

Programme Specification (UG)

Awarding body / institution:	Queen Mary University of London
Teaching institution:	Queen Mary University of London
Name of final award and programme title:	Bachelor of Science (BSc) Computer Science with Industrial Experience
Name of interim award(s):	Cert HE, Dip HE, BSc
Duration of study / period of registration:	4 years FT
QMUL programme code / UCAS code(s):	G402
QAA Benchmark Group:	Computing
FHEQ Level of Award :	Level 6
Programme accredited by:	
Date Programme Specification approved:	
Responsible School / Institute:	School of Electronic Engineering & Computer Science

Schools / Institutes which will also be involved in teaching part of the programme:

N/A

Institution(s) other than QMUL that will provide some teaching for the programme:

N/A

Programme outline

This broad degree programme provides a solid foundation for a number of IT careers, including programming and systems analysis and design. You will cover core topics such as software engineering, computer systems and applications. You can specialize in subjects such as computer graphics, artificial intelligence and distributed systems. You will gain practical experience in building a variety of computer systems in progressively more demanding contexts.

The programme includes a year in industry between the second and final years of study.

This programme is accredited by the Institution of Engineering and Technology on behalf of the Engineering Council for the purposes of fully meeting the academic requirement for registration as an Incorporated Engineer and partly meeting the academic requirement for registration as a Chartered Engineer.

Aims of the programme

The overall aims of this programme are to produce graduates with a sound understanding of the discipline of computer science and the knowledge and skills that will enable them to develop rapidly into professional software designers and engineers

Programme Title: BSc Computer Science with Industrial Experience

The programme has three main themes: software engineering, computer systems and applications. The aim is to provide a good coverage of the foundations of these areas along with the opportunity for students to develop a deeper knowledge of the topics that particularly interest them.

The programme has a strong practical character and students gain experience in building a variety of computer systems in a range of progressively demanding situations.

Alongside this, the programme pays attention to the wider context of computing and the development of transferable skills such as writing, presentation and team work. The programme is under continual revision to ensure it matches the needs of both students and their future employers.

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?

The programme provides opportunities for students to develop and demonstrate knowledge, understanding and skills in the following areas. The outcomes are informed by the QAA subject benchmark statement in Computing, the requirements of the BCS and IET for CEng accreditation and the ACM Computing Curricula 2001.

Software Engineering

- knowledge of the basic theory of programming languages and of the main classes of languages
- experience in using several programming languages
- appreciate the importance of simplicity, robustness and systematic organization in program design
- knowledge of fundamental algorithms and the notion of complexity
- experience in applying a range of methods in the development of large-scale software systems
- knowledge of the software life-cycle, software design methodologies and software development tools
- understanding of database principles and techniques and they role they play in information management

Computer Systems

- knowledge of computer system components and architecture
- understanding of the principles of operating systems and networks and the techniques required for their implementation
- knowledge of specific operating systems including experience in implementing parts of an operating system
- knowledge of the common protocols used in networks

Applications

- knowledge and understanding of some major application areas in the sciences, medicine, industry and commerce
- knowledge of some advanced application techniques and experience with using them in practice
- knowledge of usability principles and the ability to apply them in practice

Generic Knowledge and Transferable Skills

- experience in problem-solving
- work effectively as a member of a design team
- knowledge of project management skills
- appreciate the presence of risk in engineering practice
- produce well-written technical reports
- understanding of the mathematical, scientific and engineering elements of computer science
- understanding of the historical, social and professional context of computer science

QMUL Model

The QMUL Model is an innovative teaching and learning initiative that will broaden opportunities for Queen Mary undergraduates within and beyond higher education, supporting them to plan and manage their ongoing professional development. The Model is firmly grounded in the core QMUL values of respect for, and engagement with, the local area and communities, with a distinctive focus on enabling students to make a positive societal impact through leadership in their chosen field. The Model is organised around the key themes of:

- networking
- multi- and inter-disciplinarity
- international perspectives
- enterprising perspectives.

Students are required to study QMUL Model modules to the value of at least 10 credits at each year of undergraduate study. Model modules may be 5, 10 or 15 credits. Model modules are indicated within this programme specification.

