BE INSPIRED BY OUR PHD STUDENTS: BUILDING YOUR RESEARCH CAREER AT HKU

- HKU Presidential PhD Scholar Programme (HKU-PS)
- The Hong Kong PhD Fellowship Scheme (HKPFS)
This issue of Faculty of Science Newsletter highlights the unwavering commitment and efforts of our bright and talented postgraduate students. Beyond describing their innovative work, these fearless trailblazers also share the secret recipes that lie beneath their successes, the pivotal mindset needed in the face of difficulties, and the tips on acing interviews of postgraduate fellowship or scholarship. Be ready to be amused by the innovative work of the young scholars across our Science Departments and School!

One key mission of the Faculty is to provide an ideal platform for students to advance their research careers. We strongly support prospective students in applying for the Hong Kong Postgraduate Fellowship Scheme (HKPFS) and the HKU Presidential PhD Scholarship (HKU-PS) to achieve this. We firmly believe that investing in our students is the best way to leap forward, for the new discoveries that the next-generation scientists will bring might be far beyond our imagination.

Looking into the future, the Faculty aims to nurture experts in Science through launching two new MSc programmes, one in Artificial Intelligence, and the other one in Physics. While incubating science professionals is one key goal of the Faculty, science education is not just about conceptual theories and practical applications. In the Students Corner, you will learn how our undergraduate students apply their knowledge in making STEM education fun. Talking about making science exciting and approachable, in the Alumni Corner you will also hear a story on how a homegrown palaeontologist who studies dinosaur embryo hatched from HKU Science.

One of the greatest joys in teaching is to see mentees grow from novices into mature leaders. Educators play an important role as facilitators of knowledge to equip students with the know-hows and expertise. We also serve as cheerleaders to help students find their passion, in doing so, they can be self-motivated to explore the unknown and produce societal impact along the way. Let us take a moment to celebrate how our students evolve into the cornerstone of our society and shape our future!

Yours sincerely,
Dr Edmund Chun Ming TSE
Chief Editor
Assistant Professor, Department of Chemistry

Nurturing Students to Build Our Future!
Be Inspired by Our PhD Students: Building a Research Career at HKU Science

What does the life of a PhD student look like? Some might regard it an extension of undergraduate studies. In this feature story, you will find that pursuing a PhD degree is way more challenging, yet much more fruitful than you can imagine. It is all about learning independently, questioning the boundaries of existing knowledge, embracing failure and pushing frontiers through collaborations.

With the support in different aspects, our recipients of HKU Presidential PhD Scholarship (HKU-PS) and the Hong Kong PhD Fellowship Scheme (HKPFS) gradually build their research career at the Faculty, marching closer towards their scientific goals day after day. Let us hear their experiences and get some inspirations here.

Tips to ace the scholarship interview

- Be authentic and be clear about your own direction.
- Don’t be nervous when you meet the panels! Just imagine that you are having a casual talk with them.

Tips to the scholarship interview

DEPARTMENT OF CHEMISTRY

Great Teachers Lead the Way

TEO Qin Han
Recipient of HKPFS and HKU-PS

Recipient of HKPFS and HKU-PS

Field of study: synthetic organic chemistry, focusing on making molecules with seven-membered rings

Place of origin: Malaysia

Supervisor: Professor Pauline CHIU, an expert in organic chemistry

As a kid, I was often fascinated by the reaction and interaction between chemicals, so I operated a tiny laboratory to do my little experiments at home, which kindled my passion and interest in the realm of chemistry. I am a firm believer in chemistry and think that its proper applications via technology in various fields such as medicine, agriculture, and food industry shall be the legacy we leave to our future generations. Being able to be a part of this process gives me a great sense of achievement and pride.

My research focuses on making molecules with ‘seven-membered rings’, one of the many kinds of bioactive natural structures that chemists have always been fascinated with and hope to synthesise them to serve as a lead compound for drug discovery and advance our understanding of the natural world. It is one of the many paths I am attempting to explore. In the long run, I hope my work will contribute back to society and help shape the world into a better place.

Nevertheless, research funding is always a challenge. Apart from financial aid provided by my scholarship, I am grateful that I also received extra funding to support my research, and the level of support is sufficient for buying items related to my thesis research, procurement of research materials, books, equipment, publication fees, and editing service.

