BSc Mathematics

UCAS code: G100

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

Faculty of Science
Programme length: 3 years
Date of specification: 15-Apr-09
Programme Director: Dr N. R. T. Biggs
Programme Adviser: Dr T. W. Hilberdink
Board of Studies: Mathematics, Meteorology and Physics
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 BSc programme in Mathematics aims to provide a good general mathematical education for those not intending to continue as professional mathematicians. This is achieved by providing core material in the first two years and then in the third year a blend of courses, some giving an overview of a broad area of mathematics and others studying a particular topic in depth, along with a range of appropriate subject-specific and transferable skills. (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 and mathematics 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
MA11D	*Introduction to Algebra*	20	C

and other modules with a total credit of 40. No further Mathematics modules may be taken in Part 1.

Students who have taken MA11A, MA11B, MA11C, AS1A and AS1B or who have taken MA11A, MA11B, MA11C, together with 60 credits of Economics, Meteorology, Physics or Psychology may follow this programme. Such students must take MA24G in Part 2 in place of MA24K and then take MA3AL & MA3DY in Part 3 (as part fulfilment of requirement (ii)).

Part 2 (three terms)		*Credits*	*Level*
Compulsory modules			
MA24A	*Analysis*	20	I
MA24E	*Linear Algebra and Coding Theory*	20	I
MA24F	*Communicating Mathematics*	20	I
MA24J	*Vector Calculus and Numerical Analysis*	20	I
MA24K	*Algebra and Dynamics*	20	I
MA24L	*Differential Equations and Fourier Series*	20	I

Part 3 (three terms)		*Credits*	*Level*
Compulsory modules			
MA3CA	*Complex Analysis*	10	H
MA3CV	*Calculus of Variations*	10	H
MA37B	*Topics in Applied Mathematics*	20	H
MA37C	*Topics in Pure Mathematics*	20	H

Optional modules:
*(i) At least 40 additional credits of Level H or M Mathematics must be taken in Part 3, selected from the list below. (Students who took MA24G in Part 2 should take MA3AL and MA3DY, plus **20** additional credits of Level H or M Mathematics from the list below.)*

MA3NLE	Analysis of Numerical Techniques for Linear Equations and Eigenvalue Problems	10	H
MA3DS	Dynamical Systems	10	H
MA3C7	Boundary-value Problems	10	H
MA3D7	History of Mathematics and its Applications	10	H
MA3W7	Control Systems	10	H
MA3Z7	Number Theory	10	H
MA3A7	Galois Theory	20	H
MA3NIO	Analysis of Numerical Techniques for Integration and Ordinary Differential Equations	10	H
MA3CM	Classical Mechanics	10	H
MA3MB	Mathematical Biology	10	H
MA3FM	Fluid Mechanics	10	H

MA3AM1	Asymptotic Methods I	10	H
MA3ASP	Applied Stochastic Processes	10	M
MA3SM	Modelling of Soft Matter	10	M
AS3D	Operational Research Techniques	20	H

(ii) Additional modules at Level H or M to make a total of 120 credits in Part 3. These modules can be selected from the list above, or elsewhere in the University. (Your choice should not clash with your selections to fulfil requirement (i) 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 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 least 40% in the Part 1 Mathematics modules MA11A, MA11B, MA11C, MA11D, taken together, with at least 30% in each of those 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 points including grade B in A Level Mathematics; or
International Baccalaureate: 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 tutorials 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
Mathematics graduates typically find employment in areas such as finance, accountancy, actuarial work, management services and teaching, as well as further study and research and some less common choices. In recent years students who have followed this programme have gone into jobs as actuarial trainee, trainee chartered accountant, IT management trainee, teaching, business analyst and postgraduate study.

Opportunities for study abroad or for placements
Although there are no formal arrangements for the BSc Mathematics programme, informal arrangements may be possible.

Educational aims of the programme
The BSc programme in Mathematics aims to provide a good general mathematical education for those not intending to continue as professional mathematicians. This is achieved by providing core material in the first two years and then in the third year a blend of courses, some giving an overview of a broad area of mathematics and others studying a particular topic in depth, along with a range of appropriate subject-specific and transferable skills.

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, algebra, dynamics and numerical mathematics
2. the use of the basic techniques of mathematics in applicable areas of mathematics, such as differential equations, fluid mechanics, coding theory and numerical analysis
3. a selection of more specialist optional topics
4. some of the breadth of topics which can be tackled by mathematics.

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 feedback on their non-assessed work.

In the later parts of the course students are expected to work at additional problems on their own and seek help when required, using the office hours of staff. Model solutions are provided for problems set.

4. is provided by the modules *Topics in Applied Mathematics* and *Topics in Pure Mathematics*.

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 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

1- 3 are assessed indirectly in most parts of Mathematics, while 4 contributes to the more successful work. 5 is assessed in the report produced as part of the modules *Topics in Applied Mathematics* and *Topics in Pure Mathematics*.

C. Practical skills – able to:

1. understand and construct mathematical proofs
2. formulate and solve mathematical problems
3. analyse numerical methods and respond to the issues of accuracy, stability and convergence
4. write and present orally 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. Numerical analysis courses introduce and develop the ideas of accuracy, stability and convergence, illustrated by practical tasks.

Assessment

1 and 2 are tested both formatively in coursework and summatively in examinations. 3 is assessed practically through coursework and the principles through formal examination. 4 is assessed through the project dissertation and its oral presentation.

D. Transferable skills – able to:

1. use IT (word-processing, using standard and mathematical software)
2. communicate scientific ideas
3. give oral presentations
4. work as part of a team
5. use library resources
6. manage time
7. plan their career.

Teaching/learning methods and strategies

The use of IT is embedded throughout the computational side of the course. 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 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

1 and 2 are assessed through coursework. 3 - 5 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.