Programme Specification (PG)

Awarding body / institution:	Queen Mary University of London
Teaching institution:	Queen Mary University of London
Name of final award and programme title:	MSc Mathematics
Name of interim award(s):	PG Cert in Mathematics and PG Dip in Mathematics
Duration of study / period of registration:	1 year [full-time], 2 years [part-time]
Queen Mary programme code(s):	PMSF-QMMATH1 PSMAS / G1S1 [full-time], PMSP-QMMATH1 PSMAS / ⊞
QAA Benchmark Group:	Mathematics, Statistics and Operational Research
FHEQ Level of Award:	Level 7
Programme accredited by:	N/A
Date Programme Specification approved:	TBC
Responsible School / Institute:	School of Mathematical Sciences

Schools / Institutes which will also be involved in teaching part of the programme:

N/A

Collaborative institution(s) / organisation(s) involved in delivering the programme:

N/A

Programme outline

The MSc in Mathematics gives an in-depth training in advanced mathematics or advanced mathematics and statistics to students who have already done very well in a first degree with high mathematical content. Students successfully completing the MSc will acquire specialist knowledge in chosen areas of mathematics and statistics, and will complete a dissertation demonstrating their ability to work largely independently in an advanced topic in mathematics or statistics.

The MSc programme, which starts in late September, is offered full-time over one year or part-time over two.

The taught modules offered reflect the research strengths of the School of Mathematical Sciences, and are concentrated in pure mathematics (especially algebra and combinatorics), probability and statistics, dynamical systems, and networks. Students can study mostly pure mathematics, mostly applied mathematics (including, if desired, some astronomy and relativity), or mathematics with statistics.

Aims of the programme

The aim of the MSc is to offer a comprehensive range of advanced mathematical and statistical study options which will explore concepts at higher level, building upon a strong mathematics undergraduate degree. The programme aims to address both

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fundamental principles and advanced techniques in mathematics and to provide students with directly applicable knowledge and skills.

The programme is aimed at preparing students for doctoral study or specialist employment, and offers modules in advanced mathematics and statistics as well as a project dissertation component.

What will you be expected to achieve?

Students who successfully complete this programme will;

Academic Content:	
A 1	The structure of the principal types of financial instruments, and the markets in which they are traded.
A 2	Mathematical models for the behaviour of asset prices, such as geometric Brownian motion and stochastic volatility.
A 3	Techniques for calculating the prices of derivative securities using the principle of no-arbitrage.
A 4	Programming in C++ to an intermediate/advanced level, with a range of finance-related applications including binomial trees, Monte Carlo, and finite difference methods.
A 5	Calibrating models to market data.
A 6	Using statistical tools to analyse historical time series data of the prices of assets such as shares, currencies and commodities.
A 7	Determine the optimal composition of investment portfolios by maximising expected future utility and other methods.

Disciplinary Skills - able to:	
B 1	Understand the practical uses of various financial instruments and their risk/return characteristics.
B 2	Evaluate the strengths and weaknesses of various financial pricing models, and choose a suitable model for a given problem.
B 3	Select the optimal numerical method for pricing a complex derivative security, and implement this as a computer program.
B 4	Extract and assimilate key concepts from published academic research papers in financial mathematics.
B 5	Work independently to undertake research on a topic of interest, at an appropriate level.

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B 6	Write a detailed report on work undertaken.

Attributes:	
C 1	Gain a wide and deep understanding of the importance of the financial markets in the wider economy.
C 2	Appreciate how erroneous assumptions in mathematical modelling may have significant negative consequences.
C 3	Understand the importance of information technology in the finance sector and beyond.
C 4	Be familiar with the latest developments in financial mathematics and information technology, as appropriate.

How will you learn?

Teaching in most modules is primarily by formal lectures but may include guided reading of text books or web notes. Teaching of reading and project modules is primarily by guided reading of text books or web notes and weekly supervisions respectively. Learning in most modules is by attending lectures and tutorials, reading lecture notes and recommended text books or web notes, attempting exercises and asking questions of staff.

How will you be assessed?