In your first year of study, the Model module will be core or compulsory and will be situated within your home School or Institute. In subsequent years, students will be strongly encouraged to study at least one Model module beyond their home discipline(s), which could, for example, be in another School / Institute or area of QMUL or undertaken as a module outside of QMUL.

If Model module information is not provided on this programme specification for all subsequent years of study, this will be identified as your studies continue.

Where a Model module elective can be selected from an approved group of Model modules, no guarantee can be provided that your first choice of Model module will be available.

Academic Content:

A 1	Knowledge and skills related to the key field of software engineering, including the ability to design, implement and test algorithms and larger programmes in a rigorous and principled way, and detailed understanding of the software development life-cycle, relevant methodologies and tools.
A 2	Knowledge and skills related to the key field of computer systems, including understanding of the principles of computer architecture, operating systems and networks, and the ability to use specific techniques for small-scale implementations.
A 3	Knowledge and skills related to the key field of applications, including understanding of some of the major application areas in the sciences, medicine, industry and commerce, and the ability to grasp and apply appropriate usability principles and techniques for these areas.

Disciplinary Skills - able to:

B 1	Analyse and solve technical problems effectively, both individually and as part of a design team
B 2	Understand and apply technical project management techniques and skills

Programme Title: BSc Computer Science with Industrial Experience

B3	Demonstrate awareness and understanding of the mathematical, scientific and engineering foundations of the discipline of computer science
B4	Demonstrate awareness and understanding of the historical, social, professional, industrial and ethical context of the discipline of computer science
B5	Communicate technical detail effectively to a variety of audiences, both through production of well-written technical reports and through oral presentation / demonstration

Attributes:	
C1	Connect information and ideas within the broader context of the discipline of computer science
C2	Acquire and apply knowledge in a critical way, evaluating its reliability and relevance, in order to investigate and solve unfamiliar problems
C3	Explain complex technical concepts clearly in a variety of settings, to a variety of audiences, using a variety of media
C4	Develop a strong sense of intellectual and professional integrity
C5	Think and work creatively, using information and experience as the basis for decision-making

QMUL Model Learning Outcomes - Level 4:	
D1	(Networking) Identify and discuss their own career aspirations or relevant skills and knowledge and how they i
D2	(Networking) Identify and discuss what their own role in their programme and/or subject discipline might mea
D3	(International Perspectives) Consider the role of their discipline in diverse cultural and global contexts

QMUL Model Learning Outcomes - Level 5:	
E1	(Enterprising Perspectives) Demonstrate and evaluate how they have enhanced their own learning through engaging
E2	(Networking) Evaluate and demonstrate their own attitudes, values and skills in the workplace and/or in the wider wo
E3	(Networking) Evaluate and demonstrate evidence of their skills to support networking and how these have influenced

QMUL Model Learning Outcomes - Level 6:	
F1	
F2	

F3	
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QMUL Model Learning Outcomes - Level 7:	
G1	
G2	
G3	

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 place 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?

Please specify the full time and part time programme diets (if applicable). Please also outline the QMUL Model arrangements for each year of study. The description should be sufficiently detailed to fully define the structure of the diet.

Year 1 Modules
Semester 1
ECS401U Procedural Programming (15 credits)
ECS404U Computer Systems and Networks (15 credits)
ECS407U Logic and Discrete Structures (15 credits)
ECS427U Professional and Research Practice (15 credits)
Semester 2
ECS414U Object Oriented Programming (15 credits) (pre requisite for ECS639U)
ECS417U Fundamentals of Web Technology (15 credits)
ECS419U Information Systems Analysis (15 credits)
ECS421U Automata and Formal Languages (15 credits)

