• The Department’s vision is to create and disseminate knowledge and technologies of systems engineering and engineering management for the ever-changing society.

• Our goal is to extract intelligence from massive data and modelling human behaviour to derive managerial insights and make optimal decisions in complex environments.

• Our strategy is to achieve the goal by conducting innovative research and development in Financial Engineering and FinTech, Information Systems, Logistics and Supply Chain Management, Operations Research, and Service Engineering.
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Welcome to the Department of Systems Engineering and Engineering Management (SEEM) at The Chinese University of Hong Kong (CUHK)!

The SEEM department was established in 1991 and is the first of its kind among tertiary institutions in Hong Kong. Our programmes combine technology with management, with the mission to educate a new generation of technologically skilled and managerially adept engineers who can solve real-world problems in smart ways.

The SEEM discipline is modern – we take a systematic approach in designing and engineering systems to analyse massive amounts of data, derive intelligence from information and make evidence-based, optimized and insightful decisions. This discipline maximizes the efficiencies of human operations, minimizes wastage of resources, and enables us to respond quickly and effectively to changes and challenges. Possible applications are diverse – ranging across business, education, energy usage, environmental preservation, finance, healthcare, logistics, etc. – our imagination is the limit. These applications are vital for the future development of Hong Kong, Greater China and the world, which lead to bright job prospects for our graduates. Our alumni are pursuing careers in banking, education, financial engineering, information technologies, logistics, management, etc., in leading corporations and making significant contributions to our society.

Helen Meng
Chairman
Department of Systems Engineering and Engineering Management
Email: seem-chairman@se.cuhk.edu.hk
The SEEM educational objectives are to produce graduates who have:
1. the knowledge grounded in mathematics and computing to provide a solid engineering background;
2. the ability to apply a systems (or systematized) approach to solving complex problems;
3. the ability to think with depth (i.e. analytical thinking in specialized areas) and breadth (i.e. lateral thinking across areas);
4. the ability to work effectively in teams as a leader or member;
5. the ability to learn independently to stay abreast of new developments; and
6. the realisation of the significance in upholding professional ethics at the highest standards.

The SEEM undergraduate and postgraduate programmes are led by a team of active, energetic and dynamic faculty members, many of whom are world-class researchers who are leaders in their fields. Our education and research activities are supported by state-of-the-art computing facilities. Our laboratories are the cradle of new technologies, innovative systems and smart solutions that have been adopted for use in academia, government and industry. These research outputs from our faculty and students have also won numerous international and regional awards and honours. Our department also offers numerous scholarships to our best students.

The SEEM enrichment programmes include international exchanges, industrial internships and company visits. International exchanges with reputed universities around the world can broaden our students’ horizons globally. Internships provide the opportunity for our students to work in professional engineering teams and solve engineering problems in the real world. These opportunities can sharpen our students’ skills in applying their knowledge to practical situations, as well as communicate and collaborate effectively in a team. In addition, company visits involving exchanges with leading CEOs offer insightful information for our students.

Notable recent developments include our department’s launch of the first-ever Financial Technology undergraduate program in Hong Kong. Our department continues to contribute significantly towards the University’s strategic initiatives in building up the Stanley Ho Big Data Decision Analytics Research Centre, the Academic Development Plan in data analytics, and research efforts in eLearning. We also actively collaborate with the industry, as exemplified by our partnership with IBM Global Business Services in developing the course on “Technology Consulting and Business Analytics in Practice” for our education program, as well as our active involvement in the CUHK MoE-Microsoft Key Laboratory of Human-centric Computing and Interface Technologies as an integral part of our research program.

You may learn about various aspects of SEEM in the following pages. We welcome your questions and suggestions. Thank you!
The scope of our work covers:

- **Financial Engineering**: modelling, data analysis and decision making for financial services, risk management and financial regulations

- **Information Systems**: data-intensive computing for information exchange and intelligence extraction to enable better decision-making and execution for complex systems in our changing society

- **Logistics and Supply Chain Management**: develop models and methodologies to manage material, financial and information flow for improving efficiency and sustainability of supply chain operations

- **Operations Research**: develop cutting-edge tools and methodologies that underpin intelligent decisions in complex systems and modern services

- **Service Engineering and Management**: develop quantitative decision-making tools and methodologies for smooth, agile and resilient operations in data-intensive service systems such as finance, healthcare and logistics
Our faculty members are leaders in their respective fields. In recognition of their leadership and contributions to research and innovations, they are invited or elected to serve as editors of top-tier professional journals, including:

- ACM Transactions on Asian Language Information Processing
- ACM Transactions on Database Systems
- Computer Speech and Language
- Computers & Operations Research
- EURO Journal on Computational Optimization
- EURO Journal on Transportation and Logistics
- Fuzzy Decision Making and Optimization
- IEEE Transactions on Audio, Speech and Language Processing
- IEEE Transactions on Automatic Control
- IEEE Transactions on Knowledge and Data Engineering
- IEEE Transactions on Signal Processing
- IIE Transactions on Operations Engineering
- IIE Transactions on Scheduling and Logistics
- Information and Decision Technologies
- International Journal of Computational Linguistics and Chinese Language Processing
- International Journal of Cooperative Information Systems
- International Journal on Computer Processing of Oriental Languages
- Journal of Computing Science and Engineering
- Journal of Global Optimization
- Journal of Information Processing
- Journal of Scheduling
- Journal on Distributed and Parallel Databases
- Journal on Health Information Science and Systems
- Mathematical Finance
- Mathematics of Operations Research
- Naval Research Logistics
- Omega - International Journal of Management Science
- Operations Research
- Optimization Methods and Software
- Quantitative Finance
- Reliability Engineering and System Safety
- SIAM Journal on Control and Optimization
- SIAM Journal on Financial Mathematics
- SIAM Journal on Optimization
- Speech Communication
- The VLDB Journal
- Transportation Science
- World Wide Web Journal
Accolades

Our programmes are led by a team of active, energetic and dynamic faculty members. Research outputs from our faculty and students have also won numerous international and regional awards and honours, including:

- Appointed member of the Hong Kong Logistics Development Council (LOGSCOUNCIL) 2014-16.
- Best Oral Paper Award in the Asia-Pacific Signal and Information Processing Association Annual Summit and Conference 2010
- Best Paper of the 15th International Conference on Database Systems for Advanced Applications (DASFAA’10) 2010
- Best Paper of the 21st Australasian Database Conference (ADC’10) 2010
- Best Paper Award in the 26th Australasian Database Conference (ADC’15) 2015
- Best Paper award of the 32nd IEEE International Conference on Data Engineering 2016
- CUHK Research Excellence Award 2016-17
- Distinguished Project Award of China Innovation and Entrepreneurship Fair 2016
- Elected Distinguished Lecturer of the International Speech Communication Association (ISCA)
- Elected Fellow of the Chartered Institute of Logistics and Transport (2014)
- Elected Fellow of the International Speech Communication Association (2016)
- Elected Member of IEEE Board of Governors
- Elected Member of IEEE Speech and Language Processing Technical Committee
- Fellow of HKIE
- Fellow of IEEE
- Humboldt Distinguished Lecture 2013
- IBM Faculty Award 2016
- IEEE Communications Society Asia-Pacific Outstanding Paper Award 2014
- Inaugural Distinguished Lecturer of APSIPA (Asia-Pacific Signal and Information Processing Association) 2012-2014
- INFORMS Optimization Society Young Researcher Prize 2010
- Invited Speaker of Okawa Prize 2012 Commemorative Symposium
- Microsoft Research Outstanding Collaborator Award 2016
- Outstanding Fellow of the Faculty of Engineering 2015 for five years
- Outstanding ICT Women Professional Award of the Hong Kong Computer Society 2015
- Overview Speaker of IEEE Workshop on Multimedia Signal Processing 2011
- Plenary Speaker of CogInfoComm 2013
- Shenzhen Municipal Government “Peng Cheng” Visiting Professorship 2010 - Present
Our faculty members have been active in serving professional and societal roles that are related to their expertise:

- Academic Committee, The Chinese National Research Center of Mathematics and Cross-Disciplinary Science, Department of Finance and Economics
- Chinese Language Interface Advisory Committee, appointed by the Deputy Government Chief Information Officer
- Convenor, Engineering Panel, University Grants Council’s Competitive Research Funding for the Local Self-financing Degree Sector
- Convenor, Working Party on 2014 Manpower Survey of the Information Technology Sector, Committee on Information Technology Training and Development of the Vocational Training Council
- Council Member, Hong Kong Productivity Council, appointed by the Secretary for Commerce and Economic Development
- Council Member, The Open University of Hong Kong
- Digital 21 Strategy Advisory Committee, appointed by the Secretary for Commerce, Industry and Technology
- Elected Board Member, International Speech Communication Association
- Elected Vice-President of Professional Development, Hong Kong Computer Society
- Engineering Panel Member, Research Grants Council
- General Chair, International Symposium on Chinese Spoken Language Processing
- HKIE Accreditation Committee for Computer Science Programs, The Hong Kong Institution of Engineers
- IEEE Speech and Language Technical Committee
- Joint Committee on Information Technology for the Social Welfare Sector, appointed by the Director of Social Welfare
- Keynote Speaker of the International Symposium on Scheduling (2013), Tokyo, Japan
- Member of the Lottery Funds Advisory Committee, appointed by the Secretary for Labour and Welfare
- Member of the Research Grants Council, The Hong Kong SAR Government
- Member of the Steering Committee in eHR (electronic Health Record) Sharing, appointed by the Secretary of Food and Health, The Hong Kong SAR Government
- Member of the Working Group on Competitive Research Funding for Local Self-financing Degree Sector, appointed by the RGC Chairman
- Panel of Assessors, The Innovation and Technology Support Programme, appointed by the Commissioner of Innovation and Technology
- Panel of Assessors, The Small Entrepreneur Research Assistance Programme, appointed by the Commissioner of Innovation and Technology
- President, Hong Kong Information Technology Joint Council
- Review Panel, National Centres of Competence in Research, Swiss National Science Foundation
- Review Panel, National Natural Science Foundation of China
- Review Panel, Natural Sciences and Engineering Research Council of Canada
- Review Panel, Swedish Research Council European Research Infrastructure Initiative
- Scientific Programme Chair, 19th Triennial Conference of the International Federation of Operational Research Societies, 2011, Melbourne, Australia
- Task Force on Facilitating the Adoption of Wireless and Mobile Services and Technology (FAWMST), appointed by the Government Chief Information Officer
- Technical Chair, Oriental Chapter of the International Committee for the Co-ordination and Standardization of Speech Databases and Assessment Techniques
- Technical Program Co-Chair, Interspeech
- Technology Consultant, Technology Services Division, The Hong Kong SAR Government
- The Central Committee on Information Technology for Rehabilitation Services, appointed by the Director of Social Welfare
Our students are a new generation of engineers who can solve real-world problems in innovative ways. They have received a variety of awards and recognitions from many international associations and competitions.

- Best Paper Award in the IEEE International Conference on Multimedia and Expo 2016
- Best Paper Award in the 8th Beijing-Hong Kong International Doctoral Forum 2015
- Best Student Paper Award in the 5th Beijing-Hong Kong International Doctoral Forum 2010
- Best Student Paper Award in the 6th Beijing-Hong Kong International Doctoral Forum 2011
- Challenge Cup Prizes, over three years
- Championship of the case study competition in the 12th CILTHK Student Day
- Championship of the case study competition in the 13th CILTHK Student Day
- First Runner-Up Award at 2016 HKSQ Company Based Student Project Competition
- Global Scholarship Programme for Research Excellence - CNOOC Grants 2012
- Honorable mention at the Best Student Paper Competition at the Seventh POMS-HK International Conference
- Microsoft Research Asia Fellowship, multiple years
- MSR Best Student Paper Award in the Fourth China Computer Federation (CCF) Conference on Natural Language Processing & Chinese Computing (NLPCC2015) 2015
- Second-Place Prize of Student Paper Competition at the 3rd Asia Quantitative Finance Conference 2015
- Second-Place Prize of Best Student Paper Competition at the 6th POMS-HK International Conference 2015

Accolades

- Second-Place Prize of Best Student Research Paper Award Competition of Financial Service Session, INFORMS 2010
- Second Prize Winner of the Poster Session at The INFORMS Annual Conference 2012
- 第二名：兩岸四地大學生創業計劃大賽二等獎 2012
- 實時真錢港股投資比賽冠軍 2012
- 期望杯高校期貨論文大獎賽一等獎 2011
- 2nd Runner-up HKIE Manufacturing and Industrial Division Student Project Competition 2013-2014
- 2nd Runner-up HKIE Manufacturing and Industrial Division Student Project Competition 2014-2015
WORLD-CLASS FACULTY MEMBERS
Helen Meng is Professor and Chairman of the Department of Systems Engineering and Engineering Management, The Chinese University of Hong Kong. She received all her degrees from MIT and joined CUHK in 1998. She is the Founding Director of the Microsoft-CUHK Joint Laboratory for Human-Centric Computing and Interface Technologies in 2005, which has been recognized as a Ministry of Education of China (MoE) Key Laboratory since 2008. In 2006, she founded the Tsinghua-CUHK Joint Research Centre for Media Sciences, Technologies and Systems and has served as its Director. In 2013, she helped establish the CUHK Stanley Ho Big Data Decision Analytics Research Center and serves as its Founding Director. She served as former Associate Dean (Research) of Engineering (2006-2010).

Helen’s professional services include former Editor-in-Chief of the IEEE Transactions on Audio, Speech and Language Processing, and a member of the IEEE Board of Governors. She has served in the review panels of the Swedish Research Council European Research Infrastructure Initiative, and the National Centres of Competence in Research of the Swiss National Science Foundation. She is a member of the HKSAR Government’s Steering Committee on eHealth Record Sharing, Convenor of the Engineering Panel HKSAR Government’s Competitive Research Funding Schemes for the Self-financing Degree Sector, member of the Hong Kong/Guangdong ICT Expert Committee and Coordinator of the Working Group on Big Data Research and Applications, Council membership of the Open University of Hong Kong, member of the Research Grants Council, former Council Member of the Hong Kong Productivity Council, former member of the HKSAR Government’s Digital 21 Strategy Advisory Committee, and Chairlady of the Working Party of the Manpower Survey of the Information Technology Sector (undertaken by the Hong Kong Census and Statistics Department) for 2014-2017.

Helen received the Ministry of Education Higher Education Outstanding Scientific Research Output Award in Technological Advancements in 2009. She has also received CUHK’s Faculty of Engineering Exemplary Teaching Award, Young Researcher Award, and Service Award in previous years. She was elected Distinguished Lecturer of the International Speech Communication Association (2015-2016) and inaugural Distinguished Lecturer of APSIPA (2012). In 2015, Helen received Hong Kong Computer Society’s newly launched Outstanding ICT (Information and Communication Technologies) Woman Professional Award. In 2016, Helen received Microsoft Research’s Outstanding Collaborator Award 2016, as well as the ICME Best Paper Award. Helen is a Fellow of the Hong Kong Computer Society, Hong Kong Institution of Engineers, International Speech Communication Association and IEEE.

**Selected Publications**


Lifa Sun, Kun Li, Hao Wang, Shiyin Kang and Helen Meng, “Phonetic Posteriorgrams for Many-to-one Voice Conversion without Parallel Data Training”, Proc. IEEE International Conference on Multimedia and Expo 2016. (Best Paper Award)


Duan Li graduated from Fudan University, received his M.E. degree in automatic control from Shanghai Jiaotong University, and received his Ph.D. degree in systems engineering from Case Western Reserve University. From 1987 to 1994, he was a faculty member at the University of Virginia, where he was an Associate Professor in the Department of Systems Engineering and the Associate Director of the Center for Risk Management of Engineering Systems. He joined The Chinese University of Hong Kong in December 1994, where he is currently Patrick Huen Wing Ming Research Professor of Systems Engineering and Engineering Management and Director of Center for Financial Engineering, and where he served as Chair Professor from 2007-2017 and the Department Chairman from 2003 to 2012.

Duan Li’s research interests include optimization, optimal control, financial engineering, and decision-making methodologies. He has authored and coauthored over 200 technical papers in these areas. He is the coauthor of the book Nonlinear Integer Programming published by Springer in 2006. He was an Associate Editor of IEEE Transactions on Automatic Control, and has been an editorial board member or a guest editor for many other journals, including Journal of Global Optimization and IJIE Transactions on Operations Engineering. He also organised many international conferences. He was the Vice President, the Chinese Society of Mathematical Programming and the Vice President, the Chinese Society of Financial Systems Engineering, and is currently a member of Academic Committee, the Chinese National Research Center of Mathematics and Cross-Disciplinary Science, Department of Finance and Economics.

SELECTED PUBLICATIONS


Xiaoqiang Cai is Professor at the Department of Systems Engineering and Engineering Management, The Chinese University of Hong Kong. He is also Dean of General Education of Lee Woo Sing College, Director of the Center for Logistics Technologies & Supply Chain Optimization, and Director of the CUHK/Tsinghua Joint Executive M.Sc. Program in Logistics and Supply Chain Management. He received his Ph.D. from Tsinghua University, Beijing, in 1988. During 1989 to 1991, he conducted postdoctoral research at The University of Cambridge and The Queen's University of Belfast. He was Lecturer at The University of Western Australia in 1991 to 1992, before joining CUHK in 1993. He served as the Chairman of Department of SEEM during 1996 to 2003, and has been Professor since October 2000. His current research is focused on scheduling theory and applications, logistics and supply chain management, and portfolio optimization. He has published over 100 papers in leading journals in these areas, including Operations Research, Management Science, Production and Operations Management, Naval Research Logistics, IIE Transactions, and IEEE Transactions. He has been on the editorial boards of several international journals, including IIE Transactions on Scheduling and Logistics, Journal of Scheduling, and Fuzzy Decision Making and Optimization.

