風險管理科學碩士課程

M.Sc. in Risk Management Science

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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 M.Sc. 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.

Core Courses (3 units each)

Advanced Statistical Theory In Risk Management

This course discusses modern applications of advanced statistical methods in finance. Methods include Monte Carlo simulation, EWMA and GARCH model for estimating volatilities and correlations, calculation of Value at Risk using different approaches, data mining methods including Principal component analysis, Logistic regression, Multinomial logit, Linear Discriminant analysis, Classification Tree and Artificial Neural Network.

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.

Cases for Risk Management in Practice

Students need to present and discuss literatures assigned to them by the instructor on topics of current interest in financial 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.

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.

Programme Features

- Offered in full-time (1 year) and part-time (2 years)
- Each course consists of a three-hour lecture each week throughout the term
- Classes are held on weekday evenings and Saturdays at CUHK in Shatin
- Tuition fee: Part-time mode: $75,800 per year for 2020/21 admission
  Full-time mode: $151,600 per year for 2020/21 admission

Admission Requirements

- Bachelor degree with second honours class or above in Business, Science, Finance, Economics, Engineering or related disciplines
- Fulfillment of the University's English Language Requirements
- Knowledge of business, economics and/or finance is preferable but not compulsory
- Selected applicants may be interviewed

Continuing Education Fund (CEF)

This course has been included in the list of reimbursable courses under the Continuing Education Fund. This course/the mother course (Master of science in Risk Management Science) of this module is recognised under the Qualifications Framework (QF Level 6)

Elective Courses (3 units each)

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.

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.

Interest Rates and Fixed Incomes 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.

Credit Risk Management

The Credit Crisis of 2007 devastated the global financial industy and demonstrated that, despite unprecedented financial sophistication, proper credit risk management is vital for the good health of any financial institution. In this course, we will cover the cat-and-mouse history of regulation of credit, taking us to the present day. Along the way, we cover various attempts at modeling and quantifying credit risk, which will lead us through topics like VaR, copulas, credit derivatives, different credit risk methodologies (e.g. Credit Risk Plus, CreditMetrics) and much else besides. We will also discuss various case histories of financial institutions failing due to poor credit risk management.

Simulation Techniques in Risk Management and Finance

Operational Risk Management

Application Procedure

1. Submit an online application at the Graduate School website www.gs.cuhk.edu.hk
2. Submit supporting documents to the Department of Statistics, Room 119, Lady Shaw Building, the Chinese University of Hong Kong by the application deadline. Supporting documents required are,
   a. Copy of certificates
   b. Official transcripts of all tertiary level studies. Official transcripts should be sent directly to the Programme in a sealed envelope, except for CUHK qualifications where photocopies of transcripts are accepted.
   c. Proof of English Language proficiency
   d. Confidential recommendations from two referees
   e. Copy of HKID card or other identity document

Enquiries

Tel: (852) 3943 1746 Email: mscrms_admission@sta.cuhk.edu.hk
Website: www.sta.cuhk.edu.hk/Programmes/PostgraduateStudies/MScinRiskManagementScience.aspx

Special Topics in Risk Management

The course aims at discussing recent advances in risk management.

Special Topics in Quantitative Finance

The course aims at discussing recent advances in quantitative finance.

Portfolio Theory with Risk Management Perspective

The course introduces the general theory of financial portfolio based on utility theory. Non-arbitrage pricing theory based on the idea of risk management will be applied. Selected topics include utility functions, risk aversion, the St Petersburg paradox, dynamic asset pricing, forecast and valuation, portfolio optimization under budget constraints, wealth consumption, and growth versus income.

Financial Time Series

This course deals with the methodology and applications of business and financial time series. Topics include statistical tools useful in analyzing 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.

Official Statistics and Structural Equation Modelling

The course introduces the basic principles, concepts, and methodologies of official statistics and business statistics. The course is divided into two parts, "Official Statistics" and "Structural Equation Modelling".

Teaching Staff

Courses are taught by faculty members from the CUHK Department of Statistics. Experienced practitioners from financial institutions are also invited to teach in seminar courses as guest speakers. Two of these guest speakers discuss their teaching experiences below,

Mr Alvin Ma

Managing Director
and Partner,
Axiom Investment
Management Limited

"After 11 consecutive years of discussing my career and risk management experience with more than 402 graduate students on both the MSc and MPhil programmes studying such areas as debt capital markets, treasury and rates, private wealth management, advisory and discretionary asset management and allocations, I am confident in stating that the CUHK MSc in RMS is a dynamic, diversified, pragmatic and applicable science degree that prepares candidates from all walks of life (ranging from immigration officers, statistical officer of Census & Statistics Department and logistics professionals to private and public institution FRM risk and compliance officers, CPA auditors, risk advisory consultant, CFA banking and market professionals, private wealth management practitioners, and MPhil teaching assistants) with the quantitative, analytical and logical skills, mindset, readiness to excel, and passion needed to contribute to a dynamic and vibrant international city such as Hong Kong, one of the world's major financial centres.

