

## PROGRAMME SPECIFICATION

### KEY FACTS

Programme name	Mathematics and Finance Mathematics and Finance with Placement
Award	BSc (Hons)
School	School of Science & Technology
Department or equivalent	Mathematics
UCAS Code	GN13 and GN14 (with placement)
Programme code	USMAFN and USMFPA (with placement)
Type of study	Full Time
Total UK credits	360
Total ECTS	180

### 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.

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 Programme Stage 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 Programme Stage Two *or* the Diploma in Mathematics and Finance you will be able to build on your previous knowledge and experience from Programme Stage One. You will master more advanced mathematical techniques and will be able to apply these to real life problem-solving. In the third year most modules are optional and a wide variety of mathematics, finance, statistics and economics options are available. On completing Programme Stage Three *or* the degree you will further develop a systematic and detailed knowledge and understanding of advanced mathematics and finance. You will have access to modules which draw on current mathematics research and will be exposed to new areas of mathematics with applications to finance, biology and physics.

A distinctive feature of the programme is the final year group project, which provides 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, for either three years or four years with an industrial placement during the third year. At the end of the first year it is also possible to transfer to the BSc in Mathematics or Mathematics with Finance and Economics.

### Aims

1. To develop in you a comprehensive knowledge of mathematics and a good knowledge of topics in actuarial science.
2. To develop in you the ability to communicate their knowledge and understanding effectively.
3. To prepare you to enter postgraduate studies at the masters level in mathematics, actuarial science, and other closely related subjects.
4. To provide you with the basic knowledge and skills to analyse and solve mathematically based problems.
5. To enable you to cast and solve real-world problems in a mathematical framework.
6. To enable you to appreciate the universal nature of mathematics, a subject with no international boundaries.

### **WHAT WILL I BE EXPECTED TO ACHIEVE?**

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

#### Knowledge and understanding:

- synthesise and apply the major ideas of Pure Mathematics to an advanced level.
- formulate problems mathematically and select appropriate mathematical methods for a wide range of scenarios.
- evaluate and appropriately apply the major methods of Numerical Mathematics, Applied and Applicable Mathematics, Computing and Computational Mathematics.
  
- explain a comprehensive range of economic theory, both micro and macro.
- explain and evaluate a wide range of financial structures, and of the related statistical processes.

#### 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.
- acquire an ability to apply mathematics to real world problems, especially in finance.
- explain 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.
- work effectively in a team

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.

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 project in Programme Stage 3.

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 "SST 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 Programme Stage 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.

For students on a placement year you will spend that year of your degree working for a company. You will learn through self-study of academic, work based and industry related materials and regular progress review meetings with your Visiting Tutor (VT) and Work-place Supervisor (WPS). Much of your learning will be implicit in your daily tasks and projects and will be made explicit through the module deliverables, your own research and reflective discussion with your VT and WPS.

## **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 Programme Stage 3 consists of a group 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.

For students taking the placement year, you will be assessed through a written report, a professional communication project and two reflective assessments of your engagement

and progress in your placement role as well as professional and technical development through Work-based Progress Review forms, combining self-assessment and input from your Work-place Supervisor (WPS).

#### 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](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 Programme Stage of your Programme in order to progress to the following Programme Stage.

The pass mark for each module is 40%. The details of which assessment components need to be passed individually and of their respective pass marks are 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 30 credits within a Programme Stage you may be allowed compensation if:
  - Compensation is permitted for the module involved (see the What will I Study section of the programme specification), and
  - It can be demonstrated that you have satisfied all the Learning Outcomes of the modules in the Programme Stage, and
  - A minimum overall mark of no more than 10% below the module pass mark has been achieved in the module to be compensated, and
  - An aggregate mark of 40% has been achieved for the Programme Stage.

Where you are eligible for compensation at the first attempt, this will be applied in the first instance rather than offering a resit opportunity.

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

In addition, for the final year of study, condonation of one 15 credit module is possible in lieu of compensation, where the above condition on the minimum overall mark is removed.

Compensation and condonation are only permissible for modules as set out in the Programme Scheme, thus ensuring that all Programme Route Learning Outcomes have been met.

2. Resit: where you are not eligible for compensation at the first attempt, you will normally be offered one resit attempt.

