

Website: <https://www.cityu.edu.hk/ma/programmes/postgraduate/master-of-philosophy-MPhil>

Programme Aims

The research degree programme aims to provide advanced education to nurture people who can:

- contribute to the advancement of knowledge through independent and original research;
- demonstrate specialist subject knowledge and a high level of transferable skills, including analytical, communication and leadership skills; and
- enhance economic, social and cultural development.

Programme Structure

The research degree programme consists of both coursework and independent research studies culminating in the submission of a thesis.

Coursework Requirements

Students are required to fulfill the coursework requirements of 14 credit units (including at least 9 credit units of core courses and at least 2 credit units of research methodology and ethics course at postgraduate level) together with a compulsory 1 credit unit course (SG8001 – Teaching Students: First Steps) and a compulsory online training course on research integrity: Collaborative Institutional Training Initiative (CITI) Programme within their study period. Individual students with insufficient English proficiency may be required to take a 1 credit unit course “English for the Medium of Instruction” (SG8002) before they are allowed to enroll into SG8001. The credit unit earned for SG8001 and SG8002 will not be counted towards the minimum coursework requirements.

Qualifying Examination

Full-time PhD students are required to take and pass a written qualifying examination within 10-24 months after commencement of their PhD studies. The examination aims to test students’ knowledge of major subject areas of their research disciplines and assess their readiness to conduct research in their specific research disciplines. A maximum of two attempts will be allowed. Those who fail the qualifying examination after two attempts will be recommended for termination of study.

Thesis

A PhD thesis should present the results of research investigation, give evidence of a sound understanding of the area of study, its context and applicability, make a contribution to knowledge, and make a substantial original contribution to knowledge in the subject area concerned.

Period of Study	Full-time
PhD (students with a bachelor’s or a master’s degree)	4 years

Entrance Requirements

Applicants seeking admission to PhD studies at CityUHK should satisfy the following minimum entrance requirements:

- be a current MPhil student in the University who seeks transfer to PhD candidature; or
- hold a higher degree by research (or equivalent qualification) from a recognised university; or
- hold a Master's degree (or equivalent qualification) from a recognised university; or
- hold a Bachelor's degree with first class honours (or equivalent qualification) from a recognised university.

Equivalent qualifications mentioned above include relevant professional qualifications or other scholarly achievements recognised by the University.

English Proficiency Requirements

Applicants whose entrance qualification was obtained from an institution where the language of teaching is not English should satisfy the minimum English proficiency requirements specified by both the University and the College of Science:

- a minimum total score of 79 (internet-based test; sum of Reading, Listening and Writing section scores) in TOEFL;
- a minimum overall band score of 6.5 in IELTS;
- other test scores that may be regarded as equivalent to TOEFL 79 (internet-based test); or
- a minimum score of 490 in the Chinese mainland's College English Test Band 6 (CET6) may be accepted.

* TOEFL and IELTS scores are considered valid for two years from the test date and must be valid at the time of submission of application to CityUHK.

Admissions Handbook

Detailed information about application, tuition fees, programme related fees, application procedures, financial awards/assistance and admission related matters can be obtained from the Admissions Handbook.

<https://www.cityu.edu.hk/sgs/files/prospective/rpg/handbook.pdf>

Research Areas for PhD Programme

Applied Mathematics

Department of Mathematics

BACKGROUND

The Department of Mathematics was formed in September 1991 and is under the College of Science at City University of Hong Kong (CityUHK). The Department has strong mission to provide high quality education in mathematics and conduct first-class research in applied mathematics. We are striving for excellence in both teaching and research in applied mathematical sciences.

PROGRAMMES

The Department offers a wide range of programmes at both undergraduate and postgraduate levels. Over the past years, our research degree programme has successfully nurtured young mathematicians of great potential, and has earned international recognition.

FACULTY

The Department possesses a strong team of faculty members, including Chair Professors, Professors, Associate Professors and Assistant Professors. The Department benefits from the increased research strength at all levels among faculty members.

Our faculty members have a strong background in applied mathematics. They are active researchers engaging in high impact and high-quality research projects, producing publications in top international journals, serving editorial boards of a number of leading international journals, and receiving research grants and honors. Some faculty members belong to one or more of the national mathematics organizations. They are playing leading roles and recognised in their professional societies locally and internationally.

RESEARCH

Research is one of the major functions of the Department, and a considerable amount of emphasis has been placed on this area. The Department's excellent achievements in research are evidenced by its performance in the General Research Fund (GRF) exercises and the Research Assessment Exercises (RAE). Our faculty's research interests cover a wide range of topics in applied mathematics. Apart from having substantial teaching experience, faculty members are active researchers with a high profile in terms of international reputation, publications and funded research projects.

