Royal Holloway, University of London
Course specification for an undergraduate award
BSC COMPUTER SCIENCE AND MATHEMATICS (GG41)

Section 1 – Introduction to your course
This course specification is a formal document, which provides a summary of the main features of your course and the learning outcomes that you might reasonably be expected to achieve and demonstrate if you take full advantage of the learning opportunities that are provided. Further information is contained in the College prospectus, and in various handbooks, all of which you will be able to access online. Alternatively, further information on the College's academic regulations and polices can be found here. Further information on the College's Admissions Policy can be found here. Your degree course in **BSc Computer Science and Mathematics** provides a progressive structure in which you are able to gain ever-wider knowledge and understanding, and appropriate skills. The course contains a combination of mandatory and elective modules to introduce students to the theory and practice of Computer Science, including software development techniques and the technologies underlying specific application areas such as gaming and robotics. The structure encourages you to develop your own interests through informed choice among specialist options. There is a free choice of final stage modules reflecting both core material, such as compiler theory, and currently important research areas such as machine learning, information security, software language engineering, intelligent agents, and computational finance. While Royal Holloway keeps all the information made available under review, courses and the availability of individual modules, especially optional modules are necessarily subject to change at any time, and you are therefore advised to seek confirmation of any factors which might affect your decision to follow a specific course. In turn, Royal Holloway will inform you as soon as is practicable of any significant changes which might affect your studies. The following is a brief description for some of the most important terminology for understanding the content of this document: *Degree course* – May also be referred to as 'degree programme' or simply 'programme', these terms refer to the qualification you will be awarded upon successful completion of your studies. *Module* – May also be referred to as 'course', this refers to the individual units you will study each year to complete your degree course. Undergraduate degrees at Royal Holloway comprise a combination of modules in multiples of 15 credits to the value of 120 credits per year. On some degree courses a certain number of optional modules must be passed for a particular degree title.

Section 2 – Course details			
Date of specification update	February 2024	**Location of study**	Egham Campus
Course award and title	BSc Computer Science and Mathematics	**Level of study**	Undergraduate
Course code	1069	**UCAS code**	GG41
Year of entry	2024/25		
Awarding body	Royal Holloway, University of London		
Department or school	Department of Computer Science School of Engineering, Mathematical and Physical Sciences	**Other departments or schools involved in teaching the course**	Department of Mathematics
Mode(s) of attendance	Full-time	**Duration of the course**	3 years
Accrediting Professional, Statutory or Regulatory Body requirement(s)	None		
Link to Coursefinder for further information:	https://www.royalholloway.ac.uk/studying-here/	**For queries on admissions:**	https://royalholloway.ac.uk/applicationquery

Section 3 – Degree course structure					
3.1 Mandatory module information **The following table summarises the mandatory modules which students must take in each year of study**					
Year	**Module code**	**Module title**	**Credits**	**FHEQ level**	**Module status (Mandatory Condonable MC or Mandatory Non-Condonable MNC**
1	CS1811	Object Oriented Programming I	15	4	MNC
1	CS1812+	Object Oriented Programming II	15	4	MNC
1	CS1822++	Programming Laboratory	30	4	MNC
1	MT1710	Calculus I	15	4	MC
1	MT1720	Calculus II	15	4	MC
1	MT1810	Introduction to Pure Mathematics	15	4	MC
1	MT1820	Linear Algebra I	15	4	MC
2	CS2800	Software Engineering	15	5	MNC
2	CS2810	Team Project	15	5	MNC
2	CS2860	Algorithms and Complexity	15	5	MC
2	MT2320	Probability Theory	15	5	MC
2	MT2800	Linear Algebra II	15	5	MC

This table sets out the most important information for the mandatory modules on your degree course. These modules are central to achieving your learning outcomes, so they are compulsory, and all students on your degree course will be required to take them. You will be automatically registered for these modules each year. Mandatory modules fall into two categories: 'condonable' or 'non-condonable'.

