In September 2014, I took up the role of Head of the Department. I would like to take this opportunity to thank previous Department Heads, especially Prof. TANG Tao and Prof. ZHU Lixing, for their leadership and contributions to the Department in the past. We shall continue to flourish the good and well-tried practices and keep them intact, especially in upholding high standards in both teaching and research.

The Department has a distinguished record in teaching and research. A number of faculty members have been recipients of relevant awards. With the implementation of the new four-year curriculum, the Department will offer more useful courses in mathematics and general education, as well as outside classroom learning opportunities, such as internships and exchange programmes. It will be a challenge as well as an opportunity for the Department.

We are proud to be one of the most active mathematical and statistical research departments in Hong Kong. The research activities of the faculty members range across the wide spectrum of applied and computational mathematics, as well as statistics. Our funding for research comes from both government and industry. The Department also hosts various professional conferences, lectures, colloquia and seminars with distinguished speakers from all over the world.

We warmly welcome any interested parties/individuals to contact us for further information about our department.

Message From Head

Professor NG, Michael
Head of Department
List of Academic Staff

Chair Professor and
Head of Department
NG, Michael

Associate Professor and
Associate Head of Department
LIU, Hongyu

University Distinguished Professor
GLOWINSKI, Roland
MA, Zhi-Ming

Emeritus Professor
FANG, Kai-Tai
LUK, Franklin Tai Cheung

Honorary Chair Professor
TANG, Tao

Chair Professor
ZHU, Lixing

Professor
CHENG, Ming-Yen
CHIU, Sung Nok
LIAO, Li-Zhi
TAI, Xue-Cheng

Research Professor
BRUNNER, Hermann
CHUI, Charles

Associate Professor
LING, Leevan
PENG, Heng
SHIU, Wai Chee
TONG, Tiejun

Assistant Professor
FAN, Jun
KWOK, Felix
PANG, Chung Yin Amy

Research Assistant Professor
DING, Weiyang
WANG, Yuliang
ZHANG, Jin

Lecturer
HO, Man Ho
LAU, Shek Kwan Mark
LIAO, Ching-Jou
LIU, Kwong Ip
LUO, Dehui
SUN, Pak Kiu
TO, Kai Ming
YAU, Chin Ko

Instructor
CHIANG, Shun Ling
Selected Staff Achievements

Prof. NG, Michael
✦ Fellow of the Society of Industrial and Applied Mathematics (2017)

Prof. ZHU, Lixing
✦ Fellow of the American Association for the Advancement of Science (2016)
✦ The Second-Class State Natural Science Award of China (2013 and 2014)

Prof. TANG, Tao
✦ Academician of Chinese Academy of Sciences (2017)
✦ Fellow of the Society for Industrial and Applied Mathematics (2012)

Prof. BRUNNER, Hermann
✦ Group Chair for Mathematics and Statistics, Natural Sciences and Engineering Research Council, Canada (2006 — 2009)
✦ Fellow of the Fields Institute (2006)

Prof. CHENG, Ming-Yen
✦ Outstanding Alumni, College of Science, National Tsing Hua University, Taiwan (2017)
✦ Outstanding Research Award, Ministry of Science and Technology, Taiwan (2016)

Prof. CHIU, Sung Nok
✦ President’s Award for Outstanding Performance in Teaching (2015)

Prof. LIAO, Li-Zhi
✦ President’s Award for Outstanding Performance in Teaching (2003)

Prof. TAI, Xue-Cheng
✦ Nanyang Award for research excellence (2011)
✦ Feng Kang prize for scientific computing (2009)

Dr. LING, Leevan
✦ Faculty/School Performance Award in Teaching (2013)
✦ Faculty/School Performance Award (2011)

Dr. LIU, Hongyu
✦ Calderon Prize, Inverse Problems International Association (2017)
✦ MediaV Young Researcher Award (2016)

Dr. TONG, Tiejun
✦ Elected Member of International Statistical Institute (2009)

Dr. TO, Kai Ming
✦ Honourable Mention in GE Teaching Award (2016)
Research Activities

The Department of Mathematics has four research groups, which are actively involved in many areas of research.

