Programme Specification for Postgraduate Programme Leading to: MSc Financial Mathematics

Applicable for all postgraduate students starting in ***September 2020***

Version No.	Date	Notes – QUALITY ASSURANCE USE ONLY	QA
2020.21 V1.0	*19 August 2020*	*Programme content confirmed for a September 2020 start.*	*JP*
2020.21 V2.0	*6 October 2020*	*On 23 September Senate approved that a PGDip may be awarded by substitution of the dissertation for up to 30 credits of modular/assessment blocks in the taught part of the programme, provided the learning outcomes have been met.*	*JP*

Postgraduate Taught Programme	
1. Awarding institution	Brunel University London
2. Teaching institution(s)	Brunel University London
3. Home College/Department	College of Engineering, Design and Physical Sciences/ Dept of Mathematics
4. Contributing College/Department	None
5. Programme accredited by	N/A
6. Final award(s) and FHEQ Level of Award	MSc Financial Mathematics – FHEQ Level 7
7. Programme title	Financial Mathematics
8. Programme type (single honours/joint)	N/A
9. Normal length of programme (in months) for each mode of study	FT – 12 months (equivalent to 52 weeks)
10. Maximum period of registration for each mode of study	Normal or standard duration plus 2 years up to a maximum of five years.
11. Variation(s) to September start	N/A
12. Modes of study	Full time
13. Modes of delivery	Standard
14. Intermediate awards and titles and FHEQ Level of Award	PGDip Financial Mathematics - FHEQ Level 7 PGCert Financial Mathematics - FHEQ Level 7
15. UCAS Code	N/A
16. HECoS Code	101033 (40%), 101034 (30%), 100835 (30%)
17. Route Code	G330PFINMATH
18. Relevant subject benchmark statements and other external and internal reference points used to inform programme design	UK Quality Code for Higher Education QAA Subject Benchmark Statement (Mathematics, Statistics and Operational Research) Brunel 2030 Brunel Placement Learning Policy, as published under the 'Placements' section of the 'Managing Higher Education Provision with Others' page.
19. Admission Requirements	Details of PGT entry requirements are provided on the University's and College website. Levels of English for non-native speakers are outlined on Brunel International's language requirements pages.
20. Other relevant information (e.g. study abroad, additional information on placements)	N/A
21. Programme regulations not specified in Senate Regulation 3. Any departure from regulations specified in Senate Regulation 3 must be stated here and approved by Senate.	N/A
22. Further information about the programme is available from the College website.	http://www.brunel.ac.uk/courses/postgraduate/financial-mathematics-msc

23. EDUCATIONAL AIMS OF THE PROGRAMME

The main educational aims of the programme are to teach and to train candidates in such a way that they acquire working knowledge of modern mathematical theory of finance and an ability to apply this knowledge for analysis of real life problems in financial modelling and financial risk management. The programme will offer (i) an in-depth coverage of stochastic calculus and its application to pricing and hedging of financial derivatives, both in stock and fixed income markets; (ii) an in-depth coverage of construction of mathematical models applicable to design and analysis of financial asset portfolios and (iii) teaching and learning of relevant computational skills for finance. Besides covering pricing theory for a wide range of traditional financial instruments, the course also offers the students an opportunity to develop expertise in the latest trading instruments and the associated market infrastructure (cryptocurrencies and blockchains) and the latest financial analysis methodologies based on machine learning. After successful completion of the programme, it is expected that candidates will have acquired a range of relevant and viable skills in the area of financial mathematics and its applications. These will include skills in financial modelling, financial risk assessment, financial computation and financial portfolio analysis, sufficient to enable them to present themselves as excellent candidates for employment in the financial services sector in the United Kingdom or abroad.

24. PROGRAMME AND INTERMEDIATE LEARNING OUTCOMES

The programme provides opportunities for students to develop and demonstrate knowledge and understanding (K) cognitive (thinking) skills (C) and other skills and attributes (S) in the following areas:

Level	Category (K = knowledge and understanding, C = cognitive (thinking) skills, S = other skills and attributes)	Learning Outcome	Masters Award Only	Associated Assessment Blocks Code(s)	Associated Study Blocks Code(s)	Associated Modular Blocks Code(s)
7						
7	K	Develop a strong conceptual understanding of modern probability theory and its applications, including the theory of Brownian motion and stochastic calculus.				MA5602 MA5604 MA5606 MA5634
7	K, S	Demonstrate an in-depth knowledge of financial market terminology, market structures and financial products.				MA5603 MA5627 MA5635
7	K, S	Develop an awareness of the Issues currently faced by potential employers in the finance industry.				MA5603 MA5627 MA5635
7	K, C	Develop programming skills for pricing sophisticated financial instruments and designing financial risk management tools.				MA5629 MA5632 MA5635
7	C	Develop the ability to recognise which numerical approach suits best to tackle problems at hand.				MA5629 MA5632 MA5635 MA5634

