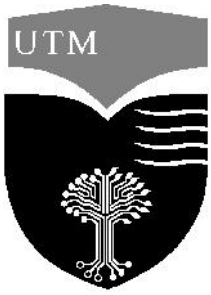

UNIVERSITY of TECHNOLOGY, MAURITIUS

School of Innovative Technologies and Engineering

Department of Applied Mathematical Sciences

MSc Financial Engineering

PROGRAMME DOCUMENT

VERSION 2.3
MFE v2.3
December 2014

University of Technology, Mauritius
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MSc FINANCIAL ENGINEERING

A. Programme Information

The financial sector is a dynamic industry involving much uncertainty and requires proper analytical and practical knowledge for efficient productivity. This Master degree is intended to provide students with the necessary understanding in financial data analysis, risk management, quantitative research, forecasting and efficient decision making, and financial information technology. The programme is designed as an intensive two-semester (full-time mode) or three-semester (part-time mode) programme to adequately empower students for effective lending of their abilities in the quantitative financial industry.

B. Programme Aims

The MSc Financial Engineering course has been designed to train students so that they can join the following fields/areas:

- Risk Analysis in Insurance and Banking Sectors
- Financial Engineering
- Stock Exchange

In addition, this degree programme will prepare the students for further studies for either an MPhil/PhD thus leading to careers as researchers in the field of finance and risk analysis or to undertake professional examinations to become Chartered Financial Analyst, CFA.

C. Programme Objectives

After successful completion of the programme, the students are expected to have developed

- considerable knowledge of the main numerical techniques used in quantitative finance
- an understanding of modern econometric techniques used in the analysis of financial time series
- an understanding of risk management tools and derivatives pricing and hedging methodologies, used in the financial sector
- an understanding of the principal stochastic differential equations that are used in derivative modelling and other areas of quantitative finance
- knowledge to apply optimization models, methods and software to solve problems in computational finance efficiently and accurately
- Knowledge of computer packages for financial applications

PART I - Regulations

D. General Entry Requirements

As per UTM'S Admissions Regulations, and 'Admission to Programmes of Study at Master's Degree Level'

E. Programme Entry Requirements

At least an Honours Degree with significant content of Mathematics.

For instance, a honours degree in Computer Science, Engineering, Accounting, Economics or Finance, or other qualifications (academic or professional) acceptable to the University of Technology, Mauritius

F. Programme Mode and Duration

Full Time:	1 Year (2 semesters)
Part Time:	1½ Years (3 semesters)

G. Teaching and Learning Strategies

- Lectures, Tutorials and Practical Laboratory Sessions
- Structured Discussions and Self-Directed Study
- Workshops and Seminars

H. Attendance Requirements

As per UTM's Regulations and Policy

I. Credit System

1 module	= 3 or 4 credits
Master Project	= 12 credits

J. Student Progress and Assessment

The programme is delivered mainly through lectures, tutorials, and practical laboratory sessions. Students are expected to be as autonomous and research oriented as possible and activities may include reading research papers, delivering presentations, taking part in quizzes, case-studying amongst others.

Each module carries 100 marks and unless otherwise specified, will be assessed as follows:
Written and / or practical examination, and continuous assessment carrying up to 40% of total marks. Continuous assessment can be based on a combination of assignments, field study, workshops, practical and class tests.

Modules 'Mathematics for Finance', 'Numerical Methods for Finance' and 'Portfolio Management and Asset Allocation' will be assessed by 100% coursework. The courseworks must consist of a minimum of one class test and one assignment.

K. Evaluation of Performance

The percentage mark contributes a 100 percent weighting towards the degree classification.

Module grading structure:

Grade	Marks x (%)
A	$70 \leq x$
B	$60 \leq x < 70$
C	$50 \leq x < 60$
D	$40 \leq x < 50$
F	$x < 40$
A-D	Pass
F	Fail

L. Award Classification

Overall weighted mark x (%)	Classification
$70 \leq x$	MSc with Distinction
$60 \leq x < 70$	MSc with Merit
$40 \leq x < 60$	MSc
$x < 40$	No Award

Minimum Credits Required for Award of:

Master's Degree:	42
Postgraduate Diploma:	30
Postgraduate Certificate:	18

M. Programme Organisation and Management

Programme Director: Dr Arshad Ahmud Iqbal PEER

Contact Details:

- Telephone Number: (+230) 207 52 50, Ext. 312
- Email: apeer@umail.utm.ac.mu

Part II - Programme Structure

N. MSc Financial Engineering – Full Time (Version 2.3)

Semester 1				*Semester 2*			
Code	**Modules**	**L+T/P**	**Credits**	**Code**	**Modules**	**L+T/P**	**Credits**
QFIN 5115C	*Financial Systems*	2+1	3	QFIN 5117C	*Hedging*	2+1	3
QFIN 5211C	*Mathematics for Finance*	2+2	4	STAT 5335C	*Financial Econometrics Modelling*	2+2	4
MATH 5330C	*Stochastic Calculus for Finance*	2+2	4	QFIN 5118C	*Financial Risk Management*	2+2	4
QFIN 5212C	*Numerical Methods for Finance*	2+2	4	QFIN 5116C	*Portfolio Management and Asset Allocation*	2+2	4
PROJ 5201C	*Master's Dissertation*						12

