



BSc. in Financial Mathematics & Economics

Fourth Year Courses

SEMESTER I

Code	Course title	Hours per week	Credits
MA 385	Numerical Analysis	2	5
MA 490	Measure Theory	2	5
MA 495	Actuarial Mathematics II: Life Contingencies	2	5
EC 410	Seminar in Econ. of Financial Markets: Financial Theory	2	5
EC/MA 471	Project (runs over Semester I)		10
	Total	8	30

SEMESTER II

MA 418	Differential Equations with Financial Derivatives	2	5
CS 423	Neural Networks	2	5
MA 494	Stochastic Processes	2	5
MP 491	Non Linear Systems	2	5
EC 420	International Monetary Economics	2	5
EC 410	Seminar in Econ. of Financial Markets: Derivatives	2	5
	Total	12	30

MA385 Numerical Analysis I

The design, analysis and implementation of numerical systems.

MA490 Measure Theory

The Lebesgue integral: the deficiencies of the Riemann integral, Lebesgue measure, measurable functions, the Lebesgue integral. Convergence theorems, functions of bounded variation and absolutely continuous functions, Vitali's Covering Theorem, integration and differentiation. General measure and integration theory: outer measures, measures, measurable functions, modes of convergence.

MA495 Actuarial Mathematics II: Life Contingencies

Life Assurance contracts, life annuity contracts, the life table.

EC410 Seminar in Economics of Financial Markets: Financial Theory

Introduces the basic economic-theoretic underpinnings of the theories of finance and use these basic principles to understand the complexities of the financial markets.

EC471 or MA471: Final Year Project

Students choose a project in mathematics, economics, statistics or finance in consultation with an assigned supervisor. This gives students the opportunity to gain more knowledge of an area that interests them and to get experience of doing their own research and independent work.

MA418 Differential Equations with Financial Derivatives

Introduction to Continuous Stochastic Processes. General probability spaces and information structures. The Wiener process. Stochastic processes as solutions of Stochastic Differential Equations. Ito process, Ito's lemmas an analogue of the chain rule. Application to the Black-Scholes Model. Derivation of the Black-Scholes Partial Differential Equation.

CS423 Neural Networks

Training and optimization. Perceptrons, linear and sigmoid neurons. Single and multi layer networks. Various architectures. Model Identification Non-linear time series, parameter estimation and predictions.

MA494 Stochastic Processes

Markov Chains (discrete time); hitting times; transition matrix; martingales; two-state birth and death process; Poisson process; birth and death chain; particles in a box.

MP491 Non Linear Systems

Non-linear stability and phase plane methods. Chaotic dynamical systems, bifurcation theory, period doubling and strange attractors. Models with chaotic behaviour in mechanics, economics and financial systems are studied mathematically and computationally.

EC320 International Monetary Economics

This course aims to introduce students to international economic transactions, as summarised in the balance of payments. Having taken the course, students should be in a position to follow contemporary discussion of exchange rates, the current account, and the overall balance of payments, and to appreciate the impact of policy changes on such variables.

EC410 Seminar in Economics of Financial Markets: Derivatives

This course is an introduction to modern derivatives pricing and risk management. We begin by exploring the basic features of futures, swaps and options, emphasising economic intuition and understanding over detailed quantitative analysis, although important quantitative techniques and arguments are developed. We use the insights developed in these topics to examine some recent applications of derivatives, including Value-at-Risk (VaR) and credit derivatives.