BSc Mathematical Studies

UCAS code: G152

For students entering Part 1 in 2006

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: 03-Apr-08
Programme Director: Dr N.R.T. Biggs
Programme Adviser: Dr T.W. Hilberdink
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 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. (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 credits for modules and the level of each module are shown after its title.

Part 1 (three terms)		*Credits*	*Level*
Compulsory modules			
MA11A	*Introduction to Analysis*	20	C
MA11B	*Calculus and Applications*	20	C

MA11C	*Matrices, Vectors and Applications*	20	C
SE1TQ5	*Commercial off the shelf Software*	20	C
AS1A	*Communicating with Statistics*	20	C
AS1B	*Probability and Statistical Methods*	20	C

Part 2 (three terms)		*Credits*	*Level*
Compulsory modules			
MA24A	*Analysis*	20	I
MA24G	*Elementary Algebra*	20	I
MA24F	*Communicating Mathematics*	20	I
AS2A	*Statistical Theory and Methods*	20	I
AS2B	*Linear Models*	20	I

Optional Modules:

(i) *One of:*

MA24L	*Differential Equations and Fourier Series*	20	I
MA24J	*Vector Calculus and Numerical Analysis*	20	I
MA24E	*Linear Algebra and Coding Theory*	20	I

Part 3 (three terms)		*Credits*	*Level*
Optional modules:			
(ii) *One of:*			
MA37B	*Topics in Applied Mathematics*	20	H
MA37C	*Topics in Pure Mathematics*	20	H
(iii) *20 credits from:*			
MA37A	*Complex Analysis and Calculus of Variations*	20	H
MA3D7	*History of Mathematics and its Applications*	10	H
MA3Z7	*Number theory*	10	H
(iv) *One of:*			
MA34L	*Differential Equations and Fourier Series*	20	H
MA34J	*Vector Calculus and Numerical Analysis*	20	H
MA34E	*Linear Algebra and Coding Theory*	20	H
AS3D	*Operational Research Techniques*	20	H

Please note

Students who took MA24L in Part 2 may not register for MA34L
Students who took MA24J in Part 2 may not register for MA34J
Students who took MA24E in Part 2 may not register for MA34E

(v) Students registered for the Mathematical Studies degree must take additional Level H modules with a total of at least 40 credits from Mathematics or Statistics in Part 3 of which at least 20 must be in Mathematics.

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

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 C level 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.

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: 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 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 Mathematics Department 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 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.

Educational aims of the programme
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.

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, 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.	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. 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 *Mathematica. 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 processes or external sources, such as professional bodies, requires a change to be made. In such circumstances, a revised specification will be issued.