PROGRAMME SPECIFICATION

Name, title and level of final qualification(s)	**MSc Quantitative Finance with Data Science** (Level 7)
Name and title of any exit qualification(s)	PG Diploma Quantitative Finance with Data Science PG Certificate Quantitative Finance with Data Science
Awarding Body	University of London
Teaching Institution(s)	Birkbeck, University of London
Home school/other teaching departments	Birkbeck Business School
Location of delivery	Central London
Language of delivery and assessment	English
Mode of study, length of study and normal start month	Full-time (1 year) Part-time (2 years) September
Professional, statutory or regulatory body	N/A
QAA subject benchmark group(s) Higher Education Credit Framework for England	Mathematics, Statistics and Operational Research
Birkbeck Course Code	TMSMFDTS_C
HECoS Code	100401
Start date of programme	Autumn 2023 *(merger between MSc Mathematical Finance & MSc Quantitative Risk Man4agement with Machine Learning)*
Date of programme approval	November 2022
Date of last programme amendment approval	December 2022
Valid for academic entry year	2023-24
Programme Director	Simon Hubbert
Date of last revision to document	09/12/2022

Admissions requirements

The normal requirement is at least a second-class degree from a UK university (or an overseas qualification of an equivalent standard obtained from a university, or educational institution of university rank, following a programme of study extending over a period of no less than three years) in a quantitative subject such as mathematics, physics, statistics, economics or engineering. Alternatively, a merit or higher in Graduate Diploma in Economics / Mathematics / Statistics would be suitable for entry. Work experience will be considered in assessing applicants. Graduates from other disciplines such as computer science will be accepted if their degree contains a major quantitative element. In some circumstances students are admitted with a first degree that is less than the usual standard, provided that their subsequent work experience and/or education and training is deemed to have brought them to an equivalent level.

We welcome applicants without traditional entry qualifications as we base decisions on our own assessment of qualifications, knowledge and previous work experience. We may waive formal entry requirements based on judgement of academic potential.

Course aims

The programme will provide training in advanced mathematical finance, together with skills in data science, enabling graduates to seek employment in modern financial institutions. The range of topics covered will include, statistical analysis, numerical mathematics, machine learning and computer programming with applications of focused on real world problems in finance. Students will acquire expertise in the areas of option pricing, risk management, numerical implementation, applications of machine learning and coding skills in Python, R, Matlab and C++.

Distinctive features of this programme are evening study, available in part-time version over two years or full time over one year.

Course structure

Level	Module Code	Module Title	Credit	Comp Core/ Option	Likely teaching term(s)
Full-time – 1 year					
6	BUEM027S6	Quantitative Techniques	30	Comp	September
7	EMMS011S7	Financial Modelling and Data Science	30	Comp	T1-2
7	EMMS016S7 or BUEM077S7	Statistical Analysis or Econometrics of Financial Markets	30	Comp	T1-2
7	BUEM053H7	Market Risk Management	15	Comp	T1
7	BUEM111H7	Financial Data Science with Python.	15	Comp	T1
7	BUEM051H7 or BUEM086H7	Credit Risk Management or Derivative Across Asset Classes	15	Comp	T2
7	EMMS022H7	Statistical Learning	15	Comp	T2
7	BUEM115S7	Dissertation Quantitative Finance with Data Science	30	Comp	T3

Part-time – 2 years					
Year 1					
6	BUEM027S6	Quantitative Techniques	30	Comp	September
7	EMMS011S7	Financial Modelling and Data Science	30	Comp	T1-2
7	BUEM053H7	Market Risk Management	15	Comp	T1
7	BUEM051H7 or BUEM086H7	Credit Risk Management or Derivative Across Asset Classes	15	Comp	T2
Year 2					
7	EMMS016S7 or BUEM077S7	Statistical Analysis or Econometrics of Financial Markets	30	Comp	T1-2
7	BUEM111H7	Financial Data Science with Python	15	Comp	T1
7	EMM022H7	Statistical Learning	15	Comp	T2
7	BUEM115S7	Dissertation Quantitative Finance with Data Science	30	Comp	T3

