STUDENT AND ACADEMIC SERVICES

PROGRAMME SPECIFICATION

Part 1: Basic Data			
Awarding Institution	University of the West of England, Bristol		
Teaching Institution	University of the West of England, Bristol		
Delivery Location	Frenchay Campus		
Study abroad / Exchange / Credit recognition	Credit recognition		
Faculty responsible for programme	Environment and Technology		
Department responsible for programme	Engineering Design and Mathematics		
Modular Scheme Title			
Professional Statutory or Regulatory Body Links	Institute of Mathematics and its Applications		
Highest Award Title	BSc(Hons) Mathematics		
Default Award Title			
Fall-back Award Title			
Interim Award Titles	BSc Mathematics Diploma of Higher Education Mathematics Certificate of Higher Education Mathematics		
UWE Progression Route			
Mode(s) of Delivery	FT / SW with Foundation year		
Codes	**UCAS:**	**JACS: G101**	
	ISIS2:G900 **G900(SW)** **G90013(FT)**	**HESA:**	
Relevant QAA Subject Benchmark Statements	Mathematics Statistics and Operational Research		
First CAP Approval Date	June 2015	Valid from	September 2015
Revision CAP Approval Date	July 2019	Revised with effect from	September 2019
Version	6		

Part 2: Educational Aims of the Programme
Students graduating from this programme will use their specialist knowledge in a wide variety of professional contexts. Mathematics graduates are employed across the economy, for example in business and financial modelling, in engineering, in research organisations modelling problems in biology, physics, computer science and social science, in computing, in the development of new technologies, and as statisticians analysing large data sets for government and commercial organisations and in education.

Part 2: Educational Aims of the Programme

Students are provided with a broad experience of the discipline through a number of interconnected strands or themes that are developed through the programme, such as modern applied mathematics, computational mathematics, algebra and geometry, decision modelling and applied statistics. The programme structure is flexible allowing students to specialize and choose options that support their future career direction. Students are informed about the future employment opportunities open to graduates through stand-alone employability sessions and employer talks.

The BSc (Hons) Mathematics has the following educational aims:

1. To produce graduates who are familiar with concepts and skills of Mathematics, Statistics and Operational Research that will enable them to gain employment in a number of sectors including science, technology, government and business;
2. To develop understanding of the underlying and unifying mathematical concepts that underpin the different branches of the discipline;
3. To prepare students for progression to study higher degrees in Mathematics, Statistics and Operational research;
4. To develop analytical, problem-solving transferable skills that will be valuable to graduates in any career;
5. To develop the ability to apply mathematical statistical and operational research concepts in a range of contexts;
6. To develop an understanding of the modelling process as applied to a range of problems in different contexts;
7. To develop the ability to use a range of specialised computer software to solve problems in the mathematical sciences.
8. To ensure that graduates can communicate effectively through presentations and through written reports;
9. To continue the development of those general study skills that will enable students to become independent lifelong learners;
10. To encourage the discerning use of reference material from a variety of sources.

Programme requirements for the purposes of the Higher Education Achievement Record (HEAR)

The aim of this programme is to produce applied mathematical science graduates able to apply their knowledge and skills in a professional context or further their knowledge through postgraduate study.

A successful graduate will be highly numerate and analytical and able to communicate their knowledge to a specialist or non-specialist audience. On completion, graduates will have successfully completed individual and group investigations, demonstrating an ability to work independently and as part of a team. Graduates will be critical thinkers who understand the strengths and limitation of mathematical and statistical models and engage with academic and professional literature.

Part 3: Learning Outcomes of the Programme

The focus of the foundation year (level0) is on the acquisition both of appropriate academic skills and relevant subject knowledge to allow students to develop and progress through levels 1,2 and 3 in relation to knowledge and understanding, cognitive, subject specific and study skills.

