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The MSc Financial Mathematics programme is fast paced. It is stimulating and intellectually demanding and you should be prepared to work on multiple projects/ assignments at a time under tight deadlines.

I would recommend this programme to people with a strong mathematics background and who have an interest in the finance industry. My advice to prospective students is start learning Matlab now, if you are not already familiar with it, since it is the main programming language used for this MSc.

At Exeter, I not only received the finest training available, but I also studied in an environment that encouraged my best work.

**RAPHEAL KARIKARI**  
**GHANA**

## WHY STUDY FINANCIAL MATHEMATICS AT EXETER?

- **Taught in collaboration with the University of Exeter Business School**
- **Ranked 1st in the UK for Accounting and Finance in the National Student Survey (2008)\* and received the highest satisfaction rating of any subject**

*\*based on average of positive responses across all survey categories for full service universities (ie, excluding specialist colleges)*

Quantitative financial methods are one of the fastest growing areas of the present day banking and corporate environments. The solution by Black, Scholes and Merton of the option pricing problem set off a revolution in finance resulting in the introduction of sophisticated mathematical techniques in the financial markets and corporate planning. To understand, apply and develop these sophisticated methods requires a good understanding of both advanced mathematics and advanced financial theory.

By combining the financial expertise in the University of Exeter Business School with expertise in the Mathematical Research Institute of the Mathematics Department at the University, this intensive MSc programme will prepare you for careers in areas such as international banking or international business. For those with a strong mathematical background, who wish to pursue a finance career, this programme forms an ideal introduction to this exciting field.

You will be allocated a Personal Tutor who is available for advice and support throughout your studies. You will also receive individual mentoring whilst undertaking your research project. There is also a Postgraduate Tutor available to help with further guidance and advice, as well as dedicated employability support.

Along with the other MSc programmes run by the University of Exeter Business School, the MSc in Financial Mathematics is offered over nine months, so that graduates are released into the world of work three months ahead of Masters degrees in other universities.

# Financial Mathematics



**KEY FACTS**

**MSc in Financial Mathematics**

**Duration** 9 months full-time

**Start-date** October

**Entry requirements** A good honours degree (the equivalent of a UK upper second classification) in mathematics, science, engineering or in an economics related subject with a substantial mathematical component. Applications are considered individually on merit. All international students whose first language is not English will need to satisfy our English Language requirements; for further information see the Postgraduate Prospectus at: [www.exeter.ac.uk/postgraduate](http://www.exeter.ac.uk/postgraduate)

**Fees (2009/10)** UK/EU students: £8,250; International students: £12,750

**Funding opportunities** The School offers scholarships to University of Exeter graduates; visit [www.exeter.ac.uk/secam/scholarships](http://www.exeter.ac.uk/secam/scholarships) for full details. There are also University Scholarships including Full Fee Masters Scholarships, British Council Fellowships and Awards and Foreign and Commonwealth Scholarships. Visit [www.exeter.ac.uk/scholarships](http://www.exeter.ac.uk/scholarships) for further information.

## Programme aims

- To provide you with a broad and balanced body of quantitative and economic theories which underpin modern financial models and strategies;
- To generate the ability to understand, evaluate and construct quantitative models of various financial phenomena;
- To prepare you for further research and for employment in the area of financial mathematics;
- To provide you with a broad knowledge of mathematical theories applicable to finance, giving you scope for further research in areas such as stochastic processes and probability models; chaotic dynamical systems and control theory; and climate systems and risk management.

## Programme outcomes

As a successful graduate of the programme you will be able to:

- Identify relevant research questions in the area of finance;
- Demonstrate a theoretical understanding of the mathematical models that underpin finance;
- Apply an understanding of statistical and probabilistic techniques including a range of numerical techniques;
- Design, perform, analyse and interpret research based upon financial data sets.