The assessment of taught modules is normally by 100% examination, 100% coursework, or a combination of examination and coursework, except that the compulsory module Research Methods in Mathematical Sciences (MTH700P) is assessed through coursework (80%) and a presentation (20%).

The project module (MTHM038) is assessed by written dissertation, in line with the regulations for projects/dissertations at Masters level.

How is the programme structured?

Please specify the structure of the programme diets for all variants of the programme (e.g. full-time, part-time - if applicable). The description should be sufficiently detailed to fully define the structure of the diet.

The programme consists of one compulsory module and eight elective modules as outlined in the module table below. Students will also complete a core 60-credit project dissertation module (MTHM038).

Full-time students are expected to complete eight taught modules and the project dissertation in one academic year. Part-time students are expected to complete the programme in two academic years, spreading their studies evenly to complete four taught modules in their first year of study, four taught modules in the second year of study and work on the project dissertation across the two academic years. Part time students will complete the compulsory module MTH700P Research Methods in

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Mathematical Sciences in the first year of study.

Students choose their elective modules according to their academic background and interests, in consultation with the Programme Director and other staff as needed.

In addition to the level-7 elective modules in mathematics and statistics outlined below, in consultation with the Programme Director, students can also choose:
- a maximum of two approved level-6 undergraduate modules taught within SMS;
- a maximum of two approved modules from the MSc Astrophysics, taught within SPA;
- a maximum of two approved intercollegiate modules.

Semester A

One compulsory module
MTH700P [7]Research Methods in Mathematical Sciences

Choose three from
MTH786P [7] Machine Learning with Python
MTH712P [7] Topics in Probability and Stochastic Processes
MTH739P [7] Topics in Scientific Computing
MTH744P [7] Dynamical Systems
Level 6 MTH modules, modules from other Schools, and intercollegiate modules as described below.

Semester B

Choose four from
MTH793P [7] Advanced Machine Learning
MTH750P [7] Graphs and Networks
MTH776P [7] Bayesian Statistics
MTH791P [7] Computational Statistics with R
MTH743P [7] Complex Systems
MTH745P [7] Further Topics in Algebra
Level 6 MTH modules, modules from other Schools, and intercollegiate modules as described below.

Semester C
MTHM038 [7] Dissertation

With the permission of the Programme Director, students may also choose:
- a maximum of two approved level-6 undergraduate modules taught within SMS;
- a maximum of two approved modules offered by another School;
- a maximum of two approved intercollegiate modules.

Modules from other Schools or Colleges will normally only be approved where they are Level 7, have substantial mathematical content and do not overlap with modules offered by SMS.

Academic Year of Study

Module Title	Module Code	Credits	Level	Module Selection Status	Academic Year of Study	Semester

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Module Title	Module Code	Credits	Level	Module Selection Status	Academic Year of Study	Semester
Research Methods in Mathematical Sciences	MTH700P	0	7	Compulsory	1	Semester 1
Machine Learning with Python	MTH786P	15	7	Elective	1	Semester 1
Topics in Probability and Stochastic Processes	MTH712P	15	7	Elective	1	Semester 1
Topics in Scientific Computing	MTH739P	15	7	Elective	1	Semester 1
Dynamical Systems	MTH744P	15	7	Elective	1	Semester 1
Advanced Machine Learning	MTH793P	15	7	Elective	1	Semester 2
Graphs and Networks	MTH750P	15	7	Elective	1	Semester 2
Bayesian Statistics	MTH776P	15	7	Elective	1	Semester 2
Computational Statistics with R	MTH791P	15	7	Elective	1	Semester 2
Complex Systems	MTH743P	15	7	Elective	1	Semester 2
Further Topics in Algebra	MTH745P	15	7	Elective	1	Semester 2
Dissertation	MTHM038	60	7	Compulsory	1	Semester 3

What are the entry requirements?

The normal entry requirement for the MSc in Mathematics is the equivalent of a British first or good upper-second class honours degree in mathematics, or in mathematics with another subject, such as statistics, philosophy, physics or computing. In addition, the undergraduate modules the applicant has taken must provide sufficient background to enable them to take an appropriate selection of our MSc modules.

