The University Of Sheffield.

Programme Specification

A statement of the knowledge, understanding and skills that underpin a taught programme of study leading to an award from The University of Sheffield

Programme Details

1. Programme title	Mathematics and Statistics
2. Programme code	MASU38 (BSc), MASU39 (MMath)
3. QAA FHEQ level	Honours (BSc), Masters (MMath)
4. Faculty	Science
5. Department	School of Mathematics and Statistics (SoMaS)
6. Other departments providing credit bearing modules for the programme	Not applicable
7. Accrediting Professional or Statutory Body	Royal Statistical Society
8. Date of production/revision	January 2015, March 2016, July 2020, September 2021, September 2022

Awards	Type of award	Duration
9. Final award	Master of Mathematics with Honours (MMath Hons) (MASU39)	4 years
10. Intermediate awards	Bachelor of Science with Honours (BSc Hons) (MASU38)	3 years

Programme Codes

11. JACS code(s) *Select between one and three codes from the HESA website.*	G350		
12. HECoS code(s) *Select between one and three codes from the HECoS vocabulary.*	100403	100406	

Programme Delivery

13. Mode of study	Full-time
14. Mode of delivery	Full-time

15. Background to the programme and subject area

Mathematics involves the study of intangible objects (such as numbers, functions, equations and spaces) which necessarily arise in our attempts to describe and analyse the world about us. It is a fascinating subject of great beauty and power. Its abstraction and universality lie behind its huge range of applications, to physical and biological sciences, engineering, finance, economics, secure internet transactions, reliable data transmission, medical imaging and pharmaceutical trials, to name a few. Mathematicians were responsible for the invention of modern computers, which in turn have had a great impact on mathematics and its applications.

Statistics, a discipline within mathematics, is the science of quantitative reasoning from data. We use Statistics to help make decisions and draw conclusions in the presence of uncertainty, when the available numerical data is 'incomplete' and cannot give us a definitive answer. Great Britain has long been recognized as having an especially admirable statistical tradition, in which empirical and theoretical work continually meet and strengthen each other. The Probability and Statistics groups in the School of Mathematics and Statistics (SoMaS) are firmly in this tradition, both in their teaching and in their research.

Teaching in the School of Mathematics and Statistics (SoMaS) is shared between specialist staff in the areas of Pure Mathematics, Applied Mathematics, and Probability and Statistics. Pure mathematics is a subject rich in patterns and one in which the development of a theory may begin with identification of behaviour common to various simple situations and proceed, through precise analysis, to the point where rigorous general results are obtained. Solutions of particular problems may involve standard analytical techniques, for example from calculus, or the application of an abstract general theory to a particular concrete example. In applied mathematics and in probability and statistics, a common approach to practical problems, from a wide variety of contexts, is to first model or interpret them mathematically and then apply mathematical or statistical methods to find a solution. In all three subjects it is vital that work should be presented in a clear, precise and logical way so that it can be understood by others. For these reasons, graduates from programmes involving mathematics are highly regarded, by a wide range of employers, for their analytical, problem-solving and communication skills as much as for their knowledge of mathematics. Statisticians are recruited by governments and many industries, to help them analyse and understand their data.

The programmes in Sheffield are intended to give students a broad knowledge and understanding of both Pure and Applied mathematics, together with a more specialist knowledge of Statistics and Probability, suitable for either a career in Statistics, or further postgraduate study.

Staff in all three areas have international reputations in research, with 96% of research activities being rated as world leading or internationally excellent in the 2021 Research Excellence Framework exercise. Many modules are taught by leading experts in the area in which the module is based. In Pure Mathematics there are particular research strengths in topology, algebra and algebraic geometry, and number theory, and there are modules available in all these areas. The main strengths within Probability and Statistics are in Bayesian statistics, statistical modelling and probability and, again, all these are prominent in the undergraduate curriculum. Applied Mathematics research is strong not only in traditional areas of the subject, such as fluid mechanics, but in interdisciplinary areas such as solar physics, particle astrophysics, environmental dynamics and mathematical biology. The School was instrumental, with other departments in the University, in setting up the Sheffield-based NERC Earth Observation Centre of Excellence for Terrestrial Carbon Dynamics.

Further information is available from the school web site: http://www.shef.ac.uk/maths

16. Programme aims

MMath Mathematics and Statistics aims to:	
A1	provide degree programmes with internal choice to accommodate the diversity of students' interests and abilities;
A2	provide an intellectual environment conducive to learning;
A3	prepare students for careers which use their mathematical and/or statistical training;
A4	provide teaching which is informed and inspired by the research and scholarship of the staff;
A5	provide students with assessments of their achievements over a range of mathematical and statistical skills, and to identify and support academic excellence;
A6	prepare students for progression to a research degree in Statistics or Probability or for careers in which the use of mathematics is central (MMath only).