He also serves as, concurrently, Dean of Science and Engineering of The Chinese University of Hong Kong, Shenzhen.

**SELECTED PUBLICATIONS**


Professor Chen Nan graduated from the Department of Probability and Statistics at Peking University in 1998, and he received his M.Sc. degree in Probability and Statistics in 2001 at Peking University, his M.Phil. and Ph.D. degrees in 2006 at Columbia University, USA. He joined the Department of Systems Engineering and Engineering Management at The Chinese University of Hong Kong in 2006.

Awards and Grants

- Best Student Research Paper Award (Second Place), Financial Services Section, INFORMS, 2006
- Exemplary Teaching Award, Faculty of Engineering, The Chinese University of Hong Kong, 2009.

Awards Received by His Students

- Xin Liu, Finalist (top 5), Best Student Research Paper Competition, Section of Financial Service, INFORMS, 2015.
- Xiangwei Wan, Second Place, Best Student Research Award, Financial Services Section, INFORMS, 2010.
- Xiangwei Wan, Outstanding Thesis Competition Award, Faculty of Engineering, The Chinese University of Hong Kong.

Selected Publications

CHENG, Chun Hung
鄭進雄

Associate Professor
BSc (The Chinese University of Hong Kong)
MSc, MBA, PhD (The University of Iowa)

RESEARCH INTERESTS
> Information Systems
> Operations Management
> Facility Location and Layout
> Logistics & Transport
> RFID Systems Deployment

EMAIL: chcheng@se.cuhk.edu.hk

After he graduated from The Chinese University of Hong Kong, Professor C.H. Cheng furthered his education in the U.S.A. He obtained his M.Sc. in Computer Science, M.B.A. and Ph.D. from the University of Iowa. While he was a graduate student, he worked at the University of Iowa Hospital & Clinics as a programming analyst. He started his teaching career in the USA but later he returned to Hong Kong and joined CUHK.

At CUHK, he teaches a wide range of courses in Information Systems and Operations Management. He enjoys teaching Database Management, E-Commerce Technologies, Information Systems Management, Logistics Management, Management Science, Manufacturing & Services Operations, Supply Chain Management, Systems Analysis & Design, among many others. In 2000, he received Exemplary Teaching Award from Faculty of Engineering. His research interests lie in computer and information technology, and logistics and operations management. He has supervised 4 Ph.D. students and 21 M.Phil. students in their research, and collaborated with both local and overseas researchers. His research work contributes to the fields of facility location and layout, transportation logistics, and service operations, etc. He also serves in 7 international journals as either an associate editor or a member of the editorial boards.

His earlier work (together with Professor WJ Boe) in factory layout was implemented by a third-party developer in Brazil for toy manufacturers. He is leading a project team to design and implement RFID prototype systems for the operations of hospitals, a major airmail center, and museums in Hong Kong. His work helps these organizations assess the financial, operational and technical feasibility for the technology. In addition, he provides consulting services to local industries. These projects include business process improvement, evaluation of micro-payment systems, MRPII implementation, simulation studies for the medical sector, and RFID system deployment.

At CUHK, he is actively involved in curriculum development, technology advancement, and student admission and counseling. He is the Associate Dean of Students for LWS College and assists the Dean in various student matters in the College. He is also the Deputy Director of the Centre for Innovation and Technology (CINTEC) in Faculty of Engineering and is active in promoting students’ innovation projects. As the Chairman of the Curriculum Committee of his Department, he designed a new 334 curriculum for Bachelor of Engineering in Systems Engineering & Engineering Management and was responsible for getting the accreditation of this programme by the Chartered Institute of Logistics and Transport in Hong Kong (CIILTHK) and the Hong Kong Institution of Engineers (HKIE). In the past, he has served as the Chairman of the Admission Committee for CUHK Faculty of Engineering.

In addition to his work in teaching, research, services, and consulting, he is serving as a board member for Hong Kong Society of Transportation Studies, and a panel member and a research advisor for the Technology Committee of the Hong Kong R&D Centre for Logistics & Supply Chain Management Enabling Technologies.
Hong Cheng received her B.S. degree and M.Phil. degree in Computer Science from Zhejiang University and Hong Kong University of Science and Technology in 2001 and 2003, respectively. She then received her Ph.D. in Computer Science from University of Illinois at Urbana-Champaign in 2008. She joined the Department of Systems Engineering and Engineering Management, The Chinese University of Hong Kong in 2008. Her main research area is data mining and information systems.

She received the Certificate of Recognition for the 2009 SIGKDD Doctoral Dissertation Award, and the 2010 Vice-Chancellor’s Exemplary Teaching Award of The Chinese University of Hong Kong.
Xuefeng Gao received his B.S. in Mathematics from Peking University, China in 2008, and his Ph.D. in Operations Research from Georgia Institute of Technology, USA in 2013. His research interests include Algorithmic Trading and Financial Engineering, Queueing Theory, and Stochastic Processes. His work has been selected as Finalist in the 2011 INFORMS Junior Faculty Interest Group (JFIG) paper competition. During summer 2011 and 2012, he worked as a research intern in the Business Analytics and Mathematical Sciences Department of the IBM T.J. Watson Research Center in New York.


GONG, Xiting
龚錫挺

Assistant Professor
BSc, MA, PhD (Peking University)

RESEARCH INTERESTS
- Logistics and Supply Chain Management
- Stochastic Inventory Theory and Applications
- Pricing and Revenue Management
- Approximation and Data-driven Algorithms

EMAIL: xtgong@se.cuhk.edu.hk

Xiting Gong is an assistant professor in the Department of Systems Engineering and Engineering Management, Faculty of Engineering (since July 2013), and the Department of Decision Sciences and Managerial Economics, CUHK Business School (since August 2017), The Chinese University of Hong Kong (CUHK). Prior to joining CUHK, he was a postdoctoral research fellow at The University of Michigan from August 2010 to May 2013. He received his B.Sc. in Applied Mathematics in 2004, and his M.A. and Ph.D. in Management Science in 2006 and 2010, all from Peking University. His main research area is logistics and supply chain management; and his recent research interests include stochastic inventory theory and applications, revenue management and pricing, and approximation and data-driven algorithms.


Xuedong He received the B.Sc. degree in Mathematics and Applied Mathematics from Peking University in 2005 and the Ph.D. degree in Mathematical Finance from the University of Oxford in 2009. He was an assistant professor at Columbia University in 2009 - 2015 and joined the Chinese University of Hong Kong as an associate professor in 2016.

Xuedong He’s research interests include portfolio selection and asset pricing in behavioral finance and economics and risk management. He has published papers in leading journals such as Management Science, Operations Research, Mathematical Finance, and Mathematics of Operations Research. He is serving as Associate Editor for Operations Research. He also organized clusters and sessions in international conferences such as the INFORMS Annual Meetings 2012–2014 and the SIAM Financial Mathematics and Engineering Conference 2014, 2016.

SELECTED PUBLICATIONS

SELECTED PUBLICATIONS


Professor Lingfei Li received his B.S. in Applied Mathematics from Peking University, China in 2007, and his M.S. and Ph.D. in Industrial Engineering and Management Sciences from Northwestern University, USA in 2008 and 2012. He joined the Department of Systems Engineering and Engineering Management, The Chinese University of Hong Kong in June 2012. His research interests include financial engineering, mathematical finance and computational finance. He worked as a quant in the commodity strategies group at Morgan Stanley in the summer of 2009.

**SELECTED PUBLICATIONS**


Xunying Liu received his PhD degree in speech recognition and MPhil degree in computer speech and language processing both from University of Cambridge, after his undergraduate study at Shanghai Jiao Tong University. He was a Senior Research Associate at the Machine Intelligence Laboratory of the Cambridge University Engineering Department, prior to joining the Department of Systems Engineering and Engineering Management, Chinese University of Hong Kong, as an Associate Professor in 2016. He was the recipient of best paper award at ISCA Interspeech2010 for his paper titled “Language Model Cross Adaptation For LVCSR System Combination”. He is a co-author of the widely used HTK toolkit and has contributed to continue its current development in deep neural network based acoustic and language modelling. His research outputs led to several large scale speech recognition systems that were top ranked in a series of international research evaluations. These include the Cambridge Mandarin Chinese broadcast and conversational telephone speech recognition systems developed for the US government sponsored speech translation evaluations from 2006 to 2011, and the Cambridge 2015 multi-genre broadcast speech transcription system. His current research interests include machine learning, large vocabulary continuous speech recognition, statistical language modelling, noise robust speech recognition, speech synthesis, speech and language processing. He is a regular reviewer for journals including IEEE/ACM Transactions on Audio, Speech and Language Processing, Computer Speech and Language, Speech Communication, the Journal of the Acoustical Society of America Express Letters, Language Resources and Evaluation, and Natural Language Engineering. He has served as a member of the scientific committee and session chair for conferences including IEEE ICASSP and ISCA Interspeech. Dr. Xunying Liu is a member of IEEE and ISCA.
Daniel Z. Long received his bachelor degree from Tsinghua University in 2005, the master degree from Chinese Academy of Science in 2008, and the Ph.D. degree from the Department of Decision Sciences, National University of Singapore in 2013. His current research revolves around the aspect of decision criteria for two classical operations research problems - inventory management and project management. His paper “Managing Operational and Financing Decisions to Meet Consumption Targets” received the second prize in the 2013 POMS-HK student paper competition.

SELECTED PUBLICATIONS

Anthony Man-Cho So received his BSE degree in Computer Science from Princeton University with minors in Applied and Computational Mathematics, Engineering and Management Systems, and German Language and Culture. He then received his MSc degree in Computer Science and his PhD degree in Computer Science with a PhD minor in Mathematics from Stanford University. Dr. So joined The Chinese University of Hong Kong (CUHK) in 2007. He currently serves as Assistant Dean of the Faculty of Engineering and is an Associate Professor in the Department of Systems Engineering and Engineering Management. He also holds a courtesy appointment as Associate Professor in the CUHK-BGI Innovation Institute of Trans-omics. His recent research focuses on the interplay between optimization theory and various areas of algorithm design, such as computational geometry, machine learning, signal processing, bioinformatics, and algorithmic game theory.

Dr. So currently serves on the editorial boards of Journal of Global Optimization, Optimization Methods and Software, and SIAM Journal on Optimization. He has also served on the editorial boards of IEEE Transactions on Signal Processing and Mathematics of Operations Research. He received the 2010 Institute for Operations Research and the Management Sciences (INFORMS) Optimization Society Optimization Prize for Young Researchers, the 2010-11 CUHK Young Researcher Award, the 2014 IEEE Communications Society Asia-Pacific Outstanding Paper Award, the 2015 IEEE Signal Processing Society Signal Processing Magazine Best Paper Award, and the 2016-17 CUHK Research Excellence Award. He also received the 2008 Exemplary Teaching Award and the 2011, 2013, 2015 Dean’s Exemplary Teaching Award from the Faculty of Engineering at CUHK, and the 2013 Vice-Chancellor’s Exemplary Teaching Award from CUHK.
Professor Chak Wong is currently Managing Director of Financial Products at Ping An Asset Management. Previously, he was Asia Head of Sovereign and Financial Institutions at Societe Generale. As Professor of Science Practice in the Mathematics department of HKUST, he taught courses on the application of stochastic differential equation to counterparty credit risk and funding valuation adjustment, the application of machine learning to finance markets as well as risk management for banks and insurances. He worked full time as Professor of Finance Practice at The Chinese University of Hong Kong, Director of MSc in Finance program, Associate Director of MBA program and Director of Business Development of The Asia Pacific Institute of Business, while serving the Deposit Protection Board and its Investment Committee of HKMA. Before returning to academia in 2010, Professor Wong was Managing Director and Head of Structuring of IBD Asia including Japan of Barclays Capital. He was responsible for client risk advisory and risk management solutions across all asset classes. Professor Wong was Managing Director and trader in UBS London and Hong Kong, co-heading the APAC structured products groups which trades and designs products including all asset classes and hybrids. He also spent a number of years in London in Goldman Sachs as Executive Director, working as a strategist/quant and trader for rate, FX and inflation. Prior to that, he was a quantitative analyst in credit derivative and emerging market in Morgan Stanley, London. He built a language for constructing credit derivative products, models for interest rate and hybrid products, as well as high dimensional PDE solver and Monte Carlo engines.

Professor Wong studied in The Chinese University of Hong Kong and University of California at Berkeley. His major was Electronic Engineering with minors in Pure Mathematics and French. He obtained his DPhil and MPhil degrees in Economics from the University of Oxford. He was Rhodes Scholar of Hong Kong 1995.
K.F. Wong obtained his Ph.D. from Edinburgh University, Scotland, in 1987. He was a post doctoral researcher in Heriot-Watt University (Scotland), UniSys (Scotland) and ECRC (Germany). At present, he is Professor in the Department of Systems Engineering and Engineering Management, The Chinese University of Hong Kong (CUHK). In parallel, he serves as the Associate Dean (External Affairs) of Engineering, the Director of the Centre for Innovation and Technology (CINTEC), and Associate Director of the Centre for Entrepreneurship (CfE), CUHK. He serves as the President of Asian Federation of Natural Language Processing (AFNLP, 2015-2016), President of the Governing Board of Chinese Language Computer Society CLCS (2015-2017). Also, he was the President of Hong Kong Information Technology Joint Council (2007-2014) and the Vice President of VLDB School China (2005-2013).

His research interest focuses on Chinese computing, database and information retrieval. He has published over 250 technical papers in these areas in different international journals and conferences and books. He is a member of the ACM, Senior Member of IEEE as well as Fellow of BCS (UK), IET (UK) and HKIE. He is the founding Editor-In-Chief of ACM Transactions on Asian Language Processing (TALIP), and serves as associate editor of International Journal on Computational Linguistics and Chinese Language Processing. He is the Chair of Conference Co-Chair of NDBC2016 (SZ), BigComp2016 (HK), NLPCC2015 (Nancheng) and UCNLP2011 (Thailand); the Finance Chair SIGMOD2007 (BJ); and the PC Co-chair of UCNLP2006 (Jeju). Also he is a Programme Committee member of many international conferences. He was awarded by the HKSAR Government Medal of Honour (MH) for his contribution to information technology development in Hong Kong in 2011, by the Shenzhen Innovation technology Council “Virtual University Campus Outstanding Project Investigator Honor Certificate” and by the Hong Kong Scout Association, the Medal of Long Services in 2013.

JOURNAL PAPERS (2013-2016)

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Baolin Peng, Kaibing Song, Jing Li and Kam-Fai Wong. “Recurrent Neural Networks with External Memory for Spoken Language Understanding” The 4th CCF Conference on Natural Language Processing & Chinese Computing (NLPCC 2015), Nanchang, China, October 9-13 2015. (Microsoft Research Best Student Paper)
Jia Zhu, Gabriel Pui Cheong Fung, Kam-Fai Wong, Binpeng Li, Zhuo Li and Haixue Dong. “The Role of Physical Location in Our Online Social Networks” The 16th International Conference on Web-Age Information Management (WAIM 2015), Qingdao, China, June 8-10 2015, pp498-501.

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K.F. Wong obtained his Ph.D. from Edinburgh University, Scotland, in 1987. He was a post doctoral researcher in Heriot-Watt University (Scotland), UniSys (Scotland) and ECRC (Germany). At present, he is Professor in the Department of Systems Engineering and Engineering Management, The Chinese University of Hong Kong (CUHK). In parallel, he serves as the Associate Dean (External Affairs) of Engineering, the Director of the Centre for Innovation and Technology (CINTEC), and Associate Director of the Centre for Entrepreneurship (CfE), CUHK. He serves as the President of Asian Federation of Natural Language Processing (AFNLP, 2015-2016), President of the Governing Board of Chinese Language Computer Society CLCS (2015-2017). Also, he was the President of Hong Kong Information Technology Joint Council (2007-2014) and the Vice President of VLDB School China (2005-2013).

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SELECTED PUBLICATIONS

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Professor Wu specializes in mathematical modeling for financial applications and data analysis for quantitative investments. Prior to joining CUHK, Prof. Wu was first a summer associate with Lehman Brothers Quantitative Credit Research in London fixed income, then an associate director with UBS North America interest rate exotic option trading, and most recently a senior quantitative analyst and team lead of interest rate analytics and stress testing methodology at the Depository Trust & Clearing Corporation reporting to the Federal Reserve Bank of New York. Professor Wu holds a Ph.D. in Applied Mathematics from Columbia University, a M.S. in Electrical Engineering from Peking University, and a B.S. in Electrical Engineering from Wuhan University. He publishes at Management Science, Mathematical Finance and International Journal of Applied and Theoretical Finance. His research is presented at Federal Research Bank of New York, US Commodity Futures Trading Commission (CFTC), Quant Congress USA, Global Derivatives, SIAM Conference on Financial Mathematics and Engineering, and INFORMS annual meeting.