## Programme overview

This programme is intended for students with a strong mathematical background – typically a first degree in mathematics, physical science, engineering, or a related subject – wishing to apply advanced mathematical techniques within a career in finance.

You will obtain a thorough understanding of the mathematical modelling techniques which are applied to problems in mathematical finance, such as option pricing, while developing your ability to apply modern econometric techniques to economic and financial data.

You can learn about various aspects of the financial markets and the wide variety of financial instruments traded there, the management and valuation of portfolios, the capital structure of a firm and the issues of raising capital, financing of debt and risk management in a corporate setting.

A unique advantage of this programme is the University's link to the Met Office. The programme offers you the chance to work on a project involving climate and its influence on financial markets, including insurance risk.

## Programme structure

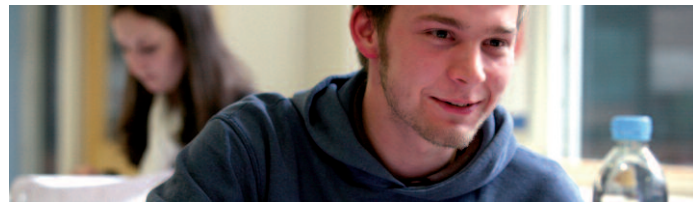
### CORE MODULES

**Advanced Econometrics**

This module provides a deep and sound knowledge of modern econometric concepts and techniques. You will be introduced to the probabilistic foundations and discuss the advanced theory of estimation and inference. Various special topics will also be covered.

**Analysis and Computation in Finance**

This module aims to provide an understanding of modern methods of numerical approximation and financial modelling. Computer packages such as Matlab are playing an increasing role in solving the models arising from theoretical ideas in mathematical finance. Using Matlab, you will develop practical skills in the use of computers in financial modelling.



### **Fundamentals of Financial Management**

This module will take you through an appraisal of models and issues arising in the area of financial management. You will be introduced to finance theory and financial management, including techniques for capital budgeting, the role of risk in capital budgeting and the cost of capital. You will also cover the topic of financial markets, including the notion of portfolio diversification, leading to simple asset pricing models. The module analyses models and evidence relating to a firm's optimal capital structure and appropriate dividend policy.

### **Investment Analysis I**

The principal function of this module is to ensure that you are able to critically review the tools available for security valuation, synthesise empirical research literature and evaluate the usefulness of financial ratios and security analysis. Particular attention will be paid to the extension of these tools to the valuation of multinational companies and to the comparison of companies in an international setting. As explained in the Research Project outline below, this module is only compulsory for those choosing to undertake a project in finance.

### **Mathematical Theory of Option Pricing**

This module applies the mathematical and computational skills gained from previous modules to a central problem in finance, that of option pricing. You will gain an understanding of the theoretical assumptions on which the mathematical models underlying option pricing depend and of the methods used to obtain analytic or numerical solutions to a variety of option pricing problems.

### **Methods for Stochastics and Finance**

The module aims to engender an understanding of the mathematics useful for the theory of financial modelling and financial derivatives. It will also develop your mathematical ability and reasoning skills.

### **Research Methodology**

Good investigative research is a difficult skill involving the framing of research goals and investigative plans as well as critical evaluation of previously published results.

This module explicitly addresses research planning and critical assessment in the context of your own research project, introducing you to independent, supervised, research at postgraduate level. As explained in the Research Project outline below, this module is only compulsory for those choosing to undertake a project in financial mathematics.

### **Research Methods for Finance and Accounting**

This module provides you with the methodological foundations of quantitative business research. It introduces a number of financial databases and research methods commonly used in finance and investment and will prepare you to undertake research projects in the area of finance and/or accounting. As explained in the Research Project outline below, this module is only compulsory for those choosing to undertake a project in finance.

