group of programmes with the same broad aims and objectives; the difference being that they address different technical flavours of the broad spectrum that is now Electronic Engineering.

Skill-based aims and objectives are, therefore, common across the family, but the instantiation of these objectives may make use

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of different technical aspects within the family.

Context-based aims and objectives describe the differences between the programmes and Level-based aims and objectives between the BEng and MEng degrees.

The year in industry supports the students in learning about the application of computer science in an organisational context. The aims of the placement year are to:
• Ground the taught components of the programme in practical experience at a scale not possible within the College;
• Improve career preparation, giving students a better understanding of future career options and enhancing their career prospects.

What Will You Be Expected to Achieve?

At the end of his/her degree, each student should be able to demonstrate the following abilities:
• the ability to recall factual knowledge and the ability to apply it in familiar and unfamiliar situations;
• the ability to apply scientific, mathematical and software 'tools' to a familiar or unfamiliar situation;
• the ability to use Information Technology as a key tool pervading all aspects of Electronic Engineering;
• the ability to understand practical issues concerning real systems (whether hardware or software);
• the ability to recognise insufficient existing knowledge and the ability to search for the necessary scientific, mathematical and software 'tools' relevant to that particular issue;
• the ability to work as part of a team;
• the ability to manage time effectively;
• the ability to appreciate the financial background against which decisions are made in industry;
• the ability to show a certain level of reflection on the role of engineering in society;
and the following skills:
• the perceptive skills needed to understand information presented in the form of technical circuit-diagrams, flow-charts and high-level languages;
• the practical skills needed to implement a piece of hardware or software and to use laboratory test equipment;
• the analytical skills needed to verify the correct behaviour of a hardware or software system or component and to be able to identify faults;
• the design skills needed to synthesise a design (in hardware and/or software) from a specification (including the choice of the best option from a range of alternatives), to implement the design and to evaluate the design against the original specification;
• the written and oral communication skills needed to present information, in particular written information, effectively;
• the critical reasoning skills needed to appraise a particular topic.

Context-based aims and objectives
• To emphasise computer systems and software
• To focus on the increasingly important areas of microprocessor and microcontroller based systems, digital systems design, and integrated circuit design (with CMOS technology), including the use of field-programmable logic
• To introduce the hardware description language VHDL for digital design, simulation and subsequent synthesis.

Academic Content:	
A 1	[US1] Knowledge and understanding of scientific principles and methodology necessary to underpin their education in their engineering discipline, to enable appreciation of its scientific and engineering context, and to support their understanding of historical, current and future developments and technologies.
A 2	[US2] Knowledge and understanding of mathematical principles necessary to underpin their education in engineering discipline and to enable them to apply mathematical methods, tools and notations proficiently in the analysis and solution of engineering problems.
A 3	[EA1] Understanding of engineering principles and the ability to apply them to analyse key engineering processes.
A 4	[EA3] Ability to apply quantitative methods and computer software relevant to the engineering discipline, in order to solve engineering problems.

A 5	[EA4] Understanding of a systems approach to engineering problems and to work with uncertainty.
A 6	[P7] Awareness of quality issues

Disciplinary Skills - able to:	
B 1	[US3] Ability to apply and integrate knowledge and understand of other engineering disciplines to support study of their own engineering discipline.
B 2	[EA2] Ability to identify, classify and describe the performance of systems and components through the use of analytical methods and modelling techniques.
B 3	[D1] Investigate and define a problem and identify constraints including environmental and sustainability limitations, health and safety and risk assessment issues.
B 4	[D4] Use creativity to establish innovative solutions.
B 5	[D5] Ensure fitness for purpose for all aspects of the problem including production, operation, maintenance and disposal.
B 6	[P8] Ability to work with technical uncertainty.
B 7	.. produce a coherent technical presentation in written or oral form;
B 8	.. present a coherent argument;
B 9	.. acquire and apply knowledge in a rigorous way to new and unfamiliar situations;
B 10	.. use quantitive data in analysis and synthesis in engineering problems.

Attributes:	
C 1	[S1] Knowledge and understanding of commercial and economic context of engineering processes.
C 2	[S5] Understanding of the need for a high level of professional and ethical conduct in engineering.

How Will You Learn?

Each non-project-based module involves lectures, problem solving coursework and practical sessions. Lectures are used to introduce principles and methods and also to illustrate how they can be applied in practice. Coursework allows students to develop their skills in problem solving and to gain practical experience. Practical sessions provide students with guidance and help while solving a problem. These lessons take the form of exercise classes and programming laboratories that allow the students to learn-by-doing in order to complement the lectures.

Individual projects are undertaken throughout the year under the supervision of an academic member of staff with whom there are weekly consultancy meetings. These are used for students to report on their progress, discuss research and design issues and plan their future work. This develops and reinforces students' ability to communicate technical ideas clearly and effectively. The Projects Coordinator also runs a thread of taught sessions to support the project module.