SELECTED PUBLICATIONS


“Scenario Hedging in Incomplete Market”, UBS Macro Desk Quant Research, 2010

“Valuation of FX-Adjusted Credit Spread”, Lehman Brothers Quantitative Credit Research, 2008

CONFERENCES & TALKS

University of Maryland, Business School, 2016-Sep.
Global Derivatives Annual Meeting, Budapest, 2016-May.
Imperial College, CPM-Imperial Institute of Quantitative Finance, London, 2016-May.
Quant Congress USA, New York, Speaker, 2014-Jul.
INFORMS Annual Meeting, Minneapolis, Speaker, 2013-Oct.
Dr. Jeffrey Xu Yu is a Professor in the Department of Systems Engineering and Engineering Management, The Chinese University of Hong Kong. His current main research interests include keywords search in relational databases, graph mining, graph query processing, and graph pattern matching. Dr. Yu served/serves in over 300 organization committees and program committees in international conferences/workshops including the PC Co-chair of APWeb’04, WAIM’06, APWeb/WAIM’07, WISE’09, PAKDD’10, DASFAA’11, ICDM’12, NDBC’13, ADMA’14, CIKM’15 and Bigcomp’17. Dr. Yu served as an Information Director and a member in ACM SIGMOD executive committee (2007-2011), an associate editor of IEEE Transactions on Knowledge and Data Engineering (2004-2008), and an associate editor in VLDB Journal (2007-2013), and the chair of the steering committee in Asia Pacific Web Conference (2013-2016). Currently, he serves as associate editor in ACM Transactions on Database Systems, WWW Journal, the International Journal of Cooperative Information Systems, the Journal of Information Processing, and Journal on Health Information Science and Systems.

Jeffrey Xu Yu is a member of ACM, a senior member of IEEE, and a member of IEEE Computer Society.


Hao Wei, Jeffrey Xu Yu, Can Lu, and Xuemin Lin: “Speedup Graph Processing by Graph Ordering”, in Proceedings of the 2016 ACM SIGMOD International Conference on Management of Data (SIGMOD’16), 2016.


Lu Qin, Jeffrey Xu Yu, Lijun Chang, Hong Cheng, Chengqi Zhang, and Xuemin Lin: “Scalable Big Graph Processing in MapReduce”, in Proceedings of the 2014 ACM SIGMOD International Conference on Management of Data (SIGMOD’14), 2014.


NG, Chi-Kong (Kevin) obtained his B.Sc., M.Sc., and M.Phil. degrees from the Hong Kong Baptist University. He received his Ph.D. degree in Systems Engineering and Engineering Management in 2003 from The Chinese University of Hong Kong (CUHK), and is currently a senior lecturer there. His Ph.D. Dissertation, entitled “High Performance Continuous/Discrete Global Optimization Methods,” has been awarded the CUHK Young Scholars Dissertation Awards 2003 by CUHK and the Outstanding Ph.D. Thesis Award 2003 by the Faculty of Engineering, CUHK.

Kevin’s research interests include theoretical, computational, and practical aspects of global optimization, nonlinear integer programming, discrete time optimal control, inventory control and supply chain management. He has published articles in SIAM Journal on Optimization, Computers & Operations Research, Journal of Global Optimization, Computational Optimization and Applications, etc. He is a member of IEEE, INFORMS, POP, and SIAM.

SELECTED PUBLICATIONS


**Selected Publications**


**Adjunct Professor**

BS (National Tsing Hua University)  
MA (Johns Hopkins University)  
PhD (Northwestern University)

**Research Interests**

- Linear and Nonlinear Programming  
- Fuzzy Optimization and Decision Making  
- Soft Computing and Heuristic Methods  
- Logistics and Supply Chain Management  
- Telecommunication Networks

Shu-Cherng Fang holds the Walter Clark Chair Professorship and Alumni Distinguished Graduate Professorship at the Industrial and Systems Engineering Department of the North Carolina State University, USA. He has been appointed as the University Chair Professor of Tsinghua University (Beijing), Honorary University Professor of Northeast University (Shenyang), Honorary University Professor of Shanghai University (Shanghai), Honorary University Professor of Fudan University (Shanghai), Graduate University Advisory Professor of the Chinese Academy of Sciences (Beijing), Honorary University Chair Professor of the National Chiao Tung University (Taiwan) and Honorary IEEM Chair Professor of the National Tsinghua University (Taiwan). Before joining NC State, Professor Fang was Senior Member of Research Staff at Western Electric Engineering Research Center, Supervisor at AT&T Bell Labs, and Department Manager at the Corporate Headquarters of AT&T Technologies.


Professor Fang has won many awards and has been listed in several major biographic references. He was elected to Fellow of the Institute of Industrial and Systems Engineers in 2002 and Fellow of the Chinese Institute of Industrial Engineers in 2015.
Dr. Hsiao-Wuen Hon is Corporate Vice President of Microsoft, Chairman of Microsoft’s Asia-Pacific R&D Group, and Managing Director of Microsoft Research Asia. He drives Microsoft’s strategy for research and development activities in the Asia-Pacific region, as well as collaborations with academia.

Dr. Hon has been with Microsoft since 1995. He joined Microsoft Research Asia in 2004 as a Deputy Managing Director, stepping into the role of Managing Director in 2007. He founded and managed the Microsoft Search Technology Center (STC) from 2005 to 2007 and led development of the Microsoft Internet Search product (Bing) in Asia Pacific. In 2014, Dr. Hon was appointed as Chairman of Microsoft Asia-Pacific R&D Group.

Prior to joining Microsoft Research Asia, Dr. Hon was the founding member and architect of the Natural Interactive Services Division at Microsoft Corporation. Besides overseeing all architectural and technical aspects of the award winning Microsoft® Speech Server product, Natural User Interface Platform and Microsoft Assistance Platform, he was also responsible for managing and delivering statistical learning technologies and advanced search. Dr. Hon joined Microsoft Research as a senior researcher at 1995 and has been a key contributor of Microsoft’s SAPI and speech engine technologies. He previously worked at Apple Computer, where he led research and development for Apple’s Chinese Dictation Kit.

An IEEE Fellow and a Distinguished Scientist of Microsoft, Dr. Hon is an internationally recognized expert in speech technology. Dr. Hon has published more than 100 technical papers in international journals and at conferences. He co-authored a book, Spoken Language Processing, which is a graduate-level textbook and reference book in the area of speech technology used in many universities all over the world. Dr. Hon holds three dozens patents in several technical areas.

Dr. Hon received a Ph.D. in Computer Science from Carnegie Mellon University and a B.S. in Electrical Engineering from National Taiwan University.

HON, Hsiao Wuen
洪小文

Adjunct Professor
BS (National Taiwan University)
MS, PhD (Carnegie Mellon University)

RESEARCH INTERESTS
- Speech Recognition and Synthesis
- Spoken Language Processing
- Natural Language Processing
- Information Retrieval and Web Search
- Data Mining

SELECTED PUBLICATIONS

- Y. Cao, J. Xu, T.Y. Liu, H. Li, Y. Huang, H.W. Hon, “Adapting ranking SVM to document retrieval”, 29th annual international ACM SIGIR-2006 conference, Seattle, WA.
SELECTED PUBLICATIONS


Z Xu, M Hong and ZQ Luo, “Semidefinite Approximation for Mixed Binary Quadratically Constrained Quadratic Programs,” Accepted for publication in SIAM Journal on Optimization, 2014.


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Luo Zhi Quan (Tom) received his B.Sc. degree in Applied Mathematics in 1984 from Peking University, Beijing, China. Subsequently, he was selected by a joint committee of American Mathematical Society and the Society of Industrial and Applied Mathematics to pursue Ph.D. study in the United States. After an one-year intensive training in mathematics and English at the Nankai Institute of Mathematics, Tianjin, China, he studied in the Operations Research Center and the Department of Electrical Engineering and Computer Science at MIT, where he received a Ph.D. degree in Operations Research in 1989. From 1989 to 2003, Dr. Luo held a faculty position with the Department of Electrical and Computer Engineering, McMaster University, Hamilton, Canada, where he eventually became the department head and held a Canada Research Chair in Information Processing. Since April of 2003, he has been with the Department of Electrical and Computer Engineering at the University of Minnesota (Twin Cities) as a full professor and holds an endowed ADC Chair in digital technology. He is currently also the Vice President (Academic) of the Chinese University of Hong Kong (Shenzhen). Since 2015, he also serves as the director of the Shenzhen Research Institute of Big Data. His research interests include optimization algorithms, signal processing and digital communication.

Dr. Luo is a fellow of SIAM, IEEE and the Royal Society of Canada. He has served as the chair/past chair of the IEEE Signal Processing Society Technical Committee on the Signal Processing for Communications (SPCOM). He is a recipient of the 2004, 2009, 2011 and 2015 IEEE Signal Processing Society’s Best Paper Awards, the 2010 Farkas Prize from the INFORMS Optimization Society, the 2010 EURASIP Best Paper Award and the 2011 ICC Best Paper Award. He has held editorial positions for several international journals including the Journal of Optimization Theory and Applications, SIAM Journal on Optimization, Mathematics of Computation, Management Science, IEEE Journal of Special Topics on Signal Processing and Mathematics of Operations Research, and was also the Editor-in-Chief for the journal IEEE Transactions on Signal Processing.
Frank Soong is a Principal Researcher and Research Manager of the Speech Group. He received his B.S., M.S. and Ph.D., all in EE from the National Taiwan University, the University of Rhode Island and Stanford University, respectively. He joined Bell Labs Research, Murray Hill, NJ, USA in 1982, worked there for 20 years and retired as a Distinguished Member of Technical Staff in 2001. In Bell Labs, he had worked on various aspects of acoustics and speech processing, including: speech coding, speech and speaker recognition, stochastic modeling of speech signals, efficient search algorithms, discriminative training, dereverberation of audio and speech signals, microphone array processing, acoustic echo cancellation, hands-free noisy speech recognition. He was also responsible for transferring recognition technology from research to AT&T voice-activated cell phones which were rated by the Mobile Office Magazine as the best among competing products evaluated. He was the co-recipient of the Bell Labs President Gold Award for developing the Bell Labs Automatic Speech Recognition (BLASR) software package. He visited Japan twice as a visiting researcher: first from 1987 to 1988, to the NTT Electro-Communication Labs, Musashino, Tokyo; then from 2002-2004, to the Spoken Language Translation Labs, ATR, Kyoto. In 2004, he joined Microsoft Research Asia (MSRA), Beijing, China to lead the Speech Research Group. He is a visiting professor of the Chinese University of Hong Kong (CUHK) and the co-director of CUHK-MSRA Joint Research Lab, recently promoted to a National Key Lab of Ministry of Education, China. He was the co-chair of the 1991 IEEE International Arden House Speech Recognition Workshop. He has served the IEEE Speech and Language Processing Technical Committee of the Signal Processing Society, as a committee member and associate editor of the Transactions of Speech and Audio Processing. He published extensively and coauthored more than 200 technical papers in the speech and signal processing fields. He is an IEEE Fellow.

**SELECTED PUBLICATIONS**

Yujia Xiao, Frank K. Soong, “Proficiency Assessment of ESL Learner’s Sentence Prosody with TTS Synthesized Voice as Reference,” Interspeech-2017

Jinghua Zhong, Wenping Hu, Frank Soong, Helen Meng, “DNN i-vector Speaker Verification with Short, Text- constrained Test Utterances,” Interspeech-2017


Yuchen Fan, Yao Qian, Frank K. Soong, Lei He, “Unsupervised Speaker Adaptation for DNN-based TTS Synthesis,” ICASSP-2016


Yuchen Fan, Yao Qian, Frank K. Soong, Lei He, “Speaker and Language Factorization in DNN based TTS Synthesis,” ICASSP-2016


Yuchen Fan, Yao Qian, Fenglong Xie and Frank, K. Soong, “TTS Synthesis with Bidirectional LSTM based Recurrent Neural Networks”, Interspeech-2014


Yu, Gang
于刚
Adjunct Professor
MS (Cornell University)
PhD (University of Pennsylvania)
RESEARCH INTERESTS
> Supply Chain Management
> E-commerce
> Discrete Optimization
> Network Models and Algorithms
> Real-time Operations Control
> Robust Optimization

Gang Yu is co-founder and Chairman of Yihaodian (www.yhd.com), a leading e-commerce company in China. Prior to founding Yihaodian, he was Vice President, Worldwide Procurement at Dell Inc. Dr. Yu also served as Vice President, Worldwide Supply Chain Operations at Amazon.com. Before Amazon, Dr. Yu served as the Jack G. Taylor Chair Professor in Business in the Department of Management Science and Information Systems at the McCombs School of Business, the University of Texas at Austin, Director of the Center for Management of Operations and Logistics, and co-Director of the Center for Decision Making under Uncertainty. He is the Founder, former Chairman and CEO of CALEB Technologies Corporation.

In addition to serving as Adjunct Professor at CUHK, Dr. Yu is also Adjunct Professor at Tsinghua University, Beijing University, Wuhan University, Shanghai Jiaotong University, Zhejiang University, Nanjing University, Xian Jiaotong University, Huazhong University of Science and Technology, Beijing University of Aeronautics and Astronautics, Xiamen University, and People’s University of China.

Dr. Yu has also received numerous awards for recognizing his achievements including: the 2002 Franz Edelman Management Science Achievement Award from INFORMS, the 2002 IIE Transaction Award for Best Application Paper, the 2003 Outstanding IIE Publication Award from the Institute of Industrial Engineers, the 2012 Martin K. Starr Excellence in Production and Operations Management Practice Award from POMS, in addition to many awards. Dr. Yu has published over 80 journal articles, 4 books, and Dr. Yu holds 3 US patents.

Dr. Yu co-founded the B2C e-commerce company Yihaodian in China in 2008. Since founding, Yihaodian has enjoyed a rapid growth and it has won the first place of the Deloitte Technology Fast 500 Asia Pacific and the first place Future Stars Award from China Entrepreneur in 2011. Yihaodian now has over 75 million customers, over 10,000 employees, 19 fulfillment centers, over 4 million product offers. Its revenue reached 11.5 billion RMB in 2013.

SELECTED PUBLICATIONS


First-Loss Capital
X. He

In most U.S. hedge funds, the managers take a performance fee, such as 20%, for any profit they generate for the investors but do not pay in case of a loss. In China private equities and also in some new hedge funds in the United States, the managers, however, need to provide a first-loss capital to absorb the investors’ loss and charge a performance fee at a higher rate, e.g., 40%. We study how the first-loss capital can reduce fund risk, improve the well-being of the managers and investors, and separate skilled managers from unskilled ones.

High Frequency Trading
N. Chen

High frequency trading (HFT) is to use computers to process market information and make elaborate decisions to “initiate buy/sell orders. As of July 2009, HFT firms account for 73% of all US equity trading volumes.” We study how to develop realistic and analytically tractable models for the dynamics of order-driven trading systems. The implications on optimal execution and investment strategies will be investigated.
Research Activities

**Interest Rate Derivative Modeling**
Q. Wu

Interest rate derivative is the largest global over-the-counter derivative market among all asset classes, with 489 trillion US dollars outstanding notional and 18 trillion market value. It plays instrumental role in the financial lives of countries and institutions. Our research dives into the following three topics: modeling of yield curves and interest rate volatility; physical measure risk management of derivative portfolios; and macro understanding of policy influences on interest rates.

**Limit Order Books**
X.F. Gao

As a trading mechanism, limit order books have gained growing popularity in equity and derivative markets in the past two decades. The objective of this project is to understand deeper on different time scales, how the price is driven by supply and demand, which is expressed in the geometric property of the time-varying order book shape.

**Mining Streams of Financial Data and News**
J. Yu

Financial market trends prediction is a technique to forecast market trend changes, which assists financial market participants to spot arbitrage opportunities for investment. Currently, most existing reported data mining studies for trend prediction focused on the time-series perspectives. However, there are numerous social factors that contribute to financial market trends prediction, but cannot be obtained from or represented in time-series data. First, in order to effectively predict market trends, one main objective of this project is to develop new data mining techniques that deal with two different types of data, namely financial data (time-series data or simply data) and news articles (textual data or simply text) concurrently. Second, stock market traders need to monitor tens of thousands of data/text sources coming as open-ended data/text streams in an on-line fashion, and need to analyse and make decisions based on the data/text streams they have received as soon as they can. We will study trend predictions by investigating the above two interrelated issues and finding associations among multiple data/text streams.

**Modeling Time Dependency in Financial Engineering**
L.F. Li

A fundamental task in financial engineering is to develop empirically realistic as well as tractable derivative models. For tractability reasons many standard models are assumed to have time-homogeneous local characteristics (i.e. drift, diffusion coefficient, jump measure), which however, are undesirable from the empirical standpoint in many applications, as they cannot capture time dependent behavior such as seasonal spikes observed in electricity spot prices, and cannot achieve satisfactory results in calibrating the term structure of interests (e.g. implied volatilities). The aim of this project is to study the theory and applications of a new technique called additive subordination for modeling time dependency in financial engineering.