Research strengths/disciplines of the Department include:

- (1) Applied Analysis: approximation theory, asymptotic analysis, harmonic analysis, inverse problems, kinetic theory, learning theory, partial differential equations, random matrix theory, and special functions;
- (2) Computational Mathematics: complexity theory, computational electromagnetics, image processing, numerical analysis, numerical linear algebra, and scientific computing;
- (3) Mathematical Modelling: control and system theory, fluid mechanics, general relativity, granular materials, mathematical biology, mathematical elasticity, mathematical finance, mathematical modeling of waves, and mathematics of new materials;

(4) Probability and Statistics: Bayesian statistics, high dimensional data analysis, mean field games, probability theory, statistical learning theory, stochastic analysis, stochastic controls, and stochastic processes.

The above research topics are among the most important ones in applied mathematics.

The Department is among the top in the region. It has renowned research reputation and earned great recognition internationally.

Departmental Research Degree Coordinator:

Prof. Shun ZHANG
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City University of Hong Kong
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Hong Kong PhD Fellowship Scheme at City University of Hong Kong

Introduction

The Hong Kong PhD Fellowship Scheme <https://cerg1.ugc.edu.hk/hkpfs/index.html>, established by the Research Grants Council (RGC) of the HKSAR government, aims at attracting the best and brightest students in the world to pursue their PhD studies in Hong Kong's universities. <https://www.cityu.edu.hk/pg/hong-kong-phd-fellowship-scheme>

Funding and scholarship

The Fellowship provides awardees with a monthly stipend of HK\$28,100 (~US\$3,600) and a conference and research-related travel allowance of HK\$14,000 (~US\$1,790) per year for a maximum of three years.

In addition, CityUHK will award each successful Fellowship recipient the *Chow Yei Ching School of Graduate Studies Entrance Scholarship* of HK\$95,496 (~US\$12,243) covering the student's full-time tuition fees and university student hall accommodation expenses in the first year of research study, and a full stipend to support the fourth year of the student's PhD study. Various types of financial support will also be provided to eligible students to undertake research related activities and to attend international academic conferences.

Application procedures for 2025-26 entry

Step one

Applicants should first register on the RGC's Online Application System (OAS) <https://cerg1.ugc.edu.hk/hkpfs/InitApplication.jsp> and obtain a RGC reference number on or before RGC's deadline: **1 December 2024** [12:00 noon Hong Kong Time].

Step two

Applicants are then required to submit a full application, together with supporting documents to CityUHK's Online Admission Application System at www.cityu.edu.hk/sgs/oas, and quote the RGC reference number, on or before CityUHK's deadline: **1 December 2024** [11:59 pm Hong Kong Time].

Application deadline for 2025-26 entry

RGC's deadline: **1 December 2024** [12:00 noon Hong Kong Time]

CityUHK's deadline: **1 December 2024** [11:59 pm Hong Kong Time]

Application results of Hong Kong PhD Fellowship 2025-26 will be announced by RGC in March 2025. Firm admission offer with regular postgraduate studentship will be given to selected CityUHK's nominees, even if they are not awarded the Fellowship by the RGC.

Faculty Members with Research Interests

Chair Professors

Prof. Daniel W. C. HO (何永昌)

Associate Dean of College of Science and Chair Professor

Research Interests

- Control Theory
- Estimation and Filtering Theory
- Complex Dynamical Distributed Networks
- Multi-agent Networks
- Nonlinear Singular Systems
- Stochastic Systems

Prof. Hongyu LIU (劉宏宇)

Chair Professor

Research Interests

- Inverse Problems
- Wave Propagation
- Partial Differential Equations
- Mathematical Materials Science
- Scattering Theory
- Spectral Theory

Prof. Jean-Michel H.O. MOREL

Chair Professor

Research Interests

- Image Processing

Professors

Prof. Heng LIAN (練恒)

Professor

Research Interests

- High-dimensional Data Analysis
- Machine Learning
- Functional Data Analysis
- Bayesian Statistics

Prof. Ya Yan LU (陸雅言)

Head of Department of Mathematics and Professor

Research Interests

- Wave Propagation (Optics and Acoustics)
- Scientific Computation

Prof. Tao LUO (羅濤)

Professor

Research Interests

- Nonlinear Partial Differential Equations
- Mathematical Theory of Fluid Dynamics
- Fluids Free Boundary Problems
- Hyperbolic Conservation Laws
- Calculus of Variations

Prof. Frederick W.F. QIU (邱蔚峰)

