BSc Mathematics and Statistics

UCAS code: GG13

For students entering Part 1 in 2003

Awarding Institution: The University of Reading
Teaching Institution: The University of Reading
Relevant QAA subject benchmarking group(s): Mathematics, Statistics and Operational Research

Faculty of Science
Programme length: 3 years
Date of specification: 18-Mar-05
Programme Director: Dr A. Kimber
Programme Adviser: Dr W. M. Patefield
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 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, CS1TQ2 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
AS2E	*Survey Data Management*	20	I
MA24A	*Analysis*	20	I
MA24B	*Differential Equations*	20	I
Optional modules:			
O*ne of:*			
MA24C	*Vectors, Dynamics 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
MA37A	*Complex Analysis and Calculus of Variations*	20	H
Optional modules:			
(i) *One of:*			
MA37B	*Topics in Applied Mathematics*	20	H
MA37C	*Topics in Pure Mathematics*	20	H
(ii) *At least one of:*			
AS3B	*Statistical Inference*	20	H
AS3C	*Analysis of Structured Data*	20	H
AS3D	*Operational Research Techniques*	20	H
AS3G	*Study Design and Sampling Methods*	20	H
(iii) *At least* 20 *credits from:*			
MA37E	*Numerical Analysis and Dynamical Systems 1*	20	H
MA38D	*History of Mathematics*	10	H
MA3B7	*Graph Theory* †	20	H
MA3C7	*Boundary-Value Problems* †	10	H
MA3D8	*Asymptotic Methods* †	10	H
MA3W7	*Control Systems* †	10	H
MA3X7	*Combinatorics* †	20	H
MA3Y8	*Mathematical Logic* †	10	H

(† a selection of these will be available in any given year.)

(iv) *Additional modules to make a total of 120 credits in Part 3.*

(v) In weeks 8 and 9 of the Summer term in Part 2 there will be an additional course in SAS statistical computing to learn the essentials of this programming language for final year modules.

Progression requirements
To proceed to Part 2 it is sufficient to obtain an average of at least 40% overall, at least 40% in the compulsory Mathematics modules taken together, at least 40% in the Statistics modules taken together, and have no module mark under 30%. Marks of less than 30% in a total of 20 credits, except for MA11A, MA11B, MA11C, AS1A, AS1B, will be condoned provided that the candidate has pursued the course for the module with reasonable diligence and has not been absent from the examination without reasonable cause.

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: 280 points including grade B 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 Alan Kimber

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 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 statistician, trainee manager (NHS Trust), trainee actuary, trainee chartered accountant and to postgraduate study.

Opportunities for study abroad or for placements
The Mathematics and Applied Statistics programme contains the same academic material as this one and includes a placement year.

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:	**Teaching/learning methods and strategies**
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 6. plan, conduct and write a report on an independent project.	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. write and defend a report on a chosen topic.
5. use statistical software in an effective manner
6. gain work experience through spending a year on placement.

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 5 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 *Mathematica, Excel, Minitab* and *SAS* taught in Parts 1 and 2. Team work and career planning are part of the module *Survey Data Management*. 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 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 *Survey Data Management.* 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 expect 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 module and programme handbooks.