The award route provides opportunities for students to develop and demonstrate knowledge and understanding, qualities, skills and other attributes in the following areas:

A. Knowledge and Understanding (subject specific)

1. analytical techniques used to solve problems involving linear systems;
2. analytical techniques used to solve problems involving nonlinear systems;
3. analytical techniques used to solve problems involving discrete mathematical objects;
4. computational techniques for solving mathematical problems;
5. the application of computer software to analyse and solve mathematical and statistical problems;
6. programming concepts and structures for implementing numerical algorithms;
7. the theoretical underpinning and application of a wide range of methods for statistical analysis, design of experiments and data modelling;
8. the modelling process, applied to a variety of problems, using techniques from mathematics, statistics and operational research
9. the theoretical underpinning of decision modeling and operational research techniques.
10. the application of mathematical and statistical techniques to solve realistic problems drawn from a variety of application areas; e.g. biology, physics, finance, health, business, transport, social science;

B. Intellectual Skills (generic)

Graduates will have the ability to:

1. think logically and use symbolic language to describe the relationships between real and abstract quantities in the context of mathematical, statistical and operational research problems;

Part 3: Learning Outcomes of the Programme

2. communicate mathematical and statistical arguments, using appropriate notation, in a clear and precise manner

3. construct rigorous logical arguments and mathematical proofs;

4. critically interpret solutions obtained using mathematical, statistical and operational research techniques and report conclusions in a clear and appropriate manner;

5. design, implement and test simple algorithms;

C. Subject/Professional/Practical Skills (subject specific)

Graduates will be able to:

1. adopt different problem solving approaches from mathematical, statistical and operational research to problems that arise in a variety of contexts;

2. use mathematical language, notation and methods in the description and analysis of problems in appropriate areas of application;

3. communicate the results from mathematical or statistical investigations in a manner that is appropriate for a non technical audience;

4. apply mathematical theory in a variety of contexts such as financial mathematics, fluid dynamics, computational mathematics, coding, mathematical biology, transport and decision modelling.

5. apply statistical methods in a variety of contexts relevant to government, science and industry.

6. develop and implement mathematical and statistical models in a variety of contexts.

D. Transferable Skills and other attributes (generic)

Graduates will be able to

1. communicate using professional standards of English, both orally and through written technical reports;

2. demonstrate the ability to manage their own time and meet deadlines;

3. work in teams and take responsibility for individual and shared objectives;

Part 3: Learning Outcomes of the Programme

4. use IT skills in context and to learn how to use new software tools to develop and to implement solutions;

5. take a logical and systematic approach to problem formulation, solution and decision making;

6. demonstrate the ability to learn independently;

7. to be able to critically to review available literature that is relevant to the subject discipline;

The programme ensures that students are aware of issues relating to Education for Sustainable Development (ESD) contexts through the core programme. Initially students at level 0 and level 1 are introduced to contexts where mathematical sciences may be used to solve problems relating to energy use, efficiency or pollution. At level 2, research studies in health, economic or social science contexts are used to explore ethical issues that arise in statistically based studies. Beyond level 2 the programme has a flexible option structure and students will have a different experience depending on the option path chosen. However, there is sufficient coverage in the option modules at level 3 to ensure that all students will be exposed to ESD contexts be it through project work, mathematics education issues or ethical issues around the use and limitations of mathematical and statistical models. Modules where students can expect to be made aware of ESD issues are highlighted in **green**, those where all students will experience material in an ESD context are **underlined**.

Learning Outcomes:	Module No: **UFMFK3-30-1**	Module No: UFMFL3-30-1	Module No: UFMFPA-30-1	Module No: **UFMFM3-30-1**	Module No: **UFMFF9-30-2**	Module No: **UFMFNA-30-2**	Module No:UFMFC7-30-2	Module No: UFMFG9-15-2	Module No:UFMFT7-15-2	Module No: UFMF7A-15-2	Module No: UFMFQ7-15-2	Module No:**UTLGSW-15-2**	Module No: **UFMFUG-15-3**	Module No: UFMFVG-15-3	Module No: UFMFWG-15-3	Module No:**UFMFK8-30-3**	Module No: UFMFX9-30-3	Module No:**UFMFY7-30-3**	Module No:**UFMFK7-30-3**	Module No:**UFMFW9-30-3**	Module No:**UFMFU9-30-3**	Module No:**UFMFV9-15-3**	Module No:**UFMFH9-30-3**	Module No:**UFMF89-15-3**
(A). Knowledge and understanding of:																								
1.analytical techniques used to solve problems involving linear systems	✓	✓		✓	✓								✓	✓			✓				✓	✓		
2.analytical techniques used to solve problems involving nonlinear systems;	✓				✓											✓					✓	✓		
3.analytical techniques used to solve problems involving discrete mathematical objects;		✓					✓				✓				✓			✓						
4.computational techniques for solving mathematical problems;	✓				✓					✓			✓				✓	✓						
5.The application of computer software to analyse and solve mathematical and statistical problems;	✓		✓	✓	✓	✓				✓			✓				✓	✓	✓	✓	✓	✓		✓
6.programming concepts and structures for implementing numerical algorithms;																								