17. Programme learning outcomes

Knowledge and understanding On successful completion of the programme, students will be able to demonstrate knowledge and understanding of:		
		Links to Aim(s)
K1	the methods of linear mathematics and advanced calculus;	2-6
K2	key fundamental concepts in each of Pure Mathematics, Applied Mathematics and Probability & Statistics, including some more specialist mathematical or statistical topics;	1-5
K3	enhanced specialist knowledge in Probability & Statistics (MMath only).	4, 6
Skills and other attributes On successful completion of the programme, students will be able to:		
S1	demonstrate skill in calculation and manipulation;	1-3, 5, 6
S2	understand and evaluate logical arguments, identifying the assumptions and conclusions made, and develop their own arguments;	1-3, 5, 6
S3	demonstrate the skills to model and analyse statistical problems, including the use of computer packages;	1-3, 5
S4	present arguments and conclusions effectively and accurately;	2, 3, 5
S5	appreciate the development of a general theory and its application to specific instances;	1-4
S6	acquire further necessary mathematical and statistical skills, if appropriate, to consider careers as practising mathematicians or statisticians;	1-5
S7	demonstrate the ability to complete an extended individual study of a statistical topic and to present an account of that topic (MMath).	4, 6

18. Learning and teaching methods

Lectures
A 10-credit lecture SoMaS module (or half-module) at Level 1 or 2 generally comprises 22 lectures supported by a weekly or fortnightly problems class. At Level 3, a typical 10-credit module has around 20 lectures, while at Level 4, modules are typically 15 or 30 credits, with 15 credits equivalent to 20 lectures with additional independent study. The lecturing methods used vary. Effective use is made of IT facilities, for example through computer demonstrations using data projectors. Students also learn mathematical techniques and theories through seeing problems being solved and results proved in lectures. Theory is developed and presented in a clear and logical way and is enhanced by the use of illustrative examples. In many modules, supporting written material is circulated. Some Level 3 and 4 modules include an element of project work for which guidance is provided in lectures.

Problems classes
At Levels 1 and 2, lecture groups are divided into smaller groups for problems classes lasting fifty minutes. Ample opportunity is provided for students to obtain individual help. Coursework, usually in the form of sets of problems, is regularly set and marked and feedback is given. This is usually administered through the problems classes. For the 40-credit "core'' module at Level 1, students meet weekly in small groups with their personal tutor, and may be required to present their solutions and participate in group discussions. Setting of coursework continues into Levels 3 and 4, together with the associated feedback, but, due to the expected increasing maturity of students, the formal mechanism provided by problems classes is replaced by informal contact with the module lecturer.

Project work
At Level 4 all students are required to take the project module. As part of this, they are given training in presentational skills, including the use of mathematical typesetting packages. The remaining part consists of a single substantial project.

Computing and Practical Sessions
There are optional modules at all levels in which students use the software package Python and typeset reports using LaTeX. Those taking Probability and Statistics are trained in the use of R.

19. Assessment and feedback methods

Most SoMaS modules are assessed by formal examinations, augmented in some cases by a component of assessed coursework; several modules include an element of the latter. The most common format involves the regular setting of assignments, each consisting of a number of problems based on material recently covered in lectures. Some Level 3 and Level 4 modules include a project and/or poster presentation. Examinations are normally of 1.5, 2 or 2.5 hours' duration. Where a module is assessed by both examinations and coursework, the latter typically contributes between 10% and 30% of the final mark.

The learning outcomes are assessed, primarily through examinations, in appropriate core modules and in the approved modules. As students progress through the programmes, less explicit guidance on selection of techniques is given and, in examinations and other assessment, more is expected in terms of formulation of problems and in solving problems requiring several techniques or ideas. Aspects of the use of computer packages are assessed by coursework in the appropriate modules.

The additional programme aim and attribute for the programme MASU39 is assessed in Level 4 examinations, and the project is assessed through a submitted project, examined by at least two members of staff and subject to moderation.

20. Programme structure and student development

The teaching year is divided into two semesters each of fifteen weeks, the final three weeks of each being devoted to examinations. The programmes are fully modular, being delivered at Levels 1-3 mainly in 10-credit modules, taught and examined during a single semester, and in 20-credit modules, often examined at the end of the year. Each year of study represents 120 credits.

