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 with German Language
2. Programme code	MASU14 (MMath), MASU20 (BSc)
3. QAA FHEQ level	Masters (MMath), Honours (BSc)
4. Faculty	Science
5. Department	School of Mathematics and Statistics (SoMaS)
6. Other departments providing credit bearing modules for the programme	None
7. Accrediting Professional or Statutory Body	Not applicable
8. Date of production/revision	January 2008, January 2009, March 2012, February 2014, March 2016, September 2021, September 2022

Awards	Type of award	Duration
9. Final award	Master of Mathematics with Honours (MMath Hons) (MASU14)	4 years
10. Intermediate awards	Bachelor of Mathematics with Honours (BSc Hons) (MASU20)	4 years

Programme Codes

11. JACS code(s) *Select between one and three codes from the HESA website.*	G100		
12. HECoS code(s) *Select between one and three codes from the HECoS vocabulary.*	100403		

Programme Delivery

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

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.

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.

This programme offers the opportunity to spend the third year studying mathematics at a University in France. Several universities offer such opportunities but the Sheffield programme is distinctive for the amount and quality of the language teaching provided by the Modern Languages Teaching Centre. We believe that this is reflected in the quality of the graduates from the programmes. In their first two years, students normally spend a third of their time on language studies and the rest on mathematics. The primary factor in determining whether a student takes the BSc or the MMath is their Level 2 examination result, but a student who qualifies for MMath has a choice between the specialist MMath programme, including a substantial project, and the broader BSc programme, augmenting the courses taken abroad. On both programmes the third year is spent in Germany. Students are required to spend part of their fourth year studying their chosen language.

The single honours programmes in Sheffield have a common SoMaS core, of 40 credits at Level 1 and 30 at Level 2, together with substantial components from each of the three areas, with a wide choice of modules at each of Levels 3 and 4. Students on these programmes take 40 language credits at Level 1. Students study two of the three Mathematical disciplines. Of these Pure Mathematics and Probability & Statistics are easiest to accommodate, with 20 credits of each at Level 1, whereas Applied Mathematics will only be available to students with a strong background in either language or mechanics.

Some SoMaS modules concentrate on applicability while others are more theoretical. Some deal with contemporary developments, such as error-correcting codes and financial mathematics, and others treat long-established topics of continuing importance. Several put the subject in its historical perspective. All are informed by the research interests and scholarship of the staff.

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. Several members of the School belong to the Sheffield Centre for Bayesian Statistics in Health Economics. 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, 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

BSc Mathematics with German Language 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	Provide a degree programme in which students may choose either to specialise in one mathematical discipline (Pure Mathematics, Applied Mathematics, Probability and Statistics) or to choose a more balanced programme incorporating two of these disciplines.
A7	Provide language instruction in order to study mathematics and statistics abroad, and to give students the opportunity to acquire all-round fluency in the language.

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.	2,4
K2	Key fundamental concepts in at least two of Pure Mathematics, Applied Mathematics and Probability & Statistics, including some more specialist mathematical or statistical topics.	1-6
K3	Enhanced specialist knowledge in at least one of the three disciplines Pure Mathematics, Applied Mathematics, Probability & Statistics.	1-6
K4	Mathematical or statistical teaching in their chosen language.	7

Skills and other attributes On successful completion of the programme, students will be able to:		
S1	Demonstrate skill in calculation and manipulation.	1-6
S2	Understand and evaluate logical arguments, identifying the assumptions and conclusions made, and develop their own arguments.	1-6
S3	Demonstrate the skills to model and analyse physical or practical problems, including the use of computer packages.	1-6
S4	Present arguments and conclusions effectively and accurately.	1-6
S5	Appreciate the development of a general theory and its application to specific instances.	1-6
S6	Acquire further necessary mathematical skills, if appropriate, to consider careers as practising mathematicians or statisticians.	1-6
S7	Demonstrate the ability to complete an extended individual study of a mathematical or statistical topic and to present an account of that topic.	1-6
S8	Demonstrate a fluent command of their chosen language in both professional and social contexts, presenting arguments and conclusions effectively and accurately, in their chosen language as well as in English.	7

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. 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.