Associate Head of Department of Mathematics and Professor

Research Interests

- Scientific Computing
- Numerical Analysis for Partial Differential Equations

Prof. Jonathan J. WYLIE

Professor

Research Interests

- Fluid Mechanics
- Granular Materials
- Suspension Mechanics
- Mathematical Modelling of Geophysical Systems

Prof. Xiaosheng ZHUANG (莊曉生)

Professor

Research Interests

- Applied and Computational Harmonic Analysis
- Machine Learning, Deep Learning and Pattern Recognition
- Sparse Approximation and Directional Multiscale Representation Systems
- Image/Signal Processing
- Compressed Sensing

Associate Professors

Prof. Dan DAI (代丹)

Associate Professor

Research Interests

- Asymptotic Analysis
- Orthogonal Polynomials and Special Functions
- Integrable Systems
- Random Matrix Theory
- Riemann-Hilbert Problems

Prof. Han FENG (馮寒)

Associate Professor

Research Interests

- Harmonic Analysis
- Approximation Theory
- Learning Theory

Prof. Wing Cheong LO (羅永昌)

Associate Professor

Research Interests

- Feedback Control of Stem Cell Lineages
- Morphogen-mediated Patterning
- Cell Polarization
- Inflammatory Disease and Cancer Modeling
- Numerical Methods for Reaction-diffusion System

Prof. Chenchen MOU (牟宸辰)

Associate Professor

Research Interests

- Mean Field Games
- Stochastic Controls and Games
- Mathematical Finance
- Stochastic Analysis

Prof. Pierre NOLIN

Associate Professor

Research Interests

- Probability Theory
- Stochastic Processes
- Statistical Mechanics

Prof. Wei XIANG (向偉)

Associate Professor

Research Interests

- Nonlinear Hyperbolic Conservation Laws and Multidimensional Shock Waves
- Nonlinear Equations of Hyperbolic-Elliptic Mixed Type
- Mathematical Theory of Fluid Mechanics

Prof. Shun ZHANG (章順)

Associate Professor

Research Interests

- Scientific Computing
- Numerical Analysis

Prof. Xiang ZHOU (周翔)

Associate Professor

Research Interests

- Applied and Computational Mathematics
- Rare Event in Stochastic Nonlinear Dynamical Systems
- Stochastic Modelling, Simulation, Optimization, Analysis and Application to/from Machine Learning

Assistant Professors

Prof. Neil K. CHADA

Assistant Professor

Research Interests

- Computational Statistics
- Monte Carlo Methods
- Inverse Problems
- Data Assimilation

Prof. Yuchen HE (何雨晨)

Assistant Professor

Research Interests

- Variational and Statistical Image Processing
- Data-driven Modeling
- Mathematical Computer Graphics
- Numerical PDE and Optimization
- Deep Learning Theory and Applications in Computer Vision

Prof. Yukun HE (何煜坤)

Assistant Professor

Research Interests

- Probability
- Random Matrix Theory

Prof. Jongchon KIM

Assistant Professor

Research Interests

- Harmonic Analysis
- Partial Differential Equations

Prof. Wing Tat LEUNG (梁永達)

Assistant Professor

Research Interests

- Numerical Analysis
- Multiscale Method
- Model Reduction

Prof. Bowen LI (李博文)

Assistant Professor

Research Interests

- Scattering Theory and Resonances
- Optimal Transport
- Inverse Problems
- Mathematical Materials Science
- Quantum Information and Computing
- Quantum many-body problems

Prof. Zongyuan LI (李宗元)

Assistant Professor

Research Interests

- Partial Differential Equations

Prof. Laurent MERTZ

Assistant Professor

Research Interests

- Applied Mathematics
- Applied Stochastic Analysis
- Modelling and Simulation

Prof. Wei QIAN (錢瑋)

Assistant Professor

Research Interests

- Probability Theory
- Random Geometry
- Statistical Physics
- Complex Analysis

Prof. Moritz A. REINTJES

Assistant Professor

Research Interests

- Mathematical Physics
- Partial Differential Equations
- General Relativity
- Fluid Dynamics and Shock Waves
- Quantum Mechanics

Prof. Panpan REN (任盼盼)

Assistant Professor

Research Interests

- Stochastic Analysis
- McKean Vlasov Stochastic Differential Equation
- Non-linear Fokker Planck Equation

Prof. Yongcun SONG (宋永存)

Assistant Professor

Research Interests

- Scientific Computing
- Machine Learning
- Optimal Control
- Optimization

Prof. Lina ZHAO (赵利娜)

Assistant Professor

Research Interests

- Numerical Analysis and Scientific Computation
- Numerical Methods for PDEs
- Flows in (fractured) Porous Media
- Unfitted Methods for Multi-subdomain Problem