### **Research Project**

You can opt either to undertake a project in Financial Mathematics or in Finance. If you wish to research a finance topic you will take three compulsory 15-credit modules – Research Methods for Finance and Accounting, Investment Analysis I and Investment Analysis Project – plus one option module worth 15-credits. Those opting for the financial mathematics topic will take a 15-credit Research Methodology module and the 45-credit Financial Mathematics Project.

Previous topics have included:

- Simulation of Bond Prices
- Optimisation with Conditional Value-at-Risk
- Investment Analysis on UK Oil Industry
- Simulation of Interest Rate Models
- Stochastic Numerical Schemes
- Game Theory and its Economic/Financial Applications
- Evolutionary Game Theory

### **OPTION MODULES**

#### **Advanced Finance Theory**

This module provides you with a deep understanding of the theory of finance and its applications and is essential for those undertaking research in this area.

#### **Advanced Topics in Statistics**

This module provides an opportunity to study in depth one or more areas in

modern statistics and its applications. The topics covered vary from year to year.

### **Corporate Finance**

This module examines analytical developments in core areas of debate such as investment appraisal, cost of capital and its measurement, capital structure, investment as a 'real' option, taxation impacts, corporate governance and international finance.

### **Derivatives Pricing**

This module will equip you with theoretical frameworks and numerical methods to evaluate derivative financial instruments in the equity and interest rate market. It covers the analysis of the Black and Scholes model and the numerical methods to price derivatives in the equity market. The module will also introduce various interest rate options and models commonly used to price these products.

### **Dynamical Systems and Chaos**

In this module you will explore qualitative and asymptotic methods for solving non-linear ordinary differential equations. The phenomena studied occur in many physical systems of interest.

### **Pattern Recognition**

This module provides a thorough grounding in the theory and application of pattern recognition, classification, categorisation, and concept acquisition. Neural networks and graphical models are flexible tools for modelling data which can be employed, in a principled statistical way, in pattern recognition schemes. You will use neural networks, graphical models and related methods to analyse and solve real problems. Symbolic algorithms are introduced for extracting knowledge from large data sets of patterns (data mining techniques, Hidden Markov Models) where it is important to have explicit rules governing pattern recognition. Problems of coping with noisy and/or missing data as well as temporal and sequential patterns are addressed.

### **Principles of Finance**

This module provides a foundation in financial theory, focusing on the theory of investment management, and introduces the most widely cited empirical research. The tools of modern finance theory are now widely employed throughout the investment community and understanding of these tools is a pre-requisite for a



successful career in finance, whether as a fund manager, investment analyst or financial advisor.

### **Quantitative Research Techniques I**

This module provides the necessary econometric and methodological research tools to equip you to carry out future research projects and set up and estimate econometric models. While part of the module is dedicated to an introduction to econometric theory, an equally important section is dedicated to the application of various econometric methods and techniques to real life problems.

*As the programme continues to develop, module options may change. This is only an indicative list; please visit our website for the latest information.*

### **Learning methods and academic support**

The taught element of the programme takes place between October and May and is arranged into two 12-week teaching semesters. Teaching is by lectures, example classes, computer classes, tutorials, set work, project work, reading and self-study. The exact form and number of the lectures and tutorials varies from module to module and is chosen according to the material to be covered. You will use the computer programming language Matlab and online financial databases such as Bloomberg and Datastream.

You will be allocated a Personal Tutor who is available for advice and support throughout your studies, along with support and mentoring from graduates who are now placed in industry. There is also a Postgraduate Tutor available to help with further guidance and advice.

### **Research**

The production of innovative research of an international standard is central to the mission of the **University of Exeter Business School**. In the last national Research Assessment Exercise in 2008, the Finance and Accounting departments within the School were ranked 2nd in the UK for world leading and internationally excellent research\*. Finance research is concentrated within the Xfi Centre for Finance and Investment. The Centre

provides financial professionals and global financial institutions with practical business solutions through the work of leading academics and practitioners.