Part 3: Learning Outcomes of the Programme

	✓				✓												✓	✓						
7.the theoretical underpinning and application of a wide range of methods for statistical analysis, design of experiments and data modelling;			✓			✓		✓											✓	✓	✓	✓		
8.the modelling process, applied to a variety of problems, using techniques from mathematics, statistics and operational research				✓	✓	✓	✓			✓			✓	✓				✓		✓	✓	✓		
9.the theoretical underpinning of decision modeling and operational research techniques		✓		✓			✓			✓								✓						
10.the application of mathematical and statistical techniques to solve realistic problems drawn from a variety of application areas; e.g. biology, physics, finance, health, business, transport, social science;	✓				✓	✓				✓	✓		✓	✓		✓		✓	✓		✓	✓		
(B) Intellectual Skills																								
1.think logically and use symbolic language to describe the relationships between real and abstract quantities in the context of mathematical, statistical and operational research problems;	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
2.communicate mathematical and statistical arguments, using appropriate notation, in a clear and precise manner	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
3.construct rigorous logical arguments and mathematical proofs;	✓	✓			✓		✓		✓		✓		✓	✓	✓	✓	✓							
4.critically interpret solutions obtained using mathematical, statistical and operational research techniques and report conclusions in a clear and appropriate manner;	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
5.design, implement and test simple algorithms;	✓				✓	✓							✓				✓			✓	✓	✓		
(C) Subject/ Professional/ Practical Skills																								
1.adopt different problem solving approaches from mathematical, statistical and operational research to problems that arise in a variety of contexts;	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
2.use mathematical language, notation and methods in the description and analysis of problems in appropriate areas of application	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
3.communicate the results from mathematical or statistical investigations in a manner that is appropriate for a non technical audience;	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
4.apply mathematical theory in a variety of contexts such as financial mathematics, fluid dynamics, computational mathematics, coding, mathematical biology, transport and decision modelling.	✓			✓	✓				✓		✓		✓	✓		✓		✓			✓	✓		
5.apply statistical methods in a variety of contexts relevant to government, science and industry.			✓			✓		✓											✓	✓	✓	✓		
6.develop and implement mathematical and statistical models in a variety of contexts.				✓						✓			✓					✓	✓		✓	✓		

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Part 3: Learning Outcomes of the Programme

(D) Transferable skills and other attributes																								
1.communicate using professional standards of English, both orally and through written technical reports;	✓		✓	✓	✓	✓		✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
2.demonstrate the ability to manage their own time and meet deadlines;	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
3.work in teams and take responsibility for individual and shared objectives;	✓				✓							✓											✓	✓
4.use IT skills in context and to learn how to use new software tools to develop and to implement solutions;	✓			✓	✓				✓				✓			✓	✓	✓	✓	✓	✓	✓		✓
5.take a logical and systematic approach to problem formulation, solution and decision making;				✓	✓	✓				✓	✓						✓	✓	✓	✓	✓	✓		
6.demonstrate the ability to learn independently	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
7.to be able to critically to review available literature that is relevant to the subject					✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	

Part 4: Student Learning and Student Support

Teaching and learning strategies to enable learning outcomes to be achieved and demonstrated

At UWE, Bristol there is a policy for a minimum average requirement of 12 hours/week contact time over the course of the full undergraduate programme. This contact time encompasses a range of face-to-face activities as described below. In addition, a range of other learning activities will be embedded within the programme which, together with the weekly contact time, will enable learning outcomes to be achieved and to be demonstrated.

On BSc Mathematics programme teaching is a mix of scheduled, independent and placement learning. The nature of sessions and learning activities may very as a result of option choices, but the typical experience of a student is detailed below

Scheduled Learning: The mode of delivery of a module is determined by its Module Leader, and typically involves a combination of one or more lectures, tutorials, workshops and computer practical sessions. Workshops can involve individual or group activities, with students' making informal presentations of their work. Those opting for a final year project will have the support of a project advisor.

