



## Programme Specification (UG)

|   |  |
|---|--|
| Awarding body / institution:                | Queen Mary University of London  |
| Teaching institution:                       | Queen Mary University of London  |
| Name of final award and programme title:    | BSc Mathematics and Statistics; BSc Mathematics and Statistics with Year Abroad; BSc Mathematics and Statistics with Professional Placement; |
| Name of interim award(s):                   | CertHE, DipHE  |
| Duration of study / period of registration: | 3/4 years  |
| QMUL programme code / UCAS code(s):         | UBSF-QMMATH1-UJMASSTA / GG31; UBSF-QMMATG1-UJMAASTY / GG31   |
| QAA Benchmark Group:                        | Mathematics, statistics and operational research   |
| FHEQ Level of Award :                       | Level 6  |
| Programme accredited by:                    | N/A  |
| Date Programme Specification approved:      |  |
| Responsible School / Institute:             | School of Mathematical Sciences  |

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

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

### Programme outline

This programme is for students who have a mathematical aptitude and are also interested in drawing conclusions from data. It incorporates straight statistics as a specialist option. It combines training in rigorous mathematics, probability and statistical theory with analysis of data using statistical computing packages. Graduates obtain jobs requiring mathematical and statistical thinking; these jobs are in diverse areas such as finance, government, industry and teaching. They are also well prepared for further training in mathematics or statistics.

### Aims of the programme

This programme aims to build statistical theory and methodology on mathematical foundations, especially probability theory. It aims to produce graduates who can apply probabilistic modelling to areas such as genetics, quantum physics and risk analysis,

and increasingly in the financial sector. Applications of probability and statistics are included, notably design of experiments, time series, and actuarial and financial mathematics.

### What will you be expected to achieve?

Students who successfully complete this programme will be expected to achieve all of the learning outcomes listed outcomes shown below.

### Please note that the following information is only applicable to students who commenced their Level 4 studies in 2017/18, or 2018/19

In each year of undergraduate study, students are required to study modules to the value of at least 10 credits, which align to one or more of the following themes:

- networking
- multi- and inter-disciplinarity
- international perspectives
- enterprising perspectives.

These modules will be identified through the Module Directory, and / or by your School or Institute as your studies progress.

| Academic Content: |   |
|-------------------|---|
| A 1               | reason clearly, critically and with rigour within a mathematical and statistical context, both theoretical and practical; |
| A 2               | choose appropriate mathematical and statistical methods and understand how to apply them in practical situations;         |
| A 3               | verify that there is no obvious mismatch between the data, the real situation and the conclusions of the analysis.        |

| Disciplinary Skills - able to: |   |
|--------------------------------|---|
| B 1                            | be fluent and accurate in basic numerical skills; |

|      |  |
|------|--|
| B 2  | comprehend fundamental concepts and techniques of calculus, linear and abstract algebra, probability theory, statistical inference, linear models and other mathematical and statistical subjects; |
| B 3  | take notes, write up notes, plan revision, and learn independently;  |
| B 4  | use e-mail for cooperation and the internet as a source of information, and have a sense of right and wrong ways of using these facilities;  |
| B 5  | manage time and work cooperatively with fellow students;   |
| B 6  | explain the interrelations among the mathematical subjects and how to use them in statistics;  |
| B 7  | explain mathematical work, in appropriate detail, both to specialists and non-specialists;   |
| B 8  | approach a practical statistical problem independently – for example, design an experiment, perform statistical modelling and data analysis;   |
| B 9  | discuss statistical aspects of a practical problem presented by a scientist;   |
| B 10 | use statistical computing packages and critically interpret their output.  |

|             |  |
|-------------|--|
| Attributes: |  |
| C 1         | acquire complex knowledge and apply it rigorously;                                     |
| C 2         | connect information and ideas within their field of study;                             |
| C 3         | use writing for learning, reflection, and communication;                               |
| C 4         | use writing for learning, reflection, and communication;                               |
| C 5         | acquire new learning skills in a range of ways, both individually and collaboratively; |
| C 6         | use quantitative data confidently and competently;                                     |
| C 7         | acquire transferable key skills to help with career goals and continuing education;    |
| C 8         | develop effective spoken English and presentation skills;                              |
| C 9         | use information for evidence-based decision-making and creative thinking.              |

### How will you learn?

Teaching in most modules is primarily by formal lectures but may include guided reading. For all except some higher-level modules, teaching is supported by tutorial classes and/or computer laboratories. Teaching of reading and project modules is primarily by guided reading and weekly seminars or supervisions.

