

**BSc Mathematics and Statistics**  
**For students entering Part 1 in 2013/4**

**UCAS code: GG13**

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:	10/Apr/2015
Programme Director:	Dr Karen Ayres
Programme Advisor:	Dr Karen Ayres
Board of Studies:	School of Mathematical and Physical Sciences
Undergraduate	
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 to those specified by the QAA for taught masters degrees. with Placement Experience
Optional placement variation(s):	

**Summary of programme aims**

The aim of the Mathematics and Statistics programme is to produce graduates who are familiar with ideas across the range of the two subjects and have a deeper knowledge of some topics and have a range of appropriate subject-specific and transferable skills. This is achieved by introducing students to the central ideas of the two subjects in Parts 1 and 2 of the course and then allowing them considerable freedom of choice thereafter, permitting students to widen their range of topics or to study fewer to greater depth.

**Transferable skills**

During the course of their studies at Reading, all students will be expected to enhance their academic and personal transferable skills. In following this programme, students will have had the opportunity to develop such skills, in particular relating to communication, interpersonal skills, learning skills, numeracy, self-management, 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 modules credit for 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>
ST1PD	Probability and Distributions	10	4
ST1SIM	Statistical Inference and Modelling	10	4
ST1AS	Applied Statistics	10	
MA1LIN	Linear Algebra	10	4
MA1RA1	Real Analysis I	20	4
MA1FM	Foundations of Mathematics	20	4
MA1MM1	Mathematical Methods I	20	4
MA1MM2	Mathematical Methods II	10	4

*Choose one of:*

MA1ALG	Algebra I	10	4
MA1GEO	Geometry	10	4
MA1MMP	Modelling and Mathematical Physics	10	4

## Part 2 (three terms)

### Compulsory modules

<i>Code</i>	<i>Module title</i>	<i>Credits</i>	<i>Level</i>
MA2NA1	Numerical Analysis I	10	5
MA2RA2	Real Analysis II	10	5
MA2ODE	Ordinary Differential Equations	10	5
MA2GS	General Skills	10	5
ST2LM	Linear Models	10	5
ST2ST	Statistical Theory	10	5
MA2PDE	Partial Differential Equations	10	5
MA2VC	Vector Calculus	10	5
MA2PT1	Probability Theory I	10	5
St2SCD	Statistical Computing and Data Analysis	10	5

### Choose 20 credits from

<i>Code</i>	<i>Module title</i>	<i>Credits</i>	<i>Level</i>
ST2MS	Medical Statistics	10	5
MA2ASV	Analysis in Several Variables	10	5
MA2AL2	Algebra II	10	5
MA2VAD	Vector Analysis and Differential Equations	10	5

## Year abroad/Year away/Additional year (three terms)

### Compulsory modules

MA2PY	Industrial Placement Year	120	5
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The placement should not normally be shorter than nine months full-time and students will be assessed in the form of an end-of-year project.

## Part 3 (three terms)

### Compulsory modules

<i>Code</i>	<i>Module title</i>	<i>Credits</i>	<i>Level</i>
MA3CA1	Complex Analysis I	10	6
AS3A	Advanced Statistical Modelling	20	6
Either			
MA3PR	Part 3 Project	10	6
Or			
ST3PR	Statistics Project	20	6

### Optional modules

(i) At least 30 credits and a maximum of 40 credits from

ST3BDA	Bayesian Data Analysis	10	6
ST3MVA	Multivariate Data Analysis	10	6
ST3CTS	Computational Techniques in Statistics	10	6

ST3OR	Operational Research	10	6
ST3ED	Experimental Design	10	6
ST3SM	Sampling Methods	10	6
<i>(ii) A minimum of 30 credits and a maximum of 50 credits from:</i>			
MA3MTI	Measure Theory and Integration	10	6
MA3TLA	Topology and Linear Analysis	20	6
MA3NAT	Numerical Analysis II	20	6
MA3ASP	Applied Stochastic Processes	10	7
MA3DS	Dynamical Systems	10	6
MA3MB	Mathematical Biology	10	6
MA3CEC	Cryptography and Error Correcting Codes	10	6
MA3WW	Water Waves	10	6
MA3CV	Calculus of Variations	10	6
MA3Z7	Number Theory	10	6
MA3PD2	Partial Differential Equations II	10	6
MA3FM	Fluid Mechanics	10	6
MA3A7	Galois Theory	20	7
MA3AGT	Applied Graph Theory	10	6
MA3FA1	Functional Analysis I	10	6