**Realization Utility**
X. He

Individual investors derive realization utility: every time they buy a stock, an investment account is created in their mind and will be closed when the stock is sold. They feel good with a realized gain and bad with a realized loss. In this project, we study how the derivation of realization utility affects the investors’ trading behavior and accounts for various empirical findings such as disposition effect.
Revised Dynamic Mean-Variance Portfolio Selection

D. Li

As the dynamic mean-variance portfolio selection formulation does not satisfy the principle of optimality of dynamic programming, phenomena of time inconsistency occur, i.e., investors may behave irrationally under the pre-committed optimal mean-variance portfolio policy when their wealth is above certain threshold during the investment process. By relaxing the self-financing restriction to allow withdrawal of money out of the market, we develop in this research a revised mean-variance policy which dominates the pre-committed optimal mean-variance portfolio policy in the sense that, while the two achieve the same mean-variance pair of the terminal wealth, the revised policy enables the investor to receive a free cash flow stream during the investment process. This research will further carry out study on minimum-cost mean-variance portfolio selection, as the monotonicity does not hold in the mean-variance world, i.e., not the larger amount you invest, the larger expected future wealth you can expect for a given risk (variance) level.

Spectral Methods for Optimal Decision and First Passage Problems

L.F. Li

We develop a new method based on spectral analysis to solve optimal decision problems including optimal stopping, optimal switching and stochastic games, and first passage problems for a rich class of Markov diffusions, jump-diffusions and pure jump processes, which are building blocks for empirically realistic financial models. These problems arise in a variety of applications in financial engineering, including evaluating financial contracts with early exercise rights or/and with barriers, such as American-style options, barrier options, callable and puttable bonds and convertible bonds, and real options arising in commodity extraction, power generation, optimal investment or divestment timing, and other irreversible decisions.

Time Consistency Issue in Financial Optimization

D. Li

Choosing an appropriate risk measure for specific investor(s) is one of the most important steps in carrying out risk management in investment. When a mean-risk measure does not possess time-consistency in efficiency, following the optimal policy derived from such a mean-risk measure may yield some irrational investment behaviours. Unfortunately, almost all widely adopted risk measures in the literature are not time consistent, or even not time-consistent in efficiency. Furthermore, the theoretical frameworks proposed recently in the literature on time consistency are difficult to satisfy and these abstract measures are not intuitively understandable by investors. The objective of this research is to develop a framework to identify suitable mean-risk measures which possess desirable properties, especially, time consistency in efficiency, and, at the same time, can be intuitively understood and appreciated by investors.
Audio Search Engines
H. Meng

Audio search engines enable us to search through the mass of audio information that is available on the internet, e.g. audio tracks of video, radio broadcasts, meeting recordings, etc. This project combines speech processing and information retrieval technologies to facilitate audio search and retrieval. Features such as automatic segmentation of hours of audio into individual stories, retrieval of Chinese spoken recordings based on textual input queries and also cross-language English-Chinese spoken document retrieval are also possible.

Bi-directional English-Chinese Machine Translation
H. Meng

We have developed one of the first bi-directional English-Chinese Machine Translation systems using semi-automatically generated grammars. The same system can automatically generate the Chinese translation of an input English query as well as the English translation of an input Chinese query. Grammars are derived semi-automatically using a data-driven technique.

Information Systems is about data-intensive computing for information processing and intelligence extraction to enable better decision-making and execution for complex systems in our changing society.

In order to leverage today’s rapidly-advancing technology, new generations of algorithms and technologies are applied. Systems engineers are well-trained with solid computer-related and programming knowledge for analysing and mining data, building large-scale analytic models, both stochastic and deterministic, creating algorithms for solving problems, executing large-scale simulation models, and allowing users to easily visualize and manipulate the data.
Computer-Aided Second Language Learning through Speech-based Human-Computer Interactions
H. Meng

This is a new initiative that aims to develop speech and language technologies to support second language learning, especially for Chinese learners of English. We are developing an automatic speech recognizer that can detect and diagnose the learners’ pronunciation errors, in order to automatically generate corrective feedback that is helpful for the user. Text-to-speech synthesis technologies are also developed to provide spoken feedback. This project brings together the fields of engineering, linguistics and education. It opens up new opportunities in the area of e-learning and collaborative learning using next-generation web technologies.

Please see www.se.cuhk.edu.hk/hccl/languagelearning

Efficient Deep Learning Algorithms For Human Language Big Data
X. Liu

Human languages are natural forms of big data. Statistical language models form key components of many human language technology applications including speech recognition, machine translation, natural language processing, human computer interaction, language learning and handwriting recognition. A central part of language modelling research is to appropriately model long-distance context dependencies. In recent years deep learning based language modelling techniques are becoming increasingly popular due to their strong generalization performance and inherent power in modelling sequence data. The application of deep learning techniques to speech and language processing also opened up a number of key research challenges. The computational cost incurred in training and evaluation significantly limits their scalability and the number of possible application areas. In order to address these issues, this project aims to significantly improve the efficiency and performance of recurrent neural network based deep language modelling approaches on large data sets.

Graph Database
J. Yu

As rapid growth of Internet and Web-technology, information becomes ever more pervasive and important. The demand keeps increasing for database management systems to provide more effective mechanisms, as being shown in up-to-date research activities in supporting Web, semistructured and XML applications in database systems. This project aims at providing advanced techniques to effectively and efficiently handle graph query processing, indexing, and storage management, for large graph datasets.

Highly Natural Chinese Speech Synthesis with a Talking Head
H. Meng

We have developed Crystal, a text-to-audiovisual-speech synthesizer that can automatically generate a cartoon-talking head based on textual input. This avatar can speak in Cantonese or Putonghua. We are working on improving the naturalness of the avatar, both in terms of its spoken expressions, as well as facial expressions and articulatory gestures. This exciting project has many applications, e.g. electronic books, reading aids for the visually impaired, language learning, etc.

Please see www.se.cuhk.edu.hk/crystal

Information Mining and Discovery from Text Data
W. Lam

Massive amount of information is stored in the form of texts. They can be in the form of unrestricted natural language and in different domains. Some texts are
Research Activities

in semi-structured form such as Web pages. This project aims at developing new models for discovering new, previously unknown information that is useful for human or for further construction of intelligent systems. Techniques drawn from machine learning, natural language processing, and information retrieval are investigated.

Integration of Classification and Pattern Mining: A Discriminative and Frequent Pattern-based Approach

H. Cheng

Many existing classification methods assume the input data is in a feature vector representation. However, in many tasks, the predefined feature space is not discriminative enough to distinguish different classes. More seriously, in many other applications, the input data has no predefined feature vector, such as transactions, sequences, graphs, and semi-structured data. For both scenarios, a primary challenge is how to construct a discriminative and compact feature set. Besides popularly investigated machine learning and statistical approaches, frequent pattern mining can be considered as another approach. The direction is interesting because frequent patterns are usually statistically significant and semantically meaningful. The objective of this project is to use discriminative frequent patterns to characterize complex structural data and thus enhance the classification power. I developed a framework of discriminative frequent pattern-based classification which could lead to a highly accurate, efficient and interpretable classifier on complex data.

Learning Text Categorization and Classification

W. Lam

One important and useful basic component in text mining is automatic text categorization. Text categorization has a lot of applications including intelligent document routing and knowledge management. It is more challenging than ordinary classification problems due to high dimensionality, text feature extraction, and skewedly distributed classes. We have been developing new algorithms for this problem. In addition to algorithmic progress, we intend to seek a more realistic model for capturing the inherent properties of text classification.

Multi-modal and Trilingual Spoken Dialog Systems

H. Meng

We are developing distributed spoken dialog systems that support the languages of Hong Kong (Cantonese, Mandarin and English) as well as human-computer interactions using portable PDAs and smart phones connected over a wireless network. Our systems accept multimodal input via speech, handwriting and pointing; and they deliver multimedia output involving text, audio and video. Users can use these systems for information access in the travel and financial domains. Our systems integrate a plethora of technologies involving speech recognition, natural language understanding, multi-modal dialog modelling and speech synthesis.

Network Informal Language Processing

K.F. Wong

Network Informal Language (NIL) refers to the language commonly used on the Internet for real-time information exchange, such as over ICQ, MSN, etc. NIL is very different from natural language. It is dynamic and anomalous in nature. We propose to use a machine learning approach to acquire new vocabulary and grammar rules from a proprietary NIL corpus. Understanding NIL would enable us to analyse the behaviour of Internet users. This in turn could be applied to commercial application, such as customer relationship management.

Querying Large Evolving Graphs

J. Yu

The data available on the Web increases significantly over years and will continue to grow significantly. We consider the Web as an example of a large evolving graph, because its content and links structure dynamically change over time. Like the Web, there exist many other large graphs in real applications that change over time dynamically, for example, the social networks. In this project, we study a large evolving graph, which is a sequence of graphs, (G1, G2, G3) such as Gj evolves from Gi if Gi appears before Gj. We focus on providing new effective and efficient mechanisms for users to understand the structural perspectives and understand how these structural perspectives evolve or change over time. The importance of this project is based on the fact
that users request to understand changes in terms of structural perspectives in a global sense rather than on a basis of individual documents and Web pages that contain certain keywords, and users request to know how the things, that are not obviously related, are related and how some have impacts over the others.

**Social Media and e-Community Analysis**

**K.F. Wong**

Facebook, Twitter, LinkedIn, etc. are popular social media. Today, they are widely used for sharing opinions on different targets, e.g. services, products, politics etc. Social media is becoming an indispensable way of communication in our daily life. Different from traditional communication, social media provides a platform where people are connected together to form e-communities. Hence, social media brings significant advances to our understanding of social behaviors, and the study of social media is of great importance in sociology, biology, and computer science. The core element in social media is the notion of e-community, which serves the roles of an information generator and propagator, as well as a relationship manager. There is, therefore, a growing research interest in understanding e-communities, which is the target of our research team.

**Temporal Information Extraction and Processing**

**K.F. Wong**

Temporal information carries information about changes and time of the changes. It is regarded as an equally, if not more, important piece of information in applications like extracting and tracking information over time or planning and evaluating activities. The conventional information systems may maintain and manipulate the occurrence time of events, but they may not be able to handle users’ queries concerning how an event relates to another in time. In this project, we investigate techniques in natural language processing for extracting temporal information from a document and, based on the extracted information, develop techniques in temporal logic inference.
Hong Kong is one of the world’s logistics and supply chain management hubs, which expands to include non-industrial operations involving supply, distribution, transportation, communication and information handling, medical care and safety. According to The Association for Operations Management (APICS), nowadays supply chain management covers the design, planning, execution, control, and monitoring of supply chain activities with the objective of creating net value, building a competitive infrastructure, leveraging worldwide logistics, synchronizing supply with demand and measuring performance globally.

To increase the agility and flexibility of today’s complex business environment, systems engineers can process huge amounts of business data for decision-making, optimization, and effective execution along the supply chain networks. They possess professional knowledge in the design and control of these operational and information-rich systems, which require the use of many different kinds of scientific management methodologies.

**Coordinated Decisions of Manufacturer/Distributor in a Fresh Product Supply Chain Involving Long Distance Transportation**

X. Cai and Gang Yu

We consider a supply chain where a manufacturer produces a variety of fresh products to supply to a distributor in a distant export market. The manufacturer faces the risk that a fresh product may decay during the process of long distance transportation, in particular in the presence of uncertain events (such as bad weather, airport delays, etc.). The distributor faces the risk that the demand for a product is uncertain and any unsold fresh products may lose its value after the sales period. While the profit potential in supplying the products to the export market is substantial, a great challenge for both parties is how to minimize the loss involved. Because time is a crucial element for fresh products, proper decisions regarding the timing to produce, deliver, and sell, become particularly critical in these situations. Main topics to be investigated include modelling to capture the prominent characteristics and concerns in different scenarios, derivation and analysis of optimal policies, and design and analysis of information and profit sharing schemes.
**Coordinating Inventory and Pricing Strategies under Total Minimum Commitment Contracts**

X.T. Gong

Total minimum commitment (TMC) contracts are supply contracts under which the buyer commits to buying a minimum quantity/dollar value of products from the supplier during the contract horizon. TMC contracts have been widely implemented in many industries including electronics, aviation, and pharmaceuticals. Motivated by the observations that effective management of TMC contracts requires the coordination between inventory and demand management and that dynamic pricing is an effective tool to manage demand, this project aims to conduct an in-depth study on the coordination between inventory and pricing strategies under TMC contracts. If successful, our research output will not only significantly contribute to the literature by filling an important gap in the literature on TMC contracts, but also have a broad impact on practitioners by enhancing their capacities of effectively managing TMC contracts through inventory and pricing coordination.

**Resource Management Platform via Tracking Data Analysis in Hospital**

C.H. Cheng and Dorbin Tobun Ng

When the whereabouts of medical resources and equipment can be tracked inside a hospital 24 hours and 7 days a week, the information about their activities associating with various treatment events and interactivities relating to different series of workflows can be used to answer questions such as how efficient these resources are utilized and whether additional resources should be acquired to improve the healthcare quality. The grounds for answering those questions come from analyzing the underlying voluminous tracking data and derived data showing the utilization of these resources. In particular, when different computed results such as clusters of different activity patterns match up with corresponding ward activities or events, decision making tool can then be developed to predict and prepare medical resources for dealing with the foreseeable events. This project aims to develop an analytic platform to turn simple but voluminous tracking data collected automatically in ward environment into knowledge for care providers to serve patients. Other than medical applications, this platform will be developed further to turn tracking data in large facilities like manufacturing factories and distribution centers for better logistics management.

**Pricing, Production and Delivery Decisions, and Cooperative Strategies in a Supply Chain with Products of Time-Varying Values**

X. Cai and J. Chen

Many industries face the problem of manufacturing and selling products of time-varying values. Due to the time-varying nature of product values, determining the proper decisions and strategies regarding the best timing to offer new sales price, to place order, and to produce and deliver, is a great challenge for the manufacturer as well as the retailers involved in the supply chain. In this project we examine a supply chain with one manufacturer and multiple retailers, where the manufacturer wishes to determine a proper pricing mechanism and the corresponding production/delivery decisions, while the retailers wishes to make use of the pricing mechanism offered by the manufacturer, through possible grouping with each other to reach the needed purchase quantities for price drops. Cooperation and competition among the retailers, and between the manufacturer and the retailers, will be considered.

**The Dynamics of Layout in a Crossdock**

C.H. Cheng and J. Leung

A fundamental problem in crossdocking operations is concerned with the arrangement of strip doors (where incoming freight is unloaded from a trailer) and stack doors (where outgoing freight is loaded onto a trailer), and the assignment of destinations to stack doors. This is referred to as the layout problem in a crossdock. To the best of our knowledge, most existing work only deals with the static problem in which the layout remains the same for the planning horizon. The static treatment provides good analytical implications. However, if facilities operate under a very dynamic environment, layout rearrangement may be required during the planning horizon to maintain layout effectiveness. In this project, we attempt to study the dynamics of layout in a crossdock. We address several research issues of crossdocking operations that have not received sufficient attention:

- Dynamic aspects with re-layout cost,
- Impacts of different material handling equipment,
Research Activities

- Interactions of layout, freight composition, and congestion.

This problem is particularly important for Hong Kong because of the high cost of land. Warehouse spaces and loading areas are severely limited in most distribution centre operations. As part of our work, we will develop models and solutions applicable to the Hong Kong situation.

The Impact of a Target on Newsvendor Decisions

Z.Y. Long

In this paper we investigate the impact of a target on newsvendor decisions. Different to the existing approach that maximizes the probability of the profit reaching the target, in this paper we model the effect of a target by maximizing the satisficing measure of a newsvendor’s profit with respect to that target. We study two satisficing measures: i) CVaR satisficing measure that evaluates the highest confidence level of CVaR achieving the target; and ii) Entropic satisficing measure that assesses the smallest risk tolerance level under which the certainty equivalent for exponential utility function achieves the target. For both satisficing measures, we find that the optimal ordering quantity increases with the target level. Further, the newsvendor orders more than the risk-neutral solution (over-order) sometimes and less than that (under-order) other times, depending on the target level. The more interesting finding is that if the target is proportional to the unit marginal profit and is also determined by only one other demand-related factor, then the newsvendor over-orders low-profit product and under-orders high-profit product.

Video Analytics for Resource Management

Kwong Tim Chan, C.H. Cheng, Dorbin Tobun Ng

In large transit facility like airport, warehouses, and distribution centers, a set of movable resources is circulating within the facility to help transport or temporarily store items going through it. For example, trolleys in an airport’s baggage reclaim hall will be fetched by passengers to carry their luggage to their choices of transportation leaving the airport. Such trolleys may be placed indoor and outdoor within the perimeter of the airport. With the fact that the CCTV visual coverage in a large facility increases over time, it is logical and economical to leverage existing CCTV infrastructure to help monitor and manage movable resources. In addition, queueing conditions in transit facility may affect or be affected by the availability of other resources. Queue performance monitoring is vital to ensure smooth transition. This project aims at using video content analytic techniques to help detect specific resources in order to achieve appropriate level of resource allocation throughout transit facility.

The project will carry out a series of pilot studies in the Hong Kong International Airport (HKIA) to measure the detection and counting capabilities of the R&D results. The first pilot study will be carried out in a relatively constant environment in Baggage Reclaim Hall to monitor number of available trolleys in trolley stations. Along with the detection module, a real-time alert system will be developed to take live CCTV feed and provide replenishment notice or alert to HKIA management and service providers to refill trolleys to appropriate trolley stations. The second pilot study will be carried out at the curbside trolley stations outside the Departure Hall where the environmental condition varies due to direct sun light at different time of the day or season as well as shadows from moving double-decker buses. The third pilot study will be at the trolley stations in the airside Departure West Hall (boarding gate areas). This pilot study is to demonstrate the extensibility of trainable object detector to detect and count trolleys of another form factor and shape under variable environmental conditions. The fourth pilot study is to demonstrate the capability to collect waiting time statistics in makeshift passenger queues in the Departure Hall. The video-based technologies developed in this project are applicable vertically to airports around the world, or horizontally to other CCTV-ready facilities like shopping malls and exhibition centers with indoor, outdoor, and mixed environment to monitor allocations of resources inside premises.
Approximation Algorithms for Perishable Inventory Systems

X.T. Gong

Perishable products such as meat, fruit, dairy products, frozen foods, and pharmaceuticals are ubiquitous and play an indispensable role in our society. However, the control and optimization of perishable inventory systems is very hard due to their finite-lifetime nature. Indeed, the optimal control policy for perishable inventory systems is very complicated; and the computation of the optimal policy using dynamic programs suffers from the well-known “curse of dimensionality” and is intractable even with a relatively short product lifetime. In this project, we aim to develop easy-to-compute and near-optimal approximation algorithms with worst-case performance guarantees for periodic-review perishable inventory systems with general demand processes. If successful, our research will not only significantly contribute to the research literature on perishable inventory management, but also have a broad impact on researchers and practitioners in perishable product industries/organizations.
Research Activities

**Distributionally Robust Discrete Optimization with Entropic Value-at-Risk**

Z. Y. Long

We study the discrete optimization problem under the distributionally robust framework. We optimize the Entropic Value-at-Risk, which is a coherent risk measure and is also known as Bernstein approximation for the chance constraint. We propose an efficient approximation algorithm to resolve the problem via solving a sequence of nominal problems. The computational results show that the number of nominal problems required to be solved is small under various distributional information sets.

**Fast Algorithms for Big Data Analytics**

A. M.-C. So

The ubiquity of big datasets and the desire to extract information and knowledge from them have motivated the development of a wide array of data analytics tools in recent years. Many of these tools aim at identifying the most informative features in a dataset according to some criteria. As such, they often require the algorithmic solution of certain (intractable)optimization problems. In this project, we will develop efficient algorithmic implementations of various optimization-based data analytics tools and rigorously establish their performance guarantees (such as convergence rate, approximation quality and statistical properties). This will contribute to both the theory and practice of big data optimization. We will also test our results on various applications, such as recommender systems and systems biology.

**Financial Systemic Risk**

N Chen

Financial institutions knit a complex network. They interconnect with each other directly through active borrowing-and-lending activities and holding significant amount of marketable securities against each other. In normal times, this network helps the institutions diversify their idiosyncratic risks to achieve an efficient allocation of economic resources. However, under crisis conditions, this network can be easily turned into a conduit that propagates failures at one or several institutions to the entire system. Further complicating the matter is a second layer of interconnectedness of the institutions, indirectly via the market. The asset fire sale by a distressed firm will create a significant negative externality for the rest of the system. As the recent financial crisis reveals, these two, direct and indirect but mutually enhancing, channels play an important role in the development of systemic risk. The objectives of my research aims to develop mathematical tools to modeling and analyzing systemic risk, in particular studying how defaults spread through the entire financial system.

**Hidden Convexity**

D. Li

The research goal is to develop sufficient conditions to identify hidden convex minimization problems. A non-convex minimization problem is called a hidden convex minimization problem if there exists an equivalent transformation such that the transformed minimization problem is convex. Sufficient conditions that are independent of transformations can be derived for identifying such class of seemingly non-convex minimization problems that are equivalent to convex minimization problems. A global optimality can be thus achieved for this class of hidden convex optimization problems by using local search methods.

**Low-Rank Tensor Recovery and Tensor PCA**

S.Q. Ma

Stimulated by the need of big data analytics, and motivated by the success of compressed sensing and low-rank matrix optimization, it is important and timely to study methods for analyzing massive tensor data. Traditional matrix-based data analysis is inherently two-dimensional, which limits its ability in extracting information from a multi-dimensional perspective. Tensor-based multi-dimensional data analysis has shown that tensor models can take full advantage of the multi-dimensional structures of the data, and generate more useful information. A common observation for huge-scale data analysis is that the data exhibits a low-dimensional property. This leads to the study of low-rank tensor optimization problems. The primal goals of our research under this project are: (i) to develop new matricization schemes for tensor and to analyze the corresponding relation between its CP rank and the rank of its matrix counterpart; (ii) to apply the matricization scheme to low-rank tensor recovery problems and their variants, and to develop efficient first-order optimization algorithms for solving these problems; (iii) to develop efficient algorithms for solving sparse PCA for tensor; (iv) to apply these models and algorithms to solve tensor optimization problems arising from real applications such as statistics, signal processing, machine learning and bioinformatics.
Managing Underperformance Risk in Project Portfolio Selection

Z.Y. Long

We consider a project selection problem where each project has an uncertain return with partially characterized probability distribution. The decision maker selects a feasible subset of projects so that the risk of the portfolio return not meeting a specified target is minimized. Our work extends the riskiness index of Aumann and Serrano (2008) by incorporating the target and also distributional ambiguity. We minimize the underperformance risk of the project portfolio, which we define as the reciprocal of the absolute risk aversion (ARA) of an ambiguity averse individual with constant ARA who is indifferent between the target return with certainty and the uncertain portfolio return. Our model captures correlation and interaction effects such as synergies. We solve the model using binary search, and obtain solutions of the subproblems from Benders decomposition techniques. A computational study shows that project portfolios generated by minimizing the underperformance risk are more than competitive in achieving the target with those found by benchmark approaches, including maximization of expected return, minimization of underperformance probability, mean-variance analysis, and maximization of Roy’s (1952) safety first ratio. As a simpler alternative, we describe a greedy heuristic, which routinely provides project portfolios with near optimal underperformance risk.

New Scheduling Models with Applications to Berth Allocation

X. Cai and C.Y. Lee

The study focuses on modelling, analysis, and algorithms for a class of new scheduling problems where a big job must occupy a full machine, while a small job may share a machine with some other jobs at the same time. Applications to berth allocation in container terminals are also investigated.

New Models in Capacitated Lot Sizing Decisions

C.H. Cheng

Existing research in the capacitated lot sizing problem (CLSP) often assumes setup time to be negligible. Although there have been efforts to reduce setup time, it is not possible to reduce it to near zero in many industries. Hence, excluding setup time from CLSP models is not practical, especially when setup time is significant and production capacity is tightly constrained. In this research, this limitation will be addressed. General models considering alternate production options will be developed. In particular the inclusion of setup time will be investigated. Further the structure of the problem will be studied and solution algorithms based on the underlying structure will be developed. An extensive computational study will be carried out.

Nonconvex Approaches to Rank-Constrained Semidefinite Programs

A. M.-C. So

Many intractable problems in engineering can be formulated as a semidefinite program (SDP) with a rank constraint. Currently, a standard approach to tackle these problems is semidefinite relaxation. The idea is to drop the rank constraint to get an efficiently solvable SDP. However, standard SDP solvers typically yield high-rank solutions. In this project, we investigate the use of nonconvex regularization terms to promote low-rank solutions. The focus will be on both the computational complexity of such approaches and their practical implementations.

Nonconvex Optimization and Global Optimization

D. Li and C. K. Ng

The research goal is to develop equivalent transformations for generating a saddle point for
nonconvex optimization problems. A saddle point condition is a sufficient condition for optimality. A saddle point can be generated in an equivalent representation space for nonconvex optimization problems that do not have a saddle point in their original settings. Certain equivalent transformations may convexify the perturbation function and a zero duality gap can be thus achieved. This investigation would lead to some efficient dual search algorithms that ensure the global optimality for a class of nonconvex optimization problems.

Nonlinear Integer Programming
D. Li and C. K. Ng

The research goal is to establish convergent duality theory and to develop efficient solution algorithms for large-scale nonlinear integer programming problems. The fundamental target underlying our theoretical development is to eliminate duality gap in the classical Lagrangian dual formulation. We have developed nonlinear Lagrangian theory that has yielded several new dual formulations with asymptotic zero duality gap. The key concept is the construction of a nonlinear support for a nonconvex piecewise-constant perturbation function. Our numerical implementation of a duality-gap reduction process relies on some novel cutting procedures. Performing objective-level cut, objective contour cut or domain cut reshapes the perturbation function, thus exposing eventually an optimal solution to the convex hull of a revised perturbation function and guaranteeing a zero duality gap for a convergent Lagrangian method. Applications include nonlinear knapsack problems, constrained redundancy optimization in reliability networks, and optimal control problems with integer constraints.

On Dynamic Decision Making to Meet Consumption Targets
Z. Y Long

We investigate a dynamic decision model that facilitates a target-oriented decision maker in regulating her risky consumption based on her desired target consumption level in every period in a finite planning horizon. We focus on dynamic operational decision problems of a firm where risky cash flows are being resolved over time. The firm can finance consumption by borrowing or saving to attain prescribed consumption targets over time. To evaluate the ability of the consumption in meeting respective targets, we propose the Consumption Shortfall Risk (CSR) criterion, which has salient properties of attainment content, starvation aversion, subadditivity and positive homogeneity. We show that if borrowing and saving are unrestricted and their interest rates are common, the optimal policy that minimizes the CSR criterion is to finance consumption at the target level for all periods except the last. For general convex dynamic decision problems, the optimal policies correspond to those that maximize an additive expected utility, in which the underlying utility functions are concave and increasing. Despite the interesting properties, this approach violates the principle of normative utility theory and we discuss the limitations of our target-oriented decision model.

Scheduling with Negotiable Third-Party Machines
X. Cai, C.Y. Lee and George Vairakarakis

Suppose a manufacturer has received a number of orders (jobs) from his customers, which should be completed by their respective due dates. Most of the facilities needed to process the jobs are available in the manufacturer’s own factory. However, for some reason, certain parts of the jobs must be outsourced to a third party who possesses the machines needed to process these parts. The availability of the third-party machines is negotiable, depending on the price. Consequently, the manufacturer has to (1) negotiate an agreement to secure the machine time on the third-party machines, and (2) generate a schedule to process the jobs, so as to minimize the total cost, including the cost for the use of the third-party machines and the cost incurred if the due dates of the jobs cannot be met. In general, consideration of third-party machines in machine scheduling problems relaxes a common assumption made in traditional scheduling studies. The main objective of this project is to explore models and algorithms to solve this new branch of scheduling problems. Nash Bargaining theory will be applied.

Scheduling of Perishable Jobs under Uncertain Deadlines
X. Cai and X. Zhou

We study a new class of scheduling problems involving perishable jobs with post-completion deterioration, where each finished product will be picked up by a transporter that arrives with uncertainty. The processing time to complete a job, as well as its fresh time, are random variables. If a job is finished too early, it may decay and thus incur a decaying cost; on the other hand, if it misses the pickup, it will suffer a loss due to such causes as having to be put to a local market at a discounted price. The problem is
to determine an optimal policy to process and handle all the jobs, so as to minimize the total expected loss. The objective of this project is to develop an in-depth study of scheduling problems with features as described above. Topics to be addressed include those on modelling, propositions of optimal policies, and algorithms.

**Sparse Optimization for High-Dimensional Data Analysis**

S.Q. Ma

In modern high dimensional data analysis, we are facing large-scale and completely dense data. It is hard to analyze these data using traditional approaches. In many problems, however, the large-scale and completely dense data usually have special structures such as sparse and low-rank structures of their solutions. Sparse optimization is a recently developed tool to analyze the data and extract the sparse information from the completely dense data. The primary goals of our research under this project are: (i) to develop a suite of efficient algorithms for solving large-scale sparse optimization problems; (ii) to provide theoretical foundations for these algorithms such as proofs of their global convergence, rate of convergence and iteration complexity for epsilon-optimality; (iii) to apply these algorithms to solve very large-scale and challenging problems from compressed sensing, machine learning and statistics such as robust PCA, sparse PCA, sparse inverse covariance selection, latent variable graphical model selection, stable principal component pursuit and compressive principal component pursuit; (iv) to implement a variety of software packages for solving these real applications that can be used in different areas.

**Strong approximations in multiclass queuing networks**

X.F. Gao

Multiclass queueing networks have been used to model manufacturing and communication systems. For those multiclass networks with a static priority service discipline, the diffusion approximation for the queue length of a higher priority group is identically zero. This approximation is not satisfactory, particularly when the traffic contributed by those higher priority class customers in each station is not negligible. The goal of this project is to propose better approximate methods for analyzing multiclass networks, especially those with feedback structure.

**Theory and Applications of Chance Constrained Optimization**

A. M.-C. So

In the formulation of optimization models, the data defining the objective functions and/or constraints are often collected via estimation or sampling, and hence are only approximations of the nominal values. One approach to incorporate data uncertainty in optimization models is through chance constrained programming, in which one only needs to satisfy the constraints for most but not all realizations of the data. Unfortunately, such an approach often leads to computationally difficult optimization problems. Our aim in this project is twofold: (i) to develop tractable reformulations or approximations of chance constrained optimization problems, in which the data satisfy certain stochastic properties, and (ii) to apply our methodologies to practical problems, such as those arise in signal processing, wireless communications, control and finance.

**Solutions to Diophantine Equations**

D. Li

Efficient methods in finding solutions to Diophantine equations are not only of their theoretical importance, but also of their far reaching impacts on many long-standing challenges in operations research, for example, the knapsack problem. It is well-known that linear Diophantine equations are polynomially solvable, while linear Diophantine equations on a bounded integer set are NP-complete. In this research we develop novel schemes for finding solutions to Diophantine equations by disaggregation and variable fixation.
Research Activities

Effective Control Strategies against Healthcare Associated Infections via Optimization Approaches

C.H. Cheng

Healthcare associated infections (HAIs) are the disease that people acquire inside a healthcare setting such as hospital. This type of infections poses a serious threat to public health. For instance, there were about 722,000 cases of HAIs reported by U.S. hospitals in 2011. About 10% of HAI cases resulted in death (Magill et al. [1]). Another example was the 2003 SARS epidemic causing hundreds of deaths around the world. It was later traced back to an outbreak in a hospital in Hong Kong (Lee et al. [2] and Hung [3]).

Modern healthcare systems are trying to reduce the risk of HAIs. Among many control strategies against infectious diseases, targeted immunization is a common and effective approach for preventing infections among people. It requires identifying potential “super spreaders” and preventing them from being the sources that spread the diseases over human contact networks, with the goal of reducing the impact of epidemic outbreaks as far as possible. Except for direct protection for targeted individuals, targeted immunization also provides indirect protection.
for people who are in the same contact networks as the targeted individuals. These people may be infants and pregnant women who are not suitable for getting vaccinated themselves. Moreover, when vaccines are scarce, possibly due to limited budgets or shortages of supply, allocating resource optimally is essentially important for developing efficient intervention strategies.

In this work, we plan to develop effective and efficient control strategies of target immunization against HAIs. This work leverages on the PI's previous project on developing a hospital risk management system with indoor application of the RFID technology. This technology tracks the location and movement of human and medical equipment and monitors real-time ward events. We have conducted a four-month pilot study of our system in a public hospital in Hong Kong. Based on the data collected, we plan to conduct further investigation for developing network-based control strategies for minimizing HAI outbreaks. Specifically, several activities are involved to achieve this goal:

- dynamic human contact network construction based on human tracking data in a hospital for characterizing person-to-person interaction in a healthcare setting,
- concise formulation of targeted immunization as an outbreak minimization problem under network diffusion models,
- investigation on the equivalence between the outbreak minimization problem and the influence maximization problem which is extensively studied in the field of social influence analysis,
- solution to the outbreak minimization problem using optimization approaches, which is applicable to real-world scenarios,
- experimental evaluations on real data and comparison to the existing methods to verify the performance and scalability.

Our work is unique for four reasons. First, we focus on the indoor application of targeted immunization in a relatively closed community against HAIs, while most existing work generally deals with outdoor cases. Second, human interaction pattern in a healthcare setting differs from that in a large population due to the highly hierarchical and modular structure of a hospital and distinct roles of patients and caregivers. Third, we solve the outbreak minimization problem with optimization approaches instead of greedy methods used in most existing work. Finally, our work makes contribution to the study on infectious disease control as well as the study on influence maximization by improving the solution efficiency and effectiveness.

**Financial Digital Library**

J. Yu, C.C. Yang and W. Lam

The Financial Digital Library being developed contains annual reports, financial news articles, and government documents that allows users from different places to access and search for the information they need based on concept space. We have a collection of annual reports from 249 Hong Kong public firms, real-time stock quotes, and a set of agents to support technical and fundamental analysis. We have also conducted a series of studies on how an electronic filing system can improve transparency of financial information transmission in Hong Kong.

**Integration of OLAP and Multidimensional Inter-Transaction Mining**

J. Yu

Today's markets are much more competitive and dynamic than ever before. Business enterprises prosper or fail according to the sophistication and speed of their information systems, and their ability to analyse and synthesize information using those systems. Integration of On-Line Analytical Processing (OLAP) and data mining is a promising direction since it facilitates interactive exploratory data analysis. The objective of this project aims at integrating OLAP and multidimensional inter-transaction data mining for large financial multidimensional databases.

