Programme Title: Bachelor of Science (BSc) Computer Science (G400) (2022-2023)

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:	BSc Computer Science
Name of interim award(s):	Cert HE, DipHE, BSc
Duration of study / period of registration:	3 years
QMUL programme code / UCAS code(s):	UBSF-QMCOMP1 / G400
QAA Benchmark Group:	Computing
FHEQ Level of Award :	Level 6
Programme accredited by:	Chartered Institute for IT (BCS). Institution of Engineering and Technology (IET) - re-accreditation currently pending confirmation.
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:

Collaborative institution(s) / organisation(s) involved in delivering the programme:

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.

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. As of September 2022 the programme's re-accreditation by the IET is pending formal confirmation.

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.

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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.

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

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Please note that the following information is only applicable to students who commenced their Level 4 studies in 2017/18, or 2018/19

In each year of undergraduate study, students are required to study modules to the value of at least 10 credits, which align to one or more of the following themes:

- networking

- multi- and inter-disciplinarity

- international perspectives

- enterprising perspectives.

These modules will be identified through the Module Directory, and / or by your School or Institute as your studies progress.

Academic Content:	
A1	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.
A2	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.
A3	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:	
B1	Analyse and solve technical problems effectively, both individually and as part of a design team
B2	Understand and apply technical project management techniques and skills
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

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C 2	Acquire and apply knowledge in a critical way, evaluating its reliability and relevance, in order to investigate and solve unfamiliar problems
C 3	Explain complex technical concepts clearly in a variety of settings, to a variety of audiences, using a variety of media
C 4	Develop a strong sense of intellectual and professional integrity
C 5	Think and work creatively, using information and experience as the basis for decision-making

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.

How is the programme structured?
Please specify the structure of the programme diets for all variants of the programme (e.g. full-time, part-time - if applicable). 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,ECS657U,ECS658U)
ECS417U Fundamentals of Web Technology (15 credits)
ECS419U Information Systems Analysis (15 credits)
ECS421U Automata and Formal Languages (15 credits) (pre requisite for ECS652U)

Year 2 Modules
Semester 3
ECS505U Software Engineering (15 credits)(pre requisite for ECS647U)
ECS509U Probability and Matrices (15 credits)
ECS519U Database Systems (15 credits) (pre requisite for ECS650U)
ECS529U Algorithms and Data Structures (15credits)
Semester 4
ECS506U Software Engineering Project (15 credits)

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ECS518U Operating Systems (15 credits) (pre requisite for ECS642U)
ECS522U Graphical User Interfaces (15 credits)
ECS524U Internet Protocols and Applications (15 credits)

ECS620U Summer Internship (15 credits) to be offered between penultimate and final year *

Final Year Module
Semester 5
ECS635U Project (30 credits) (Core)
Plus three modules from:
ECS607U Data Mining (15 credits)
ECS610U Computer Graphics (15 credits)
ECS639U Web Programming (15 credits) (pre requisite ECS414U)
ECS640U Big Data Processing (15 credits)
ECS642U Embedded Systems (15 credits) (pre requisite ECS518U)
ECS650U Semi-Structured Data and Advanced Data Modelling (15 credits) (pre requisite ECS519U)
ECS651U Computability, Complexity and Algorithms 15 credits)
ECS657U Multi-platform Games Development (15 credits) (pre requisite ECS414U)
ECS658U Further Object Oriented Programming (15 credits) (pre requisite ECS414U and ECS505U)
Semester 6
ECS635U Project (cont) (30 credits) (Core)
Plus three modules from:
ECS605U Image Processing (15 credits)
ECS637U Digital Media and Social Networks (15 credits)
ECS647U Bayesian Decision and Risk Analysis (15 credits) (pre requisite ECS505U)
ECS652U Compilers (15 credits) (pre requisite ECS401U, ECS414U and ECS421U)
ECS655U Security Engineering (15 credits)
ECS656U Distributed Systems (15 credits)
ECS659U Neural Networks and Deep Learning (15 credits)
ECS6XXU User Experience Design (15 credits) (Replacing ECS612U Interaction Design)