### Progression requirements

To gain a threshold performance at Part 1 a student shall normally be required to achieve an overall weighted average of 40% over 120 credits taken in Part 1, 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 to obtain a weighted average of at least 40% over the modules MA1MM1, MA1MM2, MA1LIN, MA1FM, MA1RA1 and obtain a weighted average of at least 40% over the modules ST1AS, ST1PD, ST1SIM and obtain marks of at least 30% in these eight modules.

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

- (i) a weighted average of 40% over 120 credits taken at Part 2;
- (ii) marks of at least 40% in individual modules amounting to not less than 80 credits; and
- (iii) marks of at least 30% in individual modules amounting to not less than 120 credits.

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

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

### Assessment and classification

The University's honours classification scheme is:

<i>Mark</i>	<i>Interpretation</i>
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

For the University-wide framework for classification, which includes details of the classification method, please see: [www.reading.ac.uk/internal/exams/Policies/exa-class.aspx](http://www.reading.ac.uk/internal/exams/Policies/exa-class.aspx)

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 placement year:** Normally

Part 2 one-third

Placement Year not included in classification

Part 3 two-thirds

(where students fail a placement year which does not contribute to classification they transfer to the three-year version of the programme)

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 achieved:

- UCAS Tariff: A Level: ABC including grade A in A-level Mathematics; *or*
- International Baccalaureat: 30 points including 6 in Higher Mathematics.

Equivalent qualifications are acceptable.

**Admissions Tutor:** Dr Steve Langdon

**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 Careers, Placement and Experience Centre (CPEC), In-session 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, academic issues (eg problems with module selection) and exam related queries. 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 contributing departments 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. There is a Programme Adviser to offer advice on the choice of modules within the programme.

**Career learning**

**Career prospects**

In recent years graduates who have followed this programme have entered jobs as trainee statistician, management information analyst, chartered accountant and programmer.

**Opportunities for study abroad**

There are currently no opportunities for Study Abroad on this programme.

**Placement opportunities**

A version of this programme to include a maxi placement is available. Students undertaking a maxi placement spend a year in industry (or a year studying abroad\*) between the second and third taught year and will be transferred to a 4-year programme. This year does not contribute to the final degree classification.

**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, data summary and presentation, statistical inference and linear modelling
2. The use of the basic techniques of mathematics in applicable areas, such as differential equations, and coding theory or numerical analysis
3. The applications of statistics in a variety of areas
4. A selection of more specialist optional topics
5. The use of statistical software in data analysis.

#### **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 programme students are expected to work at additional and practical problems on their own and seek help. 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 a subject to another
5. Recognise and use appropriate statistical methods in data analysis.

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

Logic is an essential part of the understanding and construction of mathematical proofs, statistical techniques and the use of computer software for data analysis 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. Skills 5 and 6 are assessed in practical work in Parts 2 and 3.

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

1. Understand and construct mathematical proofs
2. Formulate and solve mathematical problems
3. Plan, conduct and report on the results of statistical investigations
4. Use statistical software in an effective manner.

#### **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.

#### *Assessment*

Skills 1 and 2 are tested both formatively in coursework and summatively in examinations. Skills 3 and 4 are assessed in coursework that involves computer-based analysis.

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

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

1. Use IT (word-processing, spreadsheets, using 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.

The use of IT is embedded throughout the programme, and in the packages *Minitab*, *R* and *SAS* taught in Parts 1, 2 and 3. Team work and career planning are part of the module *General Skills*. Communication skills are enhanced in Part 2, and are deployed in modules in Parts 2 and 3. Time management is essential for the timely and effective completion of the programme. Library and internet resources are required for the final year project, and contribute to the best performances throughout.

#### *Assessment*

Skills 1 and 2 are assessed through coursework. Skills 2 - 5 and 7 contribute assessed coursework towards the module *General Skills*. Effective use of these skills 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.**