**Integration of Renewable Energy Resources with the Sustainable Water System in Hong Kong: Models and Algorithms**

C.H. Cheng & Neng Fan

Energy is required to extract, collect, pump and deliver water for human consumption and industrial use, and also for wastewater treatment before its reuse or its return to the environment. For example, the US alone uses at least 521 million MWh a year for water-related operations, and this is equivalent to 13% of the country’s total electricity consumption. According to US Environmental Protection Agency, the massive energy consumption in water/wastewater treatment and delivery add over 45 million tons of greenhouse gases annually.
Research Activities

To reduce further damage to the environment and at the same time to meet water demands sustainably, one of the most effective approaches relies on usage of renewable energy resources. However, these resources, such as solar, wind, etc., are highly unpredictable and intermittent due to weather conditions. Meanwhile, water demands are also highly uncertain depending on the future population growth and climate changes.

A large-scale integration of renewable energy into water systems faces the uncertainties in these two infrastructures. To overcome these challenges, we propose a research to develop optimization-based models and algorithms for policy makers to integrate renewable energy as a major energy source, and to optimally operate sustainable water systems. To achieve these goals, we plan to conduct the following research activities:

1. Quantifying the uncertainties of water demands and renewable energy resources through data mining and data analytics.
2. Designing multistage stochastic programming models and algorithms for renewable integration to water systems, and also for management and operations of the water/wastewater treatment facilities.
3. Evaluating the proposed techniques for practical test in a real water system.

Different from previous studies, this research is unique. First, instead of only considering the energy efficiency in a water system, we concentrate on large renewable integration for both planning, and management and operations of the water system. Second, the proposed multistage stochastic programming model will have the capability to incorporate the uncertainties because of renewable integration. Finally, the success of this project will be a practical and methodological evidence for the concept of onsite energy generation to promote the adoption of renewable energy in other industries.

Network Epidemiology Modeling of Dynamic Human Behaviors for Controlling Hospital Acquired Diseases

C.H. Cheng & Dorbin Tobun Ng

The SARS epidemic in 2003 was traced back to an outbreak in a hospital in Hong Kong. In 2013, a Frenchman died of a SARS-like virus. He got infected while he was sharing a common hospital room with an infective. To ensure public health, we need a further understanding of human interaction dynamics in a hospital environment and a deeper investigation of nosocomial infections for effective and efficient control strategies.

Time and space play an important role in shaping human behaviors, inferring human interactions, and influencing epidemic spread of infectious diseases in a healthcare institute. Our research aims at enhancing the capability of tracking the movement of people and tracing the infection of a hospital-acquired disease for each individual in order to monitor and control the epidemic spread of nosocomial infections. To achieve this goal, we plan to conduct the following research activities:

1. network models of dynamic human behaviors for an enhanced spatial-temporal analysis to determine human interaction patterns and contacts in a relatively close community,
2. epidemic models to track and trace nosocomial infections based on the time-varying contact networks to increase our understanding of transmission mechanisms in hospital,
3. traceability analysis of tracking the mobility and infection for each individual to identify risk behaviors by linking both the network and epidemic models,
4. effective and efficient control strategies against epidemic spread under different scenarios to take advantage of the network structure and disease dynamics.

This research is unique. First, since our focus is on the movement of people, our methods are very different from those used to track products in a supply chain. Further, we plan to conduct the traceability analysis of the dynamic interactions and infections of people at individual level for network epidemiology study in hospital. This differs from either the popular modeling of a static network or the traditional epidemiology study for a large region. Finally, many spatial-temporal analyses and epidemiology models are developed for outdoor applications while this work deals with indoor activities.

Knowledge Discovery

W. Lam, H. Meng and J. Yu

This project focuses on automated or semi-automated learning from data and texts, and the transformation of learned theories into some knowledge representation formalisms. We expect to develop the theory and techniques for partial or full automation of the time-consuming process of expert knowledge elicitation through automatic knowledge discovery or learning from data. We aim not only at the accuracy and effectiveness of the learned information, but also at improving the level and depth of knowledge discovered.
PROGRAMMES
The Department offers two Undergraduate Programmes, namely, Bachelor of Engineering in Financial Technology and Bachelor of Engineering in Systems Engineering and Engineering Management. Programme details are provided in the following paragraphs.

**Scholarships**

To help eligible students with financial need, the HKSAR Government has made provisions for grants and loans through the Joint Committee on Student Finance. The University and the Faculty offer Admission Scholarships to newly admitted students covering JUPAS, Non-JUPAS, International and Mainland students with excellent entrance grades in public examinations. The University and its constituent colleges also administer their own scholarships, bursaries, loans, and campus work schemes. There is also a number of scholarships specifically for students in the Department of Systems Engineering and Engineering Management, such as the Niuniu Ji Scholarship. Students may also obtain financial assistance from the schemes of Student Travel Loans, the Summer Subsistence Loans, University Bursaries and Loans, Emergency Bursaries and Loans, Student Campus Work Schemes, etc. Further details are available at the Office of Admissions and Financial Aid and the General Office of the Department.
B.ENG. IN FINANCIAL TECHNOLOGY (FTEC)

Admissions

According to University regulations, applicants seeking admission to a course of study leading to a Bachelor's degree of the University should satisfy the minimum entrance requirements of the University and the programme concerned.

The FTEC programme accepts Year 1 JUPAS (JUPAS Code JS4428) and Non-JUPAS (Local, International and Mainland) students. Please refer to http://fintech.se.cuhk.edu.hk for details.

Curriculum

Recommended Study Plan

Students are required to complete a minimum of 75 units of courses as follows:

(i) Faculty Package 9 units
(ii) FinTech Foundation Courses 12 units
(iii) Required Courses 39 units
(iv) Five Elective Courses 15 units
Total: 75 units

Term 1

<table>
<thead>
<tr>
<th>Course Title</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGG1100/ESTR1000 Introduction to Engineering Design</td>
<td>3</td>
</tr>
<tr>
<td>ECON2011/ Introduction to Organic Chemistry and Biomolecules</td>
<td>6</td>
</tr>
<tr>
<td>FINA2310 Fundamentals of Business Finance</td>
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</tr>
<tr>
<td>MATH1510 Calculus for Engineers</td>
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</table>

Term 2

<table>
<thead>
<tr>
<th>Course Title</th>
<th>Unit</th>
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<tbody>
<tr>
<td>ENGG1110/ESTR1002 Problem Solving By Programming</td>
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<tr>
<td>ENGG1410/ESTR1004 Linear Algebra and Vector Calculus for Engineers</td>
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<tr>
<td>ECON2011/ Basic Microeconomics</td>
<td>3</td>
</tr>
<tr>
<td>FINA2310 Fundamentals of Business Finance</td>
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Term 3

<table>
<thead>
<tr>
<th>Course Title</th>
<th>Unit</th>
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</thead>
<tbody>
<tr>
<td>CSCI1120/ESTR1100/ Introduction to Computing Using C++</td>
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<td>CSCI1130/ESTR1102/ Introduction to Computing Using Java</td>
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<tr>
<td>ENGG2440/ESTR2004 Discrete Mathematics for Engineers</td>
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<td>FTEC2001 FinTech Regulation and Legal Policy</td>
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<tr>
<td>FTEC2602 Financial Technology Practicum</td>
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<td>SEEM2520 Fundamentals in Financial Engineering</td>
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Term 4

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<th>Course Title</th>
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<tr>
<td>CSCI2100/ESTR2102 Data Structures</td>
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<tr>
<td>ENGG2450/ESTR2005 Probability and Statistics for Engineers</td>
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<tr>
<td>FTEC2101 Optimization Methods</td>
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## Programs

### Term 5

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<tr>
<th>Course Title</th>
<th>Unit</th>
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<tbody>
<tr>
<td>FTEC3001/ Financial Innovation and Structured Products</td>
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</tr>
<tr>
<td>FTEC3002 Introduction to Financial Infrastructures</td>
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<tr>
<td>SEEM3590/ESTR3509 Investment Science</td>
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<td>Major Elective for respective stream</td>
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### Term 6

<table>
<thead>
<tr>
<th>Course Title</th>
<th>Unit</th>
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<tbody>
<tr>
<td>FTEC3001/ Financial Innovation and Structured Products</td>
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<tr>
<td>FTEC3002 Introduction to Financial Infrastructures</td>
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<tr>
<td>SEEM3550/ESTR3506 Fundamentals in Information Systems</td>
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<td>Major Elective for respective stream</td>
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### Term 7

<table>
<thead>
<tr>
<th>Course Title</th>
<th>Unit</th>
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<tbody>
<tr>
<td>FTEC4998 Final Year Project I</td>
<td>6</td>
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<tr>
<td>IERG4130/ESTR4306 Introduction to Cyber Security</td>
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<td>Major Elective for respective stream</td>
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### Term 8

<table>
<thead>
<tr>
<th>Course Title</th>
<th>Unit</th>
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</thead>
<tbody>
<tr>
<td>FTEC4999 Final Year Project II</td>
<td>3</td>
</tr>
<tr>
<td>Major Elective for respective stream</td>
<td>6</td>
</tr>
</tbody>
</table>

### Recommended Elective Courses

Choose 15 units of courses from 4 subject areas with at least 6 units of FTEC courses.

- **ACCT2111** Introductory Financial Accounting
- **CSCI2040** Introduction to Python
- **CSCI2120** Introduction to Software Engineering
- **CSCI3150/ESTR3102** Introduction to Operating Systems
- **CSCI3160/ESTR3104** Design and Analysis of Algorithms
- **CSCI3220** Fundamentals of Machine Learning
- **CSCI4160** Distributed and Parallel Computing
- **CSCI4180** Introduction to Cloud Computing and Storage
- **CSCI4340** or IERG4310 Data Communication and Computer Networks or Computer Networks
- **ECNZ201** Basic Macroeconomics
- **ENGG1820** Engineering Internship
- **FINA3020** International Finance
- **FINA3030** Management of Financial Institutions
- **FINA3070** Corporate Finance: Theory and Practice
- **FINA3210** Risk Management and Insurance
- **FINA4010** Security Analysis
- **FTEC4001** Advanced Database Technologies
- **FTEC4002** Behavioral Analytics
- **FTEC4003** Data Mining for FinTech
- **FTEC4004** E-payment Systems and Cryptocurrency Technologies
- **FTEC4005** Financial Informatics
- **FTEC4006** Internet Finance
- **FTEC4007** Introduction to Blockchain and Distributed Ledger Technology
- **IERG4080/ESTR4312** Building Scalable Internet-based Services
- **IERG4210** Web Programming and Security
- **MKTG4120** Quantitative Marketing
- **SEEM3410** System Simulation
- **SEEM3450/ESTR3502** Engineering Innovation and Entrepreneurship
- **SEEM3570/ESTR3508** Stochastic Models
- **SEEM3580** Risk Analysis for Financial Engineering
- **SEEM4730/ESTR4508** Statistics Modeling and Analysis in Financial Engineering
Admissions
According to University regulations, applicants seeking admission to a course of study leading to a Bachelor's degree of the University should satisfy the minimum entrance requirements of the University and the programme concerned.

Students admitted through the broad-based admission scheme of the Faculty of Engineering (JUPAS Code JS4401) are eligible for admission into the SEEM programme. Please refer to http://www.erg.cuhk.edu.hk/erg/Admissions for details.

Curriculum
There are four streams of specialisation: Business Information Systems, Financial Engineering, Logistics and Supply Chain Management, Service Engineering and Management. Students may choose to specialise in one of the four streams and select courses as prescribed. A student who does not wish to specialise in any of the four streams should follow a study scheme devised with the advice of the academic advisers of the Department.

Recommended Study Plan
Students are required to complete a minimum of 75 units of courses as follows:

(i) Faculty Package 9 units
(ii) Foundation Science Courses 9 units
(iii) Foundation Mathematics Courses 9 units
(iv) Required Courses 30 units
(v) Six Elective Courses 18 units
Total: 75 units

Term 1

<table>
<thead>
<tr>
<th>Course Title</th>
<th>Unit</th>
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<tbody>
<tr>
<td>Introduction to Engineering Design</td>
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<tr>
<td>Problem Solving By Programming</td>
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<tr>
<td>Introduction to Organic Chemistry and Biomolecules</td>
<td>6 - 9</td>
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<tr>
<td>Basic Chemistry for Engineers</td>
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</tr>
<tr>
<td>Introduction to Computing Using C++</td>
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<tr>
<td>Introduction to Computing Using Java</td>
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</tr>
<tr>
<td>Engineering Physics: Electromagnetics, Optics and Modern Physics</td>
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</tr>
<tr>
<td>Basic Analog and Digital Circuits</td>
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<tr>
<td>Basic Concepts in Biological Sciences</td>
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<tr>
<td>Life Sciences for Engineers</td>
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<tr>
<td>Calculus for Engineers</td>
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<tr>
<td>General Physics for Engineers</td>
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<tr>
<td>Engineering Physics: Mechanics and Thermodynamics</td>
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<td>Engineering Economics</td>
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<tr>
<td>Introduction to Data Science</td>
<td>9 - 12</td>
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B.Eng. in Systems Engineering and Engineering Management (SEEM)
## Programmes

### Term 2

<table>
<thead>
<tr>
<th>Course Title</th>
<th>Unit</th>
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<tbody>
<tr>
<td>ENGG1100/ESTR1000/</td>
<td>Introduction to Engineering Design</td>
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<tr>
<td>ENGG1110/ESTR1002</td>
<td>Problem Solving By Programming</td>
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<tr>
<td>ENGG1410/ESTR1004</td>
<td>Linear Algebra and Vector Calculus for Engineers</td>
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<td>CHEM1280/</td>
<td>Introduction to Organic Chemistry and Biomolecules</td>
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<tr>
<td>CHEM1380</td>
<td>Basic Chemistry for Engineers</td>
</tr>
<tr>
<td>CSCI1120/ESTR1100/</td>
<td>Introduction to Computing Using C++</td>
</tr>
<tr>
<td>CSCI1130/ESTR1102/</td>
<td>Introduction to Computing Using Java</td>
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<tr>
<td>ENGG1310/ESTR1003</td>
<td>Engineering Physics: Electromagnetics, Optics and Modern Physics</td>
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<tr>
<td>IERG2060/</td>
<td>Basic Analog and Digital Circuits</td>
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<tr>
<td>LSCI1001/</td>
<td>Basic Concepts in Biological Sciences</td>
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<tr>
<td>LSCI1003/</td>
<td>Life Sciences for Engineers</td>
</tr>
<tr>
<td>MATH1510/</td>
<td>Calculus for Engineers</td>
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<tr>
<td>PHYS1003/</td>
<td>General Physics for Engineers</td>
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<td>PHYS1110/</td>
<td>Engineering Physics: Mechanics and Thermodynamics</td>
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<tr>
<td>SEEM2440/ESTR2500/</td>
<td>Engineering Economics</td>
</tr>
<tr>
<td>SEEM2460/ESTR2540</td>
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### Term 3

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<th>Course Title</th>
<th>Unit</th>
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<tbody>
<tr>
<td>CSCI2040</td>
<td>Introduction to Python</td>
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<tr>
<td>ENGG2440/ESTR2004</td>
<td>Discrete Mathematics for Engineers</td>
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<td>SEEM2602</td>
<td>Systems Engineering Practicum</td>
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### Term 4

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<th>Unit</th>
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<tr>
<td>CSCI2100/ESTR2102</td>
<td>Data Structures</td>
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<tr>
<td>ENGG2450/ESTR2005</td>
<td>Probability and Statistics for Engineers</td>
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<td>SEEM2420</td>
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### Term 5

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<tr>
<td>SEEM3410</td>
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<tr>
<td>SEEM3440/ESTR3500</td>
<td>Operations Research II</td>
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<td>SEEM3460/ESTR3504</td>
<td>Computer Processing Systems Concepts</td>
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<td>Major Elective for respective stream</td>
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### Term 6

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<tr>
<td>SEEM3550/ESTR3506</td>
<td>Fundamentals in Information Systems</td>
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<td></td>
<td>Major Elective for respective stream</td>
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<tr>
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### Term 7

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<tr>
<th>Course Title</th>
<th>Unit</th>
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<tbody>
<tr>
<td>SEEM4998</td>
<td>Final Year Project I</td>
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<td></td>
<td>Major Elective for respective stream</td>
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### Term 8

<table>
<thead>
<tr>
<th>Course Title</th>
<th>Unit</th>
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<tbody>
<tr>
<td>SEEM3450/ESTR3502 Engineering Innovation and Entrepreneurship</td>
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<tr>
<td>SEEM4999 Final Year Project II</td>
<td>6</td>
</tr>
<tr>
<td>Major Elective for respective stream</td>
<td></td>
</tr>
</tbody>
</table>

#### Recommended Elective Courses

Students choosing a stream of specialisation should take at least 6 courses (2 stream required and 4 stream elective courses) from the corresponding list for their stream of specialisation.