How Will You Be Assessed?

The assessment of taught modules normally consists of a combination of written examination and coursework.

Project modules are normally examined on the basis of a written report, a formal oral presentation, and, where applicable, a demonstration of any software and/or hardware developed.

The industrial placement is assessed by a combination of written report, viva, learning journal and 2 employer evaluations. The first employer evaluation takes place a few months into the placement and the second takes places shortly before the end of the placement. Each evaluation involves employer and student jointly setting appropriate objectives within a structured framework of categories; progress is later measured against these objectives using set marking criteria.

How is the Programme Structured?

Semester 1
ECS401U Procedural Programming
ECS402U Professional and Research Themes
ECS408U Electronic Engineering Mathematics I
ECS412U Digital Circuit Design

Semester 2
ECS403U Communications and Networks
ECS409U Analogue Electronics Systems
ECS411U Signals and Information
ECS414U Object Oriented Programming

Semester 1 and 2
ECS422U Skills for Electronic Engineering and Computer Science (non-credit bearing module)

Semester 3
ECS501U C Programming
ECS502U Microprocessor Systems Design
ECS505U Software Engineering
ECS524U Internet Protocols and Applications

Semester 4
ECS506U Software Engineering Project
ECS518U Operating Systems
ECS519U Database Systems
Plus one from:
ECS515U Signals and Systems Theory
ECS522U Graphical User Interfaces

Semesters 5 and 6
ECS550U Industrial Placement Project

Semester 7
ECS625U Project (30 credits)
ECS615U Digital Systems Design
ECS642U Embedded Systems
Plus one from:
ECS601U Control Systems
ECS602U Digital Signal Processing
ECS604U Entrepreneurship in Information Technology

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Programme Title: BEng Computer Systems Engineering with Industrial Experience

ECS607U Data Mining
ECS612U Interaction Design
ECS640U Big Data Processing
ECS650U Semi-Structured Data and Advanced Data Modelling

Semester 8
ECS625U Project (contd)
ECS617U Integrated Circuit Design
Plus two from:
ECS608U Distributed Systems and Security
ECS622U Product Development
ECS624U C++ for Image Processing
ECS637U Digital Media and Social Networks
ECS639U Web Programming
ECS647U Bayesian Decision and Risk Analysis

Academic Year of Study   1

Module Title	Module Code	Credits	Level	Module Selection Status	Academic Year of Study	Semester
			4	Core		

What Are the Entry Requirements?

General entry requirements
• A-levels: Our A-level entrance requirements are based on 3 A-levels, or 2 A-levels and 2 AS-levels. We are delighted to receive applications from students who have studied Computer Science at GCSE or A-Level (often called Computing by the examination boards), and in general we prefer Maths and Science based A-levels, though we will consider other combinations of subjects.
• Advanced diplomas: The School warmly welcomes applications from students taking Advanced or Extended (level-3) Diplomas in Information Technology or Engineering. We require 320-360 UCAS Tariff points (320 for BSc Computer Science and Mathematics, 340 for BSc(Eng) and BEng, 360 for BSc, MSci and MEng programmes) and applicants must also have passed GCE A-level Mathematics at grade C or above. Grade B or above for BSc Computer Science and Mathematics.
• Vocational or applied A-levels: Vocational A-levels are acceptable and are subject to the above tariff requirements for A/AS-levels. They should be subject-related: electronic engineering or engineering for MEng and BEng programmes. Grade B GCSE Mathematics minimum.
• Key skills: Results of key skills tests will not normally form part of an offer of a place.
• BTEC National Diploma (18 units): The BTEC National Diploma is acceptable on its own and combined with other qualifications with minimum grade requirements: DDM for BEng, MEng, DDD (with Distinctions in all modules) for BSc(Eng), BSc. Your BTEC National Diploma must be subject-related: engineering, electronic engineering for MEng and BEng programmes, computing or related subject for BSc programmes. The IT practitioners Diploma is only accepted for BSc(Eng) programmes. Additionally, we require a minimum Grade C GCSE in mathematics.
• International Baccalaureate: We require a minimum of 32 points overall for BEng and BSc programmes, 34 points for MEng and BSc(Eng) programmes. Subjects must include mathematics HL at least five points for all MEng and BEng programmes and at least six points for all BSc programmes; physics is required for selected MEng and BEng programmes; see programme details.
• European Baccalaureate: We require 80% including grade eight minimum Mathematics for all MEng and BEng programmes. Physics at grade eight required for selected MEng and BEng programmes as per A-level subject requirements, please see programmes for specific requirements.
• Access to HE Diploma: Applicants will be considered on a case-by-case basis. Please contact the School for guidance.
• European and international qualifications: The College accepts a wide range of EU and International qualifications, for information please contact the School.
• Other qualifications: The College welcomes applications from those holding qualifications not listed above. The School will be

happy to advise you as to the acceptability of your qualification.