In the case of mandatory 'non-condonable' (MNC) modules, you must pass the module before you can proceed to the next year of your course, or to successfully graduate with a particular degree title. In the case of mandatory 'condonable' (MC) modules, these must be taken but you can still progress or graduate even if you do not pass them. Please note that although Royal Holloway will keep changes to a minimum, changes to your degree course may be made where reasonable and necessary due to unexpected events. For example: where requirements of relevant Professional, Statutory or Regulatory Bodies have changed and course requirements must change accordingly, or where changes are deemed necessary on the basis of student feedback and/or the advice of external advisors, to enhance academic provision.

3.2 Optional modules

In addition to mandatory modules, there will be a number of optional modules available during the course of your degree. Although Royal Holloway will keep changes to a minimum, new options may be offered or existing ones may be withdrawn. For example where reasonable and necessary due to unexpected events, where requirements of relevant Professional, Statutory or Regulatory Bodies (PSRBs) have changed and course requirements must change accordingly, or where changes are deemed necessary on the basis of student feedback and/or the advice of External Advisors, to enhance academic provision. There may be additional requirements around option selection; please contact the Department for further information.

+ You may take CS1813 Software Development instead of CS1812 at the discretion of the department.

++ You may take CS1821 Programming Fundamentals instead of CS1822 at the discretion of the department.

Year 2 – Computer Science
In addition to the mandatory modules you must choose one further non-project CS2XXX or IY2XXX module
Year 2 – Mathematics
You must choose 30 credits of Mathematics modules (see Mathematics handbook for options)

Year 3- Computer Science
You must choose **either** CS3821 **or** CS3810

Plus

Two or three further non-project CS or IY elective modules – to a total of 60 credits of Computer Science.

Year 3 – Mathematics
You must choose 60 credits of Mathematics modules (see Mathematics handbook for options).

Note: students for each year are expected to take part in the Advanced topics seminar module (CS3010). This module is not part of the degree course but attendance will be placed in the student's transcripts.

Section 4 - Progressing through each year of your degree course

For further information on the progression and award requirements for your degree, please refer to Royal Holloway's Academic Regulations.

Progression throughout the year/s is monitored through performance in summative or formative coursework assignments. Please note that if you hold a Student Visa and you choose to leave (or are required to leave because of non-progression) or complete early (before the course end date stated on your CAS), then this will be reported to UKVI.

All first year undergraduate students are required to take and pass the non-credit bearing Moodle-based Academic Integrity module SS1001 in order to progress into the second year of study (unless their course includes the alternative mandatory SS1000 module). The pass mark for the module assessment is stated in the on-line Academic Integrity Moodle module. Students may attempt the assessment as often as they wish with no penalties or capping. Students who meet the requirements for progression as stipulated in the Academic Taught Regulations but fail to pass the Moodle-based Academic Integrity module will not be permitted to progress into their second year of academic study.

Year in Industry - A year out in industry (CS3001) may be taken between second and final year.

Students on degree courses with Year in Industry need to fulfil the requirements set out in the departmental Year in Industry Handbook in order to progress to the placement and be eligible for the degree title.

Section 5 – Educational aims of the course

The aims of this course are:

1. to produce graduates with the ability to engage in the lifelong learning and with the skills required for a professional career in a computer-based environment or for a research career in Computer Science and related areas;
2. to develop computing-related cognitive abilities and skills as described in the QAA Computer Science benchmark statement;
3. to develop, in a flexible and progressive structure, students' knowledge and understanding of essential facts and theory, with the ability to use this knowledge to devise, specify, design, implement, test, document and critically evaluate computer-based systems;
4. to develop an understanding of professional and ethical issues involved in the deployment of computer technology;
5. to produce graduates with a range of personal attributes relevant to the world beyond higher education, including information retrieval and use, numeracy, the ability to devise and present logical arguments to inform and support actions, and organisational skills.