The transition from undergraduate study to postgraduate research is also one of the bottlenecks. The most important fixed goal you can set during your undergraduate study is the date for your graduation. But as a postgraduate, your experimental plan could be changed anytime if the current one does not work. I manage to overcome it with the help of my supervisor and lab mates. I am grateful for the opportunity to work with my current supervisor, Professor Pauline CHIU, who always makes sure that I am on the right track and actively gives me feedback during our weekly meetings, which helps plan subsequent experiments and work. And thanks to my lab mates, who are from diverse backgrounds, eager to share different experiences with me all the time.

I also do my reflections and rethinking from time to time, which is an important process to lead myself and facilitate a more profound way of learning.

Benefits

The extra annual cash award cover half of my accommodation fees and some of the living expenses.

My lab mates are fun, considerate, caring and willing to help.

Extra funding to support my research.

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Networking Opens New Doors

YAP Jinn Ming
Recipient of HKPFS and HKU-PS
Year 2 PhD student from Department of Physics
Field of study: Nuclear physics, focusing on rare-earth elements
Place of origin: Malaysia
Supervisor: Dr Jenny LEE, nuclear physicist, and also recipient of 2021 HKFLEX Excellent Young Scientist Award (Hong Kong & Macau)

I have always been curious about the fundamental workings of things around us. During my undergraduate study, I had a particular interest in the building blocks of our universe and especially found nuclear processes intriguing. I was also aware that a research career would allow me to explore the frontiers of the scientific domain, which led me to look for opportunities in nuclear physics to further my studies.

In the summer of 2019, I met my current supervisor, Dr Jenny LEE, in an undergraduate conference at HKU and eventually started my PhD career at HKU Science. Dr Lee has provided me with a lot of guidance and resources. Her sound knowledge and expertise in experimental nuclear physics are immensely helpful in guiding me through the research process in this domain. Dr Lee’s ties within the international nuclear physics community have allowed me to collaborate with researchers worldwide. Her strong work ethic has also motivated me to follow in her footsteps to produce the best possible research work to my capabilities.

My research allows me to travel overseas since experimental research in nuclear physics requires extensive use of accelerators, which are only built in several places around the world. Since November 2021, I have been pursuing my research in the Institute of Physical and Chemical Research (RIKEN), Japan, one of the best facilities in the world for nuclear physics. The Radioactive Isotope Beam Factory (RIBF) at RIKEN has the most powerful accelerator for radioactive isotope production. Its capability allows us to study exotic nuclei that are both difficult to produce and elusive from measurements due to their short half lives.

My current research is to perform mass measurement of exotic nuclei in the neutron-rich rare-earth region. I will also be working on the development of current state-of-the-art mass spectograph devices to improve their efficiency and precision. The outcomes of my research will shed light on the formation and abundance of rare-earth elements during nucleosynthesis – the production of elements in the stars.

In the near future, I foresee myself continuing the path of research in nuclear physics, and perhaps even contribute to the successful development of fusion energy. This would require me to further my expertise in my current research and carve out a niche for myself. On the other hand, contemporary research is becoming more collaborative and I look forward to participating in such collaborations.

Networking enabled my overseas research by removing a huge financial burden.

Benefits

- I am given the opportunity to collaborate internationally.
- The programme broadened my network to other scientific areas and enriched my student life.
- I got the ‘revise & resubmit’ offer! The feedback from the reviewers was truly valuable.
- The travelling allowances enabled me to attend more conferences and overseas conferences, and even during the pandemic.
- The scholarship and financial aid helped me focus on my research.

Tips to ace your fellowship interview

- Prepare a good CV because the interviewers would not be able to know you well within a 15-minute interview.
- Make an all-out effort into your undergraduate study. Most importantly, get yourself strong recommendation letters from some reputable professors in your interested field.
- Advice for prospective PhD students
  - Be clear of your goals so that proper actions can then be taken to achieve them.
  - Be aware of all the resources available to you as a student or researcher, as they will be of immense help.
  - Although you will be given guidance as a student, you are meant to work independently on a research topic as a postgraduate student.

‘Fostering self-initiative is important to excel as a researcher.’

‘Work hard and you will get your reward.’

