MSc. in RISK MANAGEMENT SCIENCE

Department of Statistics
The Chinese University of Hong Kong
Overview

Risk management is an important subject in both the financial and public sectors. A successful risk management system incorporates expert knowledge from the fields of mathematics, statistics, actuarial science, finance, computing and engineering. This synergy of interdisciplinary knowledge distinguishes risk management from more traditional subjects.

The Risk Management Science programmes offered by the Department of Statistics at the Chinese University of Hong Kong have played leading roles in the development of the risk management discipline in Hong Kong. The highly successful Master of Science Programme in Risk Management Science was launched in 2003 and has been well received by the public. The Programme incorporates interdisciplinary knowledge from mathematics, statistics, actuarial science, finance, computing and engineering into risk management. Graduates are equipped with state-of-the-art risk management expertise that will allow them to play a leading role in the industry.

Coursework Requirements

Students must complete a minimum of 24 units to graduate.

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<th>Core Courses (3 units each)</th>
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| **Advanced Statistical Theory In Risk Management**  
This course discusses modern applications of advanced statistical methods in finance. Methods include times series methods, stochastic process approach, data mining, and Monte Carlo simulations. |
| **Principles of Risk Management**  
This course provides students with fundamental concepts of risk and risk management. It further introduces risk management tools used in financial products. Topics include market risk, operational risk and integrated risk management. |
| **Risk Measures**  
Risk measurement and quantification are the fundamentals of risk management procedures. This course discusses various types of risk measures but mainly focuses on the methodologies of calculating Value-at-Risk (VaR) such as historical simulation, parametric VaR, delta-gamma approximation and Monte-Carlo simulation. The uses of VaR in risk management are also addressed. Topics include portfolio risk management, asset allocation and measurement of the performance of portfolio managers. |
| **Studies on Selected Topics**  
Students need to present and discuss literatures assigned to them by the instructor on topics of current interest in financial risk management. |

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<th>Elective Courses (3 units each)</th>
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| **Statistical Methods in Risk Management and Finance**  
This course is designed to introduce the current developments in risk management in the financial markets. Risk management ideas associated with three general important areas in finance will be discussed: asset management, derivative pricing, and fixed income models. Emphasis will be placed on the statistical modelling aspects on some of the commonly used models in these areas. |
| **Simulation Techniques in Risk Management and Finance**  
This course starts with presenting standard topics in simulation including random variable generations, variance reduction methods and statistical analysis of simulation outputs. The course then reviews the applications of these methods to derivative security pricing. Topics addressed include importance sampling, martingale control variables, stratification and the estimation of derivatives. Additional topics include the use of low discrepancy sequence (quasi-random numbers), pricing American options and scenario simulation for risk management. |
| **Interest Rate and Fixed Income Risk Management**  
Fixed income securities are highly sensitive to the fluctuation of interest rates. Thus interest rate modelling becomes crucial for pricing and managing fixed income securities. This course introduces various types of fixed income securities and interest rate models. It covers the celebrated Heath-Jarrow-Morton (HJM) model as well as some term-structure models including Ho-Lee, Hull-White and the CIR models. |
Elective Courses (3 units each)

Credit Risk Management
Credit risk is an important topic in the financial market in the way that over 70% of losses in the banking industry are caused by credit risk. This includes defaults of bank loans, corporate bonds and/or counter-parties. This course aims at providing students with some quantitative methods in credit risk management. We discuss the ideas of reduced-form models and structure models to credit risk and then relate them to some software packages such as CreditmetricsTM and KMV methodologies. The usage of credit derivatives is also addressed.

Operational Risk Management
Catastrophic losses are usually caused by a combination of market risk and credit risk along with failure of financial controls, which is a form of operational risk. This course introduces some tools in operational risk management. Topics include earnings volatility, casual networks actuarial models, capital allocation and regulatory requirements.

Special Topics in Risk Management
The course aims at discussing recent advances in risk management.

High-Dimensional Data Analysis
This course emphasizes statistical methods for analysing and interpreting high-dimensional data that are common in business management, marketing research and other behavioral sciences. Selected topics include canonical correlations, classification, principal component, factor analysis, latent structure analysis and discrete multivariate methods.

Financial Time Series
This course deals with the methodology and applications of business and financial time series. Topics include statistical tools useful in analysing time series, models for stationary and non-stationary time series, seasonality, forecasting techniques, heteroskedasticity, ARCH and GARCH models, and multivariate time series.