Academic Year of Study   FT - Year 1

Module Title	Module Code	Credits	Level	Module Selection Status	Academic Year of Study	Semester
Procedural Programming	ECS401U	15	4	Compulsory	1	Semester 1
Computer Systems and Networks	ECS404U	15	4	Compulsory	1	Semester 1
Logic and Discrete Structures	ECS407U	15	4	Compulsory	1	Semester 1
Professional and Research Practice	ECS427U	15	4	Compulsory	1	Semester 1
Object Oriented Programming	ECS414U	15	4	Compulsory	1	Semester 2

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Module Title	Module Code	Credits	Level	Module Selection Status	Academic Year of Study	Semester
Fundamentals of Web Technology	ECS417U	15	4	Compulsory	1	Semester 2
Information Systems Analysis	ECS419U	15	4	Compulsory	1	Semester 2
Automata and Formal Languages	ECS421U	15	4	Compulsory	1	Semester 2

Academic Year of Study   FT - Year 2

Module Title	Module Code	Credits	Level	Module Selection Status	Academic Year of Study	Semester
Software Engineering	ECS505U	15	5	Compulsory	2	Semester 1
Probability and Matrices	ECS509U	15	4	Compulsory	2	Semester 1
Database Systems	ECS519U	15	5	Compulsory	2	Semester 1
Algorithms and Data Structures	ECS529U	15	5	Compulsory	2	Semester 1
Software Engineering Project	ECS506U	15	5	Compulsory	2	Semester 2
Operating Systems	ECS518U	15	4	Compulsory	2	Semester 2
Graphical User Interfaces	ECS522U	15	5	Compulsory	2	Semester 2
Internet Protocols and Applications	ECS524U	15	5	Compulsory	2	Semester 2

Academic Year of Study   FT - Year 3

Module Title	Module Code	Credits	Level	Module Selection Status	Academic Year of Study	Semester
Project	ECS635U	30	6	Core	3	Semesters 1 & 2

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Module Title	Module Code	Credits	Level	Module Selection Status	Academic Year of Study	Semester
Data Mining	ECS607U	15	6	Elective	3	Semester 1
Computer Graphics	ECS610U	15	6	Elective	3	Semester 1
Web Programming	ECS639U	15	6	Elective	3	Semester 1
Big Data Processing	ECS640U	15	6	Elective	3	Semester 1
Embedded Systems	ECS642U	15	6	Elective	3	Semester 1
Semi-Structured Data and Advanced Data Modelling	ECS650U	15	5	Elective	3	Semester 1
Computability, Complexity and Algorithms	ECS651U	15	5	Elective	3	Semester 1
Multi-platform Games Development	ECS657U	15	5	Elective	3	Semester 1
Further Object Oriented Programming	ECS658U	15	6	Elective	3	Semester 1
Image Processing	ECS605U	15	6	Elective	3	Semester 2
User Experience Design	ECS6XXU	15	6	Elective	3	Semester 2
Digital Media and Social Networks	ECS637U	15	6	Elective	3	Semester 2
Bayesian Decision and Risk Analysis	ECS647U	15	6	Elective	3	Semester 2
Compilers	ECS652U	15	6	Elective	3	Semester 2
Security Engineering	ECS655U	15	6	Elective	3	Semester 2
Distributed Systems	ECS656U	15	6	Elective	3	Semester 2
Neural Networks and Deep Learning	ECS659U	15	6	Elective	3	Semester 2
Summer Internship (see note in structure)*	ECS620U	15	6	Elective	3	

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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? How do we listen to and act on your feedback?

EECS has a Teaching and Learning Committee (TLC) 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 Education to ensure each programme is current and can be delivered effectively.

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 Teaching and Learning Committee (TLC) advises the Director of Education 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.

How inclusive is the programme for all students, including those with disabilities?

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.

Programme-specific rules and facts

Further information on the Academic Regulations can be found at http://www.arcs.qmul.ac.uk/policy

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.

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: Joan Hunter

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Programme Title: Bachelor of Science (BSc) Computer Science (G400) (2022-2023)

Person responsible for management of programme:

Nikos Tzevelekos

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

3 December 2021

Date Programme Specification approved by Taught Programmes Board: