

Actuarial education in the universities

Hailiang Yang

Department of Statistics and Actuarial Science
The University of Hong Kong
Hong Kong

November 15, 2011

Outline of the Presentation

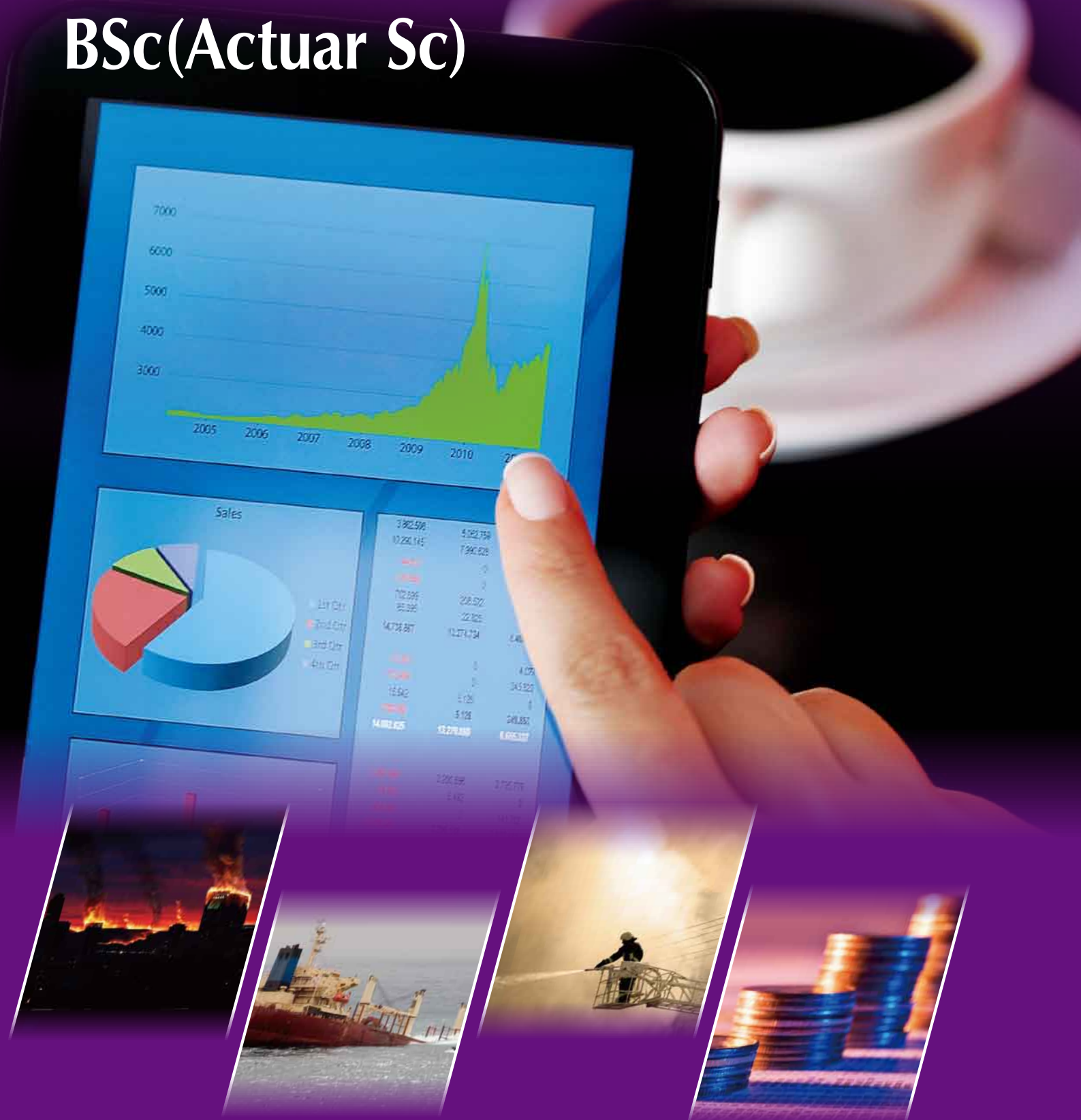
- Actuarial science programme at The University of Hong Kong
- Actuarial science programmes at universities in Mainland China
- Actuarial science programmes at universities in Canada, USA, UK and Australia

Actuarial science programme at The University of Hong Kong

- The programme started in 1994.
- The programme admits top students in Hong Kong
- About 100 graduates have become Fellow of Institute or SoA
- Our course cover all most all associate level exams syllabuses
- The Institute and Faculty of Actuaries (IFA) has accredited our programme for IFA subjects CT1 - CT8



Bachelor of Science in
Actuarial Science
BSc(Actuar Sc)





HISTORY OF THE ACTUARIAL SCIENCE PROGRAMME

In 1993, the Department of Statistics proposed a new BSc degree in Actuarial Science. The University and Polytechnic Grants Committee (UPGC), the predecessor of University Grants Committee (UGC), strongly supported the proposed degree that was regarded as filling an inexplicably vacant niche in Hong Kong. In 1994, twenty new student places were given to mount the first Actuarial Science programme in Hong Kong. Since the launch of the Actuarial Science degree, the department admits students with excellent A-level examination results every year. In light of the success of the programme in terms of student quality and job prospects, the department in 1996 proposed an expansion of the programme for the next triennium. The university approved to increase the student places to 34 commencing September 1998. Because of the importance of the programme, the department was renamed as the Department of Statistics and Actuarial Science in November 1998. In recent years, the programme also attracts many Form 6 students through the Early Admissions Scheme (EAS), non-JUPAS students and various scholarship holders from top universities in mainland China. The enrolment of the first-year actuarial science students in 2010 was 56. The Actuarial Science programme continues to rank at the top among all tertiary study programmes in Hong Kong in terms of average JUPAS admission quality since 1996. See the most recent HKU publication entitled *"First and Foremost"*.

PROGRAMME AIMS AND FEATURES

The Actuarial Science curriculum at the University of Hong Kong aims at providing formal academic and professional training to students who wish to join the actuarial profession. Although actuarial science is a separate discipline with its own area of knowledge, modern actuarial training requires multidisciplinary knowledge such as probability, statistics, economics, investment, finance, law, taxation, and accounting. The Actuarial Science curriculum reflects this by incorporating various interdisciplinary courses into the basic actuarial training. The programme is set up to equip students with solid background in actuarial science and to develop their confidence and analytical skills to define and tackle problems in actuarial science and other related fields. Specifically, the programme is designed to provide adequate knowledge for students to sit for the early professional examinations organized by international actuarial organizations so that they can successfully join the actuarial profession after graduation. In addition, the programme provides enough academic training for students who wish to pursue postgraduate studies in actuarial science or other related areas. As for accreditation, the programme has exemption arrangements with the Faculty and Institute of Actuaries, UK and has obtained Validation by Education Experience (VEE) with the Casualty Actuarial Society and the Society of Actuaries in North-America.

WHAT IS AN ACTUARY?

An actuary is a person concerned with the application of probability and statistical theory to problems of insurance, investment, pension, and financial risk management. The majority of actuaries work for life, health, and property/casualty insurance companies, which heavily rely on actuaries' judgment to ensure their financial security. Some actuaries work for actuarial consulting firms. They consult on financial services, risk management, health care fields, pension plans, and asset/liability management. Other actuaries work in various industries.

Actuaries' duties are varied, challenging and so important that they are frequently called the brains of the insurance business. Actuaries work with facts, figures and people to solve business problems. They are the



INTERNSHIP PROGRAMME

The programme assists students by advertising part-time/summer/temporary full-time positions, sending to employers resumes of interested students, and arranging interviews for the students short-listed to be sent to the employers. Recruitment activities normally begin two months or more prior to the expected starting date of a position.

As an intern, the student will gain insight into the challenging world and daily activities of an actuary while increasing his/her technical, analytical and communication skills.

List of companies participating in the internship programme:

- American International Assurance (AIA)
- AXA China Region
- BOC Group Life Assurance
- Ernst & Young
- Ageas Insurance
- General Re
- HSBC Insurance (Asia-Pacific)
- ING Life Insurance
- JP Morgan
- Manufacturers Life Insurance
- New York Life International
- Prudential Assurance
- RGA Reinsurance
- Sun Life Hong Kong
- Towers Watson

statisticians of the insurance industry, but they also have broader responsibilities of financial management. Actuaries frequently evaluate the past, make use of known changes, interpret expected changes, and set future directions to determine insurance premium, retirement benefits, etc. Actuaries work in many capacities within businesses, consulting firms, government agencies and universities, and often fill senior managerial roles in insurance and become senior officers or heads of companies. Most importantly, all actuaries have an aptitude for mathematics and apply it to financial situations.

Obtain a
Bachelor of Science in Actuarial Science
degree from HKU (3 years)

To qualify as an actuary, you must obtain the **Associateship** title and the **Fellowship** title from a professional organization. Qualifications from Australia, the UK and the US are all fully recognized in the local actuarial and insurance industries since Hong Kong does not have its own set of actuarial examinations. The average period of time needed to obtain the title ranges from 3 to 9 years. The professional organizations are shown on the right.

Institute and Faculty of Actuaries, UK
www.actuaries.org.uk

Society of Actuaries, USA
www.soa.org

Casualty Actuarial Society
www.casact.org

Institute of Actuaries of Australia
www.actuaries.asn.au

Tse Hoi Ki, Stephanie, BSc(ActuarSc)III

Prudential Corporation Asia
American International Assurance Company Limited

Working in the Strategic Asset Allocation Team at PCA and the Reinsurance Team at AIA allows me to get the firsthand actuarial practice in the business world which has been significant in my career roadmap prior to my graduation. The two internships also unearthed my strengths and weaknesses so that I can better equip myself to suit companies' needs and stay competent for future opportunities. I would like to take this opportunity to express my gratitude towards the Department for their enormous support in students' internships and the other aspects.



Wong Tsun Yu, Jeff, BSc(ActuarSc)III

American International Assurance Company Limited

Working as an intern in AIA gives me the opportunity to understand what Actuarial Science means in a business world. Unlike learning in lectures which focus on theory and calculation, working focus on implementations and application. I am glad that I was given this chance to join the internship programme so as to broaden my horizon and my social networking. This fruitful experience is undoubtedly useful for me to pursue my future career as an actuary.



SCHOLARSHIPS

There are many scholarships available to actuarial science students in each year of their studies. In particular, some of our first-year actuarial science students have been awarded the following scholarships:

- AIA Foundation Scholarship
- Chan Wing Donor Scholarship
- Chater Memorial Scholarship
- C.V. Starr Scholarship
- Eliot Hall Memorial Scholarship
- Ellen Koo Prize in Social Sciences
- Fung Ping Shan Donor Scholarships
- Ho Tung Donor Scholarships
- Hong Kong Chiu Chow Chamber of Commerce Scholarship
- Hong Kong Jockey Club Scholarships
- HKU Foundation Entrance Scholarship
- HSBC Overseas Scholarship
- HSBC One Year Exchange Scholarship
- HSBC Hong Kong Scholarship and Bursary
- HKU Worldwide Undergraduate Student Exchange Scholarships
- John Culver Woady Scholarship
- Kai Chong Tong Scholarships
- King Edward VII Scholarships
- Koo Shui Ting Memorial Scholarships
- Li Po Chun Scholarships
- Li Po Kwai Scholarships
- Mok Kon Sang Donor Scholarship
- Sir Edward Youde Memorial Scholarships
- Sir Man Kam Lo/Jardine Scholarships
- Statistics and Actuarial Science Scholarships
- The British Chevening Scholarships
- The George William Hong Choy Memorial Scholarship
- The Hong Kong Federation of Insurers Scholarship
- The K.K. Ho Prizes
- Young Community Leaders Scholarship

Choi Chun Yin, BSc(ActuarSc)III

New York Life International

Internship is really an excellent experience before graduation. It is not simply an opportunity of learning but it also allows one to know if he is really interested in the industry, whilst a more reasonable expectation would be built. I would recommend taking a six-month internship to students of lower years. It would give them competitive advantages, especially

in the current environment where a lot of actuarial students are graduating each year.

Zhou Yuhao, BSc(ActuarSc)III

AIA Group Limited

It is worthwhile to spend six months exploring one's innermost professional interests. Learning in the workplace can be as interesting and challenging as classroom learning. It was my first professional experience and surely, an unforgettable and fruitful one.



