University of Pretoria Yearbook 2016

MSc Financial Engineering (02250184)

Duration of study	1 year
Total credits	180

Programme information

The MSc degree is conferred on the grounds of a dissertation and such additional postgraduate coursework as may be prescribed.

Renewal of registration
As long as progress is satisfactory, renewal of the registration of a master's student will be accepted for the second year of the study. Registration for a third and subsequent years will only take place when the Student Administration of the Faculty receives a written motivation that is supported by the head of department and Postgraduate Studies Committee.

General
Candidates are required to familiarise themselves with the General Regulations regarding the maximum period of registration and the requirements on the submission of a draft article for publication.

Admission requirements

- An appropriate BScHons degree in Financial Engineering with a minimum of 60% for all modules at honours level. In the selection procedure the candidate's complete undergraduate and honours academic record will be considered.
- Admission is also subject to the availability of a suitable supervisor for the study.

Promotion to next study year

The progress of all master's candidates is monitored biannually by the supervisor and the postgraduate coordinator. A candidate's study may be terminated if the progress is unsatisfactory or if the candidate is unable to finish his/her studies during the prescribed period.

Subject to exceptions approved by the dean, on recommendation of the head of department, and where applicable, a student may not enter for the master's examination in the same module more than twice.

Pass with distinction

The MSc degree is conferred with distinction to candidates who obtain a final average mark of at least 75% and a mark of at least 75% for the dissertation/mini-dissertation from each of the members of the examination panel. Where a member of the examination panel awards a mark of less than 75% for the dissertation/mini-dissertation, that member of the examination panel must offer, in writing, support for his/her decision, or indicate in writing that he/she supports the examination committee's decision to confer the degree with distinction.

Curriculum: Year 1

Fundamental modules

Mathematical and computational finance 831 (WTW 831)

Module credits	30.00
Prerequisites	Financial Engineering on honours level
Contact time	1 lecture per week
Language of tuition	English
Academic organisation	Mathematics and Applied Maths
Period of presentation	Semester 1

Module content

*Consult with the Head of the Department of Mathematics and Applied Mathematics about the availability of this master's module in a particular year.
Stochastic Calculus: Multidimensional Itô formula, correlated Wiener processes, the infinitesimal operator, SDE's, PDE's, the Kolmogorov equations, martingales, stochastic integral representations and Gisanov's theorem. The martingale approach to arbitrage theory. Bonds and interest rates: Martingale models, standard models, the Heath-Jarrow-Morton framework. Monte Carlo methods. Finite difference methods.

Advanced methods of financial engineering 832 (WTW 832)

Module credits	30.00
Prerequisites	Financial Engineering on honours level
Contact time	3 lectures per week
Language of tuition	English
Academic organisation	Mathematics and Applied Maths
Period of presentation	Year

Module content

*Consult with the head of the department of Mathematics and Applied Mathematics about the availability of this master's module in a particular year.
Interest rate derivatives. Stochastic volatility models. Models to improve on the flaws in the Black-Scholes model. Principles of deal structuring. Principles of mathematical models. Specialised methods for interest rate and exotic derivatives. Application of numerical methods to relevant practical problems.

Quantitative risk management 833 (WTW 833)

Module credits	30.00
Prerequisites	Financial Engineering on honours level
Contact time	1 lecture per week
Language of tuition	English

Academic organisation	Mathematics and Applied Maths
Period of presentation	Year

Module content

*Consult with the head of the department of Mathematics and Applied Mathematics about the availability of this master's module in a particular year.
Risk in perspective. Traditional RiskMetrics. Methods to calculate VaR. Designing scenario analyses and stress analysis. Risk measures based on loss distributions. Aggregate risk measures which include coherent risk measures. Extreme value theory. Correlation, copulas and dependence. Credit risk management.

Curriculum: Final year

Fundamental modules

Mathematical and computational finance 831 (WTW 831)

Module credits	30.00
Prerequisites	Financial Engineering on honours level
Contact time	1 lecture per week
Language of tuition	English
Academic organisation	Mathematics and Applied Maths
Period of presentation	Semester 1

Module content

*Consult with the Head of the Department of Mathematics and Applied Mathematics about the availability of this master's module in a particular year.
Stochastic Calculus: Multidimensional Itô formula, correlated Wiener processes, the infinitesimal operator, SDE's, PDE's, the Kolmogorov equations, martingales, stochastic integral representations and Gisanov's theorem. The martingale approach to arbitrage theory. Bonds and interest rates: Martingale models, standard models, the Heath-Jarrow-Morton framework. Monte Carlo methods. Finite difference methods.

Advanced methods of financial engineering 832 (WTW 832)

Module credits	30.00
Prerequisites	Financial Engineering on honours level
Contact time	3 lectures per week
Language of tuition	English
Academic organisation	Mathematics and Applied Maths
Period of presentation	Year

Module content

*Consult with the head of the department of Mathematics and Applied Mathematics about the availability of this master's module in a particular year.
Interest rate derivatives. Stochastic volatility models. Models to improve on the flaws in the Black-Scholes model. Principles of deal structuring. Principles of mathematical models. Specialised methods for interest rate and exotic derivatives. Application of numerical methods to relevant practical problems.

Quantitative risk management 833 (WTW 833)

Module credits	30.00
Prerequisites	Financial Engineering on honours level
Contact time	1 lecture per week
Language of tuition	English

Academic organisation	Mathematics and Applied Maths
Period of presentation	Year

Module content

*Consult with the head of the department of Mathematics and Applied Mathematics about the availability of this master's module in a particular year.
Risk in perspective. Traditional RiskMetrics. Methods to calculate VaR. Designing scenario analyses and stress analysis. Risk measures based on loss distributions. Aggregate risk measures which include coherent risk measures. Extreme value theory. Correlation, copulas and dependence. Credit risk management.

Core modules

Dissertation: Financial engineering 894 (WTW 894)

Module credits	120.00
Prerequisites	No prerequisites.
Language of tuition	English
Academic organisation	Mathematics and Applied Maths
Period of presentation	Year