Imaging Sciences Group

Overview

The interdisciplinary field of imaging science is experiencing tremendous growth. New devices capable of imaging objects and structures from nanoscale to the astronomical scale are continuously being developed and improved, and as a result, the research of science and medicine has been extended in exciting and unexpected ways. The impact of this technology has been to generate new challenges associated with the problems of formation, acquisition, compression, transmission, and analysis of images. By their very nature, these challenges cut across the disciplines of physics, engineering, mathematics, biology, medicine, and statistics.

The Imaging Sciences Group works for fundamental results in imaging sciences, with a unique combination of mathematics and applications. The group is mathematically and computationally based, and members study methodology, models, and algorithms among diverse application areas of imaging sciences. The group members are a part of the Centre for Mathematical Imaging and Vision (CMIV) at Hong Kong Baptist University (http://www.math.hkbu.edu.hk/cmiv/). The objectives of the Centre is to promote basic and applied research in mathematical imaging and vision, computational imaging methods and image analysis and recognition, and to provide a research environment for faculty and graduate students with research interests in the aforementioned areas. Faculty members from various departments are involved in the CMIV and the CMIV facilitates their interaction with each other, as well as domestic and international visitors across universities and the industry. The CMIV is the site for several seminars and conferences for representatives from other universities, including the SIAM Conference on Imaging Sciences, which is the first SIAM Activity Group Meeting to be held in Asia and Hong Kong.

Research interests

Image Processing, including denoising, deblurring, decomposition, reconstruction, variational methods, and segmentation.

Inverse Problems, including compressive sensing, inverse scattering and Super-resolution.

Data Analysis, including social signal processing, visual surveillance, classification and learning, high-dimensional data mining, and network analysis.

Applications, including computational photography, medical imaging, computer vision, and astronomical imaging.
Overview

The statisticians in the Mathematics Department form a strong team, whose research is remarkably influential. Our people won the Humboldt research award, the State Natural Science award, IMS fellowship, ASA fellowship and ISI elected membership. Many of our publications have high citation numbers and most of us are serving as associate editors of leading journals. The HKBU statistics group has been recognized internationally.

Because of the wide applicability nature of statistical science and the diversified expertise among our team members, we have been very successful in various interdisciplinary researches. Our work is not only on cutting-edge methodology development but also on innovative applications, leading to publications in prestigious journals in statistics and in other disciplines.

As a platform, the University’s Statistics Research and Consultancy Centre (SRCC) engages in both theoretical and applied statistics research and provides statistical consultancy and sponsors academic exchange and organizes international conferences. For example, International Conference on Statistics in Honour of Professor Kai-Tai Fang’s 65th Birthday in 2005 (157 participants) and The Ninth ICSA International Conference in 2013 (452 participants) were held at HKBU.

Research interests

Applied Probability, including stochastic geometry, random processes, and probabilistic modeling of molecular mechanisms in biology.

Big Data, including big data in bio-medicine, big data analytics and applications in online education.

Biostatistics and Bioinformatics, including clinical trial design, health informatics, meta-analysis, pattern recognition, and statistical genomics.

Finance, including credit risk modeling, financial econometrics, financial risk management, and industrial engineering.

High-dimensional Data Analysis, including, covariance matrix estimation, dimension reduction, variable selection and functional data analysis, machine learning, model-adaptive dimension reduction testing for regressions, pivotal variable detection in factor models, shrinkage estimation, variable selection, and their scientific applications.

Regression, including econometrics related regression analysis, goodness-of-fit tests, model selection, nonparametric and semiparametric regression, change-point analysis, shrinkage estimation, and variable selection.

Spatial Statistics, including statistics for spatial point processes and random set models.

Miscellanea, such as data-analytic modeling, design of experiments, design methods for time-to-event data, efficient estimation and sampling, nonparametric and robust methods, resampling techniques, and survival analysis.

The Ninth ICSA International Conference: Challenges of Statistical Methods for Interdisciplinary Research and Big Data (20-23 December, 2013)
Overview


To promote world-class research environments, we organize international conferences on various aspects of scientific computing. In particular, the International Conference on Scientific Computing and Partial Differential Equations is held regularly every 3 years. On average, our research group invites over 20 scholars every year to give colloquia and seminars. New collaborations and innovative ideas are easily developed in this hospitable environment.