Independent Learning: Modules require students to carry out independent study, such as research for projects and assignments, and a full range of facilities are available to support students in this activity. The strategy is accordingly to offer students both guided support and opportunities for independent study.

The progression to independent study will also be assisted by the nature of the support offered in individual modules. Typically, module leaders will provide a plan for the module indicating the activities to be carried out and the forms of learning to be undertaken during the delivery of the module, with a view to encouraging students to plan ahead and to take responsibility for managing their time and resources.

Placement learning: involves an optional placement year in a work environment where graduates of mathematical sciences typically find employment such as financial institutions, government organisations, project planning and software development. The placement year is credit bearing with assessment that encourages students to reflect on their work environment and the development of their professional skills. The placement is supported by an academic placement tutor.

Work based learning opportunities are also available to those opting to take mathematics education modules at level 2 and level 3 with school-based placements integrated into the delivery of the module.

Personal Development: Each student is allocated an academic personal tutor who will ensure student engagement with the academic programme and assist with the delivery of generic skills through a programme of graduate development. At Level One this is designed to equip students with the necessary skills and information to help them develop as effective learners and to approach their work with confidence. Level Two work is designed to help the student recognise, describe and demonstrate their academic achievements and skills in preparation for their placement year and future career prospects. At Level Three, this should help them to plan their own 'preferred future' and to present their skills, attributes and abilities in a way that will help them achieve their goals.

Pastoral Care: The University divides responsibilities for pastoral care between academic personal tutors who look after the academic well-being of students and Student Advisors who provide comprehensive, full-time student support on a range of issues including funding, academic regulations, personal and health issues. The service operates on a drop-in basis or by appointment.

Computing Facilities: The faculty offers a specialised computing facility alongside the general University provisions. A range of computer laboratories with access to Microsoft or Unix operating systems are available for students to use when not in use for teaching. An open access computer laboratory with 24 hour opening is extensively used by students for the completion of coursework activities. Specialist mathematical and software used in the programme is part of the standard build for the Faculty's computer laboratories. All specialist software used in the programme is currently available to students for home use free of charge.

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Part 4: Student Learning and Student Support

Description of the teaching resources provided for students

Academic advice and support is the responsibility of staff delivering the module in question. Staff are expected to be available outside normal timetabled hours, either by appointment or during published "surgery" hours, in order to offer advice and guidance on matters relating to the material being taught and on its assessment.

Drop-by, one-to-one tuition is available every day through the *espressoMaths* service, which provides access to mathematics and statistics academic staff.

Peer Assisted Learning (PAL) is used to support learning at Level One. Each student has access to one PAL session per week, this session being run by a second year student who is trained as a PAL leader to assist students on problems that they face in any of the modules that they are studying.

A weekly programme hour (Maths Arcade) offers the opportunity for students to mix with other students on the programme from different years and academic staff.

Description of any Distinctive Features

Learning Support: The Mathematics and Statistics cluster contains staff who are active in national teaching and learning projects, working with colleagues in other universities to develop new approaches in the delivery and support of programmes in mathematics, statistics and operational research.

Distinctive features of our support to students.

- Mathematics Resource Centre that provides dedicated space for students to carry out group work and to practice presentations.
- *espressoMaths* that provides drop-by one-to-one tuition each day in the student canteen and also a web-site that provides a portal to a variety of online resources in mathematics and statistics.
- Computer based e-assessment: implemented in a number of first year modules, so that students can take regular short tests, with automated computer generated feedback.
- Provision of online materials through the university virtual learning environment including lecture recording with respect to some modules.

Employability: We recognise that many students entering this programme will not have clearly developed ideas as to their future career direction. We have therefore embedded activities within the programme delivery that are designed to support students as they develop their interests and future career plans.

- A programme of graduate development activities is delivered at each level, promoting awareness of employment opportunities open to graduates of mathematics and statistics. This programme includes development of transferable skills, researching the graduate employment market and preparing a CV. At Level Two, employers and recent graduates are invited to the University to speak to students and to encourage participation in the placement year. At Level Three we concentrate on academic achievement and future plans.
- The optional placement year provides extensive and valuable experience of the workplace.
- The department's extensive outreach programme provides opportunities for students to work with young learners in local secondary schools. The work involves learning to be part of a team, and it provides opportunities to develop leadership skills, confidence and independence.

