BSc Mathematics **UCAS code: G100**
For students entering Part 1 in 2010/1

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:	12/Apr/2012
Programme Director:	Dr Karen Ayres
Programme Advisor:	Dr Karen Ayres
Board of Studies:	School of Mathematical and Physical Sciences Undergraduate
Accreditation:	This programme will meet the education requirements of Chartered Mathematician designation awarded by the Institute of Mathematics and its Applications when followed by subsequent training and experience in employment to obtain equivalent competencies to those specified by the Quality Assurance Agency (QAA) for taught masters degrees

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.

Transferable skills
During the course of their studies at Reading, all students will be expected to enhance their academic and personal transferable skills in line with the University's Strategy for Learning and Teaching. In following this programme, students will have had the opportunity to develop such skills, in particular relating to career management, communication (both written and oral), information handling, numeracy, team working, 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 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 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 credits per module and the level of each module are shown after its title.

Part 1 (three terms)
Compulsory modules

Code	*Module title*	*Credits*	*Level*
MA1AN1	Introduction to Analysis	20	4
MA1CAL	Calculus Methods	20	4
MA1VM	Vectors and Matrices	10	4
MA1AL1	Introduction to Algebra	20	4
MA1OD1	Ordinary Differential Equations I	10	4
MA1LIN	Linear Algebra	10	4
AS1G	Probability	10	4

Optional modules
Students should choose additional modules to make a total of 120 credits in Part 1. Students are encouraged to select 20 credits from the Mathematics and Statistics modules:

MA1GEO	Geometry	10	4
MA1SW	Scientific Writing and Mathematical Programming	10	4
AS1F	Statistical Inference	10	4
AS1H	Statistical Methods	10	4

Students who have taken MA1AN1, MA1CAL, MA1VM and MA1OD1 in Part 1 may follow this programme. Students who have also taken MA1AL1 must take MA2LA in place of MA2DY, and then take MA3DY in Part 3 as an option. Students who have not taken MA1AL1 must take MA2AL1 and MA2LA in place of MA2AL2, MA2DY and MA2ASV, and take MA3AL2, MA3DY and MA3ASV in Part 3 as three of their Part 3 options.

Part 2 (three terms)
Compulsory modules

Code	*Module title*	*Credits*	*Level*
MA2AN2	Analysis II	20	5
MA2COM	Communicating Mathematics	20	5
MA2OD2	Ordinary Differential Equations II	10	5
MA2PD1	Partial Differential Equations I	20	5
MA2AL2	Algebra II	10	5
MA2DY	Dynamics	10	5
MA2VC	Vector Calculus	10	5
MA2NM	Numerical Methods	10	5
MA2ASV	Analysis in Several Variables	10	5

Part 3 (three terms)
Compulsory modules

Code	*Module title*	*Credits*	*Level*
MA3CA1	Complex Analysis I	10	6
MA3PR	Part 3 Project	10	6

Optional modules

(i) At least 80 additional credits of level 6 or 7 Mathematics modules must be taken in Part 3, selected from the list below. (Students who took MA1AL1 in part 1 and subsequently MA2LA in part 2 must take MA3DY in Part 3 plus 70 additional credits of level 6 or 7 Mathematics from the list below. Students who took MA2AL1 and MA2LA in Part 2 should take MA3AL2, MA3DY and MA3ASV in Part 3, plus 50 additional credits of level 6 or 7 Mathematics from the list below.)

MA3CA2	Complex Analysis II	10	6
MA3DS	Dynamical Systems	10	6
MA3IBP	Initial and Boundary-Value Problems	10	6
MA3W7	Control Systems	10	6
MA3Z7	Number Theory	10	6
MA3A7	Galois Theory	20	7
MA3CM	Classical Mechanics	10	6
MA3MB	Mathematical Biology	10	6
MA3FM	Fluid Mechanics	10	6
MA3AM1	Asymptotic Methods I	10	7
MA3ASP	Applied Stochastic Processes	10	7
MA3MDE	Mathematics of the Digital Economy	10	6
MA3ECC	Error Correcting Codes	10	6
MA3NA2	Numerical Analysis II	10	6
MA3CRY	Cryptography	10	6
MA3FA1	Functional Analysis I	10	6

MA3MTI	Measure Theory and Integration	10	6
MA3PD2	Partial Differential Equations II	10	6
MA3PT	Probability Theory	10	7
MA3TLA	Topology and Linear Analysis	10	6
MA3WW	Water Waves	10	6
MA37K1	Algebra	10	6
AS3D	Operational Research Techniques	20	6

(ii) Additional modules to make a total of 120 credits in Part 3, of which at least 100 credits must be at level 6 or 7. These modules can be selected from the list above or below (your choice should not clash with your selections to fulfil requirement (i) above.)

ST3MVA	Multivariate Data Analysis	10	6
ST3SM	Sampling Methods	10	6
ST2EPI	Epidemiology	10	5
ST2CT	Clinical Trials	10	5
ST2EPI	Genetic Data Analysis	10	5
ST2FS	Forensic Statistics	10	5

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 4 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 MA1CAL, MA1OD1, MA1AN1 and MA1VM 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.

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

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.

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: 320 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 Graham Williams

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 Student Employment, Experience and Careers Centre (SEECC), In-sessional 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. 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

Within the Mathematics & Statistics 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, where appropriate. 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.

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, algebra, dynamics and numerical mathematics 2. The use of the basic techniques of mathematics in applicable areas of mathematics, such as differential equations, 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	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. Where appropriate, model solutions are provided for problems set. 4. is provided by the project module. *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 the subject to another 5. Conduct independent study of a chosen topic and report on the results	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 project module
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 process or external sources, such as professional bodies, requires a change to be made. In such circumstances, a revised specification will be issued.