O. MSc Financial Engineering – Part Time (Version 2.3)

Semester 1				*Semester 2*			
Code	**Modules**	**L+T/P**	**Credits**	**Code**	**Modules**	**L+T/P**	**Credits**
QFIN 5115C	*Financial Systems*	2+1	3	QFIN 5212C	*Numerical Methods for Finance*	2+2	4
QFIN 5211C	*Mathematics for Finance*	2+2	4	QFIN 5118C	*Financial Risk Management*	2+2	4
MATH 5330C	*Stochastic Calculus for Finance*	2+2	4	STAT 5335C	*Financial Econometrics Modelling*	2+2	4
				PROJ 5201C	*Master's Dissertation*		-

Semester 3			
Code	**Modules**	**L+T/P+DS**	**Credits**
QFIN 5117C	*Hedging*	2+1	3
QFIN 5116C	*Portfolio Management and Asset Allocation*	2+2	4
PROJ 5201C	*Master's Dissertation*		12

P. MODULE OUTLINE

QFIN 5211C: MATHEMATICS FOR FINANCE

- Interest Rates and Present Value Analysis
- Normal Distribution of Stock Returns
- Techniques required to deal with Compound Interest Problems
- Loans Repayable by Instalments of Principal and Interest
- The Effect of Income and Capital Gains Taxes
- Simple Stochastic Interest Rate Models
- Option Pricing
- The Multi-period Binomial Model
- The Black-Scholes Option Pricing Formula
- Applications of the Black-Scholes Formula
- Utility functions and Portfolio Theory
- Bond Mathematics
- Interest Rate Derivatives and Related Models

QFIN 5115C: FINANCIAL SYSTEMS

- The financial system
- The financial Market
- Money and Capital market
- Financial intermediaries
- Non-banking financial institutions
- The regulatory body
- Financial structure and economic performance
- Financial instruments
- Capital structure of firms
- Comparative financial systems: The structure and functions of financial systems in the USA, Germany, Japan, Islamic countries
- Regulatory and tax aspects and other restrictions

MATH 5330C: STOCHASTIC CALCULUS FOR FINANCE

- Random walk
- Brownian motion
- Martingales
- Ito's calculus
- Stochastic differential equations
- Arbitrage and SDEs
- The diffusion equation
- The Feynman-Kac formula

QFIN 5212C: NUMERICAL METHODS FOR FINANCE

- Financial theory
- Fixed-income securities
- Stock portfolio optimization
- Modelling the dynamics of asset prices
- Derivatives pricing
- Pricing equity options
- Introduction to exotic and path-independent options
- Numerical analysis
- Numerical integration
- Finite difference methods for partial differential equations

STAT 5335C: FINANCIAL ECONOMETRICS MODELLING

- Building an econometric model
- Development and Analysis of the Classical Linear Regression Models
- Classical linear regression model assumptions and diagnostic tests
- Univariate time-series modelling and forecasting
- Multivariate models
- Error Correction Model
- Vector Error Correction Model
- Autoregressive Distributed Lag
- Vector Autoregression
- Modelling long-term relationships in finance
- Modelling volatility and correlation
- Switching models
- Simulations methods

QFIN 5118C: FINANCIAL RISK MANAGEMENT

- Risk management and financial returns
- Volatility modelling
- Correlation modelling
- Modelling the conditional distribution
- Simulation-based methods
- Option pricing
- Modelling option risk
- VAR, Backtesting and stress testing
- Credit risk management: Rating systems
- Credit risk management: Portfolio models
- Credit derivatives
- Operational risk

QFIN 5117C: HEDGING

- Assessment of risk, risk attitude, risk adjusted performance measures
- Risks in financial markets and hedging principles
- Market Risk: Static Hedging
- Market Risk: Dynamic delta hedging
- Market Risk: Gamma and volatility hedging; portfolio insurance
- Credit Risks: Credit derivatives and other forms of credit risk mitigation
- Multifactor hedging: Forex and interest rate risks
- Impact of hedging on regulatory and economic capital
- Hedging programmes banks, investment firms and corporate

QFIN 5116C: PORTFOLIO MANAGEMENT AND ASSET ALLOCATION

- Introduction to Portfolio Management Process
- Informational Efficiency
- Asset Pricing Models in Portfolio Management
- International Equity and Bond Investing
- Derivatives and Portfolio Management
- Model Limitations and Failures
- Code of Ethics
- Standards of Professional Conduct

PROJ 5201C: MASTER'S DISSERTATION

- Dissertation guidelines will be given in the Dissertation Handbook