Learning in most modules is by attending lectures, reading lecture notes and recommended text books, attempting exercises and asking questions in tutorial classes and/or computer laboratories and staff office hours.

## How will you be assessed?

Assessment is normally primarily by written examination but for some modules may also include continuous assessment of coursework consisting of solutions to exercises, which are set weekly or fortnightly, and/or one or more tests. Summative coursework assessment or tests may typically contribute up to 10% of the assessment. Assessment of project modules is normally by a project report, presentation and, at the examiners' discretion, an oral examination.

## 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.

For degree awarding purposes (in order to deal with special cases like changes of programme) students will be allowed to choose up to 30 credits of off diet modules in any year (with School approval). At the end of year two, students have the opportunity to take a placement year in industry - GG32 Mathematics and Statistics with Professional Placement. Students also have the option to take advantage of studying abroad - GG3Y Mathematics and Statistics with Year Abroad.

### Year 1

#### Semester A

2 compulsory level 4 modules

MTH4000 [4] Programming in Python I

MTH4213 [4] Numbers, Sets and Functions

#### Semester B

2 compulsory level 4 modules

MTH4104 [4] Introduction to Algebra

MTH4215 [4] Vectors and Matrices

#### Semester A & B

2 compulsory level 4 modules

MTH4300 [4] Introduction to Analysis with Calculus

MTH4500 [4] Probability & Statistics

### Year 2

#### Semester A

Compulsory

MTH5112 [5] Linear Algebra I

MTH5123 [5] Differential Equations

MTH5129 [5] Probability and Statistics II

Choose one from:

MTH5104 [5] Convergence and Continuity

MTH5130 [5] Number Theory

MTH5124 [5] Actuarial Mathematics I

#### Semester B

Compulsory

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MTH5001 [5] Introduction to Computer Programming  
MTH5120 [5] Statistical Modelling I

Choose two from:

MTH5103 [5] Complex Variables  
MTH5105 [5] Differential and Integral Analysis  
MTH5113 [5] Introduction to Differential Geometry  
MTH5114 [5] Linear Programming and Games

Year 3  
Semester A  
Compulsory

MTH6134 [6] Statistical Modelling II  
MTH6102 [6] Bayesian Statistical Methods

Choose two from:

MTH6151 [6] Partial Differential Equations  
MTH6141 [6] Random Processes  
MTH6154 [6] Financial Mathematics I  
MTH5124 [5] Actuarial Mathematics I  
MTH6138 [6] Third Year Project (may be taken in either semester)

Semester B  
Choose four from:

MTH6150 [6] Numerical Computing with C and C++  
MTH6142 [6] Complex Networks  
MTH6155 [6] Financial Mathematics II  
MTH6101 [6] Introduction to Machine Learning  
MTH6139 [6] Time Series  
MTH6113 [6] Mathematical Tools for Asset Management  
MTH6138 [6] Third Year Project (may be taken in either semester)  
MTH6110 [6] Communicating and Teaching

Academic Year of Study FT - Year 1

| Module Title               | Module Code | Credits | Level | Module Selection Status | Academic Year of Study | Semester   |
|----------------------------|-------------|---------|-------|-------------------------|------------------------|------------|
| Programming in Python I    | MTH4000     | 15      | 4     | Compulsory              | 1                      | Semester 1 |
| Number, Sets and Functions | MTH4213     | 15      | 4     | Compulsory              | 1                      | Semester 1 |
| Introduction to Algebra    | MTH4104     | 15      | 4     | Compulsory              | 1                      | Semester 2 |
| Vectors and Matrices       | MTH4215     | 15      | 4     | Compulsory              | 1                      | Semester 2 |