Research interests

**Finite Element Methods**, including conforming, nonconforming and hybrid-mixed finite element methods for solving second and fourth order, linear and nonlinear problems. Finite element methods for problems with singularities and problems on unbounded domains are also studied.

**Spectral Methods**, which focuses mainly on its application to computational fluid dynamics, and its application for solving problems in unbounded domains.

**Meshless Methods**, which focuses mainly on algorithm design, convergence analysis, and its application for solving PDEs.

**Domain Decomposition Methods**, in which we consider preconditioners for various kinds of problems - selfadjoint or non-selfadjoint, linear or nonlinear, based on the finite element discretization and conjugate gradient iteration.

**Grid Generation**, in which we develop automatic grid generation techniques for arbitrary domains using quadrilateral or triangle meshes. Applications include the tidal analysis of harbors and computer aided geometric design.

**Parallel Computing**, which is concentrated on the development of parallel methodologies for large scale optimization, optimal control and numerical solutions for partial differential equations.

**Numerical PDEs**, including efficient numerical schemes for solving acoustic, electromagnetic and elastic scattering problems as well as the corresponding inverse scattering problems.

**Matematerials**, which focuses on the modeling, mathematical design and numerical simulations of various metamaterial devices.
Optimization Group

Overview

The optimization group in our department consists of three faculty members working on continuous optimization and one faculty member working on combinatorial optimization. The research of the continuous optimization team focuses on numerical optimization, neurodynamic optimization, nonconvex optimization and various applications, particularly data mining and networks. The research of combinatorial optimization works mainly on graph theory.

Research interests

Numerical Optimization, including nonlinear programming, variational inequalities, complementarity problems, and large-scale convex problems.

Neurodynamic Optimization, including neural networks, neurodynamic models for interior point methods, and continuous models for optimization.

Nonconvex Optimization, including sparse and low-rank optimization, matrix optimization, and network optimization.

Graph Theory, including code and frequency assignment problems, graph coloring problems, spectral of graphs, and chemical indices of graph.

Research Assessment Exercise (RAE) 2014

The Research Assessment Exercise (RAE) 2014 found that 38% and 37% of the academic research by our department had achieved a 4- and 3-star rating or "world leading" and "internationally excellent" by international standards respectively.
Academic Programmes and General Education

Bachelor of Science Programme

✦ Bachelor of Science (Honours) in Mathematics and Statistics

In the era of big data, well-trained specialists to comprehend sophisticated mathematical and statistical ideas are in ever higher demand. Thus, we offer an undergraduate programme to meet the need of the society. The feature that it puts equal emphasis on both mathematics and statistics is unique in Hong Kong. The optional concentrations (in Operations Research, Scientific Computing, Quantitative Data Analysis, Financial Risk Management, and Actuarial Statistics) provide great flexibility according to students’ interests and career goals.

Master of Science Programmes

✦ Master of Science in Mathematical Finance (Hong Kong Baptist University)
  Master of Science in Financial Markets (University of Kent)

The Masters in Mathematical Finance and Financial Markets provides a solid background in mathematical finance, financial principles and practices and develops skills needed by future business and financial professionals. The programme provides a comprehensive framework of knowledge, insight and vision regarding the key issues in finance, the finance function of organizations and operations and functions of financial institutions and markets.

✦ Master of Science in Operational Research and Business Statistics (Hong Kong Baptist University)
  Master of Science in Operational Research and Business Statistics (University of Kent)

The aim of the programme is to provide an opportunity of further education for working professionals in the field of Operational Research and Business Statistics, and to offer well-motivated individuals a path for career conversion into the field of Operational Research and Business Statistics. Students acquire a solid foundation in the principles of Operational Research and Business Statistics, and a wealth of knowledge of software packages and their applications.
General Education Courses

The General Education Program at HKBU provides a strong foundation for well-rounded university education with the goal of promoting individual development. Numeracy is a category that strives to support students by helping them understand various topics in mathematics so that they may make connections between everyday phenomena and mathematics. Quantitative Reasoning is another general education category, which aims to guide students to use real-world quantitative information, such as Big Data, for the purpose of analysis and reasoning to understand, interpret, critique, debunk, challenge, explicate, and draw conclusions in the context of a discipline or an interdisciplinary problem. Students who complete these courses will develop analytical abilities and computational skills that will enable them to manipulate the tools of mathematics and quantitative analysis in order to solve problems that they will encounter during their career paths and future academic pursuits.

