

MRes Stochastic Analysis and Mathematical Finance [1+3]

This document provides a definitive record of the main features of the programme and the learning outcomes that a typical student may reasonably be expected to achieve and demonstrate if s/he takes full advantage of the learning opportunities provided. This programme specification is primarily intended as a reference point for academic and support staff involved in delivering the programme and enabling student development and achievement, for its assessment by internal and external examiners, and in subsequent monitoring and review.

Programme Information

Award	MRes			
Programme Title	Stochastic Analysis and Mathematical Finance			
Programme code	G1U7			
Awarding Institution	Imperial College London			
Teaching Institution	Imperial College London			
Faculty	Natural Sciences			
Department	Mathematics			
Mode and Period of Study	1 calendar year full-time (12 months)			
Cohort Entry Points	Annually in October			
Relevant QAA Benchmark Statement(s) and/or other external reference points	Mathematics, Statistics and Operational Research			
Total Credits	ECTS:	90	CATS:	180
FHEQ Level	Level 7 - Master's			
EHEA Level	2 nd cycle			
External Accreditor(s)	None			
Specification Details				
Student cohorts covered by specification	2016-17			
Responsible Officer	Dr Tom Cass			
Date of introduction of programme	October 2013			
Date of programme specification/revision	January 2017			

Description of Programme Contents

MRes in Stochastic Analysis and Mathematical Finance is a full-time 12 month programme which provides a high level training in Mathematical research for students who will go on to pursue a PhD.

Learning Outcomes

Knowledge and Understanding of:

1. The fundamentals of Stochastic Analysis or Mathematical Finance as living disciplines in their own right.
2. The development of the application of Stochastic Analysis or Mathematical Finance in a wide range of situations relevant to research and industry.
3. The importance of precision of argument.
4. Problem-solving strategies and methods.
5. Computational skills.
6. A selection of subjects which students study in greater depth, according to their interests leading to current developments at the frontiers of the subject.

Intellectual Skills:

1. Ability to assimilate and understand a large body of complex concepts and their inter-relationships.
2. Knowledge and understanding of the role of logical mathematical argument and deductive reasoning, together with formal processes of mathematical proof and development of mathematical theories.
3. Use of a structured mathematical analytical approach to problem solving, including the importance of assumptions made and consequences of their violation.
4. Use of Mathematics to describe and model in applications, including appropriate solution method, and interpretation of results.
5. Carry out extended investigative mathematical work as an individual.

Practical Skills

1. Carry out investigative project work as an individual and as part of a small group. Use symbolic and numerical software as part of practical computation.

Transferable Skills:

1. Solve open-ended problems and problems with well-defined solutions by formulating problems in precise terms, identifying key issues and trying different approaches in order to make progress.
2. Carry out an independent investigation using textbooks and other available literature, searching databases and interacting with colleagues and staff to extract important information.
3. Communicate effectively by listening carefully and presenting complex information in a clear and concise manner orally, in paper and using IT.
4. Use analytical skills, paying attention to detail and using technical language correctly, to manipulate precise and intricate ideas, to construct logical arguments.
5. Use IT skills for communication and analysis.
6. Work independently, use their initiative, organize themselves to meet deadlines, plan and execute an extended project
7. Work in groups, interacting constructively with others.

Entry Requirements	
Academic Requirement	Normally an upper second class (2:1) honours degree in Mathematics or a related subject from a UK university or equivalent.
Additional Requirements	The applicants are generally selected on the basis of their undergraduate performance; those showing evidence of aptitude for research will be preferred.
English Requirement	Standard requirements - IELTS 6.5 with no element below 6.0 (or equivalent)
Learning & Teaching Strategy	
Scheduled Learning & Teaching Methods	<ul style="list-style-type: none"> • Lectures • Tutorials • Problems classes • Seminars • Subject-specific reading groups • Exercises in scientific writing and scientific presentation
E-learning & Blended Learning Methods	N/A
Project and Placement Learning Methods	<ul style="list-style-type: none"> • Major Research Project
Assessment Strategy	
Assessment Methods	<ul style="list-style-type: none"> • Written examination • Coursework • Assignments • Reports • Literature review • Project plan • Oral presentation • Dissertation
Academic Feedback Policy	
<p>Any assessed coursework done as part of a module, will be marked promptly and returned to the student. Students are encouraged to discuss difficulties with the module lecturer. There is access to lecturers informally and through a formal 'office hours' system.</p> <p>On the project, students will meet their supervisor at least weekly to discuss their progress. They should choose advanced courses to complement their project, and discuss their work on these with their supervisor.</p>	

Re-sit Policy

The programme follows the College Academic and Examination regulations which permit re-entry to written examinations on one occasion. This will be at the next available opportunity (i.e. the following academic year).

For full details see:

- General Regulations
- Regulations for the award of Taught Master's Degrees, Postgraduate Diplomas and Postgraduate Certificates
- Regulations for the Examination of Master's Level Degrees

<http://www3.imperial.ac.uk/registry/proceduresandregulations/regulations>

Mitigating Circumstances Policy

The Department follows the College's [Academic and Examination Regulations](#) and [Mitigating Circumstances Policy and Procedures](#).

Programme Structure

Students take 3 elective (A) modules from a range of options. They then take a further 2 elective (B) modules from wider list of options – these are non-assessed and not for credit. Students spend much of the year working on a research project.