Basic Actuarial Principles and Their Applications
This course introduces the basic actuarial principles applicable to a variety of financial security systems. Focus will be on topics related to life insurances and annuities. It also develops students' understanding of the purpose of these systems, and the design and development of financial security products. Topics include theory of interest, survival distribution and life tables, life insurance, life annuities, and benefit premiums.

Selected Topics on Data Science and Business Statistics
Recent topics on data science and business statistics are selected for discussion.

Programme Features
The MSc. in Risk Management is offered on a part-time basis. Students normally take two courses each term and complete their studies in two years. Each course consists of a three-hour lecture each week throughout the term. Classes are held on weekday evenings and Saturday afternoons at CUHK in Shatin. The tuition fee is HK$50,000 per year (provisional).

Continuing Education Fund (CEF)
The Risk Measures course is included on the CEF list of reimbursable courses. Students will be reimbursed 80% of the course fee, subject to a maximum sum of HK$10,000.
Admission

- A Bachelor’s degree with Second Honours Class or above in Business, Science, Engineering or related disciplines
- Fulfilment of the English Language Proficiency Requirement stipulated by Graduate School (more information on that requirement is available on the Graduate School website at www2.cuhk.edu.hk/gss)
- Knowledge of business, economics and/or finance is preferable but not compulsory

Application Procedure

1. Submit an online application at the Graduate School website www2.cuhk.edu.hk/gss OR complete a paper application form, which is obtainable at the Graduate School Office, Room G01, G/F., Academic Building No.1, Chinese University of Hong Kong, Shatin, N.T.

2. Send supporting documents to the M.Sc. Programme in Risk Management Science, Department of Statistics, Room 119, Lady Shaw Building, Chinese University of Hong Kong. Applicants should quote the “Application No.” generated for their application on the documents. Supporting documents should include:
   - Official Transcripts*
   - Copies of degree certificates
   - Documents showing that the applicant has fulfilled the Graduate School’s English Language Proficiency Requirement
   - Confidential recommendations from two referees*
   - Application fee receipt (not applicable for credit card payment via online application)
   - Copy of identity card or passport

* Official Transcripts and Confidential Recommendations must reach the Programme directly from the University and referees, or in sealed envelopes and sent by the applicant with other supporting documents

Words from Alumni

“\nMy study in the M.Sc. Programme in Risk Management Science was really memorable and enjoyable, especially because we experienced the financial tsunami at the start of the Programme. I was not yet working in the finance industry at that time and did not understand much about the market. Regardless of our backgrounds, the professors would share their thoughts of what was happening with us with great enthusiasm. Sooner or later we saw similar ideas in journals. Suddenly I felt like an insider.

One of the most valuable skills I gained from the Programme was the ability to understand financial fundamentals from complex-looking formula, and to interpret logically in simple terms. Together with other elements of risk management knowledge, these will be essential to my career goals in the industry.

Mr. Roger Chu
M.Sc. in RMSC 2009
Development Specialist,
Global Banking and Markets, HSBC”

“I appreciated studying in the Risk Management Science Programme as it combines theory with application and enriched my knowledge of mathematics and statistics.

Through elective courses, I gained experience in running simulations by writing computer programs, and learned basic actuarial principles that I found interesting and insightful. The Programme is definitely suitable for those who would like to equip themselves in the field of risk management and prepare for the Financial Risk Manager (FRM) examination.

Ms. Annie Cheung
M.Sc. in RMSC 2009
Senior Financial Analyst, SCMP Publishers Ltd”

“When I decided to pursue my Master degree in risk management, I did not have a relevant academic background or work experience. I chose risk management as my postgraduate study because of my interest in statistical analysis and curiosity about the risk concealed beneath the flourishing financial market in 2007. I appreciated the Programme's broad coverage, from risk management theory to technical pricing techniques, from analytical calculation to simulation, from credit risk to market risk, and so on. It helped me to equip myself well to catch the opportunity of starting a career in risk management field. Even though I cannot yet completely unite everything I learned in the Programme, the solid foundation boosted my learning speed in the real and competitive market.

Ms. Rity Cheung
M.Sc. in RMSC 2009
Global Market Credit Risk Methodology Manager, HSBC”

Enquiries

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