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| Module Title                           | Module Code | Credits | Level | Module Selection Status | Academic Year of Study | Semester        |
|--|-------------|---------|-------|-------------------------|------------------------|-----------------|
| Introduction to Analysis with Calculus | MTH4300     | 30      | 4     | Compulsory              | 1                      | Semesters 1 & 2 |
| Probability & Statistics               | MTH4500     | 30      | 4     | Compulsory              | 1                      | Semesters 1 & 2 |

Academic Year of Study FT - Year 2

| Module Title                          | Module Code | Credits | Level | Module Selection Status | Academic Year of Study | Semester   |
|---------------------------------------|-------------|---------|-------|-------------------------|------------------------|------------|
| Linear Algebra I                      | MTH5112     | 15      | 5     | Compulsory              | 2                      | Semester 1 |
| Differential Equations                | MTH5123     | 15      | 5     | Compulsory              | 2                      | Semester 1 |
| Probability and Statistics II         | MTH5129     | 15      | 5     | Compulsory              | 2                      | Semester 1 |
| Convergence and Continuity            | MTH5104     | 15      | 5     | Elective                | 2                      | Semester 1 |
| Number Theory                         | MTH5130     | 15      | 5     | Elective                | 2                      | Semester 1 |
| Actuarial Mathematics I               | MTH5124     | 15      | 5     | Elective                | 2                      | Semester 1 |
| Introduction to Computer Programming  | MTH5001     | 15      | 5     | Compulsory              | 2                      | Semester 2 |
| Statistical Modelling I               | MTH5120     | 15      | 5     | Compulsory              | 2                      | Semester 2 |
| Complex Variables                     | MTH5103     | 15      | 5     | Elective                | 2                      | Semester 2 |
| Differential and Integral Analysis    | MTH5105     | 15      | 5     | Elective                | 2                      | Semester 2 |
| Introduction to Differential Geometry | MTH5113     | 15      | 5     | Elective                | 2                      | Semester 2 |
| Linear Programming and Games          | MTH5114     | 15      | 5     | Elective                | 2                      | Semester 2 |

Academic Year of Study FT - Year 3

| Module Title                            | Module Code | Credits | Level | Module Selection Status | Academic Year of Study | Semester        |
|---|-------------|---------|-------|-------------------------|------------------------|-----------------|
| Statistical Modelling II                | MTH6134     | 15      | 6     | Compulsory              | 3                      | Semester 1      |
| Bayesian Statistical Methods            | MTH6102     | 15      | 6     | Compulsory              | 3                      | Semester 1      |
| Partial Differential Equations          | MTH6151     | 15      | 6     | Elective                | 3                      | Semester 1      |
| Random Processes                        | MTH6141     | 15      | 6     | Elective                | 3                      | Semester 1      |
| Financial Mathematics I                 | MTH6154     | 15      | 6     | Elective                | 3                      | Semester 1      |
| Actuarial Mathematics I                 | MTH5124     | 15      | 6     | Elective                | 3                      | Semester 1      |
| Third Year Project                      | MTH6138     | 15      | 6     | Elective                | 3                      | Semester 1 or 2 |
| Numerical Computing with C and C++      | MTH6150     | 15      | 6     | Elective                | 3                      | Semester 2      |
| Complex Networks                        | MTH6142     | 15      | 6     | Elective                | 3                      | Semester 2      |
| Financial Mathematics II                | MTH6155     | 15      | 6     | Elective                | 3                      | Semester 2      |
| Introduction to Machine Learning        | MTH6101     | 15      | 6     | Elective                | 3                      | Semester 2      |
| Time Series                             | MTH6139     | 15      | 6     | Elective                | 3                      | Semester 2      |
| Mathematical Tools for Asset Management | MTH6113     | 15      | 6     | Elective                | 3                      | Semester 2      |
| Communicating and Teaching              | MTH6110     | 15      | 6     | Elective                | 3                      | Semester 2      |

### What are the entry requirements?

For UK applicants, we require 3 GCE A-levels at ABB—including Mathematics at Grade A. Grade C or 4 in GCSE English Language is also required.

