BSc Mathematics and Statistics **UCAS code: GG13**

For students entering Part 1 in 2007

Awarding Institution:	The University of Reading
Teaching Institution:	The University of Reading
Relevant QAA subject benchmarking group(s):	Mathematics, Statistics and Operational Research : 22 points
Faculty of Science	Programme length: 3 years
	Date of specification: 9 April 2009

Programme Director: Dr K L Ayres
Programme Adviser: Dr K L Ayres
Board of Studies: Mathematics and Statistics
Accreditation: Approved by the Institute of Mathematics and its Applications as an appropriate academic training for mathematicians seeking the qualification *Chartered Mathematician*.

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. (For a full statement of the programme aims and learning outcomes see below.)

Transferable skills

The University's Strategy for Teaching and Learning has identified a number of generic transferable skills which all students are expected to have developed by the end of their degree programme. In following this programme, students will have had the opportunity to enhance their skills relating to career management, communication (both written and oral), information handling, numeracy, problem-solving, team working and use of information technology.

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 "selected" 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) *Credits* *Level*

Compulsory modules

AS1A	*Communicating with Statistics*	20	C
AS1B	*Probability and Statistical Methods*	20	C
MA11A	*Introduction to Analysis*	20	C
MA11B	*Calculus and Applications*	20	C
MA11C	*Matrices, Vectors and Applications*	20	C

Additional modules selected to make a total of 120 credits in Part 1.
Those who wish to keep the option of transfer to single-subject Mathematics after Part 1 should take MA11D Introduction to Algebra. In other cases, SE1TQ5 Commercial Off-the shelf Software is recommended.

Part 2 (three terms) *Credits* *Level*

Compulsory modules

AS2A	*Statistical Theory and Methods*	20	I
AS2B	*Linear Models*	20	I
AS2G	*Skills for Statisticians*	20	I
MA24A	*Analysis*	20	I
MA24L	*Differential Equations and Fourier Series*	20	I

Selected modules:
O*ne of:*

MA24J	*Vector Calculus and Numerical Analysis*	20	I
MA24E	*Linear Algebra and Coding Theory*	20	I

Part 3 (three terms) *Credits* *Level*

Compulsory modules

AS3A	*Advanced Statistical Modelling*	20	H
MA3CA	*Complex Analysis*	10	H
MA3CV	*Calculus of Variations*	10	H

Selected modules:
(i) *One of:*

MA37B	*Topics in Applied Mathematics*	20	H
MA37C	*Topics in Pure Mathematics*	20	H

(ii) *At least one of:*

AS3C	*Analysis of Structured Data*	20	H
AS3D	*Operational Research Techniques*	20	H
AS3G	*Study Design and Sampling Methods*	20	H

[continued overleaf]

(iii) *At least* 20 *credits from:*

MA3NIO	*Analysis of Numerical Techniques for Integration and Ordinary Differential Equations*	10	H
MA3DS	*Dynamical Systems*	10	H
MA3NLE	*Analysis of Numerical Techniques for Linear Equations and Eigenvalue Problems*	10	H
MA3MB	*Mathematical Biology*	10	H
MA3ASP	***Applied Stochastic Processes***	10	H
MA3SM	*Modelling of Soft Matter*	10	H
MA3C7	*Boundary-Value Problems*	10	H
MA3D7	*History of Mathematics and its Applications*	10	H
MA3W7	*Control Systems*	10	H
MA3DY	*Dynamics*	10	H
MA3Z7	*Number Theory*	10	H

(iv) Additional modules to make a total of 120 credits in Part 3 of which at least 100 credits must be at level H. This may include

AS2D	*Medical Statistics*	20	I
AS2H	*Forensic Statistics and Genetics*	20	I

Progression requirements

To gain a threshold performance at Part 1 a student shall normally be required to achieve an overall 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 an average of at least 40% in the compulsory Mathematics modules taken together, with at least 30% in each of those modules, and to obtain an average of at least 40% in the Statistics modules taken together, with at least 30% in each of these modules.

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.

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.

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

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: 300 including grade B in A Level Mathematics; *or*
International Baccalaureat: 32 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, *or*
Irish Leaving Certificate: Grade A in Mathematics and four Bs in four other subjects

Admissions Tutor: Dr Karen Ayres (Applied Statistics)

Support for students and their learning

University support for students and their learning falls into two categories. Learning support includes IT Services, which has several hundred computers and the University Library, which across its three sites holds over a million volumes, subscribes to around 4,000 current periodicals, has a range of electronic sources of information and houses 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, the Careers Advisory Service, the University's Special Needs Advisor, Study Advisors, Hall Wardens and the Students' Union.

Within the contributing departments additional support is given though 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 prospects

In recent years graduates who have followed this programme have entered jobs as trainee statistician, management information analyst, chartered accountant and programmer, but other openings similar to those for Mathematics and Statistics are expected.

Opportunities for study abroad

The BSc Mathematics and Applied Statistics programme contains the same academic material as this one and includes a placement year which may be spent abroad.

Educational aims of the programme

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.

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:	**Teaching/learning methods and strategies**
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.	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. 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.

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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.

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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:

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.

Teaching/learning methods and strategies

The use of IT is embedded throughout the programme, and in the packages *Minitab* and *SAS* taught in Parts 1 and 2. Team work and career planning are part of the module *Skills for Statisticians*. 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 larger pieces of coursework.

Assessment

Skills 1 and 2 are assessed through coursework. Skills 2 - 5 and 7 contribute assessed coursework towards the module *Skills for Statisticians*. 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 processes or external sources, such as professional bodies, requires a change to be made. In such circumstances, a revised specification will be issued.**