2 Year Dual Degree programme					
Full-time Year 1					
Modules taken abroad at the partner university, Univerisità degli Studi di Milano-Bicocca, equivalent to BUEM027S6 Quantitative Techniques and EMMS011S7 Derivatives with Data Science, for which **APL will be given (total 60 credits)**. Additionally, in line with CAS regulations only 30 credits can be compensated for the modules taken at Birkbeck for the Dual-Degree.					
Full-time Year 2					
7	BUEM053H7	Market Risk Management	15	Comp	T1
7	BUEM051H7	Credit Risk Management	15	Comp	T2
7	EMMS016S7	Statistical Analysis	30	Comp	T1+T2
7	BUEM111H7	Financial Data Science with Python	15	Comp	T1
7	EMM022H7	Statistical Learning	15	Comp	T2
7	BUEM115S7	Dissertation Quantitative Finance with Data Science	30	Comp	T3

Core: *Module must be taken and passed by student*
Compulsory: *Module must be taken but can be considered for compensated credit (see CAS regulations paragraph 24)*
Option: *Student can choose to take this module*

How you will learn

Your learning and teaching is organised to help you meet the learning outcomes (below) of the course. As a student, we expect you to be an active learner and to take responsibility for your learning, engaging with all of the material and sessions arranged for you.

Each course is divided into modules. You will find information on the virtual learning site (Moodle, see Academic Support below) about each of your modules, what to expect, the work you need to prepare, links to reading lists, information about how and when you will be assessed.

The majority of teaching is delivered in the form of the traditional in-person lectures; these will also be simulcast, meaning that you will have the option to participate in the lecture remotely if it is not possible to attend in person.

While lecturing is the primary method of delivery, it is by no means the only one. An important aspect of learning involves solving problems and, to this end, many of the lectures will be augmented by supporting classes to discuss solutions to problem sets.

Courses which contain a significant programming component can be taught in a computer lab and/or online where the convenor can demonstrate the implementation of computational methods, set short tasks and allow the students to write their own code.

Most courses make use of substantial hand-outs that are designed to help students digest the material developed in lectures. Specific directions to textbooks, academic papers or extensive lecture notes help the students obtain a clear idea of the material. Lectures also specify precise objectives at the outset and this is particularly helpful in calibrating oneself with the state of the course especially if work commitments force absence.

An important ingredient of learning is private study. Apart from the reading lists the programme requires students to produce independent project work, aiding development of analytic, quantitative as well as written communication skills.

Learning is further assisted by review sessions; these are important as they also provide guidance on examination technique.

How we will assess you

The course will use a variety of assessment methods. Assessment is used to enhance your learning rather than simply to test it. For most of the modules associated with this course, your assessment will be through the following types of assessment.

- Unseen examinations
- Assessed coursework
- Dissertation

For each module the bulk (generally around 80%) of the assessment comes from unseen examinations. These are typically held in June, thus giving as much time as possible for assimilation of the material, promoting an overall understanding and engagement with the curriculum. The contribution (around 20%) from the coursework ensures that, throughout the year, students get practice, and are given feedback, in tackling and solving problems independently without time pressure of examinations.

The range of questions and problems set within examinations and coursework are structured to balance theory and practice, to address the individual learning outcomes and to discriminate between different levels of achievement. Our assessment strategy also takes into consideration that students can exhibit a wide range of aptitudes and abilities in different aspects of the programme. Thus the assessment is designed to ensure a good coverage of the curriculum so that all students have the opportunity to demonstrate their strengths.

Learning outcomes (what you can expect to achieve)

‘Learning outcomes’ indicate what you should be able to know or do at the end of your course. Providing them helps you to understand what your teachers will expect and also the learning requirements upon which you will be assessed.

In general, at the end of the programme students should have a comprehensive overview of the fields of applicable mathematics with computational finance. They should be able to apply quantitative tools to solve problems in this field and conduct independent applied research in the form of a dissertation.

