

PROGRAMME SPECIFICATION

KEY FACTS

Programme name	Mathematics and Finance Mathematics and Finance with Placement
Award	MMath
School	School of Mathematics, Computer Science and Engineering
Department or equivalent	Mathematics
UCAS Code	GN13
Programme code	USMFNM and USMFMY (with placement)
Type of study	Full Time
Total UK credits	480
Total ECTS	240

PROGRAMME SUMMARY

The principal aim of this programme is to introduce you to a variety of different aspects of modern mathematics, finance and economics, with a particular focus on actuarial science. In mathematics you will focus in particular on applied mathematics, although you will also be introduced to several aspects of pure mathematics throughout the degree. In finance and economics you will focus in particular on those aspects relevant to a career in actuarial science. Thus this degree can be regarded as a hybrid between degrees in Mathematical Science and in Actuarial Science. You will receive training in advanced mathematical techniques and develop problem solving and communication skills much valued by employers.

As for the BSc, the first year of the programme is devoted to core material, including basic programming and statistics that is needed by all Mathematics and Finance graduates, together with some basic economics and financial mathematics. On completing Part one *or* the Certificate in Mathematics and Finance you will be able to discuss underlying concepts and principles of mathematics, programming, economics, finance and statistics and to apply these to specific problems. In the second year the proportion of the course that is core decreases, and you can choose from an increasing range of options. On completing Part Two *or* the Diploma in Mathematics and Finance you will be able to build on your previous knowledge and experience from Part I. You will master more advanced mathematical techniques and will be able to apply these to real life problem-solving. The programme then builds on the first two years of the associated BSc, by combining modules from the third year of the BSc with higher-level material so that you will achieve a Master's level in Mathematics and Finance. In the third and fourth years you study selected modules from the BSc degree, together with two special topics and a project each year at Master's level. On completing Parts Three and Four of the MMath you will develop a systematic, critical and detailed understanding of advanced mathematics and finance. You will have access to higher level modules which draw on current mathematics research and will be exposed to new areas of mathematics with applications to finance, biology and physics.

Distinctive features of the programme are the third and fourth year projects, which provide you with the opportunity to write a technical report and give individual

presentations. The summer teaching term in the first two years is also designed around project work and presentation skills.

The programme is undertaken full time, and in all cases entry is by transfer from the associated BSc degree at the end of Part 2. The MMath takes two further years, although it is possible to graduate after one year with a BSc.

Please note that TOEFL is not accepted as evidence of English language ability for students that require a Confirmation of Acceptance for Studies.

Aims

1. To develop in you an in-depth knowledge of mathematics to a high level and a good knowledge of topics in actuarial science.
2. To enable you to appreciate the universal nature of mathematics, a subject with no international boundaries.
3. To develop in you the ability to communicate your knowledge and understanding effectively at a high level.
4. To prepare you to enter postgraduate studies at the masters or doctorate level in mathematics, actuarial science, and other closely related subjects.
5. To provide you with a broad base of knowledge and skills to analyse and solve mathematically based problems showing a level of originality where necessary.
6. To enable you to cast and solve real-world problems in a mathematical framework.
7. To develop in you the ability to work independently with a minimum amount of supervision within a set of agreed guidelines.

WHAT WILL I BE EXPECTED TO ACHIEVE?

On successful completion of this programme, you will be expected to be able to:

Knowledge and understanding:

- demonstrate a detailed knowledge of the major ideas of pure mathematics to an advanced level.
- demonstrate a comprehensive knowledge of mathematical methods and be able to apply these to a range of associated problems.

- demonstrate a detailed knowledge of the major topics of numerical mathematics, applied and applicable mathematics, computational mathematics, statistics and probability.
- demonstrate a comprehensive knowledge of economic theory, both micro and macro.
- demonstrate an understanding and detailed knowledge of a wide range of financial structures, and of the related statistical processes.
- integrate knowledge from various areas and handle complex ideas.