The final year module *Mathematics Education Project* provides a work-based learning opportunity for students who are thinking about becoming a mathematics teacher. Places are limited by the number of school placements that can be supported in a given year and so are decided by a competitive application process.

The foundation year is common with a number of Engineering Design and Mathematics programmes which allows flexibility for students to transfer between programmes in the subject area as is most appropriate for their emergent subject and/or their professional interests.

Part 5: Assessment
Approved to University Regulations and Procedures It is the Award Board's responsibility to determine whether a student's attainment at level 0 is sufficient to progress to level 1.
Assessment Strategy The assessment strategy uses a variety of assessment types as detailed below to allow students to demonstrate that they have achieved the knowledge, skills and understanding identified in the learning outcomes. The range of assessments ensures that students are able to demonstrate confident communication skills, time management and independent learning that will be required in the work-place. It is possible through the options to select modules involving work-based learning. The assessment on these modules is designed so that students are able develop their professional skills and reflect on the professional environment.

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Part 6: Programme Structure:				
This structure diagram demonstrates the student journey from Entry through to Graduation for a typical **full time student**, including: level and credit requirements; interim award requirements module diet, including compulsory and optional modules				
ENTRY	Year 1(level 0)	**Compulsory Modules** UFMFBG-30-0 Foundation Mathematics: Algebra and Calculus UFMFAG-30-0 Foundation Mechanics UFMFFG-15-0 Foundation Mathematical Structures UFMFDG-15-0 Foundation Statistics UFMFGG-15-0 Foundation Mathematical Investigations UFMFHG-15-0 Foundation Group Project	**Optional Modules** None	**Interim Awards** 120 credits at Level 0 Successful completion of all level 0 modules required to permit progression to level 1.
	Year 2 (level 1)	**Compulsory Modules** UFMFL3-30-1 Sets, Functions and Linear Algebra UFMFK3-30-1 Calculus and Numerical Methods UFMFPA-30-1 Statistical Reasoning UFMFM3-30-1 Modelling and Optimisation	**Optional Modules** None	**Interim Awards** **Certificate of Higher Education Mathematics** Credit Requirements: 240 credits At least 100 credits at level 1 or above. 120 credits at level 0
		Level 2 BSc (Hons) Mathematics International Variant – Mathematical Sciences and Statistical Sciences and Operations Research undergraduate programmes, College of Humanities and Sciences. Virginia Commonwealth University **NOTE: STUDENTS MUST TAKE A TOTAL OF 8 (US three credit – Level 300-500) MODULES** In accordance with UWE Academic Regulations and Procedures, the modules studied at VCU will be recognised by UWE as contributing to the credit requirements of the award as accredited learning (AL), subject to the student achieving a pass in each of the VCU modules. No marks will be transferred from VCU to UWE. The assessment outcomes against the equivalent UWE modules will be pass or fail only. VCU has suspended outward mobility to Virginia Commonwealth University from 2018/19.		

Year 2 (level 1) – VCU	**Compulsory modules** **Students must take all of the following modules** • **MATH307 Multivariate Calculus** • **MATH432 Ordinary Differential Equations** • **MATH433 Partial Differential Equations** • **STAT310 Introduction to Statistical Inference** • **STAT544 Statistical Methods II**	**Optional modules** **Students must take three modules from the following modules**: • **MATH415 Numerical Methods** • **OPER427 Deterministic Operations Research** • **MATH380 Introduction to Mathematical Biology** • **MATH401 Introduction to Abstract Algebra** • **MATH350 Introductory Combinatorics** • **MATH351 Applied Abstract Algebra** • **MATH191 Topics in Mathematics**	**Interim Awards:** • Credit requirements: 240 (EQUIVALENT) – Diploma in Higher Education Other requirements None
Year 3 (level 2)	**Compulsory Modules** UFMFF9-30-2 Mathematical Methods UFMFNA-30-2 Statistical Modelling UFMFC7-30-2 Algebra, Combinatorics and Graphs	**Optional Modules** *Select 30 credits from* UFMFG9-15-2 Mathematical Statistics UFMFT7-15-2 Complex Variables UFMF7A-15-2 Operational Research UFMFQ7-15-2 Coding Theory and Applications UTLGSW-15-2 Mathematics Education UFMFSK-30-2 Reflection on Practice in Secondary Education (only available for students transferring from the Maths with QTS programme)	**Interim Awards** **Diploma of Higher Education Mathematics** Credit requirements: 360 credits At least 100 credits at level 2 or above. At least 120 credits at level 1 or above. 120 credits at level 0. .
<u>Year Out:</u> Students on the sandwich complete a minimum of 40 weeks working for an organisation, in a role where mathematical and statistical methods are used in the workplace. <u>Placement Option:</u> **Industrial Placement** UFMF89-15-3			