How will the quality of the programme be managed and enhanced? How do we listen to and act on your feedback?

Student-Staff Liaison Committees provide a formal means of communication and discussion between Schools and their students. Each committee consists of student representatives from each year in the School/Institute together with appropriate representation from staff within the School/Institute. It is designed to respond to the needs of students, as well as act as a forum for discussing programme and module developments. Staff-Student Liaison Committees meet regularly throughout the year.

Each School operates a Learning and Teaching Committee, or equivalent, which advises the School/Institute Director of Taught Programmes on all matters relating to the delivery of taught programmes at School-level including monitoring the application of

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relevant QM policies and reviewing all proposals for module and programme approval and amendment before submission to Taught Programmes Board. Student views are incorporated in this Committee's work in a number of ways, such as through student membership, or consideration of student surveys.

All Schools operate an Annual Programme Review of their taught undergraduate and postgraduate provision. The process is normally organised at a School-level basis with the Head of School, or equivalent, responsible for the completion of the School's Annual Programme Reviews. Schools/Institutes are required to produce a separate Annual Programme Review for undergraduate programmes and for postgraduate taught programmes using the relevant Undergraduate or Postgraduate Annual Programme Review pro-forma. Students' views are considered in this process through analysis of the NSS/PTES and module evaluations.

What academic support is available?

All students will be assigned an academic advisor. In addition the students will have the standard induction, advice and supervisory arrangements normally offered to students within SMS.

The School's MSc Student Handbook will be provided (and made accessible at all times) to students, where all the channels of support will be outlined. These include the support channels within the school and also those available at College level.

Programme-specific rules and facts

[Numbering relates to the QMUL Academic Regulations 2021/22.]

6.60 Failure may be condoned in up to 30 (MSc/PgDip) or 15 (PgCert) credits of modules where all of the following conditions are met:
i the module mark for each failed module is 0.0 or higher; and,
ii the mean average mark across all modules, including the failed module(s), is 50.0 or higher; and,
iii a failed module is not designated as 'core' (must be passed outright) in the programme regulations.

6.61 A student may take a maximum 30 credits (MSc or PgDip) or 15 credits (PgCert) of taught modules at level 6, selected from a list approved by the Head of School.

6.62 Exceptionally, and at the discretion of the Subject Examination Board, a student may request an alternative field of study that reflects the content of the taught modules and dissertation/project undertaken. The title will be selected from a list approved by the Programme Director. A student must make their request to the Programme Director, in writing, at the time of entry to the examinations.

How inclusive is the programme for all students, including those with disabilities?

Queen Mary has a central Disability and Dyslexia Service (DDS) that offers support for all students with disabilities, specific learning difficulties and mental health issues. The DDS supports all Queen Mary students: full-time, part-time, undergraduate, postgraduate, UK and international at all campuses and all sites.

Students can access advice, guidance and support in the following areas:
• Finding out if you have a specific learning difficulty like dyslexia
• Applying for funding through the Disabled Students' Allowance (DSA)
• Arranging DSA assessments of need
• Special arrangements in examinations
• Accessing loaned equipment (e.g. digital recorders)
• Specialist one-to-one "study skills" tuition
• Ensuring access to course materials in alternative formats (e.g. Braille)
• Providing educational support workers (e.g. note-takers, readers, library assistants)
• Mentoring support for students with mental health issues and conditions on the autistic spectrum.

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Links with employers, placement opportunities and transferable skills

High-level numeracy is one of the most sought-after skills in the workplace, and many opportunities are open to a mathematical sciences graduate. During this degree programme students learn research methods, how to analyse and solve problems, apply mathematical modelling, communicate their ideas and theories effectively, and work independently and manage their own time. These skills are highly desirable to employers ranging from business and finance to the chemicals and materials industries.

Programme Specification Approval

Person completing Programme Specification:

Dr Mark Walters, DoE

Person responsible for management of programme:

Date Programme Specification produced / amended by School / Institute Learning and Teaching Committee:

05 August 2021

Date Programme Specification approved by Taught Programmes Board:

TBC

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