Graduate Employment

Our graduates serve in various sectors of Hong Kong, including government, education, commerce, industry, community and social services. The following are some examples:

✦ ZHANG Yubo, (BSc, 2009), Graphics Architect, NVIDIA
✦ CHAN Yuen Ting (BSc, 2010), Senior Data Analyst, Enterprise Data Analytics and Management, BOC Credit Card Ltd
✦ GENG Qinxin (BSc, 2011) Data Scientist, Amazon
✦ YANG Bai (BSc, 2012), Decision Tech Modeler, JPMorgan Chase
✦ LEE Ming Hei (BSc, 2012), Credit Officer, Standard Chartered Bank
✦ CHAN Chi Wing Alex (BSc, 2014), Relationship Manager, HSBC
✦ LEUNG Wing Hung Jennifer (BSc, 2014), Compliance Analyst, BNP Paribas
Diversified Learning Experience

Student Advising and Mentoring

Each student in the Faculty of Science would be assigned a mentor (Faculty Advisors) at the beginning of Year 1. By the end of their completion of the Mentor-Mentee program, students should be able to:

1. adapt successfully to university education;
2. choose a suitable major and identify the requirements of it; and
3. develop learning and personal goals for their University studies.

Each student in our department would be assigned an academic advisor (Department Mentors) at the beginning of Year 2 (or the first year of their study in our department for senior admission). By the end of their completion of the Academic Advising program, students should be able to:

1. adapt successfully to their major programme;
2. identify the requirements of their major programmes and various academic policies and regulations;
3. develop learning and personal goals for their University studies; and
4. formulate their career goals and/or develop their plans for further study.

Further Studies

Our graduates are well-prepared for further studies in local and overseas universities of the highest world rankings. The following are some examples:

- Brown University — MENG Xiaojun, 2014
- Chicago University — XIE Dongyue, 2016
- Columbia University — YOU Jiwen, 2015; GAO Qianyu, 2015; MA Yuchen, 2017
- Harvard University — XU Yuejia, 2015; WANG Siqian, 2017
- University of Hong Kong — YU Mujun, 2015; WANG Yizhu, 2016
- Johns Hopkins University — MA Xuedi, 2015; WANG Yinyi, 2015
- London School of Economics and Political Science — PANG Shuo, 2017
Exchange Program

YU Yueting visiting University of Amsterdam, the Netherlands.

LUK Nga Man visiting Carroll University, USA

Visiting Other Universities / Study Tours

Kyoto University

Academic Visit to Singapore

Katie Lam visiting Carroll University, USA

LUK Nga Man visiting Carroll University, USA

YU Yueting visiting University of Amsterdam, the Netherlands.
Internship / Job Practicum

The department would provide students with internship opportunities in the summer, and organises various recruitment talks. The objective is to enhance students’ competitiveness for future employment, and to build a channel through which they can reach their potential employers. Students will work in an organisation or a company as interns and complete work assignment that are primarily related to their major study.

The internship is credit bearing, and hence students earn academic credits after satisfactorily completing internship at an approved company or organisation. The Census and Statistics Department of the government, iMusicTech Ltd., Convoy Financial Services, and Maxim’s have previously offered intern positions to our students.
Student Achievements

- Undergraduate students, LI Pak Lim and YAO Yushan, received Prof. Huang Hong Ci Prize in Mathematics of 2017-2018.
- Undergraduate students, LI Yanan and SI Yuefeng, received Mr. Li Men Jan Prize in Mathematics of 2017-2018.
- Undergraduate student, Ma Tao, received HKSAR Government Scholarship and The Baptist Convention of Hong Kong Outstanding Student Award for 2015/16.
- Undergraduate students, Zizhen Song, Keli Guo, and Zhongli Jiang received Honourable Mention Prize in MCM/ICM Contest 2016.
- Ph.D graduate, Zhang Leihong, was awarded the Applied Numerical Algebra Prize for his outstanding academic paper at the Fourth International Conference on Numerical Algebra and Scientific Computing (NASC 2012) held in October 2012.

Contact Information

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