Skills:

- communicate in symbolic and written form and using oral presentations.
- differentiate and integrate a comprehensive range of mathematical functions and carry out basic calculus, applying the same to suitable problems.
- apply core concepts and principles in well-defined contexts, showing judgement in the selection and application of tools and techniques.
- use your knowledge of computing to construct programmes in order to solve mathematical and non-mathematical problems.
- solve and analyse differential equations using standard analytical and numerical methods.
- comprehend problems, formulating them mathematically and obtaining solutions by appropriate methods.
- understand logical arguments, identifying the assumptions and conclusions made.
- manipulate matrices and vectors and be able to analyse problems involving the same using general methods.
- show confidence in calculating and manipulating mathematics within the context of the core modules in mathematics, statistics and computing.
- apply mathematical methods to a variety of problems.
- demonstrate the basic skills in statistics to be able to understand and formulate a data based problem in statistical terms.
- display a qualitative approach to problems encountered in finance and economics.
- discuss problems in economics using the appropriate language and mode of thinking.
- discuss problems in finance using the appropriate language and mode of thinking.
- apply statistical methods to problems in finance.

Values and attitudes:

- demonstrate the value of logical thought with respect to mathematical problems.
- follow, with rigour, an analytical approach towards problems.

This programme has been developed in accordance with the QAA Subject Benchmark for Mathematics, Statistics, and Operational Research.

HOW WILL I LEARN?

Teaching and Learning methods are designed to foster your knowledge of and enthusiasm for the subject and stimulate engagement and participation in the learning process. They encourage learning in depth and encourage you to reflect on and take responsibility for your own learning and to develop your academic self- confidence. In the MMath a greater emphasis is placed on independent learning, with substantial individual projects in Part 3 and Part 4.

The majority of courses are taught using lectures. These are supported through tutorials, laboratories and examples classes where appropriate. Details can be found in the individual module specifications.

Lectures are the principal introduction to new material. They are relatively formal in style and are presented to the whole student group or sometimes to more than one group together. Each lecture is of 50 minutes duration with the timetable based on units of one hour to allow for short breaks. Full, prompt attendance is expected.

For tutorials, groups are much smaller and provide opportunities for you to work on problems and exercises connected with the lecture courses. This also provides an additional opportunity for staff to help you with questions arising from the lectures.

Laboratories provide you with the opportunity to practice computational and programming techniques, and to seek practical help from a tutor.

In addition to the taught elements of the programme, which on average require around 12-15 contact hours per week, there will be the need for private study. This time will be spent working on background reading, revision of notes, work on tutorial problems, coursework and individual or group work on projects including the major projects in Parts 3 and 4.

The academic year consists of two eleven week teaching periods, a three week summer teaching period, and two main examination periods. You are expected to undertake around 30 hours per week of private study spread over a rather longer period than the contact hours, to account for reflective learning weeks, revision and the project work in the summer term. The ratio of private study to contact hours is approximately 4:1. The number of self-directed study hours for each module is specified in the module specification.

All modules are supported by an online learning environment called “Moodle”. Moodle contains information specific to the modules you are studying on your programme and additional modules that provide support for your studies in a variety of ways. Moodle is used by different modules in different ways, but you will generally find module material, such as course schemes, supplementary study material, tutorial sheets etc., which you can download or look at online. Each module also contains a “Grades” application where you can view your coursework marks.

There are also two Moodle modules which are designed to support your studies in a more general way: the “Mathematics Focal Point” which contains information relevant to the administration of the programme and the “SMCSE Placement & Internships Resource Centre”, which helps you find placements and internships. Moodle will also be used to send messages to you.

All students have Personal Tutors. These staff members provide small group tutorials throughout Part 1, and are available to help throughout your time at the University. They provide support for mathematics and other matters, as well as serving as a link with other resources within the University and possibly elsewhere.

WHAT TYPES OF ASSESSMENT AND FEEDBACK CAN I EXPECT?