Subject Specific

1. Substantial knowledge and understanding of mathematical techniques that are commonly used in the finance industry, e.g., derivative pricing, risk quantification, portfolio management.
2. Substantial knowledge and understanding of statistical tools that are commonly used in the finance industry e.g., forecasting, hypothesis testing, volatility models, financial time series.
3. Knowledge and understanding of the mathematical and statistical fundamentals of Machine Learning.
4. Understanding how to implement solutions to financial problems using the programming languages R, Python, Matlab and C++.
5. Substantial knowledge of the different approaches to modelling and managing both market and credit risk.
6. An advanced ability to critically review current literature, pose new questions and carry out a research project.

Intellectual

7. Understanding how to understand advanced material on the behaviour of prices in financial markets.
8. Understanding how to analyse and interpret data and make judgements – even in the absence of complete data.
9. Understanding how to conceive and write computer programmes, in a range of languages, for use in a financial context.
10. Understanding how to use statistical tools to provide computer systems the ability to learn with data, i.e., progressively improve performance on a specific task.

Practical

11. How to solve financial problems, both theoretically and numerically.
12. How to analyse and quantify financial risks by means of statistical techniques.
13. How to use machine learning techniques in a financial context.

Personal and Social

14. Demonstrate the ability to develop knowledge independently by study of a range of sources.
15. Demonstrate the ability to plan, execute and complete an in-depth study of a particular topic within a specified period of time and to write a polished and convincing summary of the results obtained.

Careers and further study

You will find Quantitative Finance and Data Science graduates in the following

- Quantitative Analyst/Developer roles across a range of financial institutions including investment banks, hedge funds and insurance firms.
- Analyst/Advisor roles in the risk management sector.
- Portfolio management.
- Roles as financial data scientists.
- Roles as a machine learning engineer.
- Analyst roles within the Bank of England and the treasury.

Birkbeck offers a range of careers support to its students. You can find out more on the careers pages of our website.

Academic regulations and course management

Birkbeck's academic regulations are contained in its Common Award Scheme Regulations and Policies published by year of application on the Birkbeck website.

You will have access to a course handbook on Moodle and this will outline how your course is managed, including who to contact if you have any questions about your module or course.

Support for your study

Your learning at Birkbeck is supported by your teaching team and other resources and people in the College there to help you with your study. Birkbeck uses a virtual learning environment called Moodle and each course has a dedicated Moodle page and there are further Moodle sites for each of your modules. This will include your course handbook.

Birkbeck will introduce you to the Library and IT support, how to access materials online, including using Moodle, and provide you with an orientation which includes an online Moodle module to guide you through all of the support available. You will also be allocated a personal tutor and provided with information about learning support offered within your School and by the College.

Please check our website for more information about student support services. This covers the whole of your time as a student with us including learning support and support for your wellbeing.

Quality and standards at Birkbeck

Birkbeck's courses are subject to our quality assurance procedures. This means that new courses must follow our design principles and meet the requirements of our academic regulations. Each new course or module is subject to a course approval process where the proposal is scrutinised by subject specialists, quality professionals and external representatives to ensure that it will offer an excellent student experience and meet the expectation of regulatory and other professional bodies.

You will be invited to participate in an online survey for each module you take. We take these surveys seriously and they are considered by the course team to develop both modules and the overall courses. Please take the time to complete any surveys you are sent as a student.

We conduct an annual process of reviewing our portfolio of courses which analyses student achievement, equality data and includes an action plan for each department to identify ongoing enhancements to our education, including changes made as a result of student feedback.

Our periodic review process is a regular check (usually every four years) on the courses by department with a specialist team including students.

Each course will have an external examiner associated with it who produces an annual report and any recommendations. Students can read the most recent external examiner reports on the course Moodle pages. Our courses are all subject to Birkbeck Baseline Standards for our Moodle module information. This supports the accessibility of our education including expectations of what information is provided online for students.

The information in this programme specification has been approved by the College's Academic Board and every effort has been made to ensure the accuracy of the information it contains.

Programme specifications are reviewed periodically. If any changes are made to courses, including core and/or compulsory modules, the relevant department is required to provide a revised programme specification. Students will be notified of any changes via Moodle.

Further information about specifications and an archive of programme specifications for the College's courses is available online.

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