Programme Title: BSc Computer Science with Industrial Experience

<p>Year 2 Modules</p> <p>Semester 3</p> <p>ECS505U Software Engineering (15 credits)</p> <p>ECS509U Probability and Matrices (15 credits)</p> <p>ECS519U Database Systems (15 credits) (pre requisite for ECS650U)</p> <p>ECS529U Algorithms and Data Structures (15credits)</p> <p>Semester 4</p> <p>ECS506U Software Engineering Project (15 credits)</p> <p>ECS518U Operating Systems (15 credits)</p> <p>ECS522U Graphical User Interfaces (15 credits)</p> <p>ECS524U Internet Protocols and Applications (15 credits)</p> <p>Year 3 Modules</p> <p>ECS550U Industrial Placement Project (30 credits)</p> <p>Final Year Modules</p> <p>Semester 5</p> <p>ECS635U Project (30 credits)</p> <p>Plus three modules from:</p> <p>ECS607U Data Mining (15 credits)</p> <p>ECS610U Computer Graphics (15 credits)</p> <p>ECS639U Web Programming (15 credits) (pre requisite ECS414U)</p> <p>ECS640U Big Data Processing (15 credits)</p> <p>ECS642U Embedded Systems (15 credits)</p> <p>ECS650U Semi-Structured Data and Advanced Data Modelling (15 credits) (pre requisite ECS519U)</p> <p>ECS651U Computability, Complexity and Algorithms (15 credits)</p> <p>Semester 6</p> <p>ECS635U Project (cont) (30 credits)</p> <p>Plus three modules from:</p> <p>ECS605U Image Processing (15 credits)</p> <p>ECS612U Interaction Design (15 credits)</p> <p>ECS629U Artificial Intelligence (15 credits)</p> <p>ECS637U Digital Media and Social Networks (15 credits)</p> <p>ECS641U Communicating and Teaching Computing (UAS) (15 credits)</p> <p>ECS647U Bayesian Decision and Risk Analysis (15 credits)</p> <p>ECS652U Compilers (15 credits)</p> <p>ECS655U Security Engineering (15 credits)</p> <p>ECS656U Distributed Systems (15 credits)</p> <p>ECS657U Multi-platform Games Development (15 credits)</p> <p>ECS658U Further Object Oriented Programming (15 credits)</p>

Academic Year of Study FT - Year 1

Module Title	Module Code	Credits	Level	Module Selection Status	Academic Year of Study	Semester	QMUL Model
Professional and Research Practice	ECS427U	15	4	Compulsory	1	Semester 1	<input checked="" type="checkbox"/>
Procedural Programming	ECS401U	15	4	Compulsory	1	Semester 1	<input type="checkbox"/>

Programme Title: BSc Computer Science with Industrial Experience

Module Title	Module Code	Credits	Level	Module Selection Status	Academic Year of Study	Semester	QMUL Model
Computer Systems and Networks	ECS404U	15	4	Compulsory	1	Semester 1	<input type="checkbox"/>
Logic and Discrete Structures	ECS407U	15	4	Compulsory	1	Semester 1	<input type="checkbox"/>
Object Oriented Programming	ECS414U	15	4	Compulsory	1	Semester 2	<input type="checkbox"/>
Fundamentals of Web Technology	ECS417U	15	4	Compulsory	1	Semester 2	<input type="checkbox"/>
Information Systems Analysis	ECS419U	15	4	Compulsory	1	Semester 2	<input type="checkbox"/>
Automata and Formal Languages	ECS421U	15	4	Compulsory	1	Semester 2	<input type="checkbox"/>

Academic Year of Study FT - Year 2

Module Title	Module Code	Credits	Level	Module Selection Status	Academic Year of Study	Semester	QMUL Model
Software Engineering	ECS505U	15	5	Compulsory	2	Semester 1	<input type="checkbox"/>
Probability and Matrices	ECS509U	15	5	Compulsory	2	Semester 1	<input type="checkbox"/>
Database Systems	ECS519U	15	5	Compulsory	2	Semester 1	<input type="checkbox"/>
Algorithms and Data Structures	ECS529U	15	5	Compulsory	2	Semester 1	<input type="checkbox"/>
Software Engineering Project	ECS506U	15	5	Compulsory	2	Semester 2	<input type="checkbox" value="Yes"/>
Operating Systems	ECS518U	15	5	Compulsory	2	Semester 2	<input type="checkbox"/>
Graphical User Interfaces	ECS522U	15	5	Compulsory	2	Semester 2	<input type="checkbox"/>
Internet Protocols and Applications	ECS524U	15	5	Compulsory	2	Semester 2	<input type="checkbox"/>