If you are successful in the resit, you will be awarded the full credit for that module. The mark for each assessment component that is subject to a resit will be capped at the pass mark for the module. This capped mark will be used in the calculation of the final module mark together with the original marks for the components that you passed at first attempt.

If you do not meet the pass requirements for a module and do not complete your resit by the date specified, you will not progress to the next Programme Stage and the Assessment Board will require you to be withdrawn from the Programme.

If you fail to meet the requirements for a particular Programme Stage or the Programme, the Assessment Board will consider whether you are eligible for an Exit Award as per the table below.

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:

<https://www.city.ac.uk/about/governance/policies/city-university-of-london-senate-regulations>

## **WHAT AWARD CAN I GET?**

Bachelor's Degree with Honours:

### **Degree / Stage 3**

For all of you completing Stage Three or the degree you will further develop a coherent systematic, detailed knowledge of Mathematics as well as knowledge of Finance. You will be able to select appropriate mathematics methods to model a variety of situations, work effectively, individually and in a team, and manage and evaluate your studies clearly.

For students completing the three year programme, your overall aggregate mark will be calculated by combining the aggregate marks from Programme Stages 1, 2 and 3 with weightings 10%, 30% and 60% respectively.in the ratio 1:3:6.

For students taking the placement year (in year 3) the weightings of years 1-4 will be 9%, 27%, 10% and 54% respectively.

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

**Class**                      **% required**

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I	70
II upper division	60
II lower division	50
III	40

Ordinary Degree:

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

**Class**                      **% required**

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With Distinction	70
With Merit	60
Without	40
Classification	

Diploma of Higher Education:

**Diploma / Stage Two**

For all of you completing Stage Two *or* the Diploma in Mathematics and Finance you will build on your previous knowledge and experience. You will show more in-depth knowledge and understanding, develop programming and data skills to solve problems and apply core mathematical principles.

Programme Stage	HE Level	Credits	Weighting (%)
1	4	120	25
2	5	120	75

**Class**                      **% required**

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With Distinction	70
With Merit	60
Without	40
Classification	

Certificate of Higher Education:

**Certificate / Stage One**

For all of you completing stage one *or* the Certificate in Mathematics and Finance you will be able to demonstrate understanding of core mathematical concepts, apply standard techniques and construct a logical argument.



Programme Stage	HE Level	Credits	Weighting (%)
1	4	120	100

Class	% required
With Distinction	70
With Merit	60
Without	40
Classification	

## WHAT WILL I STUDY?

### Programme Stage 1

Programme Stage 1 consists of modules that make up 120 credits. All modules are compulsory.

Module Title	SITS Code	Module Credits	Core/ Elective	Can be compensated?	Level
Functions, Vectors and Calculus I	MA1623	15	C	N	4
Functions, Vectors and Calculus II	MA1624	15	C	N	4
Algebra	MA1605	15	C	N	4
Introduction to Microeconomics	EC1008	15	C	N	4
Introduction to Macroeconomics	EC1009	15	C	N	4
Linear Algebra	MA1622	15	C	N	4
Introduction to Probability and Statistics	MA1608	15	C	Y	4
Financial and Investment Mathematics A	MA1614	15	C	N	4

### Programme Stage 2

Programme Stage 2 consists of modules that make up 120 credits.

There are seven compulsory modules and one elective module.

Module Title	SITS Code	Module Credits	Core/ Elective	Can be compensated?	Level
Programming and Data Science for the Professions	MA2619	15	C	Y	5
Real Analysis	MA2618	15	C	N	5
Vector Calculus	MA2615	15	C	N	5
Fundamentals of Finance	AS2114	15	C	Y	5

Financial Reporting	AS2207	15	C	Y	5
Financial and Investment Mathematics B	MA2614	15	C	Y	5
Professional Development and Employability for Mathematics	MA2201	15	C	N	5
Sequences and Series	MA2617	15	E	Y	5
Applied Mathematics	MA2607	15	E	Y	5
Numerical Mathematics	MA2608	15	E	Y	5
Applications of Probability and Statistics	MA2611	15	E	Y	5

### Programme Stage 3

Programme Stage 3 consists of modules that make up 120 credits. There are two compulsory modules, a compulsory group project, and 75 credits of elective modules. Three modules must come from the mathematics elective modules (which are those in the list of elective modules whose module code begins with MA) and two from the remainder.