PROGRAMME STRUCTURE

Introductory Courses			Advanced Courses					
Year I			Year II			Year III		
Core courses		Credits	Core courses		Credits	Core courses		Credits
STAT1801	Probability and Statistics: Foundations of Actuarial Science	6	STAT2801	Life Contingencies	6	STAT2805	Credibility Theory and Loss Distributions	6
STAT1802	Financial Mathematics	6	STAT2802	Statistical Models	6	STAT2812	Financial Economics I	6
BUSI1002	Introduction to Accounting	6	STAT2803	Stochastic Models	6	STAT3322	Market Risk Analysis	6
CSIS1117	Computer Programming I	6	STAT2804	Linear Models and Forecasting	6	STAT3811	Survival Analysis	6
MATH1813	Mathematical Methods for Actuarial Science	6	STAT2820	Introduction to Financial Derivatives	6	STAT3821	Financial Economics II	6
ECON1001	Introduction to Economics I	6	STAT3801	Advanced Life Contingencies	6	3 elective courses		18
ECON1002	Introduction to Economics II	6	STAT3810	Risk Theory	6			
FINA1003	Corporate Finance	6	Any advanced level course selected from Inter/Intra Faculty Courses		6			
(48 credits)			(48 credits)			(48 credits)		
Language and Common Core Courses		Credits	Language, Common Core and Elective Courses		Credits	Elective courses		Credits
CSCI0001	Practical Chinese Language Course for Science Students	3	CAES2802	Advanced English for Science Students	3	Any advanced level courses selected from Inter/Intra Faculty courses		12
CAES1801	Academic English for Science Students	3	Common Core Course		6			
Common Core Course		6	Any level course selected from Inter/Intra Faculty Courses		3			
(12 credits)			(12 credits)			(12 credits)		

HKU WORLDWIDE UNDERGRADUATE STUDENT EXCHANGE PROGRAMME

The Programme offers exchange opportunities to students to world-renowned universities such as University of California (Berkeley), University of California (Los Angeles), University of Chicago, University of Nottingham, University of Queensland, University of Toronto, Tufts University, University of Virginia, Illinois State University, University of Waterloo, Lund University, University of Victoria, York University, University of British Columbia, Ball State University, University of Western Ontario and University of Otago. The following are messages from three exchange students:



Jackie K.C. Tom, BSc(ActuarSc)III
University of Otago, New Zealand

My stay in New Zealand was amazing and definitely a memory to treasure forever. My host university had a lot to offer and I could explore my interests and broaden my horizons in an exotic, yet pleasant place. I had classes with students from all over the world, exchanging thoughts and ideas. I remembered having a tutorial with a Swedish girl talking about the reasons why her country chose not to adopt the Euro, which was exhilarating. I stayed with four flat-mates from New Zealand, Mexico and the US in a house and that was one of the best parts in my exchange life. We had to do all the housework ourselves, including cooking, cleaning, and everything you could think of. In the "Flat-cooking" during weekdays' nights, I could try many delicious dishes from them. It was a pity that I did not have much traditional Chinese recipe for them to try at that time. During the breaks in the semester, I travelled all around New Zealand. The country is one of the least polluted places in the world and it is truly a paradise with snowy mountains, crystal-clear lakes, and cute little towns. I was able to see wild penguins on a beach facing the Antarctica and visited my classmate from HKU in Auckland. My feelings in the exchange could not simply be described by words, and this is something that someone has to experience themselves.

Ng Chi Chung, Leo, BSc(ActuarSc)III
The University of Nottingham, the United Kingdom

It was undoubtedly an unforgettable and valuable experience to go on exchange in Nottingham. Nottingham is a small city compared to London and provided us with the opportunity to get in touch with local British people easily and understand and learn more about their culture. I met many friends from all over the world and established a very close relationship with them during the study. Even now we still keep in touch through the Internet and I even met some of them in Hong Kong! This is the most wonderful studying experience ever in my life and I will never forget what I learnt and whom I met in Nottingham!



Zhou Yuhao, BSc(ActuarSc)III
University of California, Los Angeles
There are much more to explore in university life apart from academics. I enjoyed travelling to different states and meeting different people when I was in the US. For me, exchange study was a chance to embrace the whole world.