7	C	Demonstrate the ability to analyse and evaluate different approaches for financial derivative pricing (e.g. for pricing options) and choose the best approach for a particular problem.				MA5600 MA5602 MA5603 MA5604 MA5606 MA5629
7	S	Develop a systematic understanding of a specific topic in financial modelling, with an ability to analyse critically the current research on that topic, and an ability to prepare, organise, and report the results of the findings in a structured and coherent manner.	**Y**			MA5600 MA5627

Learning/teaching strategies and methods to enable learning outcomes to be achieved, including formative assessments

Knowledge and understanding in the theoretical areas indicated above will be acquired through a combination of lectures, seminars, and self-study (and, where applicable, individual projects). For numerical aspects, in addition, computer workshops and individual and group-project works will be involved. In the lectures, important scientific concepts will be illustrated and explained; such concepts include both the relevant background mathematical material as well as the body of detailed knowledge indicative of how the mathematics is applied in the setting of financial modelling in a variety of examples and situations. Various examples will be worked through in detail so that candidates will be in a position to grasp the ideas within the given context. Seminars will provide candidates with the opportunity (a) for them to see how problems are solved in practice, and (b) for them to raise, at greater length, issues arising in lectures or private studies. Additionally, the seminars will provide opportunities for the course lecturers to assess student understanding of the subject through (a) discussion of relevant problems, and (b) questions raised by students. Computing lab sessions and projects will be used in the computational courses as well as some of the theoretical courses to foster practical engagement with the taught material and to highlight the various links between mathematics, algorithms, and applications. In the case of the dissertation project, students will be assigned a project supervisor, normally an internal member of the Department. In some cases, a student may be assigned in addition an external supervisor from industry, depending on what is optimal given the nature of the particular project.

Summative assessment strategies and methods to enable learning outcomes to be demonstrated.

A variety of assessment methods will be used. The final examination features prominently (sometimes 100%) in theory-based modules. Written assignments and/or individual or group-project work will also be used as a component of the assessment, in some of the theory-based modules and in the computation-based modules, depending on the material involved. The dissertation project leads to the submission of a thesis or dissertation, will be marked and assessed according to a specified marking scheme.

25. Programme Structure, progression and award requirements

Programme structures and features: levels, assessment blocks, credit and progression and award requirements

- **Compulsory block:** one which all students registered for the award are required to take as part of their programme of study. These will be listed in the left hand column;
- **Optional block:** one which students choose from an 'option range'. These will be listed in the right hand column**;**
- A **core assessment** is an assessment identified within an assessment block or modular block (either compulsory or optional) which must be passed (at grade C- or better) in order to be eligible to progress and to be eligible for the final award. All core assessments must be specified on the programme specification next to the appropriate assessment or modular block:

  Where students are expected to pass the block at C- or better, but not necessarily all elements, then the block itself is core.
  e.g. AB5500 Project (40)
  Core: Block

  Where only some elements of assessments are required to be passed at C- or better, these will be identified by listing each element that is core

e.g. ABXXX1 Title (XX credits)
Core: 1 & 4

Where students are expected to pass all assessments in a block then this will be identified. By setting the assessment this way, students are also required to pass the block by default. This will be identified thus:

e.g. ABXXXX Title (XX credits)
Core: All, Block

- A **non-core assessment** does not have to be passed at grade C- or better, but must D- or better in order to be eligible for the final award.

Masters and FHEQ Level 7	
Compulsory module block codes, titles and credit	**Optional module block codes, titles and credits**
MA5602 Probability and Stochastics (15 credits) MA5603 Financial Markets (15 credits) MA5604 Option Pricing Theory (15 credits) MA5606 Interest Rate Theory (15 credits) MA5627 Research Methods and Case Studies (15 credits) MA5632 Computer Intensive Statistical Methods (15 credits) MA5600 Financial Mathematics Dissertation (60 credits) Core Block	In addition to the compulsory modules, students must study 30 credits from the modular blocks listed below: MA5634 Fundamentals of Machine Learning (15 credits) MA5629 Time Series Modelling (15 credits) MA5635 Cryptocurrencies and Blockchain Technology (15 credits)
Masters and FHEQ Level 7 Progression and Award Requirements **As per Senate Regulation 3** A PGDip may be awarded by substitution of the dissertation (MA5600) for up to 30 credits of modular/assessment blocks in the taught part of the programme, provided the learning outcomes have been met.	

Please note: this specification provides a concise summary of the main features of the programme and the learning outcomes that a student might reasonably be expected to achieve and demonstrate if he/she takes full advantage of the learning opportunities that are provided. More detailed information on the learning outcomes, content and teaching, learning and assessment methods can be found in the modular block, assessment and study block outlines and other programme and block information. The accuracy of the information contained in this document is reviewed by the University from time to time and whenever a modification occurs.