Assessment and Assessment Criteria

Most modules are assessed with examinations and courseworks. Details can be found in the individual module specifications. Assessment is carried out according to context and purpose and recognises that you may exhibit different aptitudes in different forms of assessment:

- Some assessment is by set exercises or coursework which you take home and complete with the aid of your notes
- There are formal unseen written examinations every year
- Some assessment takes the form of class or online tests
- A small number of modules require students to give presentations
- A core module at Part 3 and at Part 4 consists of a project. Group projects also form the basis of assessment for some electives.

In addition to assessing mathematical knowledge and understanding, the programme also assesses the ability to use mathematical ideas in the context of an application, the ability to carry out a substantial piece of independent work and the ability to communicate effectively.

Assessment Criteria are descriptions, based on the intended learning outcomes, of the skills, knowledge or attitudes that you need to demonstrate in order to complete an assessment successfully, providing a mechanism by which the quality of an assessment

can be measured. Grade-Related Criteria are descriptions of the level of skills, knowledge or attributes that you need to demonstrate in order to achieve a certain grade or mark in an assessment, providing a mechanism by which the quality of an assessment can be measured and placed within the overall set of marks. Assessment Criteria and Grade-Related Criteria will be made available to you to support you in completing assessments. These may be provided in programme handbooks, module specifications, on the virtual learning environment or attached to a specific assessment task.

Feedback on assessment

Feedback will be provided in line with our Assessment and Feedback Policy. In particular, you will normally be provided with feedback within three weeks of the submission deadline or assessment date. This would normally include a provisional grade or mark. For end of module examinations or an equivalent significant task (e.g. an end of module project), feedback will normally be provided within four weeks. The timescale for feedback on final year projects or dissertations may be longer. The full policy can be found at:

https://www.city.ac.uk/_data/assets/pdf_file/0008/68921/assessment_and_feedback_policy.pdf

Feedback will typically consist either of individual comments on your work, or of model solutions with general comments on common errors delivered during a lecture or via Moodle. For examinations, you may be allowed to view your scripts for feedback purposes, in conjunction with your lecturer.

Assessment Regulations

In order to pass your Programme, you should complete successfully or be exempted from the relevant modules and assessments and will therefore acquire the required number of credits. You also need to pass each Part of your Programme in order to progress to the following Part.

Your overall aggregate mark will be calculated by combining the aggregate marks from Parts 1, 2, 3, and 4 in the ratio 1:3:6:6.

The Pass mark for each module is 40% except for level 7 modules (with module codes beginning MAM) where the Pass mark is 50%. In most modules there is also a requirement to pass individual components of the module. The Pass mark for these individual components is the same as the Pass mark for the module. The details of which assessment components need to be passed individually is given in the module specifications.

If you fail an assessment component or a module, the following will apply:

1. Compensation: where you fail up to a total of 20 credits of any Part except the final one at first or resit attempt, you may be allowed compensation if:

- Compensation is permitted for the module involved (see the module specification), and
- It can be demonstrated that you have satisfied all the Learning Outcomes of the modules in the Part, and
- A minimum overall mark of 30% (40% for level 7 modules) has been achieved in the module to be compensated, and
- An aggregate mark of 40% has been achieved for the Part.

If you receive a compensated pass in a module you shall be awarded the credit for that module. The original component marks shall be retained in the record of marks and the greater of the original module mark and the minimum pass mark for the module shall be used for the purpose of calculation towards the Award.

2. Compensation is not allowed at the final Part. As an exception to the standard regulations condonation of failure in modules may be considered by the Assessment Board as follows:

- Modules must have been taken in a single valid attempt, including where resits have taken place; this means that you must have taken all assessments associated with the Part within the normal specified time of that Part.
- Condonation is only permissible for elective modules as set out in the Programme Scheme, thus ensuring that all Programme Route Learning Outcomes have been met.
- Condonation may only be made in one 15 credit module.