MEMBERS OF ADVISORY BOARD OF THE ACTUARIAL SCIENCE PROGRAMME AT HKU

Ms. Annie S.H. Choi, JP
Commissioner of Insurance, HKSAR

Mrs. Estella S.F. Chiu
*Regional Chief Actuary and Head of Investment & Insurance Risks,
HSBC Insurance (Asia-Pacific) Holdings Ltd.*

Professor Harry H. Panjer
*Department of Statistics and Actuarial Science,
University of Waterloo, Canada*

Mr. Patrick S.C. Poon
*China Pacific Life Insurance Co. Ltd.,
Shanghai, China*

Mr. Edmund Tse
*Chairman & Chief Executive Officer,
American International Assurance Co. Ltd.*

DISTINGUISHED VISITING PROFESSOR IN ACTUARIAL SCIENCE (2005-2011)

Professor Hans U. GERBER, Past President of the Institute of Actuarial Science at the University of Lausanne, Switzerland, is the leading actuarial science professor in the world. He has authored several influential actuarial textbooks which have been translated into many languages, including Chinese. In 1995, he won the Centennial Award of the International Actuarial Association. The Society of Actuaries awarded him its Annual Prize three times and its Edward A. Lew Award in 1999. He also won the David Garrick Halmstad Prize from the Actuarial Education and Research Fund twice.

DISTINGUISHED VISITING PROFESSOR IN STATISTICS (2005-2013)

Professor Howell TONG, Honorary Fellow, Institute of Actuaries, U.K., the founding Chair of Statistics at the CUHK, and the founding Dean of Graduate School of HKU, is presently Emeritus Professor of Statistics at the London School of Economics and Political Science. He served as a Pro-Vice-Chancellor of HKU, 2002-2004. Professor Tong received the Year-2000 Chinese National Natural Science Prize (Class II) in Mathematics and Mechanics and the sole recipient of the 2002 Distinguished Research Achievement Award at HKU. He is a Foreign Member of the Norwegian Academy of Science and Letters. He is a pioneer of non-linear time series models including, in particular, the threshold model. Professor Tong was awarded the Guy Medal in Silver by the Royal Statistical Society (U.K.) in 2007 for his many important contributions to time series analysis.

TEACHING STAFF AND THEIR RESEARCH INTERESTS

Dr. Eric C.K. Cheung, BSc HK; MMath, PhD Waterloo; ASA
Insurance Risk Theory; Ruin Theory; Aggregate Claims; Queueing Theory

Dr. K.C. Cheung, BSc, PhD HK, ASA
Actuarial Science; Dependence Structures; Stochastic Orders; Risk Measures

Mr. Y.K. Chung, BSc, MPhil CUHK
Bioinformatics; Protein Modelling; Forensic Statistics; Monte Carlo Simulation

Prof. Tony W.K. Fung, BSocSc HK; MSc Lond; PhD HK; DIC
Statistical Diagnostics and Robustness; Longitudinal Data Analysis; DNA Fingerprinting and Forensic Statistics; Statistical Genomics; Credibility Theory

Dr. C.W. Kwan, BSc, PhD HK
Influential observations; Multivariate statistics; Nonlinear random model

Dr. Eddy K.F. Lam, BA St. Thomas; MA New Brunswick; PhD HK
Multivariate Survival Analysis; Semiparametric Regression; Medical Statistics

Prof. Stephen M.S. Lee, BA, PhD Cantab
Bootstrap; Resampling Methods; Statistical Theory: Asymptotics and Applications

Dr. Guodong Li, BSc, MSc Peking; PhD HK
Time Series Analysis; Financial Econometrics; Financial Risk Management

Prof. W.K. Li, BSc, MA York; PhD W Ont
Time Series Analysis; Financial Econometrics; Environmental Modelling; Financial Risk Management; Actuarial Applications

Dr. Gilbert C.S. Lui, MSocSc, Birm; MPhil CUHK; PhD HK
Time Series Analysis; State-space Modelling; Environmental Statistics; Financial Time Series and Econometrics

Dr. Louis F.K. Ng, BA HK; MSc Br Col; PhD Tor; FSA, FCIA, CFA
Asset Liability Management; Enterprise Risk Management; Insurance Pricing Models; Pension Projection Models; Regression Analysis

Prof. K.W. Ng, BSc CUHK; MSc Alberta; PhD Tor
Foundation of Inference; Multivariate Analysis; Linear Models; Inverse Bayes Methods; Distribution Theory; Ruin Probability and Risk