Section 6 - Course learning outcomes

In general terms, the courses provide opportunities for students to develop and demonstrate the following learning outcomes. (*Categories – Knowledge and understanding (K), Skills and other attributes (S), and Transferable skills (*)*)

Course learning outcome	Level 4	Level 5	Level 6
1. Explain, apply and innovate using the broad range of fundamental mathematical knowledge underpinning computer science.	1.4.1: Explain the basic mathematical building blocks of computer science and apply this knowledge in small exercises and programs.	1.5.1: Compare key algorithms and data-structures and select the most appropriate depending on the situation.	1.6.1: Apply this knowledge to design and compare solutions to problems in a medium or large-scale individual project. 1.6.3: Apply foundational knowledge of a broad range of advanced computer science topics.
2: Gain knowledge and understanding of mathematical concepts, mathematical methods, and abstract mathematical structures.	2.4.1: Develop knowledge and understanding of mathematical methods. 2.4.2: Start to develop knowledge and understanding of abstract objects and structures such as groups, matrices, and fields.	2.5.1: Embed knowledge and understanding of mathematical methods. 1.5.2 Embed knowledge of the abstract theory of matrices.	2.6.1: Extend knowledge and understanding of mathematical methods. 1.6.2 Extend knowledge of abstract structures such as groups.
3: Grow an understanding of results from a range of areas of mathematics, how these are interlinked, and how mathematics is key to applications in Computer Science.	3.4.1: Develop the ability to take theoretical knowledge gained in one area and apply it elsewhere.	3.5.1: Develop knowledge and understanding of some results from a range of major areas of mathematics, statistics or operational research.	3.6.1: Develop knowledge and understanding of computer science as an area of applications in which the mathematics is used in a serious manner and is essential for proper understanding.
4: Develop skills of numeracy, manipulation of mathematical expressions, and the analytic approach to solving problems.	4.4.1: Apply a high level of numeracy. 4.4.2: Develop the ability to manipulate and analyse complex mathematical expressions accurately.	4.5.1: Grow the ability to manipulate and analyse complex mathematical expressions accurately. 4.5.2: Develop a general ethos of numeracy and of analytical approaches to problem solving.	4.6.1: Develop the ability to provide accurate analysis of a situation, the factors involved and possible approaches to solution.

5. Design, plan, and execute software projects, then present, document, and reflect on the results.	5.4.1 Explain and apply software design techniques to analyse requirements and specify software systems. 5.4.2 Discuss and apply the core concepts of modern industrially relevant programming languages in small- to medium-sized programs. 5.4.3 Present and document the design and features of a system, and evaluate both the software and the process.	5.5.1 Utilise advanced software development tools and environments. 5.5.2 Describe and deploy best-practice software development practices.	5.6.1 Plan, evaluate the risks of, and execute a supervised project, and communicate the results via presentations and a critical report.
6. Explain and apply methods, techniques and tools for information modelling and management.	6.4.1 Describe the basic principles of computer data representation and organisation.		6.6.1 Systematically apply software engineering tools for designing and creating appropriate software systems.
7. Work independently and as a team, demonstrating time-management and organisational skills.	7.4.1 Complete and manage the delivery of multiple pieces of individual and team-based work.	7.5.1 Put into practice industry-standard team working principles and methodologies.	7.6.1 Plan and deliver a medium or large-scale individual project. 7.6.2 Extend team working skills.
8. Develop and demonstrate new skills independently.	8.4.1 Deliver a medium-sized group project incorporating elements of self-learning. 8.5.1 Start the journey towards gaining the ability to communicate mathematical results clearly.	8.5.1 Deliver a large group project incorporating elements of self-learning. 8.5.2 Develop the ability to communicate mathematical results clearly.	8.6.1 Deliver an individual project incorporating elements of self-learning. 8.6.2 Extend the ability to communicate mathematical results clearly, to both mathematicians and lay persons.
9. Explain and apply knowledge of cutting-edge topics in computer science and mathematics.			9.6.1 Explain and apply knowledge of cutting-edge topics of-computer-science and mathematics.
10. Discuss and appreciate the professional, commercial, moral, and ethical aspects of computer-based systems.	10.4.1 Follow codes of conduct in informal team-based environments. 10.4.2 Recognise the wider societal context of software systems and the developer responsibilities.	10.5.1 Follow codes of conduct in professional team-based environments. 10.5.2 Develop code to meet external and commercial, rather than self-driven, requirements.	10.6.1 Reflect on the societal and professional impact of a large-scale software product.