Specific programme entry requirements
• A-level or equivalent Mathematics.

International students - English Language entry requirements
For international students, English Language skills are required to a recognised standard. The minimum requirement is IELTS 6.0 or equivalent.

How Do We Listen and Act on Your Feedback?

The Student-Staff Liaison Committee provides a formal means of communication and discussion between the School and its students. The committee consists of student representatives from each cohort, together with appropriate representation from School staff. It is designed to respond to the needs of students, as well as act as a forum for discussing programme and module developments. Student-Staff Liaison Committees meet four times a year, twice in each teaching semester.

Each semester, students are invited to complete a web-based module questionnaire for each of their taught modules, and the results are fed back through the SSLC meetings. The results are also made available on the student intranet, as are the minutes of the SSLC meetings. Any actions necessary are taken forward by the relevant Senior Tutor, who chairs the SSLC, and general issues are discussed and actioned through the School's Learning and Teaching Committee.

The School's Learning and Teaching Committee advises the Director of Taught Programmes on all matters relating to the delivery of taught programmes at school level including monitoring the application of relevant QM policies and reviewing all proposals for module and programme approval and amendment before submission to Taught Programmes Board. Student views are incorporated in this Committee's work in a number of ways, including through student membership and consideration of student surveys and module questionnaires.

The School participates in the College's Annual Programme Review process, which supports strategic planning and operational issues for all undergraduate and taught postgraduate programmes. The APR includes consideration of the School's Taught Programmes Action Plan, which records progress on learning and teaching related actions on a rolling basis. Students' views are considered in the APR process through analysis of the NSS and module questionnaires, among other data.

Academic Support

All students are assigned an academic advisor during induction week. The advisor 's role is to guide their advisees in their academic development including module selection, and to provide first-line pastoral support.

In addition, the School has 2 Senior Tutors for undergraduate students who provide second-line guidance and pastoral support for students, as well as advising staff on related matters.

Every member of teaching staff holds 2 open office hours per week during term-time.

The year in industry is supported by a dedicated Industrial Placements Manager.

Programme-specific Rules and Facts

Students must pass their Final Year Project in order to obtain the BEng. Students who do not pass their Final Year Project will exit with the BSc(Eng). This is an IET requirement.

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Specific Support for Disabled Students

Queen Mary has a central Disability and Dyslexia Service (DDS) that offers support for all students with disabilities, specific learning difficulties and mental health issues. The DDS supports all Queen Mary students: full-time, part-time, undergraduate, postgraduate, UK and international at all campuses and all sites.

Students can access advice, guidance and support in the following areas:
• Finding out if you have a specific learning difficulty like dyslexia
• Applying for funding through the Disabled Students' Allowance (DSA)
• Arranging DSA assessments of need
• Special arrangements in examinations
• Accessing loaned equipment (e.g. digital recorders)
• Specialist one-to-one "study skills" tuition
• Ensuring access to course materials in alternative formats (e.g. Braille)
• Providing educational support workers (e.g. note-takers, readers, library assistants)
• Mentoring support for students with mental health issues and conditions on the autistic spectrum.

Links With Employers, Placement Opportunities and Transferable Skills

The School has a wide range of industrial contacts secured through research projects and consultancy, our Industrial Experience programme and our Industrial Advisory Panel.

The Industrial Advisory Panel works to ensure that our programmes are state-of-the-art and match the changing requirements of this fast-moving industry. The Panel includes representatives from a variety of Computer Science oriented companies ranging from SMEs to major blue-chips. These include: Microsoft Research, IBM, The National Physical Laboratory, National Instruments, PA Consulting, Rohde and Schwarz, O2, Cisco Systems, ARM, Selex and BAE Systems.

Recent graduates have found employment as IT consultants, specialist engineers, web developers, systems analysts, software designers and network engineers in a wide variety of industries and sectors. A number of students also go on to undertake PhDs in electronic engineering and computer science. Merril Lynch, Microsoft, Nokia, Barclays Capital, Logica,, Credit Suisse, KPMG, Transport for London, Sky and Selex ES are among the organizations that have recently employed graduates of EECS programmes.

Transferable skills are developed through a variety of means, including embedding of QM Graduate Attributes in taught modules and the project, together with the opportunity to participate in extra-curricular activities, e.g. the School's E++ Society, the School's Annual Programming Competition and external competitions with support from the School.

Programme Specification Approval

Person completing Programme Specification	Jane Reid
Person responsible for management of programme	Dr. Chris Phillips
Date Programme Specification produced/amended by School Learning and Teaching Committee	12 Feb 2016
Date Programme Specification approved by Taught Programmes Board	

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