Dr. Gary G. Tian, BSc Hunan Normal; MSc Wuhan; PhD Chinese Acad of Sc
Missing data problems; Constrained parameter models; Variable selection; Sample surveys with sensitive questions; Biostatistics

Dr. Raymond W.L. Wong, BSc, MPhil CUHK; MA, PhD Pittsburgh; ASA
Actuarial Science; Errors-in-variables Regression Models; Monte Carlo Simulations; Robustness Studies and Applications of Asymptotic Theory

Prof. Hailiang Yang, BSc Inner Mongolia; MMath Waterloo; PhD Alberta; ASA
Actuarial Science; Insurance Risk Models; Mathematical Finance

Dr. Jianfeng Yao, BSc, MSc, PhD Paris XI
Random matrix theory and high-dimensional data analysis: large sample covariance matrices, high-dimensional estimation and testing; Inference for stochastic processes: nonlinear time series and Markov-switching processes; Image analysis and understanding using Markovian spatial models: image segmentation, motion analysis and tracking

Dr. Guosheng Yin, MA Temple; MSc N Carolina; PhD N Carolina
Bayesian Adaptive Designs, Clinical Trials and Drug Development, Survival Analysis, Cancer Research

Dr. Philip L.H. Yu, BSc, PhD HK
Data Mining and Machine Learning; Ranking Methods; Financial Data Mining; Risk Management; Environmental Statistics

Prof. K.C. Yuen, BSc, MSc, PhD Calgary; ASA
Insurance Risk Modelling; Financial Risk Analysis; Survival Analysis

Dr. Zhiqiang Zhang, BSc E China Normal, PhD HK
Time Series Analysis; Extreme Value Theory; Insurance Risk Modelling



2009 EMPLOYMENT STATISTICS

Employment Sectors vs % of Graduates

- Commerce & Industry: 90%
- Civil Service: 5.0%
- Educational Institutions: 2.5%
- Community, Social & Personal Service: 2.5%

Number of Full-time Job Offers



Salary

Gross Income	2009	2008
Mean	\$14,259	\$17,080
Median	\$13,000	\$16,250
Minimum	\$6,417	\$10,000
Maximum	\$36,740	\$40,000

CAREER PROSPECTS

In view of the booming insurance industry in Hong Kong and the rapid development of the China market, job prospects for actuaries are good. Recent graduates were employed by various major insurance companies, reinsurance companies, actuarial consulting firms, and investment banks such as American International Assurance (AIA), AXA Insurance, BOC Group Life Assurance, HSBC Life, ING Asia, Manulife, Sun Life Financial, General Re, Reinsurance Group of America (RGA), JP Morgan, Ageas Insurance, Ernst & Young, Towers Watson, Mercer, Goldman Sachs, Morgan Stanley, Deloitte Touche Tohmatsu,.....

Some of our graduates pursued postgraduate studies in world-renowned universities such as Harvard University, University of Cambridge, Oxford University, London School of Economics and Political Science, The Wharton School of University of Pennsylvania, Johns' Hopkins University, Columbia University and Cornell University.

ADMISSION REQUIREMENTS

JUPAS applicants

Selection for admission is based mainly on HKALE results, HKCEE results, and academic references.

Non-JUPAS applicants

Non-JUPAS applicants are selected based on academic merit, language and communication skills, motivation, relevant work experience, and extra-curricular activities.

In addition to satisfying the University admission requirements (www.hku.hk/admission/ug.htm), candidates for admission shall obtain Grade E or above in AL Pure Mathematics.

ENQUIRIES

Please contact:

Department of Statistics and Actuarial Science at

Tel: 2859 2466 Fax: 2858 9041

Email: ug_enquiry@saas.hku.hk

or visit the Departmental web page at

<http://www.hku.hk/statistics>

Actuarial science programmes at universities in Mainland China

- In the later 1980s and early 1990s, Supported by IFA, Central University of Finance and Economics, Beijing launched an actuarial science programme
- At the same time period, supported by SoA, Nankai University also launched an actuarial science programme
- Currently, many universities in China have actuarial science programme, such as Beijing University, Tsinghua University, ECNU, Chongqing U, Sun Yat-sen University, etc.
- China has their own actuarial exams in Chinese.

Actuarial science programmes at universities in Canada, USA, UK and Australia

- University of Waterloo
- USA universities
- Heriot-Watt University
- Australia universities

Thank you!