The BSc degree has an identical curriculum to the first three years of the MMath. At Level 1 students

take one core 40-credit module. The material in this module is mostly pure mathematical, although the choice of topics is influenced by the potential for application. In addition, they take one 20-credit module in each of Pure Mathematics, Applied Mathematics and Probability & Statistics. Finally, the School offers a 20-credit module covering mathematical investigation skills. At Level 2, students take a core 30-credit SoMaS module, in linear mathematics and advanced calculus, and a further 90 credits chosen from modules in Pure Mathematics, Applied Mathematics and Probability & Statistics, including a module building on the computational skills developed in the optional Level 1 module.

The modules offered at Levels 3 and 4 are in specialist topics and the only core module at Level 4 is the project module, in which students must write a substantial dissertation, which must be in the area of Statistics or Probability, and there are further compulsory credits in Statistics at Levels 3 and 4. The Level 3 and Level 4 modules are consistent with the guidelines in the Council for the Mathematical Sciences briefing document and the European Mathematical Society document, as well as the QAA Framework documents.

Students can register for either the MMath or the BSc programme. At the end of their second year, students choose between the three year BSc programme and four year MMath programme. Students averaging less than 59.5% in their Level 2 assessment are required to transfer to the BSc. Masters graduates do not also obtain a BSc but an MMath candidate failing to achieve 2.2 standard or higher may be awarded a BSc.

Classification of the final degree is subject to the University of Sheffield General Regulations. Level 1 serves as a qualifying year and does not contribute to degree classification. The weighting for Levels 2 and 3 of the BSc is 1:2; for Levels 2, 3 and 4 of the MMath it is 1:2:2.

The subject is essentially linear with key skills and core knowledge taught at Level 1 or Level 2 required at subsequent levels.

Level 1 consolidates key technical skills for use throughout the programmes. Ideas of proof and abstraction, illustrated by concrete examples, are introduced in the Pure Mathematics modules and modelling and applications are developed in Applied Mathematics and Probability & Statistics. Training in appropriate computer packages is given where appropriate.

Level 2 introduces more advanced technical methods, in particular those of linear mathematics and advanced calculus. The Pure Mathematics modules put some topics introduced at Level 1 on a sounder theoretical basis than before or treat them at a more sophisticated level of abstraction. There is further development of theory and applications in Applied Mathematics, including differential equations, and Probability & Statistics, including statistical inference.

Modules at **Level 3** and **Level 4** offer a range of specialist options consistent with the principles outlined in reference points (1), (3) and (4). Some of these build on knowledge acquired in earlier years and others, though requiring skills already acquired and the corresponding degree of mathematical maturity, introduce topics that are essentially developed from scratch.

Detailed information about the structure of programmes, regulations concerning assessment and progression and descriptions of individual modules are published in the University Calendar available online at http://www.sheffield.ac.uk/calendar/.

21. Criteria for admission to the programme

Detailed information regarding admission to programmes is available from the University's On-Line Prospectus at http://www.shef.ac.uk/courses/.

22. Reference points

The learning outcomes have been developed to reflect the following points of reference:

Subject Benchmark Statements
https://www.qaa.ac.uk/quality-code/subject-benchmark-statements

Framework for Higher Education Qualifications (2014)
https://www.qaa.ac.uk/docs/qaa/quality-code/qualifications-frameworks.pdf

University Strategic Plan
http://www.sheffield.ac.uk/strategicplan

Learning and Teaching Strategy (2016-21)
https://www.sheffield.ac.uk/polopoly_fs/1.661828!/file/FinalStrategy.pdf

23. Additional information

SoMaS has an active Staff-Student Forum and there is a lively Student Maths Society.

Personal Tutorials
The School of Mathematics and Statistics runs a personal tutorial system. All students are allocated a personal tutor from the School at the outset of their University career. It is hoped that the association will remain during the whole of each student's course. However, a system is in place to allow a student to transfer to another tutor if they wish. Personal tutors provide personal support and academic guidance, acting as a point of contact and gateway for University support services, such as Careers and the Counselling Service.

Students are expected to see their tutor at scheduled sessions, the frequency of which is highest at Level 1, and may contact their tutor at other times.

Many other staff members also have particular responsibility for student support, in particular the Senior Tutor. The web page for SoMaS is at http://www.shef.ac.uk/maths

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This specification represents a concise statement about the main features of the programme and should be considered alongside other sources of information provided by the teaching department(s) and the University. In addition to programme specific information, further information about studying at The University of Sheffield can be accessed via our Student Services web site at http://www.shef.ac.uk/ssid.