The **Mathematics Research Institute**, within the School of Engineering, Computing and Mathematics, brings together our international quality research in various areas of pure and applied mathematics, in particular climate and environmental modelling, geophysical and astrophysical fluid dynamics, dynamical systems and control, and number theory. This Institute also forms the core of our increasingly close collaborations with the UK Met Office, who jointly fund three professorships in mathematics (Professors Cox, Stephenson and Thuburn). In the 2008 RAE the fluids, dynamical systems and climate groups were singled out as being very strong, with our partnership with the Met Office considered a particular strength.

### **Postgraduate facilities and resources**

The School provides a warm, friendly and supportive atmosphere. The close personal contact between staff and students contributes to a highly productive and well-organised research environment.

The School has excellent teaching and research resources and has recently invested £2.8 million into providing new academic and social facilities. You will have access to the School's fully-equipped research centres, comprehensive laboratories and workshops and computer facilities including wireless networking in most areas. The School has a brand new study area with core texts for courses, individual rooms for study groups to meet, and wireless connection for laptops and LCD TVs to display presentations.

Our Research Institutes offer weekly seminars which provide invaluable insights into current research and related work as well as a place to meet staff and other students. There are also a range of extra-curricular activities organised by students, student societies and the Research Institutes that provide an opportunity to meet students and staff in more informal settings.

### **International students**

We pride ourselves on making our international students feel welcome and at home, with tutors offering guidance and support. International students appreciate Exeter's safe location and friendly atmosphere.

There is a thriving international student community of some 2,000 students from over 100 countries. There is a full-time International Student Adviser to help with welfare and visa issues. The INTO University of Exeter Centre provides courses for students who need to improve their English before starting a degree and free tuition during term-time. For further information visit [www.exeter.ac.uk/international](http://www.exeter.ac.uk/international)

Under the Post Study Work Scheme, international students who have graduated from one of our postgraduate programmes may be able to remain and work in the UK for up to 24 months after notification of their results. Students who wish to take advantage of the Scheme are encouraged to contact the University's Careers and Employment Service after they arrive at Exeter to discuss employment possibilities.

### **Employment**

The programme prepares you for a career in financial modelling within financial institutions themselves and within other sectors. It builds upon the success of Exeter's well-established range of Masters programmes in Finance and related areas, many of whose graduates now hold senior positions in areas such as corporate financial strategy, financial planning, treasury and risk management and international portfolio management.

With the strong links between the School of Engineering, Computing and Mathematics and the Met Office, the course also prepares you for career opportunities within reinsurance and credit risk management, especially in the development of financial models that rely on weather/climate systems.

\*RAE 2008 based on percentage of research categorised as 4\* and 3\*



## Why choose Exeter?

### A top 15 research-led university

- The University of Exeter is ranked 13th in the *Times* and 14th in the *Guardian* and *Sunday Times* 2008 league tables. Nearly 90 per cent of Exeter's research was rated as being at internationally recognised levels in the 2008 Research Assessment Exercise. Sixteen of our 31 subjects are ranked in their respective top 10, with 27 in their respective top 20. Every subject was assessed as including world-leading (4\*) research.\*
- In the last year, £51 million was invested in research and the value of new research grants and contracts rose by 49 per cent.
- Exeter receives significant funding from the Research Councils. We are in the top 12 UK universities for receipt of research awards from the Arts and Humanities Research Council and in the top 15 for awards from the Economic and Social Research Council.

### Dedicated support and training

- We invest £4.5 million per year in scholarships and financial support for postgraduates.
- Our employment rates for postgraduates are above the national average;\*\* 97 per cent of postgraduates who graduated in 2006/7 entered employment or further study.\*\*\*
- The Postgraduate Centre on the Streatham Campus offers purpose-built study and leisure facilities, including a 24-hour computer room, lounges, seminar room, bar and dining room.
- The Postgraduate Union (PGU) represents postgraduates across the University, organising the

Postgraduate Forum which gives students the opportunity to provide feedback, as well as social events. Postgraduates are well represented on the Guild's award-winning media and wide range of clubs and societies. Each October, there is a Welcome Week specifically designed for new postgraduates.

