

# UNIVERSITY OF YORK

## POSTGRADUATE PROGRAMME SPECIFICATION

This document applies to students who commence the programme(s) in:			October 2017		
Awarding institution			Teaching institution		
University of York			University of York		
Department(s)					
Mathematics					
Award(s) and programme title(s)			Level of qualification		
MSc in Statistics and Computational Finance			Level 7 (Masters)		
Award(s) available <i>only</i> as interim awards					
Postgraduate Diploma in Statistics and Computational Finance					
Postgraduate Certificate in Statistics and Computational Finance					
Admissions criteria					
The normal entry requirement is a second class honours degree in mathematics, statistics, economics, or equivalent, with a significant mathematical component. Although substantial prior knowledge of statistics is not essential, applicants must at least have studied first year Probability and Statistics modules. Applicants who have other qualifications or have studied overseas are welcome.					
Length and status of the programme(s) and mode(s) of study					
Programme	Length (years) and status (full-time/part-time)	Start dates/months (if applicable – for programmes that have multiple intakes or start dates that differ from the usual academic year)	Mode		
			Face-to-face, campus-based	Distance learning	Other
MSc in Statistics and Computational Finance	One year full time	1/October	Face-to-face, campus-based		
Language of study		English			
Programme accreditation by Professional, Statutory or Regulatory Bodies (if applicable)					
Educational aims of the programme(s)					
For the Masters, Diploma and Certificate:					
This programme aims to train students to work as professional statisticians at the interface between statistics and finance. It will equip students with contemporary statistical ideas and methodologies as well as advanced knowledge in computational finance, which will make students very competitive in financial industries					

<p>Additionally for the Diploma (if applicable):</p> <p>Students will have very solid training in the statistical methodologies and computational finance.</p>	
<p>Additionally for the Masters:</p> <p>Besides having very solid training in the statistical methodologies and computational finance, students successfully completing this MSc programme will also gain substantial experience in real data analysis as well as solving problems that arise in financial markets through their dissertations. Students with interest in academic work may also decide to continue on a PhD programme in Statistics or a related field, for which this MSc programme provides a sound foundation.</p>	
<p><b>Intended learning outcomes for the programme – and how the programme enables students to achieve and demonstrate the intended learning outcomes</b></p>	
<p><i>This programme provides opportunities for students to develop and demonstrate knowledge and understanding qualities, skills and other attributes in the following areas:</i></p>	<p><i>The following teaching, learning and assessment methods enable students to achieve and to demonstrate the programme learning outcomes:</i></p>
<p><b>A: Knowledge and understanding</b></p>	
<p>Knowledge and understanding of:  <i>For the Masters, Diploma and Certificate:</i>            1. Commonly used computational finance methods and statistical methodologies which are applicable not only to finance but also to other scientific areas where data analysis is needed</p> <p><i>Additionally for the Diploma:</i>            2. Advanced computational finance and statistical methodologies which are applicable not only to finance but also to other scientific areas where data analysis is needed.</p> <p><i>Additionally for the Masters:</i>            3. Advanced computational finance and statistical methodologies which are applicable not only to finance but also to other scientific areas where data analysis is needed.</p>	<p>Learning/teaching methods and strategies (relating to numbered outcomes):            (1,2,3). Teaching and learning methods include lectures, examples classes, practical classes, and discussion and news forums using the Departmental VLE (Moodle). Each core module and most options are taught by 2 hours of lectures with weekly problem or practical classes. Lectures are used to convey analytical frameworks, present empirical evidence and give perspectives of current developments in the subject and of open research questions. The small group activities are devoted either to seminar discussion of particular ideas or evidence-based exercises.            (4). We will provide a range of projects in the areas of statistics and computational finance. Each student will be closely supervised by a staff member via biweekly supervision meetings. Each student should select a topic and a supervisor in week 1, Spring term, and hand-in his/her preliminary plan to the supervisor for checking in week 4. The final dissertations should be submitted at the end of August/<a href="#">in accordance to University regulations</a>.</p>