If you receive condonation for a Module you will be awarded the credits for that Module, however the actual mark obtained for that module will be used for the purpose of calculation towards the award.

3. Resit: you will normally be offered one resit attempt. However, if you did not participate in the first assessment and have no extenuating circumstances, you may not be offered a resit.

If you are successful in the resit, you shall be awarded the credit for that module. The mark used for the purpose of calculation towards your Award shall be calculated from the original marks for the component(s) that you passed at first attempt and the minimum pass mark for the component(s) for which you took a resit.

If you do not satisfy your resit by the date specified you will not progress to the next Part and the Assessment Board shall require that you withdraw from the Programme.

4. If you fail to meet the requirements for a particular Part, but satisfy the requirements for the previous Part, then a lower qualification may be awarded as per the table below. If you fail to meet the requirements for a particular Part and are not eligible for the award of a lower level qualification, the Assessment Board shall require that you withdraw from the Programme.

If you would like to know more about the way in which assessment works at City, please see the full version of the Assessment Regulations at:

http://www.city.ac.uk/data/assets/word_doc/0003/69249/s19.doc

WHAT AWARD CAN I GET?

Enhanced First Degree with Honours:

Part	HE Level	Credits	Weighting (%)
1	4	120	6
2	5	120	18
3	6	120	38
4	7	120	38

Class	% required
I	70
II upper division	60
II lower division	50
III	40

Bachelor's Degree with Honours:

Part	HE Level	Credits	Weighting (%)
1	4	120	10
2	5	120	30
3	6	120	60

Class	% required
I	70
II upper division	60
II lower division	50
III	40

Ordinary Degree:

Part	HE Level	Credits	Weighting (%)
1	4	120	10
2	5	120	30
3	6	60	60

Class	% required
With Distinction	70
With Merit	60
With Pass	40

Diploma of Higher Education:

Part	HE Level	Credits	Weighting (%)
1	4	120	35
2	5	120	65

Class	% required
With Distinction	70
With Merit	60
With Pass	40

WHAT WILL I STUDY?

Parts 1 and 2

You will not be registered on the MMath degree until Part 3, but will take the first two Parts of the associated BSc degree. Details of the makeup of the first two Parts can be found in the associated programme specification. The marks you obtain on the BSc will count towards Parts 1 and 2 of the MMath degree.

Part 3

Part 3 consists of modules that make up 120 credits. There are three compulsory modules and three elective modules. Two modules must be chosen from the level 7 modules (which have module codes that start with MAM), and one module from the remaining electives.

Not all level 7 modules will be offered each year, and the selection will change each year. Modules are only compensatable if you continue into Part 4.

The module MA2611 is a prerequisite for AS2204.

Module Title	SITS Code	Module Credits	Core/ Elective	Can be compensated?	Level
Mathematical Methods	MA3603	30	C	N	6
Project	MAM698	30	C	N	7
Differential Equations for Finance	MA3607	15	C	N	6
Perturbation Theory	MAM610	15	E	N	7
Nonlinear Integrable Systems	MAM611	15	E	N	7
Evolutionary Game Theory	MAM613	15	E	N	7
Topology	MAM614	15	E	N	7
Geophysical and Astrophysical Fluid Dynamics	MAM615	15	E	N	7
Hilbert Spaces with Application to Optimization	MAM616	15	E	N	7
Stochastic Models	AS2204	15	E	Y	5
Operational Research	AS3021	15	E	Y	6
Investment	AS3301	15	E	Y	6
General Insurance	AS3303	15	E	Y	6
Corporate Finance	EC3010	15	E	Y	6
Introduction to Financial Derivatives	EC3011	15	E	Y	6
Corporate Risk Management	FR2105	15	E	Y	5

Part 4

Part 4 consists of modules that make up 120 credits. There is one compulsory module and 90 credits of elective modules. Two modules must be chosen from the level 7 modules (which have module codes that start with MAM), and 60 credits from the remaining electives, excluding modules already taken in Part 3. Two modules must be chosen from the mathematics electives (which have module codes that start with MA, but excluding MA2620), and 30 credits from the remainder.

