Programme Specification
BSc Mathematics with Computer Science
For students entering Part 1 in September 2024

UCAS Code: GG14
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This document sets out key information about your Programme and forms part of your Terms and Conditions with the University of Reading.

Awarding Institution	University of Reading
Teaching Institution	University of Reading
Length of Programme	3 years
Length of Programme with placement/year abroad	BSc Mathematics with Computer Science with Placement Year - 4 years (UCAS Code: GG41) BSc Mathematics with Computer Science with Study Year Abroad - 4 years (internal transfer only)
Accreditation	Accredited by the Institute of Mathematics and its applications to meet the educational requirements of the Chartered Mathematician designation when followed by subsequent training and experience in employment to obtain competencies equivalent to those specified by the QAA for taught Masters degrees.
QAA Subject Benchmarking Group	Mathematics, Statistics and Operational Research

Programme information and content	
The programme aims to provide you with a general education in mathematics, with some emphasis on the computational aspects, along with topics from computer science. It aims to produce mathematicians who have some experience of numerical techniques and an appreciation of wider computational issues. You will benefit from significant opportunities to develop your problem-solving skills. Logic is an essential part of the understanding and construction of mathematical proofs and is embedded throughout the programme. In Computer Science you will develop essential skills in programming to enhance employability, and will have the opportunity to learn about the latest techniques in modern Computer Science in the optional modules in the final year.	
Part 1:	Part 1 introduces you to core mathematics skills and knowledge through a number of introductory modules designed to manage the transition to university level mathematics and statistics and provide the basis for more advanced study in later years. In Computer Science you will learn fundamentals of programming and basic algorithmic principles, including programming in an object-oriented language.
Part 2:	Part 2 provides you with more advanced topics in mathematics, with topics such as differential equations building on techniques established in

	Part 1 in the areas of calculus and linear algebra. The study of real analysis will deepen your understanding of important areas in pure mathematics while numerical analysis techniques will be introduced as a way to solve problems numerically. In Computer Science you will learn about artificial intelligence and programming for data analytics.
Placement/Study abroad year:	A placement year, if undertaken, provides the opportunity to obtain practical experience and apply academic knowledge. It also helps provide focus in the final year of academic study. Students gain transferable skills demanded by graduate employers and on return to university are better informed about future career paths. A year abroad provides the opportunity for students to broaden both their academic and cultural awareness.
Part 3:	In Part 3 you will undertake some project work in mathematics. The choice of optional modules will allow you to express your preference for certain topics in pure or applied mathematics, and in computer science.

Programme Learning Outcomes - BSc Mathematics with Computer Science

During the course of the Programme, you will have the opportunity to develop a range of skills, knowledge and attributes (known as learning outcomes) For this programme, these are:

	Learning outcomes
1	Demonstrate logical thinking through the production of a structured argument.
2	Select and use appropriate mathematical, statistical and computing tools, techniques and theory to solve problems in the mathematical and computer sciences, and cognate disciplines, and be able to critically evaluate and reflect on the appropriateness of these.
3	Recognise what makes an argument a mathematical proof, and be able to construct mathematical proofs to a range of propositions drawn from the mathematical sciences.
4	Critically analyse so-called 'real world' problems and identify their essential mathematical or statistical features, and apply appropriate elements of discipline-based theory to solve these.
5	Reflect on aspects from one sub-field of the mathematical sciences and articulate how this applies to or illuminates another.
6	Plan, conduct and appropriately communicate work undertaken as part of a project.
7	Communicate, clearly and effectively, discipline-based arguments to a variety of audiences through a variety of means.
8	Identify how skills obtained in the programme can be applied outside the context of your studies.
9	Demonstrate knowledge of computer systems, computing concepts, programming principles and algorithms, and be able to apply such knowledge to support lifelong learning.
10	Learn and apply new approaches and new technologies to solve challenging computing problems.

11	Critically analyse a problem, design, implement and evaluate a computing-enabled solution that meets computing requirements based within interdisciplinary domains.
12	Demonstrate critical thinking in articulating problems in a defined domain context and creating fit-for-purpose and sustainable solutions.

You will be expected to engage in learning activities to achieve these Programme learning outcomes. Assessment of your modules will reflect these learning outcomes and test how far you have met the requirements for your degree.

To pass the Programme, you will be required to meet the progression or accreditation and award criteria set out below.

Module information

Each part comprises 120 credits, allocated across a range of compulsory and optional modules as shown below. Compulsory modules are listed.

Part 1 Modules:

Module	Name	Credits	Level
CS1IP	Imperative Programming	20	4
CS1OP	Object-Oriented Programming	20	4
MA1CA	Calculus	20	4
MA1FM	Foundations of Mathematics	20	4
MA1LA	Linear Algebra	20	4
ST1PS	Probability and Statistics	20	4

Part 2 Modules:

Module	Name	Credits	Level
CS2AI	Artificial Intelligence	20	5
CS2PP	Programming in Python	20	5
MA1RA1	Real Analysis I	20	4
MA2DE	Differential Equations	20	5
MA2MMS	Mathematical Modelling and Professional Skills	20	5
MA2NAO	Numerical Analysis I	20	5

Modules during a placement year or study year (if applicable):

Module	Name	Credits	Level
MA2PY	Industrial Placement Year	120	5
MA2SA	Study Abroad Year	120	5

Students on a 4 year version of the programme will take one 120 credit module in either Industrial Placement Year (MA2PY) or Study Abroad Year (MA2SA).

If you take a year-long placement or study abroad, Part 3 as described below may be subject to variation.

Part 3 Modules:

Module	Name	Credits	Level
MA3PPR	Portfolio of Projects	20	6

Students must take 100 credits of optional modules from a list available from the Department of Mathematics and Statistics, 40 credits of which must be Computer Science modules, and 60 credits of which must be Mathematics or Statistics modules.

Placement opportunities

Placements:

You may be provided with the opportunity to undertake a credit-bearing placement as part of your Programme. This will form all or part of an optional module. You will be required to find and secure a placement opportunity, with the support of the University

Study Abroad:

You may be provided with the opportunity to undertake a Study Abroad placement during your Programme. This is subject to you meeting academic conditions detailed in the Programme Handbook, including obtaining the relevant permissions from your School, and the availability of a suitable Study Abroad placement. If you undertake a Study Abroad placement, further arrangements will be discussed and agreed with you.

Optional modules:

The optional modules available can vary from year to year. An indicative list of the range of optional modules for your programme can be found online in the Course Catalogue. Details of optional modules for each part, including any additional costs associated with the optional modules, will be made available to you prior to the beginning of the Part in which they are to be taken and you will be given an opportunity to express interest in the optional modules that you would like to take. Entry to optional modules will be at the discretion of the University and subject to availability and may be subject to pre-requisites, such as completion of another module. Although the University tries to ensure you are able to take the optional modules in which you have expressed interest this cannot be guaranteed.

Teaching and learning delivery:

You will be taught primarily through a mixture of lectures, tutorials, computer classes and supervised project work, depending on the modules you choose. Some modules may include group work.

Elements of your programme will be delivered via digital technology.

The scheduled teaching and learning activity hours and amount of technology enhanced learning activity for your programme will depend upon your module combination. In addition, you will undertake some self-scheduled teaching and learning activities, designed

by and/or involving staff, which give some flexibility for you to choose when to complete them. You will also be expected to undertake guided independent study. Information about module study hours including contact hours and the amount of independent study which a student is normally expected to undertake for a module is indicated in the relevant module description.

Accreditation details

These programmes are accredited by the Institute of Mathematics and Its Applications (IMA). Accreditation guarantees that the educational requirements for the Chartered Mathematician (CMath) designation, subject to subsequent training and experience in employment to obtain equivalent competences to those specified by the Quality Assurance Agency (QAA) for taught Masters degrees, are met. When you successfully complete the degree, you can apply for Associate Membership of the IMA.

Assessment

The programme will be assessed through a combination of written examinations, coursework (including class tests) and oral examinations. Further information is contained in the individual module descriptions.

Progression

Part 1
To achieve a threshold performance at Part 1, a student will normally be required to:
(i) Obtain an overall average of 40% over 120 credits taken in Part 1;
(ii) Obtain a mark of at least 40% in individual modules amounting to not less than 80 credits taken in Part 1; and
(iii) Obtain marks of at least 30% in modules amounting to 120 credits.

In order to progress from Part 1 to Part 2, a student must achieve a threshold performance;

The achievement of a threshold performance at Part 1 qualifies a student for a Certificate of Higher Education if they leave the University before completing the subsequent Part.

Students on this major/minor programme who achieve the University threshold standard for progression at Part 1 may transfer to a single honours degree in the major subject if they have achieved at least 40% in 40 or more credits (i.e. 2 x 20 credit modules) of modules owned by the School or Department which delivers the single honours programme to which the student wishes to transfer and met any programme specific requirements on the single honours programme. Students should seek advice about the titles of programmes they may be eligible to transfer to.

Part 2
To achieve a threshold performance at Part 2, a student shall normally be required to:

(i) Obtain a weighted average of 40% over 120 credits taken in Part 2; and
(ii) Obtain marks of at least 40% in individual modules amounting to at least 80 credits

taken in Part 2; and
(iii) Obtain marks of at least 30% in individual modules amounting to at least 120 credits, except that a mark below 30% may be condoned in no more than 20 credits of modules owned by the Department of Mathematics and Statistics.

In order to progress from Part 2 to Part 3, a student must achieve a threshold performance;

The achievement of a threshold performance at Part 2 qualifies a student for a Diploma of Higher Education if they leave the University before completing the subsequent Part.

Professional/placement year

Students are required to pass the professional placement year/study abroad year in order to progress on the programme which incorporates the professional placement year/study abroad year. Students who fail the professional placement year/study abroad year transfer to the non-placement year version of the programme.

Classification

Bachelors' degrees
The University's honours classification scheme is based on the following:

Mark Interpretation
70% - 100% First class
60% - 69% Upper Second class
50% - 59% Lower Second class
40% - 49% Third class
35% - 39% Below Honours Standard
0% - 34% Fail

The weighting of the Parts/Years in the calculation of the degree classification is:

Three year programmes:
Part 2: one-third
Part 3: two-thirds

Four year programmes, including professional/work placement or study abroad:
Part 2: one-third
Placement/Study abroad: not included in the classification
Part 3: two-thirds

The classification method is given in detail in [Section 17](#) of the Assessment Handbook.

Additional costs of the programme

During your programme of study you will incur some additional costs. For textbooks and similar learning resources, we recommend that you budget up to £100 per year, depending on your preference to have your own books rather than borrow from the library. Some books may be available second-hand, which will reduce costs. A range of resources to

support your curriculum, including textbooks and electronic resources, are available through the library. Reading lists and module specific costs are listed on the individual module descriptions. You will need an approved scientific calculator (approximate cost £14).

Costs are indicative and may vary according to optional modules chosen and are subject to inflation and other price fluctuations. Estimates were calculated in 2023.

For further information about your Programme please refer to the Programme Handbook and the relevant module descriptions, which are available at <u>http://www.reading.ac.uk/module/</u>. The Programme Handbook and the relevant module descriptions do not form part of your Terms and Conditions with the University of Reading.

BSc Mathematics with Computer Science for students entering Part 1 in session 2024/25
7 July 2023