<p>4.Real data analysis, statistical modelling in the particular topic selected in the dissertation; the interrelations between different methods and models in finance, together with experience of their use through dissertation.</p>	<p><b>Types/methods of assessment (relating to numbered outcomes)</b>  (1,2,3).The assessment methods contain weekly/fortnightly coursework exercises, closed book examinations, open book examinations, and oral presentations. All taught core modules will be assessed by closed book written exam, marked against the university postgraduate mark scale. Coursework will consist of problem questions, practical questions which may require using some software, and mini-projects. The assessment methods of the coursework and written exam are matched to the learning outcomes as follows: (a) subject knowledge is assessed through problems and practical questions that require either or both of knowledge of a topic and the ability to compare and evaluate different bits of knowledge and explore the application of knowledge to a new area;(b) analytical and theoretical skills are tested through unseen problem questions in the exams; (c) overall understanding of the subject area of a module is tested by questions set at a broad, open-ended level; (d) In other, including small, group activity students submit written work (mini-project reports and exercises) which is assessed and commented on, this assessment is solely a learning/feedback aid to students and teacher and does not form part of the examination process.</p> <ul style="list-style-type: none"> <li>• (4) Dissertations are marked by two members of staff, of whom the first will normally be the supervisor of the project. Each of them gives a class mark (First, II(i), etc) for each aspect of the dissertation, based on which to decide an overall mark between 0 and 100. The two markers then come together and agree a final mark for the dissertation. The dissertation may also be read by an external examiner, who can moderate the mark of the dissertation.</li> <li>• Detailed information on assessment is available in the written statement of assessment which applies to this programme and the relevant module descriptions. These are available in the student handbook and on the department's website:</li> </ul>
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<b>B: (i) Skills – discipline related</b>	
<p>Able to:</p> <p><i>For the Masters, Diploma and Certificate:</i></p> <ol style="list-style-type: none"> <li>1. Use commonly used statistical techniques and software to do data analysis, make sensible investments in financial markets, provide consultancy in financial investments, and effectively communicate independent works in both oral and written form.</li> </ol> <p><i>Additionally for the Diploma:</i></p> <ol style="list-style-type: none"> <li>2 Use advanced statistical techniques and software to do data analysis, make use of advanced computational finance methods to plan and make sensible and calculated investments in financial markets.</li> </ol> <p><i>Additionally for the Masters:</i></p> <ol style="list-style-type: none"> <li>3. Besides the skills stated above, students successfully completing this MSc programme will also be able to critically evaluate different statistical and/or econometric methods to find a suitable one for a given circumstance. Students should also be able to formulate and solve a small research problem and gain the skills of data assembly and analysis, and of writing up and presenting a substantial research report.</li> </ol>	<p>Learning/teaching methods and strategies (relating to numbered outcomes):</p> <p>(1,2,3) Lectures, research seminars, problem classes, computer classes, and small group presentations.</p> <p>(3) Each student progressing to the MSc prepares a supervised 10,000 word dissertation over the summer which is examined individually by internal examiners and an external examiner. The dissertation amounts to 60 credits. The dissertation can take various forms: the two most common are either the solution of a small, complete and well-defined theoretical problem or an application of statistics to finance. Minority forms of dissertation comprise a literature survey of a small field incorporating evaluation of alternative research both against each other and against the problem the research is trying to resolve or a statistical study where the nature of the problem or the data make statistical analysis more appropriate than naïve data analysis.</p>
	<p>Types/methods of assessment (relating to numbered outcomes)</p> <p>(1,2,3) Coursework and mini-projects or practical data analyses. Small group presentations are assessed by two members of staff.</p> <p>(3) Dissertations are assessed by two internals and are also read by an external examiner for potential adjustment.</p>
<b>B: (ii) Skills - transferable</b>	
<p>Able to:</p> <p><i>For the Masters, Diploma and Certificate:</i></p> <ol style="list-style-type: none"> <li>1. Think logically, and critically; analyse technical problems and solve such problems; work in a collegial environment, when required; work independently, when required;</li> </ol>	<p>Learning/teaching methods and strategies (relating to numbered outcomes):</p> <ul style="list-style-type: none"> <li>• Graded mini-project and course work, independent and group work in modules, problem or practical classes, group presentations, class presentations, mini-projects.</li> </ul>