Not all level 7 modules will be offered each year, and the selection will change each year, but there will always be at least two Special Topics available which you will not have taken in Part 3. No more than two level 5 modules may be picked in years 3 and 4 in total.

The module MA2611 is a prerequisite for AS2204 and MA2620.

Module Title	SITS Code	Module Credits	Core/ Elective	Can be compensated?	Level
Project - MMath Part 4	MAM692	30	C	N	7
Perturbation Theory	MAM610	15	E	N	7
Nonlinear Integrable Systems	MAM611	15	E	N	7
Evolutionary Game Theory	MAM613	15	E	N	7
Topology	MAM614	15	E	N	7
Geophysical and Astrophysical Fluid Dynamics	MAM615	15	E	N	7
Hilbert Spaces with Application to Optimization	MAM616	15	E	N	7
Stochastic Models	AS2204	15	E	N	5
Operational Research	AS3021	15	E	N	6
Investment	AS3301	15	E	N	6
General Insurance	AS3303	15	E	N	6
Corporate Finance	EC3010	15	E	N	6
Introduction to Financial Derivatives	EC3011	15	E	N	6
Corporate Risk Management	FR2105	15	E	N	5
Probability and Statistics 2	MA2620	30	E	N	5
Discrete Mathematics	MA3604	15	E	N	6
Differential Equations for Finance	MA3607	15	E	N	6
Dynamical Systems	MA3608	15	E	N	6
Fluid Dynamics	MA3609	15	E	N	6
Mathematical Models and Modelling	MA3611	15	E	N	6
Quantum Mechanics	MA3613	15	E	N	6
Mathematical Processes for Finance	MA3614	15	E	N	6
Groups and Symmetry	MA3615	15	E	N	6

Mathematical Biology	MA3616	15	E	N	6
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WHAT KIND OF CAREER MIGHT I GO ON TO?

Mathematics and finance programmes prepare you for future employment by providing you with key skills highly valued by employers. Our graduates are very successful at finding employment in a wide range of areas.

Many of our graduates secure jobs in the financial sector. Some of the typical financial institutions recent graduates have gone on to work for include Lloyds TSB, KPMG, Citigroup, Santander, TBS, Commerzbank, and Natwest. Typical jobs within the financial sector have included Financial Consultant, Investment Banker, and Customer Service Officer.

Former students have also gone on to do finance-related work such as accounting or banking management for other types of institutions. Recent examples include the British Museum, The National Children's Bureau, the UK Border Agency and a large number of retailers such as Orange, JD Sports or Sainsbury's.

A significant number of graduates go on to do further study in the form of an MSc or a PhD in a Mathematics related area or to receive specialist training for particular professions. Examples of specialist training are the PGCE (Postgraduate Certificate in Education), Chartered Financial Analyst and Chartered Accountant.

The Centre for Career & Skills Development provides a service to current full-time and part-time undergraduates and postgraduates and to recent graduates of the University. Their aim is to give you the advice, information and skills you need to make a smooth transition into the world of work.

If you would like more information on the Careers support available at City, please go to: <http://www.city.ac.uk/careers/for-students-and-recent-graduates>.

WHAT PLACEMENT OPPORTUNITIES ARE AVAILABLE?

You may go on an approved placement between the second and third years, as part of the associated BSc. Details can be found in the BSc programme specification.

HOW DO I ENTER THE PROGRAMME?

Entry is by transfer from the BSc Mathematics and Finance degree programme. Eligibility to transfer to the MMath Programme is decided by the respective Part 2 Board of Assessment. You must pass Part 2 of your programme, and have an overall average mark of over 60%.

Scholarships

Details of scholarships available to new undergraduate students can be found on the University's website at <http://www.city.ac.uk/study/why-study-at-city/fees-and-finance/scholarships>

Version: 2.1

Version date: October 2014

For use from 2014-15