Full-time	Pre-session	Term One	Term Two	Term Three	Term Four
Core Modules	0	1	1	1	0
Elective Modules	0	1	1	0	0
Preliminary Report	0	1	0	0	0
Project	0	1			

Assessment Dates & Deadlines

Written Examinations	January, March, May or June
Coursework Assessments	Continuous A summary and critique of an academic paper – Week 9
Project Deadlines	Preliminary Report: March Dissertation: September
Practical Assessments	Oral presentation after submission of preliminary report. Oral presentation and exam after submission of final dissertation.

Assessment Structure		
Element (% Weighting)	Module	% Weighting
Taught	3 x module from elective group (A)	100%
	2 x modules from elective group (A/B)*	0%
Research	Research Project	100%
*The two additional modules taken from elective group A or B are not assessed and not for credit.		
Progression Rules		
A distinction in the MRes will result in progression to the PhD; otherwise progression is at the Examination Board's discretion.		
Marking Scheme		
<p>Pass:</p> <ul style="list-style-type: none"> In order to pass, a candidate must achieve at least 50 per cent in each element. <p>Merit:</p> <ul style="list-style-type: none"> In order to be awarded a result of a merit, a candidate must achieve at least 60 per cent in each element. Where appropriate, a Board of Examiners may award a result of merit where a candidate has achieved an aggregate mark of 60% or greater across the programme as a whole AND has obtained a mark of 60 per cent or greater in each element with the exception of one element AND has obtained a mark of 50 per cent or greater in this latter element. <p>Distinction:</p> <ul style="list-style-type: none"> In order to be awarded a result of distinction, a candidate must achieve at least 70 per cent in each element. Where appropriate, a Board of Examiners may award a result of distinction where a candidate has achieved an aggregate mark of 70 per cent or greater across the programme as a whole AND has obtained a mark of 70 per cent or greater in each element with the exception of one element AND has obtained a mark of 60 per cent or greater in this latter element. <p>Condonement Rules:</p> <p>Where appropriate, a Board of Examiners may condone any mark(s) between 40-50 in some individual assessments or modules provided the aggregate for that element is above 50%.</p>		

Module List											
Code	Title	Core/ Elective	L&T Hours	Ind. Study Hours	Place- ment Hours	Total Hours	% Written Exam	% Course -work	% Practi- cal	FHEQ Level	ECTS
M5MR1	Stochastic Integrals: An Introduction to Ito Calculus	Elective (A)	30	295	0	325	100%	0%	0%	7	13
M5MR4 (M5MF3)	Stochastic Processes	Elective (A)	40	285	0	325	100%	0%	0%	7	13
M5MR5 (M5MF5)	Advanced Methods in Derivative Pricing	Elective (A)	40	285	0	325	100%	0%	0%	7	13
M5MR7 (M5MF32)	Levy Processes: Theory and Applications	Elective (A)	40	285	0	325	100%	0%	0%	7	13
M5MR8 (M5MF2)	Simulation Methods for Finance	Elective (A)	40	285	0	325	100%	0%	0%	7	13
M5MR9 (M5MF35)	Dynamic Portfolio Theory	Elective (A)	30	295	0	325	100%	0%	0%	7	13
M5MR11	Stochastic differential equations	Elective (A)	30	295	0	325	100%	0%	0%	7	13
M5MR12	Markov Processes	Elective (A)	30	295	0	325	100%	0%	0%	7	13
M5MR13	Convex Analysis and Optimization	Elective (A)	30	295	0	325	100%	0%	0%	7	13
M5MR2	Advanced Topics in Stochastic Analysis: Regularity Structures	Elective (A)	25	300	0	325	100%	0%	0%	7	13
M5P7	Functional Analysis	Elective (B)	30	295	0	325	Not assessed			7	0

Module List

Code	Title	Core/ Elective	L&T Hours	Ind. Study Hours	Place- ment Hours	Total Hours	% Written Exam	% Course -work	% Practi- cal	FHEQ Level	ECTS
M3M3	Introduction to Partial Differential Equations	Elective (B)	30	295	0	325	Not assessed			7	0
	Elective options from London Graduate School in Mathematics and Finance	Elective (B)	Variable				Not assessed			7	0
	Research Project	Core	0	1275	0	1275	89%	11%	0%	7	51

Supporting Information

The Programme Handbook is available at:

<http://www.imperial.ac.uk/natural-sciences/departments/mathematics/study/students/mres/>

The Module Handbook is available at:

<http://www.imperial.ac.uk/naturalsciences/departments/mathematics/study/students/mres/>

The programme's competency standards documents can be found at: TBC

The College's entry requirements for postgraduate programmes can be found at:

<http://www3.imperial.ac.uk/entryrequirements/graduate>

Details of the College's pastoral care and welfare support are available at:

<http://www.imperial.ac.uk/students/student-support/>

Details of Departmental arrangements for pastoral care and welfare support is available at: TBC

The College's Quality & Enhancement Framework is available at:

<http://www3.imperial.ac.uk/registry/proceduresandregulations/qualityassurance>

The programme is consistent with the Qualifications Framework of the European Higher Education Area which is available at:

<http://www.ehea.info/Uploads/qualification/QF-EHEA-May2005.pdf>