<p>communicate coherently on both small and large scales, in written, spoken and graphical forms; gather information, both in electronic and printed form.</p> <p><i>Additionally for the Diploma:</i>  2. Think logically, precisely and critically; analyse technical problems and solve such problems; routinely use electronic means of transferring and manipulating data, from email and the world wide web to specialised computer packages and programs.</p> <p><i>Additionally for the Masters:</i>  3. Think logically, precisely and critically; analyse technical problems and solve such problems; routinely use electronic means of transferring and manipulating data, from email and the world wide web to specialised computer packages and programs.  4. Identify a credible research project suitable for completion within a time constraint. Plan and carry out the selected project.</p>	<p>Types/methods of assessment (relating to numbered outcomes)  (1,2,3) Assessed mini-projects, assignments, and oral presentations to groups. Mini-project writing  (4) Dissertation proposal, progress reports and public presentations.</p>
<p><b>C: Experience and other attributes</b></p>	
<p>Able to:  <i>For the Masters, Diploma and Certificate:</i></p> <p>1. Have experience in carrying out financial data analyses using statistical methods. Assess and filter information "on the fly", and make accurate records for</p>	<p>Learning/teaching methods and strategies (relating to numbered outcomes):</p> <p>1. Mini-projects and small group works.  2. Dissertation supervisions.</p>

<p>future reference;</p> <p>summarise and evaluate information presented in lectures, in a timely and reflective manner; participate constructively in small group learning.</p> <p><i>Additionally for the Diploma:</i></p> <p>2. appreciate and experience the processes of statistical discovery; routinely analyse and reflect on personal performance and achievement.</p> <p><i>Additionally for the Masters:</i></p> <p>3. appreciate and experience the processes of statistical discovery; routinely analyse and reflect on personal performance and achievement.</p> <p>4. Have experience in carrying out financial data analyses using statistical methods.</p>	<p>Types/methods of assessment (relating to numbered outcomes)</p> <ul style="list-style-type: none"> <li>• (1,2,3) Assessed mini-projects, assignments, and small group works.</li> <li>• (4) Assessed dissertations.</li> </ul>
<p><b>Relevant Quality Assurance Agency benchmark statement(s) and other relevant external reference points</b> (e.g. National Occupational Standards, or the requirements of Professional, Statutory or Regulatory Bodies)</p>	
<p>N/A</p>	
<p><b>University award regulations</b></p>	
<p>To be eligible for an award of the University of York a student must undertake an approved programme of study, obtain a specified number of credits (at a specified level(s)), and meet any other requirements of the award as specified in the award requirements and programme regulations, and other University regulations (e.g. payment of fees). Credit will be awarded upon passing a module's assessment(s) but some credit may be awarded where failure has been compensated by achievement in other modules. The University's award and assessment regulations specify the University's marking scheme, and rules governing progression (including rules for compensation), reassessment and award requirements. The award and assessment regulations apply to all programmes: any exceptions that relate to this programme are approved by University Teaching Committee and are recorded at the end of this document.</p>	
<p><b>Departmental policies on assessment and feedback</b></p>	
<p>Detailed information on assessment (including grade descriptors, marking procedures, word counts etc.) is available in the written statement of assessment which applies to this programme and the relevant module descriptions. These are available in the student handbook and on the Department's website: <a href="http://maths.york.ac.uk/www/ForPostgrads">http://maths.york.ac.uk/www/ForPostgrads</a></p>	
<p>Information on formative and summative feedback to students on their work is available in the written statement on feedback to students which applies to this programmes and the relevant module descriptions. These are available in the student handbook and on the Department's website:</p>	

**Diagrammatic representation of the programme structure, showing the distribution and credit value of core and option modules**

**Masters (Core modules)**

Autumn term	Spring term	Summer term	Summer vacation
Advanced Regression Analysis (20)	Financial Time Series (10)	Dissertation (60)	
Portfolio Theory and Risk Management (10)	Advanced Multivariate Analysis (10)		
Computational Finance (10)			