Programme Title: BSc Computer Science with Industrial Experience

Academic Year of Study FT - Year 3

Module Title	Module Code	Credits	Level	Module Selection Status	Academic Year of Study	Semester	QMUL Model
Industrial Placement Project	ECS550U	30	5	Core	3	Semesters 1 & 2	<input type="checkbox"/>

Academic Year of Study FT - Year 4

Module Title	Module Code	Credits	Level	Module Selection Status	Academic Year of Study	Semester	QMUL Model
Project	ECS635U	30	6	Core	4	Semesters 1 & 2	<input type="checkbox"/> Yes
Data Mining	EC607U	15	6	Elective	4	Semester 1	<input type="checkbox"/>
Computer Graphics	ECS610U	15	6	Elective	4	Semester 1	<input type="checkbox"/>
Web Programming	ECS639U	15	6	Elective	4	Semester 1	<input type="checkbox"/>
Big Data Processing	ECS640U	15	6	Elective	4	Semester 1	<input type="checkbox"/>
Embedded Systems	ECS642U	15	6	Elective	4	Semester 1	<input type="checkbox"/>
Semi-Structured Data and Advanced Data Modelling	ECS650U	15	6	Elective	4	Semester 1	<input type="checkbox"/>
Computability, Complexity and Algorithms	ECS651U	15	6	Elective	4	Semester 1	<input type="checkbox"/>
Image Processing	ECS605U	15	6	Elective	4	Semester 2	<input type="checkbox"/>
Interaction Design	ECS612U	15	6	Elective	4	Semester 2	<input type="checkbox"/>
Artificial Intelligence	ECS629U	15	6	Elective	4	Semester 2	<input type="checkbox"/>
Digital Media and Social Networks	ECS637U	15	6	Elective	4	Semester 2	<input type="checkbox"/>
Communicating and Teaching Computing	ECS641U	15	6	Elective	4	Semester 2	<input type="checkbox"/>

Programme Title: BSc Computer Science with Industrial Experience

Module Title	Module Code	Credits	Level	Module Selection Status	Academic Year of Study	Semester	QMUL Model
Bayesian Decision and Risk Analysis	ECS647U	15	6	Elective	4	Semester 2	<input type="checkbox"/>
Compilers	ECS652U	15	6	Elective	4	Semester 2	<input type="checkbox"/>
Security Engineering	ECS655U	15	6	Elective	4	Semester 2	<input type="checkbox"/>
Distributed Systems	ECS656U	15	6	Elective	4	Semester 2	<input type="checkbox"/>
Multi-platform Games Development	ECS657U	15	6	Elective	4	Semester 2	<input type="checkbox"/>
Further Object Oriented Programming	ECS658U	15	6	Elective	4	Semester 2	<input type="checkbox"/>

What are the entry requirements?

Further information about the entry requirements for this programme can be found at:

<http://www.eecs.qmul.ac.uk/undergraduates/entry-requirements/>

How will the quality of the programme be managed and enhanced?

EECS has a Student Experience Teaching Learning and Assessment (SELTA) structure which enables programmes to be both managed and enhanced.

The Structure allows for subject level teaching groups and programme coordinators to regularly evaluate the content and delivery of each programme. Feedback from module evaluations and SSLC meetings are fed into these groups and this provides an opportunity for student feedback to be incorporated into the programmes.

Additionally, programme coordinators work with the Director of Taught Programmes to ensure each programme is current and can be delivered effectively.

How do we listen to 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 Student Experience Learning Teaching And Assessment (SETLA) Committee.

The School's SETLA 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.

What academic support is available?

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

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

The School also has a Student Support Officer who is the first point of contact regarding all 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

Further information on the Academic Regulations can be found at <http://www.arcs.qmul.ac.uk/media/arcs/policyzone/academic/Academic-Regulations-2017-18.pdf>

In addition to this the programme does have special regulations (further details are available in the Academic Regulations):

1. There is a requirement for students to achieve a minimum mark of 30.0 in every module, and to pass the project outright (in addition to the standard award rules) in order to achieve the intended, accredited, award.
2. The exit award and the field of study of the exit award will be dictated by the specific modules passed and failed by a student.

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. Merrill 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:

Person responsible for management of programme:

Date Programme Specification produced / amended by School / Institute Learning and Teaching Committee:

Date Programme Specification approved by Taught Programmes Board: