

**BSc Mathematical Studies**  
**For students entering Part 1 in 2010/1**

**UCAS code:**

Awarding Institution:	University of Reading
Teaching Institution:	University of Reading
Relevant QAA subject Benchmarking group(s):	Mathematics, Statistics and Operational Research
Faculty:	Science Faculty
Programme length:	3 years
Date of specification:	11/Apr/2012
Programme Director:	Dr Karen Ayres
Programme Advisor:	Dr Karen Ayres
Board of Studies:	School of Mathematical and Physical Sciences Undergraduate
Accreditation:	This programme will meet the education requirements of Chartered Mathematician designation awarded by the Institute of Mathematics and its Applications when followed by subsequent training and experience in employment to obtain equivalent competencies to those specified by the Quality Assurance Agency (QAA) for taught masters degrees

**Summary of programme aims**

The aim of the Mathematical Studies programme is to produce graduates who are well educated in mathematical problem-solving and statistical techniques and have a range of appropriate subject-specific and transferable skills. The degree achieves this by concentrating on the core areas of mathematical methods and statistics, with lesser emphasis on the theoretical topics and specialised applications.

**Transferable skills**

During the course of their studies at Reading, all students will be expected to enhance their academic and personal transferable skills in line with the University's Strategy for Learning and Teaching. In following this programme, students will have had the opportunity to develop such skills, in particular relating to career management, communication (both written and oral), information handling, numeracy, team working, use of IT and problem-solving and will have been encouraged to further develop and enhance the full set of skills through a variety of opportunities available outside their curriculum.

By the end of the programme students are expected to have gained experience and show competence in the following transferable skills: IT (word-processing, using standard, mathematics and statistics software), scientific writing, oral presentation, team-working, problem-solving, use of library resources, time-management, and career management and planning.

**Programme content**

The profile which follows states which modules must be taken (the compulsory part), together with one or more lists of modules from which the student must make a selection (the optional modules). Students must choose such additional modules as they wish, in consultation with their programme adviser, to make 120 credits in each Part. The number of credits per module and the level of each module are shown after its title.

**Part 1 (three terms)**

*Compulsory modules*

<i>Code</i>	<i>Module title</i>	<i>Credits</i>	<i>Level</i>
MA1AN1	Introduction to Analysis	20	4
MA1CAL	Calculus Methods	20	4
MA1VM	Vectors and Matrices	10	4
MA1OD1	Ordinary Differential Equations I	10	4
SE1TQ5	Commercial Off-the-Shelf Software 1	20	4
AS1E	Exploring Your Data	10	4
AS1F	Statistical Inference	10	4
AS1G	Probability	10	4
AS1H	Statistical Methods	10	4

**Part 2 (three terms)***Compulsory modules*

<i>Code</i>	<i>Module title</i>	<i>Credits</i>	<i>Level</i>
AS2A	Statistical Theory and Methods	20	5
AS2B	Linear Models	20	5
MA2AN2	Analysis	20	5
MA2COM	Communicating Mathematics	20	5
MA2AL1	Algebra I	20	5
MA2OD2	Ordinary Differential Equations II	10	5
MA2LA	Linear Algebra	10	5

**Part 3 (three terms)***Compulsory modules*

<i>Code</i>	<i>Module title</i>	<i>Credits</i>	<i>Level</i>
MA3PR	Project	10	6
MA2PD1	Partial Differential Equations I	20	5
MA3CA1	Complex Analysis I	10	6

*Optional modules**(i) 20 credits from:*

MA3CA2	Complex Analysis II	10	6
MA3CV	Calculus of Variations	10	6
MA3ASV	Analysis in Several Variables	10	6
MA3Z7	Number Theory	10	6
MA3VC	Vector Calculus	10	6
MA3NA1	Numerical Methods I	10	6
AS3D	Operational Research Techniques	20	6

*(ii) Additional Mathematics or Statistics modules at Level 6 or 7 to total 40 credits, of which at least 20 must be Mathematics. These can be selected from modules listed above or below. (Your choice should not clash with your selections to fulfil requirement (i) above.)*

MA3AL2	Algebra II	10	6
MA3DY	Dynamics	10	6
MA3DS	Dynamical Systems	10	6
MA3IBP	Initial and Boundary-value Problems	10	6
MA3W7	Control Systems	10	6
MA3ASP	Applied Stochastic Processes	10	7
MA3CM	Classical Mechanics	10	6
MA3AM1	Asymptotic Methods I	10	7
MA3MDE	Mathematics for the Digital Economy	10	6
MA3ECC	Error Correcting Codes	10	6
MA3CRY	Cryptography	10	6
MA3Z7	Number Theory	10	6
AS3A	Advanced Statistical Modelling	20	6
ST3MVA	Multivariate Data Analysis	10	6
ST3MSD	Modelling Structured Data	10	6
ST3SM	Sampling Methods	10	6
ST3ED	Experimental Design	10	6
ST3BDA	Bayesian Data Analysis	10	6

*(iii) Additional modules at Level 6 or 7 to make a total of 120 credits in Part 3. These modules can be selected from the lists above, or from elsewhere in the University. (Your choice should not clash with your selections to fulfil requirements (i) or (ii) above.)*

Note that most modules have pre-requisites and co-requisites which students must undertake. Information regarding pre-requisites and co-requisites can be found in the appropriate module description.

### **Progression requirements**

To gain a threshold performance at Part 1 and qualify for the CertHE a student shall normally be required to achieve an overall average of 40% over 120 credits taken in Part 1, where all the credits are at level 4 or above, and a mark of at least 30% in individual modules amounting to not less than 100 credits. In order to progress from Part 1 to Part 2, a student shall normally be required to achieve a threshold performance at Part 1, and obtain an average of at least 40% in the Mathematics modules taken together and an average of at least 40% in the Statistics modules taken together and have no module mark below 30%.

To gain a threshold performance at Part 2 and qualify for the DipHE a student shall normally be required to achieve an overall average of 40% over 120 credits taken in Part 2, and a mark of at least 30% in individual modules amounting to not less than 100 credits. In order to progress from Part 2 to Part 3, a student shall normally be required to achieve a threshold performance at Part 2.

Part 2 contributes one third of the final assessment and Part 3 the remaining two thirds.

### **Summary of Teaching and Assessment**

Teaching is organised in modules that typically involve both lectures and problems. The assessment is carried out within the University's degree classification scheme, details of which are in the programme handbooks. The pass mark in each module is 40%. Modules in Part 1 and 2 are assessed by a mixture of coursework and formal examination. There are some modules which are assessed wholly by coursework and others wholly by examination; the details are given in the module descriptions.

### **Admission requirements**

Entrants to this programme are normally required to have obtained:

Grade C or better in English in GCSE; and achieved

UCAS Tariff: A Level: 220 points including grade C in A Level Mathematics; or

International Baccalaureat: 30 points including 6 in Higher Mathematics; or

Advanced GNVQ: Merit in one of the following subject areas: Engineering, Information Technology or Science, accompanied by A Level Mathematics Grade B or

Scottish Highers: Grade A in Mathematics and two Bs and a C in three other subjects.

Irish Leaving Certificate: Grade A in Mathematics and three Bs and a C in four other subjects

Two AS grades are accepted in place of one A-Level except in Mathematics.

**Admissions Tutor:** Dr Graham Williams

### **Support for students and their learning**

University support for students and their learning falls into two categories. Learning support is provided by a wide array of services across the University, including: the University Library, the Student Employment, Experience and Careers Centre (SEEC), In-sessional English Support Programme, the Study Advice and Mathematics Support Centre teams, IT Services and the Student Access to Independent Learning (S@il) computer-based teaching and learning facilities. There are language laboratory facilities both for those students studying on a language degree and for those taking modules offered by the Institution-wide Language Programme. Student guidance and welfare support is provided by Personal Tutors, School Senior Tutors, the Students' Union, the Medical Practice and advisers in the Student Services Centre. The Student Services Centre is housed in the Carrington Building and offers advice on accommodation, careers, disability, finance, and wellbeing. Students can get key information and guidance from the team of Helpdesk Advisers, or make an appointment with a specialist adviser; Student Services also offer drop-in sessions and runs workshops and seminars on a range of topics. For more information see [www.reading.ac.uk/student](http://www.reading.ac.uk/student)

Within the Mathematics Department additional support is given through practical classes in Part 1. The development of problem-solving skills is assisted by extensive provision of model solutions to problems, where appropriate. There is a Course Adviser to offer advice on the choice of modules within the programme.

### **Career prospects**

In recent years students who have followed this programme have gone into jobs as scientific officer (DERA), trainee accountant, teacher training and clinical data assistant.

## Opportunities for study abroad or for placements

Although there are no formal arrangements for this programme, informal arrangements may be possible.

## Programme Outcomes

The programme provides opportunities for students to develop and demonstrate knowledge and understanding, skills, qualities and other attributes in the following areas:

### Knowledge and Understanding

#### A. Knowledge and understanding of:

1. The fundamental concepts and techniques of calculus, analysis, linear algebra, and numerical mathematics
2. The fundamental concepts and techniques of data summary and presentation, statistical inference and linear modelling
3. The use of the basic techniques of mathematics in applicable areas of mathematics, such as differential equations, coding theory and numerical analysis
4. The use of statistical software in data analysis
5. A selection of more specialist optional topics

#### Teaching/learning methods and strategies

The knowledge required for the basic topics is delineated in formal lectures supported by problem sets for students to tackle on their own. In Part 1 these are supported by tutorials and practical classes through which students can obtain additional help and feedback on their work.

In the later parts of the course students are expected to work at additional problems on their own and seek help when required. Where appropriate, model solutions are provided for problems set.

#### Assessment

Most knowledge is tested through a combination of coursework and unseen formal examinations.

Dissertations and oral presentations also contribute in other parts of the programme.

### Skills and other attributes

#### B. Intellectual skills - *able to*:

1. Think logically
2. Analyse and solve problems
3. Organise tasks into a structured form
4. Transfer appropriate knowledge and methods from one topic within the subject to another
5. Conduct independent study of a chosen topic and report on the results

#### Teaching/learning methods and strategies

Logic is an essential part of the understanding and construction of mathematical proofs and structured computer programs and is embedded throughout the programme. The quality of a solution to a problem is substantially determined by the structure of that response; analysis, synthesis, problem solving, integration of theory and application, and knowledge transfer from one topic to another are intrinsic to high-level performance in the programme.

#### Assessment

Skills 1- 3 are assessed indirectly in most parts of the programme, while 4 contributes to the more successful work. 3 and 5 are assessed in the report produced as part of the third year project.

#### C. Practical skills - *able to*:

1. Understand and construct mathematical proofs
2. Formulate and solve mathematical and statistical problems
3. Analyse numerical methods and respond to the issues of accuracy, stability and convergence
4. Use statistical software in an effective manner
5. Write and defend a report on a chosen topic

#### Teaching/learning methods and strategies

Mathematical proof is taught in Part 1 lectures and reinforced in practical classes. Problem solving is introduced in lectures in Part 1 and forms a large part of subsequent Mathematics. Lectures, practical work and assignments in Statistics are designed to enhance skills 2 and 4. Numerical analysis courses introduce and develop the ideas of accuracy, stability and convergence, illustrated by practical tasks.

#### *Assessment*

Skills 1 and 2 are tested both formatively in coursework and summatively in examinations. Skill 4 is assessed in coursework that involves computer-based analysis. 5 is assessed through the project dissertation and its oral presentation.

#### **D. Transferable skills - *able to:***

1. Use IT (word-processing, standard, mathematical and statistical software)
2. Communicate scientific ideas
3. Give oral presentations
4. Work as part of a team
5. Use library and internet resources
6. Manage time
7. Plan their career

#### **Teaching/learning methods and strategies**

The use of IT is embedded throughout the programme, and in the packages Excel and Minitab taught in Part 1. Team work and career planning are part of one Part 2 module. Communication skills are the focus of one module in Part 2, and these are deployed in the final year project. Time management is essential for the timely and effective completion of the programme. Library and internet resources are required for the small project within one Part 2 module and the final year project, and contribute to the best performances throughout.

#### *Assessment*

Skills 1 and 2 are assessed through coursework. Skills 3 - 5 and 7 contribute assessed coursework towards the Part 2 module Communicating Mathematics, and 2, 3 and 5 also in the project. The other skills are not directly assessed but their effective use will enhance performance in later modules.

**Please note - This specification provides a concise summary of the main features of the programme and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if he/she takes full advantage of the learning opportunities that are provided. More detailed information on the learning outcomes, content and teaching, learning and assessment methods of each module can be found in the module description and in the programme handbook. The University reserves the right to modify this specification in unforeseen circumstances, or where the process of academic development and feedback from students, quality assurance process or external sources, such as professional bodies, requires a change to be made. In such circumstances, a revised specification will be issued.**