#### Business Information Systems Stream

- SEEM3430 Information Systems Analysis and Design
- SEEM4540 Open Systems for E-Commerce
- SEEM3490 Information Systems Management
- SEEM3510 Human and Computer Interaction
- SEEM4480 Decision Methodology and Applications
- SEEM4570 System Design and Implementation
- SEEM4630 E-Commerce Data Mining
- SEEM4670 Service Systems
- SEEM4680/ESTR4504 Technology, Consulting and Analytics in Practice
- CSCI4140 Open-source Software Project Development

#### Financial Engineering Stream

- SEEM2520 Fundamentals in Financial Engineering
- SEEM3570/ESTR3508 Stochastic Models
- SEEM2550 Differential Equations
- SEEM3470 Dynamic Optimization and Applications
- SEEM3580 Risk Analysis for Financial Engineering
- SEEM3590/ESTR3509 Investment Science
- SEEM4480 Decision Methodology and Applications
- SEEM4720/ESTR4506 Computational Finance
- SEEM4730/ESTR4508 Statistics Modeling and Analysis in Financial Engineering
- MATH4210 Financial Mathematics

#### Logistics and Supply Chain Management Stream

- SEEM4600/ESTR4500 Logistics Management
- SEEM4610/ESTR4502 Supply Chain Management
- SEEM2520 Fundamentals in Financial Engineering
- SEEM3470 Dynamic Optimization and Applications
- SEEM3500 Quality Control and Management
- SEEM3630/ESTR3510 Service Management
- SEEM4480 Decision Methodology and Applications
- SEEM4630 E-Commerce Data Mining
- SEEM4680/ESTR4504 Technology, Consulting and Analytics in Practice
- MKTG2010 Marketing Management

#### Service Engineering and Management Stream

- SEEM3630/ESTR3510 Service Management
- SEEM4670 Service Systems
- SEEM3470 Dynamic Optimization and Applications
- SEEM3500 Quality Control and Management
- SEEM3570/ESTR3508 Stochastic Models
- SEEM4480 Decision Methodology and Applications
- SEEM4610/ESTR4502 Supply Chain Management
- SEEM4630 E-Commerce Data Mining
- SEEM4680/ESTR4504 Technology, Consulting and Analytics in Practice
- MKTG2010 Marketing Management
Admission Criteria

The Ph.D. programme in SEEM normally requires the candidate to hold a research-based Master degree in engineering, applied mathematics, computer science, or related areas. The M.Phil. programme in SEEM normally requires the candidate to hold a bachelor degree in engineering, applied mathematics, computer science, or related areas. Exceptional candidates with a bachelor degree may apply directly to the Ph.D. Programme.

Applicants must meet the general qualifications required for admission to the Graduate School http://www.gs.cuhk.edu.hk/page/EntryRequirements

All applicants must also fulfil the “English Language Proficiency Requirement” as stipulated by the Graduate School before being considered for admission. Please refer to the “Postgraduate Prospectus” of the Chinese University of Hong Kong for details. Please refer to Admission On-line of CUHK for more information: http://www.cuhk.edu.hk/gss
Application Procedures

Applicants can apply for either M.Phil. or Ph.D. programme. The applications may be made in September for admission in August of the following year. Ph.D. applications during other periods will be subject to the available places. Please submit online application form to http://www.cuhk.edu.hk/gss and send the supporting documents (such as TOEFL, and GRE General Test scores) to our Department. An applicant should also have the following credentials sent separately to the Department as early as possible:

- one official transcript of academic record, to be sent by the original university/institution; the institution should be requested to indicate the programme that the candidate applies for;
- two letters of recommendation by his/her former teachers; and
- one copy of academic credentials, certificates, diplomas, etc.

Curricula

An M.Phil. student in this Division is required to take at least 4 courses with a total of 12 units. A Ph.D. student is required to take at least 7 courses with a total of 21 units. At most 1 undergraduate course with a total of 3 units can be used to fulfill this requirement. Among the 7 courses, at least 4 courses with a total of 12 units are required to be completed during the pre-candidacy stage, including at least 1 faculty core course. Moreover, a Ph.D. student must fulfil the candidacy requirements within the maximum period of his/her pre-candidacy stage before the advancement to the post-candidacy stage. In addition, all M.Phil. and Ph.D. students must register for the Research for Thesis course (SEEM8003, SEEM8006 & SEEM8012). Exemption to any of the above requirements must be approved by the Division Head on a case-by-case basis.
Programmes

### Other SEEM courses

<table>
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<tr>
<th>Course Code</th>
<th>Course Name</th>
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<tbody>
<tr>
<td>SEEM5120</td>
<td>Advanced Topics in Systems Engineering and Engineering Management (I)</td>
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<tr>
<td>SEEM5121</td>
<td>Advanced Topics in Systems Engineering and Engineering Management (II)</td>
</tr>
<tr>
<td>SEEM5130</td>
<td>Advanced Topics in Systems Engineering and Engineering Management (III)</td>
</tr>
<tr>
<td>SEEM5131</td>
<td>Advanced Topics in Systems Engineering and Engineering Management (IV)</td>
</tr>
<tr>
<td>SEEM5201</td>
<td>Seminars in Systems Engineering and Engineering Management (I)</td>
</tr>
<tr>
<td>SEEM5202</td>
<td>Seminars in Systems Engineering and Engineering Management (II)</td>
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<tr>
<td>SEEM5490</td>
<td>Advanced Engineering Economics</td>
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### Faculty core courses

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<tbody>
<tr>
<td>ENGG5101</td>
<td>Advanced Computer Architecture</td>
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<tr>
<td>ENGG5103</td>
<td>Techniques for Data Mining</td>
</tr>
<tr>
<td>ENGG5104</td>
<td>Image Processing and Computer Vision</td>
</tr>
<tr>
<td>ENGG5105</td>
<td>Computer and Network Security</td>
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<tr>
<td>ENGG5106</td>
<td>Information Retrieval and Search Engines</td>
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<tr>
<td>ENGG5108</td>
<td>Big Data Analysis</td>
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<tr>
<td>ENGG5189</td>
<td>Advanced Topics in Artificial Intelligence</td>
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<tr>
<td>ENGG5202</td>
<td>Pattern Recognition</td>
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<tr>
<td>ENGG5281</td>
<td>Advanced Microwave Engineering</td>
</tr>
<tr>
<td>ENGG5282</td>
<td>Nanoelectronics</td>
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<tr>
<td>ENGG5291</td>
<td>Fiber Optics: Principles and Technologies</td>
</tr>
<tr>
<td>ENGG5301</td>
<td>Information Theory</td>
</tr>
<tr>
<td>ENGG5302</td>
<td>Random Processes</td>
</tr>
<tr>
<td>ENGG5303</td>
<td>Advanced Wireless Communications</td>
</tr>
<tr>
<td>ENGG5383</td>
<td>Applied Cryptography</td>
</tr>
<tr>
<td>ENGG5392</td>
<td>Lightwave System Technologies</td>
</tr>
<tr>
<td>ENGG5402</td>
<td>Advanced Robotics</td>
</tr>
<tr>
<td>ENGG5403</td>
<td>Linear System Theory and Design</td>
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<tr>
<td>ENGG5404</td>
<td>Micromachining and Microelectromechanical Systems</td>
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<tr>
<td>ENGG5405</td>
<td>Theory of Engineering Design</td>
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<td>ENGG5501</td>
<td>Foundations of Optimization</td>
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<tr>
<td>ENGG5601</td>
<td>Principles of Biomechanics and Biomaterials</td>
</tr>
<tr>
<td>ENGG5781</td>
<td>Matrix Analysis and Computations</td>
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</table>

### Presentation and Seminar Requirements

An M.Phil. or a Ph.D. student is required to give a presentation on his/her research progress each year before his/her Thesis Advisory Committee and submit a research report during his/her normative period of study. In addition, he/she must complete the SEEM seminar courses (SEEM5201 and SEEM5202) in his/her first year of study.

### Financial Aid

All full-time M.Phil. and Ph.D. students receive financial support. This could be:

1. **Postgraduate Studentships**: For 2017-2018, the monthly stipend is around HK$16,270 which is non-taxable. The amount may be adjusted annually to accommodate cost-of-living adjustments. Students with postgraduate studentships are generally required to take up some tutoring duties;

2. **Scholarships and Bursaries**: There are a number of scholarships and bursaries available to eligible students.
M.Sc. Programme in E-Commerce and Logistics Technologies

The Programme focuses on information and logistics technologies that support Internet business, and aims at training a new generation of talents in both the management and engineering aspects of E-Commerce and Logistics Technologies.

Admission Criteria

An applicant should have:

1. graduated from a recognized university and obtained a Bachelor's degree in engineering, science, business administration or related fields, normally with Second Class Honours or higher, or an average grade of B or better in his undergraduate courses; or

2. completed a course of study in a tertiary educational institution and obtained professional or similar qualifications equivalent to an honours degree in related fields.

All applicants must also fulfil the “English Language Proficiency Requirement” as stipulated by the Graduate School before being considered for admission. Please refer to the “Postgraduate Prospectus” of The Chinese University of Hong Kong for details. Please refer to Admission Online of CUHK for more information: http://www.cuhk.edu.hk/gss

Curriculum

All students are required to take a minimum of 8 postgraduate courses (24 credits in total) within a normal period of two years (Part-time mode) or one-year (Full-time mode) of which 4 should be required courses and 4 elective courses. An exemption from a required course may be sought provided that the student has sufficient background and knowledge in the required course. The exempted course must be replaced with an approved elective course. Other M.Sc. courses from the Faculty of Engineering may be taken as electives with the approval of the Division Head. The degree of Master of Science will be conferred upon students who have completed the prescribed coursework with a cumulative grade-point average of 2.0 or above.

Required Courses

- ECLT5710 Fundamentals of E-Commerce Technologies
- ECLT5720 Electronic Payments Systems
- ECLT5930 Engineering Economics
- Either ECLT5730 Logistics Management or ECLT5940 Supply Chain Management

Elective Courses

A student should choose at least two courses from each area:

**Area I: Internet and Information Systems**

- ECLT5740 Cryptography, Information Security and E-Commerce
- ECLT5810 E-Commerce Data Mining Techniques
- ECLT5820 Distributed and Mobile Systems
- ECLT5830 Network and Web Programming
- ECLT5840 Open Systems for E-Commerce
- ECLT5850 Project I in E-Commerce and Logistics Technologies

**Area II: Enterprise Solutions**

- ECLT5910 Information Technology Management
- ECLT5920 Decision Methodology with Financial Application
- ECLT5940 Supply Chain Management
- ECLT5950 Project II in E-Commerce and Logistics Technologies
Programmes

M.S.C. PROGRAMME IN SYSTEMS ENGINEERING AND ENGINEERING MANAGEMENT

This taught programme is offered with the following objectives:

1. to provide advanced training for engineers and professionals who aspire to take up more management responsibilities in their careers, and
2. to offer students a well-rounded education through a selected set of courses on state-of-the-art subjects and cutting-edge technologies.

Admission Criteria
An applicant should have:

1. graduated from a recognized university and obtained a Bachelor’s degree in engineering, science, business administration or related fields, normally with Second Class Honours or higher, or an average grade of B or better in his undergraduate courses; or
2. completed a course of study in a tertiary educational institution and obtained professional or similar qualifications equivalent to an honours degree in related fields.

All applicants must also fulfil the “English Language Proficiency Requirement” as stipulated by the Graduate School before being considered for admission. Please refer to the “Postgraduate Prospectus” of The Chinese University of Hong Kong for details. Please refer to Admission Online of CUHK for more information: http://www.cuhk.edu.hk/gss

Curriculum
All students are required to take a minimum of 8 postgraduate courses (24 credits in total), within a normal period of two years (Part-time mode) or one year (Full-time mode) of which 3 should be required courses and 5 elective courses. An exemption from a required course may be sought provided that the student has sufficient background and knowledge in the required course. The exempted course must be replaced with an approved elective course. Other M.Sc. courses from the Faculty of Engineering may be taken as electives with the approval of the Division Head. The degree of Master of Science will be conferred upon students who have completed the prescribed coursework with a cumulative grade-point average of 2.0 or above.

Required Courses
SEEM5710 Principles of Engineering Management
SEEM5730 Information Technology Management
SEEM5820 Models and Decisions with Financial Applications

Elective Courses
Students must complete 5 elective courses but they cannot take more than 2 from each of the following three areas. SEEM5910 may be grouped under any of the areas.

SEEM5910 Project in SEEM

<table>
<thead>
<tr>
<th>Area I: Engineering Management</th>
</tr>
</thead>
<tbody>
<tr>
<td>SEEM5720 Manufacturing and Service Operations Management</td>
</tr>
<tr>
<td>SEEM5740 Engineering Economics</td>
</tr>
<tr>
<td>SEEM5780 Quality Assurance and Control</td>
</tr>
<tr>
<td>SEEM5790 Project and Technology Management</td>
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<tr>
<td>SEEM5800 Logistics Management</td>
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<tr>
<td>SEEM5880 Supply Chain Management</td>
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</table>

<table>
<thead>
<tr>
<th>Area II: Information Systems</th>
</tr>
</thead>
<tbody>
<tr>
<td>SEEM5750 Expert Systems and Decision Support</td>
</tr>
<tr>
<td>SEEM5760 Client/Server Information Systems</td>
</tr>
<tr>
<td>SEEM5770 Open Systems and Electronic Commerce</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Area III: Financial Engineering</th>
</tr>
</thead>
<tbody>
<tr>
<td>SEEM5830 Stochastic Investment Models</td>
</tr>
<tr>
<td>SEEM5840 Financial Analysis and Security Trading</td>
</tr>
<tr>
<td>SEEM5850 Computational Intelligence in Financial Information Systems</td>
</tr>
<tr>
<td>SEEM5870 Computational Finance</td>
</tr>
</tbody>
</table>
To lead in today’s rapidly-changing world, systems engineers need to have strong quantitative and interdisciplinary training. Our graduates work in a wide range of industries, such as telecommunications, entertainment, finance, fast moving consumer goods, healthcare, logistics, manufacturing, semiconductors, sports, travel, and transportation. They have pursued successful careers in entrepreneurship, consulting, investment banking, enterprise management, financial analysis, government policy analysis, industrial research, line management, product development, project management, strategic planning, and university teaching and research. Examples of employers of our graduates include:

- AIA Group
- Accenture
- Agricultural Bank of China
- Bank of China
- Bank of Communications
- Cathay Pacific Airways
- China Construction Bank
- China Mobile
- China Securities Index Co.
- DBS Bank
- Deloitte
- FedEx
- Hang Seng Bank
- Hong Kong Air Cargo Terminals
- Hong Kong Interbank Clearing
- Hongkong International Terminals
- HSBC
- Huawei Technologies
- IBM
- Industrial and Commercial Bank of China
- J.P. Morgan
- Kerry Logistics
- KPMG
- MAERSK
- Merrill Lynch
- Modern Terminals
- Oracle
- Orient Overseas Container Line
- Pacific Alliance Group
- PCCW
- PricewaterhouseCoopers
- Society for Worldwide Interbank Financial Telecommunication (SWIFT)
- Shell
- Standard Chartered Bank
- Swire
- Tectura
- The Hong Kong Jockey Club
- The Hong Kong SAR Government
- Tibbett & Britten
- Wing Lung Bank
Programmes

PLACEMENT AND INTERNSHIP PROGRAMME

To have the opportunity to apply the knowledge acquired from our programme, our students can consider joining the Placement and Internship Programme (PIP). Through the PIP, our students can become familiar with the real business world, as they can involve in day-to-day business operations.

By joining the PIP, our students can enhance their technical knowledge, as well as gain leadership and teamwork experiences. In order to become competent systems engineers, our students can learn about project management in the real world, where tight deadlines and quality deliverables are expected.

In some cases, students will be assigned to different departments inside a company to understand the collaborations among departments. These opportunities provide our future systems engineers with solid knowledge and exposure on how to design and manage a complex system in today’s ever-changing environments.

INDUSTRY-TYPE FINAL YEAR PROJECTS

The careers of systems engineers are exciting and rewarding. They can help our society and businesses solve challenging problems and add value to existing operations. To prepare undergraduates to enter the business world, a final year project is required of each student. The topics of the projects are designed by professors, targeting problems in the daily operations of businesses, and students work in groups on a specific topic to gain collaboration experience.

At the same time, business leaders are invited to be project advisors, whose advice will stimulate our students to consider, as systems engineers, different perspectives in real-world situations, enhancing our students’ critical thinking ability, knowledge, and skills. The project advisors include leaders from local and international corporations such as All Nippon Airways, Convoy Financial Services, Deloitte Touche Tohmatsu, ESRI, FTI Consulting, HSBC, IKEA, Mitsui O.S.K. Lines, Prudential Brokerage, Toshiba, and UOB Kay Hian.
Our department is equipped with state-of-the-art laboratories, where our students can engage in the use of leading technology to conduct quantitative analysis, test their hypothesis, discover new insights and formulate innovative methodologies. Our integrated technology platforms can deal with today’s challenging requirements include big-data, mobile technologies, cloud computing and enterprise information exchange. Our department has the following laboratories to conduct data-intensive teaching and research.

**E-Services Laboratory**

This laboratory supports research and teaching in E-Services technology. Through this laboratory, we aim to broaden and strengthen the service industry of Hong Kong and help transform the local service industry from the traditional labour-intensive paradigm to a sophisticated Internet-based electronic service paradigm. The laboratory is equipped with the state-of-the-art equipment to support both research and teaching. The latest PCs and enterprise servers are interconnected by a high-speed network. This provides an ideal environment to support sophisticated commercial systems and software. Our research focuses on decision methodology and information systems to improve service business operations. In one on-going project, we develop RFID-enabled sensing technologies for service operations. The project plans to develop a configurable RFID hardware platform, which cannot be found in any of the commercially available active RFID technologies to house various external sensor and utility modules based on different monitoring needs.

