香港中文大學統計學系
Department of Statistics
THE CHINESE UNIVERSITY OF HONG KONG

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: $79,000 per year for 2021/22 admission
  Full-time mode: $158,000 per year for 2021/22 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.

Practicum

The course serves to provide a bridge between the classroom and the real business world. Students will be required to complete a project assigned by a company or an organization on a part-time basis. Each student will undertake a project under the joint supervision of an instructor and a member of the company or organization. Students will be required to give a final project presentation and submit a written report on which their assessment will be based.

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.

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 of academic/ professional qualifications
   b. Official transcripts of all tertiary level studies.
   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/mrms

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 12 consecutive years of discussing my career and risk management experience with more than 445 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 2020, we secured over 103 quality group-based project reports on the topics of both "exposure risk management" and "asset protection and management", 36 of which have been selected as award-winning project reports. Last but not least, twelve 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 144 credit hours of interactive lectures with 445 graduates over the past 12 years, and wish every one of them a very successful and fruitful future. I have had the honour of mentoring 61 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. Sandy Lam

A year after receiving my Bachelor's degree in data analysis and finance, I decided to embark on postgraduate studies of risk management alongside my full-time work to deepen my knowledge of statistics, finance and risk management.

With its diverse coverage, the MSc in RMSC gave me valuable experience of analysing and solving practical problems by utilising what I had learned, such as building an investment portfolio, conducting risk assessment and applying statistical theories in real-life situations. I particularly enjoyed exchanging ideas with professors after classes and with practitioners during seminars and special topic sessions.

Alongside my postgraduate studies, I worked in the field of data management in the banking industry. My studies supported my work by enhancing my understanding of the data requests I received from the risk department. After I finished studying, my passion for risk management inspired me to further advance my career by joining another major area of financial services, insurance. The MSc in RMSC was invaluable to my career development and heightened my enthusiasm for discovering, analysing and solving business challenges.

Ms. Sandy Lam
(2019 graduate)-
Data and Information Management, HSBC Insurance Asia Limited

Ms. Lori Cheung

I am glad that I chose to enrol in the 2-year MSc in RMSC. I appreciated the programme's comprehensive coverage, ranging from fundamental theories to advanced risk modelling, from market risk to credit risk and from quantitative to qualitative approaches. Students can select courses in a flexible manner according to their knowledge levels and schedules.

Some courses are taught by guest speakers with experience in the financial industry. Students can obtain up-to-date market information while exchanging ideas with these experts. This programme is a good choice for those who are keen to gain more financial knowledge and/or prepare for careers in risk management.

Mr. Jason Chiu

What I liked most about the MSc in RMSC was its balance of theoretical and practical learning. We worked on an asset allocation project under the guidance of a seasoned portfolio manager, and experienced traders and risk managers shared their insights into the industry. We also attended programming workshops, which were very useful for my coursework and my career development. The programme provides a comprehensive range of courses, from required theoretical courses on stochastic calculus and simulation to topic-specific elective courses on market risk, credit risk and operational risk. I believe that the programme is both well structured and flexible. It offers students up-to-date information, with interesting new topics regularly added to the syllabus.

I had worked in the financial industry before enrolling in this programme. One of my biggest takeaways from the programme was a statistical way of thinking. Over two years of practice, I gradually honed my skills in analysing data and incorporating risk and uncertainty into decision making. I have found these two skills very helpful in my career.

Mr. Jason Chiu
(2019 graduate)-
Fitch Ratings

Mr. Jay Chu

Long before graduating from the MSc in RMSC at CUHK in 2014, I found myself stuck in a series of junior trading desk officer posts, with a shallow learning curve and few opportunities for advancement. When I applied for the MSc in RMSC at CUHK's Department of Statistics, I had no work experience of risk management. The programme equipped me with risk management knowledge and practicum experience, enabling me to switch careers by securing a job in the risk management department at Ping An Asset Management in Hong Kong.

The programme provides a wide range of financial and risk management knowledge, with curricula similar to those tested in the CFA and FRM examinations. I thus managed to obtain FRM certification while studying and the CFA Charter after graduation.

I am grateful to the professors and staff members who gave me both much-needed knowledge and opportunities for career change and advancement. I have been promoted swiftly since graduating from the programme and am now a manager in my company's risk management department, supervising a team of risk management associates.

Mr. Jay Chu
(2014 graduate)-
Ping An Insurance Overseas (Holdings) Limited