Language Teaching

Language skills are taught using seminars supplemented by more informal group and pair work. Students may enrol to use the MLT Centre's up-to-date Self-Access Centre, comprising a 27 position Computer-Aided Language Learning (CALL) laboratory, an Audio Visual room, with access to European television channels, and an extensive library of print material, audio and video cassettes.

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 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.

Each student is required to submit a report on the year abroad to the Year Abroad tutor. This should include a record of courses taken, examination papers, a sample of coursework, their assessment record and a discussion of their experiences as a student abroad. The tutor recommends a mark for the year abroad to the Director of Teaching and the agreed mark is presented to external examiners and the final SoMaS Examination Board. If, due to practice at the host university, there is insufficient information available on the assessment of the student's work in the year abroad, the tutor may recommend that the year abroad mark should be replaced by a weighted average of the student's marks in Years 2 and 4. The year abroad mark accounts for 100, 110, or 120 credits and is augmented by the grades awarded on any MLTC Year Abroad modules taken in the third year. Language modules are assessed by methods including tests, records of independent study and for MLTC Year Abroad modules at Level 3, a year abroad diary, a project and a presentation in the target language on return to the UK.

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 and 2 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.

On these dual programmes, students must take credits in the appropriate language. On all these programmes the third year is spent at the European University.

At Level 1 students take one core 40-credit module. The material in this module comprises mathematical methods: the choice of topics is influenced by the potential for application. Depending on their background in language and mechanics, students take a further 40 credits of Mathematics consisting of two of the following: 20 credits of Pure Mathematics, 20 credits of Applied Mathematics, 20 credits of Probability & Statistics. In addition, they take 40 credits in their target language. At Level 2, students usually take 30 SoMaS core credits, a further 50 mathematics credits, and 40 credits of language. The third year is spent at the European host university and should include a component of language, provided either by the host or by the Modern Language Teaching Centre's

Study Abroad modules. In the fourth year, the student returns to Sheffield and takes modules at Level 4 (for MASU14) or Level 3 (for MASU20). Level 3 modules are also typically 10 credits, whereas Level 4 modules are in 15-credit chunks. For MASU20, students take 40 credits of their chosen language, as well as 80 credits of mathematics modules in their final year. Students on MASU14 will take 30 credits of language in their final year, along with a substantial project module, worth 45 credits, and a further 45 credits of mathematics. The SoMaS modules offered at Level 4 are in specialist topics and there are no lecture-based core modules. The Level 4 SoMaS modules are consistent with the guidelines in the Council for the Mathematical Sciences briefing document and the European Mathematical Society document guidance.

At the end of their second year, students choose between the BSc programme and the MMath programme, the essential difference being the level of courses in the final year. Students averaging less than 59.5% on the mathematics modules in their Level 1 or Level 2 assessment are required to transfer to the BSc. Students on MASU14 who fail to achieve an average of 59.5% or above at Level 1 or Level 2 will also normally be required to transfer to the corresponding BSc programme (MASU20). It is possible for a student who is qualified for the MMath to transfer to the BSc. For example, a student whose host university has a less significant provision than Sheffield in one of the three disciplines could choose between a broad BSc programme including that discipline or a more specialised MMath programme. Students averaging less than 55% on the language modules at Level 1 or Level 2 will be required to transfer to the MMath (MASU02) or BSc Mathematics (MASU01) programme. Masters graduates do not also obtain a BSc but an MMath candidate failing to achieve II(ii) 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 Level 2, the year abroad and Level 4 on the MMath is 1:1:2; for the BSc it is 1:0:2, but students are required to pass their year abroad.

Mathematics is essentially a linear subject with key skills and core knowledge taught at Level 1 or Level 2 often 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 applications are developed in Applied Mathematics and Probability & Statistics.

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 treats 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 modelling.

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. Several of those offered at Level 4 have Level 3 prerequisites and the selection of such modules by an MMath student is monitored to ensure that the student has acquired appropriate background knowledge during their year abroad.

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

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.

In addition to the pastoral support of their SoMaS personal tutor, students on this programme have the support of the SoMaS Year Abroad Tutor who provides specialist support arising from the nature of this programme. The Senior Tutor is responsible for all day-to-day issues for individual students, liaising with the Year Abroad Tutor for students on this programme.

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

The web page for SoMaS is at http://www.shef.ac.uk/maths

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.