For students taking the placement year, you will take the modules below in year 4, and in year 3 take the 120 credit level 6 non-compensatable core placement module IN3053.

Module Title	SITS Code	Module Credits	Core/ Elective	Can be compensated?	Level
Codes	MA3100	15	E	Y	6
Differential Equations I	MA3617	15	C	Y	6
Differential Equations II	MA6318	15	E	Y	6
Complex Analysis	MA3659	15	C	Y	6
Group Project	MA3697	15	C	N	6
Advanced Complex Analysis	MA3661	15	E	Y	6
Game Theory	MA3662	15	E	Y	6
Operational Research	AS3021	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
Graph Theory	MA3300	15	E	Y	6
Dynamical Systems	MA3608	15	E	Y	6
Introduction to the Mathematics of Fluids	MA3609	15	E	Y	6

Introduction to Mathematical Physics	MA3663	15	E	Y	6
Mathematical Processes for Finance	MA3614	15	E	Y	6
Groups and Symmetry	MA3615	15	E	Y	6
Mathematical Biology	MA3616	15	E	Y	6
Probability 2	MA3666	15	E	Y	6

### 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 WILL BE AVAILABLE TO ME?

You may go on an approved placement between the second and third years, taking module IN3053 Professional Placement. Your experience will be graded on the basis of reports from two visits made by the Visiting Tutor and your final report. However, although the grade obtained is reported on the degree transcript it does not contribute to the final degree result.

Placement guidelines are issued to students and employers at the commencement of training, and these include a placement health and safety booklet. Early in the placement year you will be required, in conjunction with your Workplace Supervisor and the Visiting Tutor (a member of academic staff), to produce a placement plan. Training is monitored through two formal visits by the Visiting Tutor, and written reports. Informal

contact is maintained throughout the year as necessary.

If you wish to take a professional placement then you are advised to register accordingly at the beginning of Programme Stage 2. The School of Mathematics, Computer Science and Engineering Professional Liaison Unit Work Based Learning Advisor collaborates with the University Career and Skills Development Service to deliver a series of Professional Development workshops to prepare you for searching for and applying for a work placement. The Professional Liaison Unit is in regular contact with companies and other organisations concerning the availability of training placements and will advise students on making applications.

Independently from the Placements scheme described above, the Work Based Learning Advisor and the Careers Centre also provide support if you wish to take a summer internship during any of your years at University. Furthermore, City University through the Careers Centre supports several volunteering schemes which allow you to develop valuable work and inter-personal skills.

You are welcome to make your own applications at any time but are strongly advised to discuss these with the Work Based Learning Advisor. Support for seeking placements is provided in the SST Placement & Internships Resource Centre module on Moodle.

#### **WILL I GET ANY PROFESSIONAL RECOGNITION?**

This programme will meet the educational requirements of the Chartered Mathematician designation, awarded by the Institute of Mathematics and its Applications, when they are/it is followed by subsequent training and experience in employment to obtain equivalent competences to those specified by the Quality Assurance Agency (QAA) for taught masters degrees.

<https://ima.org.uk/university-degree-programme-accreditation/>

#### **HOW DO I ENTER THE PROGRAMME?**

Our typical offer for entry to the first year of the programme is AAB with A in A-level mathematics, or an International Baccalaureate with 32 points including 6 at Higher Level mathematics.

Entry is also possible via the International Foundation Programmes provided by INTO City University London and Kaplan International College London. If you have studied another foundation course or have other equivalent qualifications then you will be considered individually.

Please note that TOEFL is not accepted as evidence of English language ability for students that require a Confirmation of Acceptance for Studies. Students taking IELTS are required to obtain an overall grade of at least 6.0 with at least 6.0 in each subcomponent of the test.

#### **RPL/RP(E)L Requirements**

Second year entry:

Direct entry into the second year is also possible. This is normally for students who have successfully completed the first year of a similar undergraduate course. In all cases you will be individually assessed by the Admissions Tutor who will determine your suitability for the course.

### **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>

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