**Financial Engineering Laboratory**

Hong Kong is a world financial centre. The development of its financial market is, therefore, a key factor to the success of the city. In the Financial Engineering Laboratory (FEL), theoretical as well as practical financial problems, such as portfolio selection, financial and behavioural risk assessment,
Programmes

asset liability management, stochastic control, pricing models and computational methods are investigated. In addition, data-driven analytical models are studied to extract critical information hidden in a huge amount of dynamically changing financial data. The FEL provides great opportunities for faculty and students to investigate various new financial issues.

Human-Computer Communications Laboratory

The Human-Computer Communications Laboratory (HCCL) was established in 1999. Our vision is to leverage the powerful confluence of massive computing, communication and content to derive intelligence in a form that is amenable to effective access, visualization and utilization for humans. Our mission is to foster interdisciplinary research and education in human-centric information systems. The scope of our study includes how interactive and intelligent human-computer interfaces to information should be designed and realized, in order to enable users to accomplish their desired tasks in smart, effective and efficient ways.

Guided by our mission, HCCL supports research areas including but not limited to: speech recognition, spoken language understanding, speech generation and synthesis, conversational systems development, audio information processing, multimodal and multimedia interface development, multi-biometric authentication, intelligent agents, mobile computing and e-learning.

Information Systems Laboratory

(Key Laboratory of High Confidence Software Technologies)

This laboratory supports research and teaching in all aspects in information processing and management.

The scope includes effective information retrieval and management, efficient data organization and storage, automated knowledge discovery and machine learning, intelligent analysis and reasoning, as well as friendly access and timely delivery techniques. A major goal is to facilitate sophisticated decision making for enterprise operations and management. The laboratory also provides the state-of-the-art facilities offering excellent support for conducting cutting edge research and developing industrial-strength projects.

To achieve the goal, the laboratory investigates both basic and applied research issues including but not limited to: intelligent information retrieval, natural language processing (Chinese and English), data mining and text mining, knowledge discovery and automated reasoning, machine learning, multimedia information processing, and text mining for financial applications.

Knowledge Engineering Laboratory

The Knowledge Engineering (KE) Lab has dedicated research in a number of research topics covering intelligent information systems in both software and hardware. These include:

3. Three-dimensional integrated circuits (3D-IC) for dynamic programming networks (in IEEE Circuits & Systems Magazine and Transactions, 2011)
Excellence in our department’s research is reflected through many publications in top journals and conferences in our fields of expertise. Our work has also been realized in applications and generated impact across different sectors. We also create knowledge for the industries to develop strategic new directions to enhance their competitiveness.

Our faculty has been awarded many research grants and industry sponsorships to support our R&D programmes and our postgraduate students, including:

<table>
<thead>
<tr>
<th>Grant</th>
<th>Project Title</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>X. Cai</td>
<td>RGC Theme-based Research Scheme</td>
<td>HK$1,000,000</td>
</tr>
<tr>
<td>X. Cai, D.D. Yao</td>
<td>Joint R&amp;D Center with Tsinghua University for Chinese Enterprise Internet Operations</td>
<td>HK$6,000,000</td>
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<tr>
<td>N. Chen</td>
<td>RGC - General Research Fund</td>
<td>HK$744,177</td>
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<tr>
<td>N. Chen</td>
<td>A Computational Approach for Stochastic Dynamic Programming and its Applications in Financial Engineering</td>
<td>HK$717,000</td>
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<tr>
<td>C.H. Cheng</td>
<td>RGC - General Research Fund</td>
<td>HK$482,605</td>
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<tr>
<td>C.H. Cheng</td>
<td>Integration of Renewable Energy Resources with the Sustainable Water System in Hong Kong: Models and Algorithms</td>
<td>HK$695,854</td>
</tr>
<tr>
<td>Grant</td>
<td>Project Title</td>
<td>Amount</td>
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<tr>
<td>C.H. Cheng</td>
<td>Network Epidemiology Modeling of Dynamic Human Behaviors for Controlling Hospital Acquired Diseases</td>
<td>HK$692,894</td>
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<tr>
<td>C.H. Cheng</td>
<td>Development of an Elderly Community IT Infrastructure at the Clague Garden Estate – Analysis Report</td>
<td>HK$562,500</td>
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<td>C.H. Cheng</td>
<td>Center for Logistics Technologies and Supply Chain Optimization</td>
<td>HK$620,000</td>
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<tr>
<td>C.H. Cheng</td>
<td>Video Analytics for Resource Management</td>
<td>HK$5,256,999</td>
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<tr>
<td>C.H. Cheng</td>
<td>Developing the detailed specifications of landslide detection system for natural terrain mitigation measures</td>
<td>HK$1,170,000</td>
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<tr>
<td>C.H. Cheng</td>
<td>Developing and installing the prototype system for erection of a warning sign with flashing lights at Sai Wan Road</td>
<td>HK$345,000</td>
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<tr>
<td>H. Cheng</td>
<td>A Natural Language Based Interactive System To Query Knowledge Graphs</td>
<td>HK$700,000</td>
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<tr>
<td>H. Cheng</td>
<td>Spatio-Temporal Social Query Processing in Location-based Social Networks</td>
<td>HK$155,000</td>
</tr>
<tr>
<td>H. Cheng</td>
<td>Optimal Point of Interest Routing in a Urban Environment</td>
<td>HK$155,279</td>
</tr>
<tr>
<td>H. Cheng</td>
<td>Discriminative Pattern Mining and Causal Analysis Technology Research</td>
<td>HK$955,125</td>
</tr>
<tr>
<td>H. Cheng</td>
<td>Link Analysis in Big Signed Networks</td>
<td>HK$987,000</td>
</tr>
<tr>
<td>X.F. Gao</td>
<td>Asymptotic Analysis in Limit Order Markets</td>
<td>HK$71,000</td>
</tr>
<tr>
<td>X.F. Gao</td>
<td>Order Fill Probability in Algorithmic Trading</td>
<td>HK$150,000</td>
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<tr>
<td>X.F. Gao</td>
<td>Optimal market making for large-tick liquid stocks in a limit order market, with and without latency</td>
<td>HK$443,950</td>
</tr>
<tr>
<td>X.F. Gao</td>
<td>Spread crossing and order placement in limit order markets</td>
<td>HK$776,075</td>
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<tr>
<td>X.T. Gong</td>
<td>Coordinating Inventory and Pricing Strategies under Total Minimum Commitment Contracts</td>
<td>HK$695,854</td>
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<tr>
<td>X.T. Gong</td>
<td>Developing Provably Near-Optimal Approximation Algorithms for Perishable Inventory Systems</td>
<td>HK$506,737</td>
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<tr>
<td>X.D. He</td>
<td>Between Naifs and Sophisticate: Time-Inconsistent Behavior with Partial Self Awareness and Self Control</td>
<td>HK$150,000</td>
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<tr>
<td>X.D. He</td>
<td>Stochastic control without dynamic programming: Markovian controls and time inconsistency</td>
<td>HK$582,000</td>
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<tr>
<td>X.D. He</td>
<td>Stock Trading with Realization Utility</td>
<td>HK$675,647</td>
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<tr>
<td>W. Lam</td>
<td>Social-Aware News Trend Discovery via Joint Detection of Latent Information Structure from News and Social Media Text Content</td>
<td>HK$692,894</td>
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<tr>
<td>W. Lam</td>
<td>Neutral Models for Text document Summarization</td>
<td>HK$843,875</td>
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<tr>
<td>W. Lam</td>
<td>Reader Interest-Aware News Summarization for Smart Phone Users</td>
<td>HK$838,500</td>
</tr>
<tr>
<td>W. Lam</td>
<td>Mining Time-Aware Urban Living Styles via Latent Semantic Concept Analysis</td>
<td>HK$116,345</td>
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<tr>
<td>D. Li</td>
<td>Exactness Conditions of SDP Relaxations for Generalized Extended Trust Region Subproblems</td>
<td>HK$443,950</td>
</tr>
<tr>
<td>D. Li</td>
<td>Towards More Effective Convex Reformulation and Relaxation of Quadratically Constrained Quadratic Programming</td>
<td>HK$675,647</td>
</tr>
<tr>
<td>Grant</td>
<td>Project Title</td>
<td>Amount</td>
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<td>---------------------------</td>
<td>-------------------------------------------------------------------------------</td>
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<tr>
<td>D. Li RGC - General Research Fund</td>
<td>Optimal Dynamic Mean-Downside Risk Portfolio Selection</td>
<td>HK$875,000</td>
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<tr>
<td>L.F. Li RGC - General Research Fund</td>
<td>Continuous Time Markov Chain Approximation for Option Pricing in Financial Engineering</td>
<td>HK$375,060</td>
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<tr>
<td>L.F. Li RGC - General Research Fund</td>
<td>Research topics for some jump processes in financial engineering</td>
<td>HK$675,647</td>
</tr>
<tr>
<td>L.F. Li RGC – Early Career Scheme Grant</td>
<td>Time Dependency Modeling in Financial Engineering</td>
<td>HK$706,737</td>
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<tr>
<td>A. Liu CUHK Research Committee Funding (Direct Grants)</td>
<td>Deep Language Models for Big Data</td>
<td>HK$150,000</td>
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<tr>
<td>A. Liu Microsoft Research Asia Grant</td>
<td>Efficient Deep Learning Algorithms For Human Language Big Data</td>
<td>HK$233,000</td>
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<tr>
<td>D. Long RGC - General Research Fund</td>
<td>Preservation of Supermodularity in General Parametric Optimization Problems and its Applications in Operations Management</td>
<td>HK$495,728</td>
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<tr>
<td>D. Long RGC – Early Career Scheme Grant</td>
<td>Dynamic Decision Making with the Objective in Meeting Profit Targets</td>
<td>HK$456,737</td>
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<tr>
<td>S.Q. Ma RGC - General Research Fund</td>
<td>Stochastic Quasi-Newton Methods for Nonconvex Optimization Problems</td>
<td>HK$472,351</td>
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<tr>
<td>S.Q. Ma RGC - General Research Fund</td>
<td>Optimization Algorithms for Low-Rank Tensor Recovery and Tensor PCA</td>
<td>HK$500,000</td>
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<tr>
<td>S.Q. Ma RGC – Early Career Scheme Grant</td>
<td>Sparse Optimization for High-Dimensional Data Analysis: Algorithms and Applications</td>
<td>HK$595,100</td>
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<tr>
<td>H. Meng RGC - General Research Fund</td>
<td>Research and Development in Disordered Speech Restoration Technology using a Deep Learning based Voice Conversion Approach</td>
<td>HK$875,000</td>
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<tr>
<td>H. Meng RGC - General Research Fund</td>
<td>Research and Development of a Tensor-based Framework for Knowledge Representation in Natural Language Processing</td>
<td>HK$675,647</td>
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<tr>
<td>H. Meng RGC - General Research Fund</td>
<td>Unsupervised Derivation of Non-native Acoustic-Phonetic Patterns for Unified Mispronunciation Detection and Diagnosis in Computer-Aided Pronunciation Training</td>
<td>HK$695,861</td>
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<tr>
<td>H. Meng RGC - General Research Fund</td>
<td>Prosodic Control for Expressive Speech Synthesis using Deep Learning Architectures</td>
<td>HK$692,894</td>
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<tr>
<td>H. Meng Microsoft Research Asia Grant</td>
<td>Planning for the CUHK MoE-Microsoft Key Laboratory on Human-centric Computing and Interface Technologies for 2016</td>
<td>HK$77,600</td>
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<tr>
<td>H. Meng Microsoft Research Asia Grant</td>
<td>Monitoring Lifestyle Modification using Wearable Health Services</td>
<td>HK$232,500</td>
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<tr>
<td>H. Meng Microsoft Research Asia Grant</td>
<td>Developing a Speech Technologies Platform to Support Computer-Aided Pronunciation Cross-speaker, Cross-lingual Text-to-speech Synthesis Based on Spectral Space Warping</td>
<td>HK$116,345</td>
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<tr>
<td>H. Meng Microsoft Research Asia Grant</td>
<td>Searching For The Culprit Pollutant Responsible for The Association of Traffic Air Pollution With Asthma</td>
<td>HK$116,345</td>
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<td>H. Meng Microsoft Research Asia Grant</td>
<td>Discriminative Acoustic and Visual Modeling for Segmental Mispronunciation Detection and Diagnosis in Computer-aided Pronunciation Training</td>
<td>HK$156,000</td>
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<tr>
<td>H. Meng Microsoft Research Asia Grant</td>
<td>Ministry of Education of China (MoE) Higher Education Outstanding Scientific Research Output Awards 2009</td>
<td>HK$11,500</td>
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<tr>
<td>H. Meng Recurrent funding CUHK MoE - Microsoft Key Laboratory of Human-Centric Computing &amp; Interface Technologies</td>
<td>Department of Science and Engineering at the University of Tokyo</td>
<td>HK$150,000</td>
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<tr>
<td>H. Meng UGC Matching Grant</td>
<td>Research Work in Spoken Language Technologies</td>
<td>HK$193,050</td>
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<tr>
<td>H. Meng Young Researcher Award</td>
<td>Young Researcher Award</td>
<td>HK$100,000</td>
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<tr>
<td>H. Meng Donation + Matching</td>
<td>The Big Data Decision Analytics (BDDA) Research Center</td>
<td>Multimillion-dollars donation</td>
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</tbody>
</table>
## Programmes

<table>
<thead>
<tr>
<th>Grant</th>
<th>Project Title</th>
<th>Amount</th>
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<tbody>
<tr>
<td>A. So</td>
<td>RGC - General Research Fund Pinning Down the Lojasiewicz Exponent: Towards Understanding the Convergence Behavior of First-Order Methods for Structured Non-Convex Optimization Problems</td>
<td>HK$582,000</td>
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<tr>
<td>A. So</td>
<td>RGC - General Research Fund Error Bounds and Convergence Rate Analysis of First-Order Methods for Matrix Norm Regularization</td>
<td>HK$692,894</td>
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<tr>
<td>A. So</td>
<td>Microsoft Research Asia Grant Optimization Models in Big Data Analytics: Efficient Algorithms with Provable Guarantees</td>
<td>HK$116,375</td>
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<td>A. So</td>
<td>Hong Kong Jockey Club Odds Verification for the Hong Kong Jockey Club</td>
<td>HK$1,431,520</td>
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<td>A. So</td>
<td>Young Researcher Award 2010 Young Researcher Award 2010</td>
<td>HK$100,000</td>
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<tr>
<td>K.F. Wong</td>
<td>RGC - General Research Fund Microblog Summarization Using Discourse</td>
<td>HK$450,432</td>
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<tr>
<td>K.F. Wong</td>
<td>Hong Kong Applied Science and Technology Research Institute Company Limited Colloquial Cantonese Text Mining</td>
<td>HK$800,000</td>
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<td>K.F. Wong</td>
<td>ITF Research and Development of Integrated Community-based Microblog Recommendation System (INCOMIRS)</td>
<td>HK$3,117,000</td>
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<tr>
<td>K.F. Wong</td>
<td>ITF - General Support Programme (GSP) Fusion between Chinese Cultural Arts and Robotics (Phase 2)</td>
<td>HK$3,005,030</td>
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<tr>
<td>K.F. Wong</td>
<td>Peking University 微博摘要化研究</td>
<td>HK$177,910</td>
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<tr>
<td>K.F. Wong</td>
<td>Peking University 國家“863”計劃課題“海量Web數據結構化內容提取與集成及大型示範應用”</td>
<td>RMB$500,000</td>
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<tr>
<td>K.F. Wong</td>
<td>Shenzhen International Cooperation Research Funding Intelligent Financial Information Service System Based on Internet Mining</td>
<td>RMB$500,000</td>
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<tr>
<td>K.F. Wong</td>
<td>Recurrent funding CUHK MoE (Ministry of Education) - Key Laboratory of High Confidence Software Technologies</td>
<td>HK$150,000</td>
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<tr>
<td>Q. Wu</td>
<td>RGC - General Research Fund Studies on Margin Procyclicality - the Impact of Volatility Persistence and Nonlinear Payoffs</td>
<td>HK$582,000</td>
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<tr>
<td>Q. Wu</td>
<td>RGC - General Research Fund Asymptotic Analysis of Portfolio Tail Risk and the Diversification Effect under Multivariate Elliptical Distributions for Static Portfolios</td>
<td>HK$482,605</td>
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<tr>
<td>Q. Wu</td>
<td>RGC – Early Career Scheme Grant Low-dimensional Modeling of Collateralized Term Structure with Non-Gaussian Dynamics for Centrally-cleared Interest Rate Swaptions</td>
<td>HK$706,737</td>
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<tr>
<td>J. Yu</td>
<td>RGC - General Research Fund A Natural Language Based Interactive System To Query Knowledge Graphs</td>
<td>HK$700,000</td>
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<tr>
<td>J. Yu</td>
<td>RGC - General Research Fund A New Contraction &amp; Expansion Framework for I/O Efficient Graph Processing</td>
<td>HK$712,325</td>
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<tr>
<td>J. Yu</td>
<td>RGC - General Research Fund Exploring Hidden Structures over Large Graphs</td>
<td>HK$450,432</td>
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<tr>
<td>J. Yu</td>
<td>Microsoft Research Asia Grant Finding Information Nebula over Large Networks</td>
<td>HK$156,000</td>
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<td>-</td>
<td>Donation + Matching Patrick Huen Wing Ming Professorship of Systems Engineering and Engineering Management</td>
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<td>-</td>
<td>Donation Department of SEEM Distinguished Lecture Series and Dr. Ina Chan Fellowship</td>
<td>HK$3,000,000</td>
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