	Year 4 (level 3)	**Compulsory Modules** ***Select one of the following project modules*** UFMFU9-30-3 Mathematics, Statistics and Operational Research Project A UFMFV9-15-3 Mathematics, Statistics and Operational Research Project B UFMFH9-30-3 Mathematics Education Project	**Optional Modules** ***Select at most 105 credits from Mathematics Options*** UFMFUG-15-3 Financial Mathematics UFMFVG-15-3 Fluid Dynamics UFMFWG-15-3 Applied Algebra and Geometry UFMFK8-30-3 Dynamical Systems UFMFX9-30-3 Numerical Analysis UFMFY7-30-3 Decision Modelling ***Select at most 30 credits from: Statistics Options.*** UFMFK7-30-3 Applied Statistical Research Methods UFMFW9-30-3 Multivariate Statistical Modelling	**Interim Awards** **BSc Mathematics** Credit requirements: 420 credits At least 60 credits at level 3 or above. At least 100 credits at level 2 or above. At least 140 credits at level 1 or above. 120 credits at level 0 **Highest Award** **BSc (Hons) Mathematics** Credit requirements: 480 credits At least 100 credits at level 3 or above. At least 100 credits at level 2 or above. At least 140 credits at level 1 or above. 120 credits at level 0.

GRADUATION

Part 7: Entry Requirements
The University's Standard Entry Requirements apply*: However, an applicant to this programme will typically have an A-level in mathematics at grade A or at grade B. Applicants without A-level mathematics at the appropriate grade, a successful completion of the foundation year programme or an equivalent qualification, will be considered on a case-by-case basis.

Part 7: Entry Requirements
Tariff points as appropriate for the year of entry and up to date requirements are available through the courses database.

Part 8: Reference Points and Benchmarks
Description of ***how*** the following reference points and benchmarks have been used in the design of the programme: This programme has been prepared with reference to a number of external benchmarks, including the QAA Subject Benchmark Statements for Mathematics, Statistics and Operational Research, the QAA Framework for HE Qualifications and the University's Learning and Teaching Strategy. The Subject Benchmark Statements for Mathematics, Statistics and Operational Research emphasises the diversity of programmes that are likely to draw upon this benchmark. It notes that some programmes give a broad coverage of a wide area of topics that fall within the scope of mathematical and statistical subjects, while others develop particular subject areas in depth. http://www.qaa.ac.uk/Publications/InformationAndGuidance/Documents/Maths07.pdf The BSc Mathematics programme provides that broad coverage while allowing specialisation in the later stages of the award. While highlighting certain core topics, such as knowledge of number systems, sets, functions, linear algebra and probability, to be included in any undergraduate mathematics programme, the subject benchmark emphasises the development of logical thinking, proof, problem solving and mathematical modelling as core skills for graduate mathematicians. Reference should be made to the graduate outcomes identified in the QAA-HEA Guidance
What methods have been used in the development of this programme to evaluate and improve the quality and standards of learning? This could include consideration of stakeholder feedback from, for example current students, graduates and employers. The design and content of programme has been informed by employer input through our student placements, by employer participation at our graduate development and outreach events and by our research and consultancy activities. The aim of our programme is to produce graduates that are ready to gain graduate level outcomes on completion of the programme. Student input into the design of the programme is through statutory staff-student meetings, module evaluations, ongoing dialogue with placement students and participation in Periodic Curriculum Review (November 2014).

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First Approval Date	June 2015			
Revision Approval Date	16 November 2016	Version	2	Link to RIA (new education module)
	31 January 2017		3	Link to RIA (compulsory project modules)
	10 November 2017		4	Link to RIA (ID 4550)
	16 Jan 2018		5	Link to RIA (ID 4231)
	2 July 2019		6	Link to RIA (ID 5243)