The Chinese University of Hong Kong
Department of Statistics

M.Sc. in Risk Management Science
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 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.
Programme Features

- Part-time programme with a normative study period of two years
- Students normally take two courses each term
- 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
- Tuition fee is $60,000 per year for 2015/16 admission

Admission Requirements

- Bachelor degree with second honours class or above in Business, Science, Engineering or related disciplines
- Fulfillment of the English Language Proficiency Requirement stipulated by Graduate School
- Knowledge of business, economics and/or finance is preferable but not compulsory
- Selected applicants may be interviewed

Continuing Education Fund (CEF)
Risk Measures has been included in the list of CEF reimbursable courses. Eligible CEF applicants will be reimbursed 80% of the course fee, subject to a maximum sum of HK$10,000 (whichever is the less) on successful completion of the course.

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 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
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.
Application Procedure

Applicants can submit applications via the Internet through Graduate School website www2.cuhk.edu.hk/gss

The required support documents include:
1. Submit an online application;
2. Official Transcripts from the University attended by applicants*;
3. Copies of degree certificates;
4. Documents showing the applicant has fulfilled the Graduate School’s English Language Proficiency Requirement;
5. Confidential Recommendations from two referees respectively*;
6. Application Fee Receipt (Not necessary for credit card payment through online application);
7. Copies of identity card or passport;

* Official Transcripts and Confidential Recommendation must reach the respective divisions directly from the University and referees, or in sealed envelopes and send by the applicant with other support documents to the Graduate Division.

Enquiries

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

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, causal 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 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.

Selected Topics on Data Science and Business Statistics
Recent topics on data science and business statistics are selected for discussion.
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 Head of Emerging Wealth Team, Private Banking, EFG Bank AG

After seven consecutive years of discussing my career and risk management experience with more than 245 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 and logistics professionals to private and public institution FRM risk and compliance officers, CPA auditors, 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, and VAR matrix analysis.

Between 2008 and 2014, we secured over 42 quality group-based project reports on the topics of both exposure risk management and asset protection and management, 18 of which have been selected as award-winning project reports. Last but not least, six 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 72 credit hours of interactive lectures with 245 graduates over the past seven years, and wish every one of them a very successful and fruitful future. I have had the honour of mentoring 16 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.
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

Ms Karen Lee

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. 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 entirely 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.

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 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.