I was introduced to the guest lecturer programme by Dr Samuel Wong and Dr H.Y. Wong in 2008 via a veteran BSc in RMSC graduate who was a colleague on the Treasury and Rates team of which I was a member. I delivered a lecture on "exposure risk management", based on my experience at Bank of America, Chase, Citigroup and Standard Chartered, to the Class of 2008 in mid-January 2009, not long after the start of the global financial crisis that kicked off in the second week of September 2008. In my lectures to the Class of 2009 and subsequent classes, I have delivered lectures on and discussed my experiences in the areas of "asset protection and management", private wealth management at UBS, Credit Suisse, EFG and China Citic Bank International, term structure yield curve segmentation analysis, portfolio planning, construction and rebalancing, risk management, Swiss-based structured product payoff, VAR matrix analysis, PRC Wealth & Asset Management Processes; RMB/CNH Term Structure & Stock & Bond Connect; EIS & ETF Solutions as well as HKMA/SFC; PRC CBRC/CSRC & Singapore MAS Risk & Compliance Code of Conduct Principles; AML Guidelines; and Selling & Suitability Principles & Processes.

Between 2008 and 2019, we secured over 103 quality group-based project reports on the topics of both "exposure risk management" and "asset protection and management", 32 of which have been selected as award-winning project reports. Last but not least, ten outstanding graduates have been selected as Annual Best Macro/Micro Economic Barometers and Financial Performance Forecasters.

All in all, I have enjoyed every minute of the 132 credit hours of interactive lectures with 402 graduates over the past 11 years, and wish every one of them a very successful and fruitful future. I have had the honour of mentoring 58 of these graduates, and am very proud that every one of them has secured his or her desired career option post graduation."

Mr Terrence Ho

"If you ever want to achieve your dream, you have to start taking positive, calculated risks. Even if you are risk-averse, you may still be affected by others who have taken ill-advised risks. Just ask the US taxpayers who had to bear the cost of the 2008 financial crisis. Until that crisis hit, regulators were unaware that they did not fully understand the risks that banks were running. So whether you like it or not, we all have to live with risk, which means that we might as well adopt a positive attitude towards it. Risk is not something that we can avoid but something that we need to understand, identify, analyse and manage. In today's fast-evolving financial markets in which numerous new financial products are introduced every year, it is essential that we fully understand the risk inherent to every transaction. I am delighted to be able to share my 30 years of trading experience, during which the financial crisis occurred. It is important to learn from mistakes, and I firmly believe that the world will not be safe until we have a thorough understanding of risk."

Alumni Sharing

Ms Rity Cheung

When I decided to pursue my Master's 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 both my interest in statistical analysis and my curiosity about the risk concealed in the financial market prior to the crisis in 2008. I appreciated the broad coverage of material in the Programme, from risk management theory to technical pricing techniques; from analytical calculation to simulation, and from credit risk to market risk. In short, the programme helped me to well-equip myself to start a career in the field of risk management. Even though I am not able to unitize everything I learned in the Programme, the solid foundation boosted my learning speed in the real and competitive market.

Ms Rity Cheung
(2009 graduate) -
Senior FI Credit Risk Manager,
HSBC

Ms Karen Lee

I chose risk management for my postgraduate studies because of my dual enthusiasm for data science and financial compliance disciplines.

I appreciate the programme's diverse coverage, ranging from fundamental theories to technical pricing techniques; from financial risks to actuarial principles and from statistical modelling to simulations, all of which I find exciting and insightful.

When I decided to pursue a Master's degree, my work and academic experience was in an entire different area, namely forensic investigation. Although it sounds unrelated to risk management, the interdisciplinary knowledge gained from the programme enables me to help clients to resolve financial crimes, address regulatory compliance issues and conduct due diligence through investigation and evaluation of the potential underlying risks and uncertainties in addition to the traditional approaches.

Data is power, and every personal and business decision involves risk. By combining knowledge of both data and risk, the programme not only helps those who would like to pursue a career in the field of financial risk management, but also (from a broader perspective) enables those who wish to equip themselves with the power to understand how our world works to see things more comprehensively.

Ms Karen Lee
(2011 graduate) -
Manager, Forensic Services,
PricewaterhouseCoopers

Mr Michael Hung

Having worked in the financial industry for more than 15 years, I decided to pursue a Master's degree in risk management to acquire the most up-to-date knowledge in finance, in particular, the development of credit risk, securitisation and financial statistics during the recent financial crisis.

I joined the programme in September 2012 as a part-time student. I found the programme very flexible, as it allowed me to take more courses in a semester when I was not busy, but fewer courses when the demand from my job was heavy. Hence, I was able to maintain a healthy balance between my studies, work and family life. Moreover, a diverse selection of topics was offered, ranging from basic risk management science, credit risk and risk measures to advanced statistical theory and simulation techniques. Also, I was able to write papers on related topics such as actuarial principles to further enrich my knowledge on the insurance industry.

The programme emphasises both the practical and theoretical aspects of risk management, which are very useful for my current role in portfolio management. The solid and rigorous theoretical framework embedded in the courses have strengthened my skills and given me an in-depth understanding of complex financial products such as CDOs and CLOs. Over the course of the programme, experienced financial professionals were regularly invited to present real-life examples and exchange their views and experiences with students through case studies.

Mr Michael Hung
(2014 graduate) -
President, I-Access Asset
Management

Mr Joseph Au-Yeung

When I decided to apply for the Master's programme in risk management science, I had a strong interest in data analysis but with no relevant work experience. The curriculum is well-designed, covering not only the foundation knowledge of statistics and finance, but also introducing specific topics such as risk measures and fixed income modelling. In addition, Seminars on current market were given by practitioners in the banking industry. In addition to the lectures, I also enjoyed exchanging ideas with professors and fellow students through group projects. In short, I really enjoyed my study in this programme, which has equipped me with both the essential analytical skills and knowledge of financial products to further my career in the industry.

Mr Joseph Au-Yeung
(2014 graduate) -
Assistant Credit Risk Manager,
Bank of China (Hong Kong) Limited