**Additional core modules under Pathway A**

Autumn term	Spring term	Summer term	Summer vacation
Mathematical Methods of Finance (20)	Stochastic Calculus and Black-Scholes Theory (20)		

**Additional core modules under Pathway B**

Autumn term	Spring term	Summer term	Summer vacation
Stochastic Processes (10)	Mathematical Finance II (10)		
	Statistics for Insurance (10)		
Statistical Modelling with Practical Data Analysis in R (10)			

**Optional modules under Pathway A**

Autumn term	Spring term	Summer term	Summer vacation
Stochastic Processes (10)	Statistics for Insurance (10)		
Bayesian Statistics (10)	Credit Risk (10)		
	Survival Analysis (10)		
Statistical Modelling with Practical Data Analysis in R (10)			
C++ Programming with Applications in Finance (10)			

**Optional modules under Pathway B**

Autumn term	Spring term	Summer term	Summer vacation
Bayesian Statistics (10)	Survival Analysis (10)		
C++ Programming with Applications in Finance (10)			

**Postgraduate Diploma (if applicable)**

Autumn term	Spring term	Summer term	Summer vacation
120 credits from core and optional Masters modules			

**Postgraduate Certificate**

Autumn term	Spring term	Summer term	
60 credits from core and optional Masters modules			

**Diagrammatic representation of the timing of module assessments and reassessments, and the timing of departmental examination/progression boards**

Autumn term	Spring term	Summer term	Summer vacation	Date of final award board
Bayesian Statistics Assessment in Spring term; reassessment in Summer vacation	Financial Time Series Assessment in Summer term; reassessment in Summer			November
Advanced Regression Analysis Assessment in Spring term; reassessment in Summer	Survival Analysis Assessment in Summer term; reassessment in Summer			
Stochastic Processes Assessment in Spring term; reassessment in Summer	Advanced Multivariate Analysis Assessment in Summer term; reassessment in Summer			
Mathematical Methods of Finance Assessment in Spring term; reassessment in Summer	Stochastic Calculus and Black-Scholes Theory Assessment in Summer term; reassessment in Summer			
Portfolio Theory and Risk Management Assessment in Spring term; reassessment in Summer	Mathematical Finance II (M-level) Assessment in Summer term; reassessment in Summer			
Computational Finance Assessment in Summer term; reassessment in Summer	Statistics for Insurance: assessment in Summer term; reassessment in Summer			
	Credit Risk: assessment in Summer term; reassessment in Summer			
Statistical Modelling with Practical Data Analysis in R: some assessment in Autumn, some in Spring; reassessment in Summer	Statistical Modelling with Practical Data Analysis in R: some assessment in Autumn, some in Spring; reassessment in Summer			
C++ Programming with Applications in Finance some assessment in Autumn and Spring, main assessment(s) in Summer; reassessment in Summer	C++ Programming with Applications in Finance some assessment in Autumn and Spring, main assessment(s) in Summer; reassessment in Summer			



## Overview of modules

### Modules table

Module title	Module code	Credit level <sup>1</sup>	Credit value <sup>2</sup>	Prerequisites	Assessment rules <sup>3</sup>	Timing (term and week) and format of main assessment <sup>4</sup>	Independent Study Module? <sup>5</sup>
Advanced Regression Analysis	MAT00042M	M	20			Spring, week 1, 3h closed written exam	No
Portfolio Theory and Risk Management	MAT00032M	M	10			Spring, week 1, 2h closed written exam	No
Financial Time Series	MAT00041M	M	10			Summer, week 5-7, 2h closed written exam	No
Stochastic Calculus and Black-Scholes Theory	MAT00028M	M	20	Mathematical Methods of Finance		Summer week 5-7, 3h closed written exam	No
Advanced Multivariate Analysis	MAT00040M	M	10			Summer, week 5-7, 2h closed written exam	No
Computational Finance	MAT00069M	M	10			Summer, week 5-7, 2h closed written exam	No

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The **credit level** is an indication of the module's relative intellectual demand, complexity and depth of learning and of learner autonomy. Most modules in postgraduate programmes will be at Level 7/Masters. Some modules are permitted to be at Level 6/Honours but must be marked on a pass/fail basis. See University Teaching Committee guidance for the limits on Level 6/Honours credit.