### Investment in student and research facilities

- We are near to completing a £140 million investment programme in new buildings and facilities, ranging from dedicated postgraduate study facilities and new research centres to the Students' Guild building and nightclub.
- The University is now looking to the future with a planned £450 million investment in campus facilities by the end of the next decade. This will include a £40 million redevelopment of the centre of the Streatham Campus and a new £45 million INTO Centre for international students.
- Exeter's expenditure on library books, journals and electronic resources is 35 per cent above the national average in terms of spend per full-time student.\*\*\*\*
- An £8 million development programme has given Exeter some of the best sports facilities in the country. New indoor tennis facilities to LTA standards opened in 2004 on the Streatham Campus, making Exeter one of only nine UK universities to have such facilities. A new £2 million cricket centre will open in spring 2009.

### An exceptional location

- The Streatham Campus in Exeter is one of the most beautiful in the country.
- A safe, student-friendly city within walking distance of both campuses, Exeter is consistently rated one of the best places to live in the UK for the quality of its facilities and low crime rate. For those looking to escape city life, sandy beaches, moorland and some of the most stunning countryside in Britain are all just a short journey away.
- No longer the 'sleepy cathedral town', Exeter is booming economically and culturally but without losing its human scale and relaxed ambience. Large companies like the Met Office are choosing to relocate and there are major developments in shopping, leisure and nightlife in the city centre, including a £200 million new retail centre. Exeter ranks joint 8th (just behind Brisbane, Shanghai, Sydney and London) in a worldwide study of promotion of inward investment and was voted 2nd best place for retail therapy in the UK outside London (Yellow Pages survey, 2007).

\* based on percentage of research categorised as 3\* and 4\* (internationally excellent or world leading)

\*\* HESA 2005/6

\*\*\* Figures at Jan 2008 as a percentage of Home Full-time graduates available for employment or further study

\*\*\*\* LISU/SCONUL figures, 2006/7



## Application procedure

You can apply online via the programme page on our website at [www.exeter.ac.uk/postgraduate](http://www.exeter.ac.uk/postgraduate)

Further information on application procedures can be found at [www.exeter.ac.uk/postgraduate/admissions](http://www.exeter.ac.uk/postgraduate/admissions)



## Useful contacts

### **School of Engineering, Computing and Mathematics**

Telephone: +44 (0)1392 263624

Email: [t.albutt@exeter.ac.uk](mailto:t.albutt@exeter.ac.uk)

[www.exeter.ac.uk/secam](http://www.exeter.ac.uk/secam)

### **Postgraduate admissions**

Telephone: +44 (0)1392 263316

Email: [pg-ad@exeter.ac.uk](mailto:pg-ad@exeter.ac.uk)

### **Information for international students**

Telephone: +44 (0)1392 263405

Email: [intoff@exeter.ac.uk](mailto:intoff@exeter.ac.uk)

[www.exeter.ac.uk/international](http://www.exeter.ac.uk/international)

### **University accommodation**

[www.exeter.ac.uk/postgraduate/accommodation](http://www.exeter.ac.uk/postgraduate/accommodation)

### **Fees and finance**

[www.exeter.ac.uk/postgraduate/money](http://www.exeter.ac.uk/postgraduate/money)

This document forms part of the University's Postgraduate Prospectus. Every effort has been made to ensure that the information contained in the Prospectus is correct at the time of going to press. However, the University cannot guarantee the accuracy of the information contained within the Prospectus and reserves the right to make variations to the services offered where such action is considered to be necessary by the University. For further information, please refer to the Postgraduate Prospectus (available at [www.exeter.ac.uk/pgp/disclaimer](http://www.exeter.ac.uk/pgp/disclaimer)).