Section 8 – Additional costs
There are no single associated costs greater than £50 per item on this degree course.
These estimated costs relate to studying this particular degree course at Royal Holloway. General costs such as accommodation, food, books and other learning materials and printing etc., have not been included, but further information is available on our website.

Section 7 - Teaching, learning and assessment
Teaching and learning is mostly by means of lectures, small-group tutorials, practical and problem classes, supervised computing laboratory work, group work, completion of coursework and private study, guided independent study and research in the stage three individual project. Assessment of knowledge and understanding is typically by formal, unseen written examination, coursework assignments, project reports, oral presentations, and the final stage project report. Transferable skills are also inherently assessed through the assignments, reports and oral presentations. Feedback is provided on students' performance in coursework, both assessed and non-assessed, and during tutorial and practical sessions. Full details of the assessments for individual modules can be obtained from the Department Contact hours come in various forms and may take the form of time spent with a member of staff in a lecture or seminar with other students. Contact hours may also be laboratory or, studio-based sessions, project supervision with a member of staff, or discussion through a virtual learning environment (VLE). These contact hours may be with a lecturer or teaching assistant, but they may also be with a technician, or specialist support staff. The way in which each module on your degree course is assessed will also vary, however, the assessments listed above are all 'summative', which means you will receive a mark for it which will count towards your overall mark for the module, and potentially your degree classification, depending on your year of study. On successful completion of the module you will gain the credits listed. 'Coursework' might typically include a written assignment, like an essay. Coursework might also include a report, dissertation or portfolio. 'Practical assessments' might include an oral assessment or presentation, or a demonstration of practical skills required for the particular module More detailed information on modules, including teaching and learning methods, and methods of assessment, can be found via the online Module Catalogue. The accuracy of the information contained in this document is reviewed regularly by the university, and may also be checked routinely by external agencies, such as the Quality Assurance Agency (QAA).

Section 9 – Indicators of quality and standards	
QAA Framework for Higher Education Qualifications (FHEQ) Level	4-6
Your course is designed in accordance with the FHEQ to ensure your qualification is awarded on the basis of nationally established standards of achievement, for both outcomes and attainment. The qualification descriptors within the FHEQ set out the generic outcomes and attributes expected for the award of individual qualifications. The qualification descriptors contained in the FHEQ exemplify the outcomes and attributes expected of learning that results in the award of higher education qualifications. These outcomes represent the integration of various learning experiences resulting from designated and coherent courses of study.	
QAA Subject benchmark statement(s)	http://www.qaa.ac.uk/quality-code/subject-benchmark-statements
Subject benchmark statements provide a means for the academic community to describe the nature and characteristics of courses in a specific subject or subject area. They also represent general expectations about standards for the award of qualifications at a given level in terms of the attributes and capabilities that those possessing qualifications should have demonstrated.	

Section 10– Intermediate exit awards (where available)		
You may be eligible for an intermediate exit award if you complete part of the course as detailed in this document. Any additional criteria (e.g. mandatory modules, credit requirements) for intermediate awards is outlined in the sections below.		
Award	**Criteria**	**Awarding body**
Diploma in Higher Education (DipHE)	Pass in 210 credits of which at least 90 must be at or above FHEQ Level 4 and at least 120 of which must be at or above FHEQ Level 5	Royal Holloway and Bedford New College
Certificate in Higher Education (CertHE)	Pass in 120 credits of which at least 90 must be at or above FHEQ Level 4	Royal Holloway and Bedford New College