<sup>2</sup> The **credit value** gives the notional workload for the module, where 1 credit corresponds to a notional workload of 10 hours (including contact hours, private study and assessment)

<sup>3</sup> **Special assessment rules** (requiring University Teaching Committee approval)

P/F – the module is marked on a pass/fail basis (NB pass/fail modules cannot be compensated)

NC – the module cannot be compensated

NR – there is no reassessment opportunity for this module. It must be passed at the first attempt

<sup>4</sup> AuT – Autumn Term, SpT – Spring Term, SuT – Summer Term, SuVac – Summer vacation

<sup>5</sup> **Independent Study Modules** (ISMs) are assessed by a dissertation or substantial project report. They cannot be compensated (NC) and are subject to reassessment rules which differ from 'taught modules'. Masters programmes should include an ISM(s) of between 60 and 100 credits. This is usually one module but may be more.

Mathematical Methods of Finance	MAT00020M	M	20			Spring, week 1, 3h closed written exam	No
Mathematical Finance II	MAT00074M	M	10			Summer, week 5-7, 2h closed written exam	No
Statistics & Computational Finance Dissertation	MAT00043M	M	60		Marginal fails can be reassessed (university regulations)	Submitted at end of August/in accordance to University regulations	Yes
C++ Programming with Applications in Finance	MAT00021M	M	10			Open Book Exam Summer week 5-7	No
Survival Analysis	MAT00039M	M	10			Summer, week 5-7, 2h closed written exam	No
Stochastic Processes	MAT00030H	M	10			Spring, week 1, 2h closed written exam	No
Bayesian Statistics	MAT00003H	H	10		P/F	Spring, week 1, 2h closed written exam	No
Statistical Modelling and Practical Data Analysis in R	MAT00068M	M	10		2 Coursework projects with presentations during Autumn and Spring terms		No
Credit Risk	MAT00067M	M	10	Stochastic Calculus & Black Scholes Theory		Summer, week 5-7, 2hr closed written exam	No
Statistics for Insurance	MAT00061M	M	10			Summer, week 5-7, 2h closed written exam	No

Transfers out of or into the programme	
Exceptions to University Award Regulations approved by University Teaching Committee	
Exception	Date approved
Quality and Standards	
<p>The University has a framework in place to ensure that the standards of its programmes are maintained, and the quality of the learning experience is enhanced.</p> <p>Quality assurance and enhancement processes include:</p> <ul style="list-style-type: none"> <li>• The academic oversight of programmes within departments by a Board of Studies, which includes student representation</li> <li>• The oversight of programmes by external examiners, who ensure that standards at the University of York are comparable with those elsewhere in the sector</li> <li>• Annual monitoring and periodic review of programmes</li> <li>• The acquisition of feedback from students by departments.</li> </ul> <p>More information can be obtained from the Academic Support Office:  <a href="http://www.york.ac.uk/about/departments/support-and-admin/academic-support/">http://www.york.ac.uk/about/departments/support-and-admin/academic-support/</a></p> <p>Departmental Statements on Audit and Review Procedures are available at:  <a href="http://cms.york.ac.uk/terminalfour/SiteManager?ctfn=publish&amp;fnno=30&amp;sid=32825">http://cms.york.ac.uk/terminalfour/SiteManager?ctfn=publish&amp;fnno=30&amp;sid=32825</a></p>	
<b>Date on which this programme information was updated:</b>	August 2017
<b>Departmental web page:</b>	<a href="https://www.york.ac.uk/maths/">https://www.york.ac.uk/maths/</a>
<p><b>Please note</b></p> <p>The information above provides a concise summary of the main features of the programme and learning outcomes that a typical students might reasonably be expected to achieve and demonstrate if he/she takes full advantage of the leaning opportunities that are provided.</p> <p>Detailed information on learning outcomes, content, delivery and assessment of modules can be found in module descriptions.</p> <p>The University reserves the right to modify this overview in unforeseen circumstances, or where processes of academic development, based on feedback from staff, students, external examiners or professional bodies, requires a change to be made. Students will be notified of any substantive changes at the first available opportunity.</p>	