International Baccalaureate: Acceptable on its own and combined with other qualifications.

Subjects and grades required: 34–36 points total including Higher Level Mathematics at grade 6.

Non-UK applicants: Equivalent qualifications may be accepted. IELTS: 6.0 (with a minimum of 5.5 in all sections) is required.

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

The programme is overseen by a Programme Director with overall oversight of the programme.

The quality and structure of the programme as a whole is the responsibility of the DoE with support from DDoE, the Programme Director and the School's Education Committee. This includes revising the syllabuses of modules, and refining the module offering.

The quality of individual modules is monitored by DoE and DDoE, and includes evaluation of student feedback through questionnaires, the Student Staff Liaison Committee, module registrations, exam performance, as well as direct observations of the lectures.

The School operates an Education Committee, which advises the School's Director of Education on all matters relating to the delivery of taught programmes at School level, including monitoring the application of relevant QMUL policies and reviewing all proposals for module and programme approval and amendment before submission for approval to Taught Programmes Board. Student views are incorporated in this Committee's work in a number of ways, such as through the SSLC and consideration of student surveys.

All Schools operate an Annual Programme Review (APR) of their taught undergraduate and postgraduate provision. APR is a continuous process of reflection and action planning which is owned by those responsible for programme delivery; the main document of reference for this process is the Student Experience Action Plan (SEAP) which is the summary of the School's work throughout the year to monitor academic standards and to improve the student experience. The process is organised at a School-level basis with the Director of Taught Programmes responsible for updating the School's Taught Programmes Action Plan. Students' views are considered in this process through analysis of the NSS and module evaluations.

Every 5-6 years the School undergoes a Periodic Review of its teaching provision, by a panel consisting of experts external to the School. The process is organised at a School-level basis with the Director of Education responsible for updating the School's Taught Programmes Action Plan. Students' views are considered in this process through analysis of student surveys and module evaluations.

The Staff-Student Liaison Committee provides a formal means of communication and discussion between the School and its students. The committee consists of student representatives from each year of the programmes, together with appropriate representation from staff within the School. It is designed to respond to both the general needs of students, and subject specific concerns, as well as act as a forum for discussing programme and module developments. Staff-Student Liaison Committees meet regularly throughout the year.

The Director of Education and Deputy Director of Education both attend the Staff-Student Liaison Committee and the School's Education Committee and ensure that student feedback is fed into the review of modules and programmes. Student views are also incorporated in the Committee's work in other ways, such as through the National Student Survey (NSS) and student module evaluations.

## What academic support is available?

Each student is allocated a personal academic advisor, who acts as a first point of contact for general academic and pastoral support. Personal tuition is provided primarily through tutorial classes and visits to module organisers during their office hours, which are advertised on the web. Programme induction for new students begins during the enrolment period and extends into the first semester; it includes a series of presentations organised by the Education Services Team. Each programme is assigned a Programme Director and all teaching is overseen by the Education Committee, which includes the Programme Directors and is chaired by the Director of Education. Programmes are monitored continuously and reviewed every few years by the Education Committee.

## 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



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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.

### Programme-specific rules and facts

### Links with employers, placement opportunities and transferable skills

A lot of our graduates go on to jobs directly related to their degree: for example, as a Statistics Officer for the Department of Transport. The Government is one of the largest employers of statisticians and has over 1,200 employed across a number of different departments. Other graduates have found positions in the finance sector with companies like Deloitte and Touche, or have gone on to work for the NHS and Pfizer, the pharmaceutical company. The combination of mathematical and statistical knowledge is very useful in such sectors. Many graduates take MSc courses in Medical Statistics, Financial Mathematics and other subjects. High-level numeracy is one of the most sought-after skills in the workplace and many opportunities are open to a mathematical sciences graduate.

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## Programme Specification Approval

**Person completing Programme Specification:**

Simon Rawstron (ESM-Education Services Manager), Shabnam

**Person responsible for management of programme:**

Shabnam Beheshti, DoE

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

14 Dec 2022

**Date Programme Specification approved by Taught Programmes Board:**