Failure is Success in Progress

JIN Huaqing
Recipient of HKPFS and HKU-PS
Year 4 PhD student from Department of Statistics and Actuarial Science
Field of study: Biostatistics, focusing on analysing the medical data and clinical trials
Place of origin: Shandong, China
Supervisor: Professor Guosheng YIN, an expert in biostatistics who made significant contributions to the frontiers of clinical trials. He was elected as a Fellow of the Institute of Mathematical Statistics (IMS) in 2021, one of the top honours for demonstrating distinction in research in statistics or probability.

When I came to our Department as a freshman, I had no idea which area of research to focus on. Thanks to my supervisor, Professor Guosheng YIN, who introduced me to the beauty of Bayesian statistics, which provides many powerful tools to analyse the datasets in practice. There is an urgency to accelerate clinical trials while maintaining safety and efficacy for the development of new drugs and vaccine candidates during the pandemic. Under the guidance of Professor YIN, I am motivated to focus my research on medical data and clinical trials.

On our team, we developed a new phase I and phase II clinical trial design, which would help to speed up the development of the new drugs and vaccines. One of my papers has recently been accepted by a journal that developed a new calibration-free phase I/II design. I hope my methods will be widely applied in practice and be adopted in clinical trials by doctors one day. In this way, it will make my research work much more meaningful.

Every PhD student struggles to publish their first paper and I am no exception. My first project started in December 2018, three months after becoming a PhD student. However, when I was about to submit it to a conference six months later, I found that I had made some mistakes in the datasets of the paper. I must admit that there was a moment I almost broke down and wanted to give up.

Luckily, my supervisors Professor YIN and Dr Fei JIANG had been very patient with me. I managed to fix those mistakes with their help and submitted the paper on time. Nevertheless, the story did not end here. My paper got rejected, followed by some very harsh and critical comments – I got stumped again! Fortunately the misstep did not make me doubt myself. After repeated rejections and unsuccessful attempts, I did a substantial revision and had the paper submitted to a prestigious journal. Though I have never held of being able to make it, surprisingly, I received good news from the journal after two months – I got the ‘revise & resubmit’ offer! The feedback from the reviewers was truly inspiring and helped me to address their comments during those rounds of edits. Eventually, my paper got accepted in May 2021. It took me two years to have my first paper published. This long journey made me realise that although the road of research is full of obstacles, you will still get the reward if you work hard to pursue your goal. I will finish my thesis in July 2022 and continue my research career as a postdoctoral fellow at the University of California, San Francisco. My adventure has just begun!
The ability to carry out interdisciplinary research is a major calling card. This allowed me to be free from financial restrictions and choose any topics I desire to focus on.

As a graduand in the Class of 2023, I am fully aware of the highly competitive job market in the academia. To cope with this, the ability to carry out interdisciplinary research projects is a major calling card. Therefore, I am currently doing research on both environmental elementary cycling (by running simulations) and microbial activity (by lab work), and I also equipped myself by learning versatile research techniques, including computer simulation and microbial culturing, hoping that enhancing interdisciplinary research skills may benefit my future research path.

At this point, I have been trying my best to address small questions, as I believe this will eventually help the scientific community solve the big questions collectively.

The ability to carry out interdisciplinary research is a major calling card.
Early Research Experiences Fuel Interest in Science

Elsie Chit Yu IU
Recipient of HKU-PS
Year 1 PhD student from School of Biological Sciences
Field of study: molecular biology
Place of origin: Hong Kong
Supervisor: Dr Chi Bun CHAN, an expert in energy metabolism, whose research interests lie in physiological regulation and pathological alternation.

Like many of my undergraduate fellows, I hardly knew what scientific research was like as a freshman, but I was deeply impressed by the enthusiasm of researchers and their commitment to lifelong learning, which led me to take the initiative and volunteer as a student helper in the laboratory led by Dr Minghui WANG, whose research focuses on anti-cancer effects of phytochemicals. My first research experience was very educative. I learned to integrate various experimental techniques in chemical compound analysis, better understand the cell culture process, and was given a chance to perform animal experiments. Besides teaching me an array of techniques, Dr Wang also shared his research experience along the way, and showed me how to run a research laboratory, giving me an idea of what to expect in my scientific career.

After having a taste of scientific research, I was admitted to the Summer Research Fellowship (SRF) Scheme. I was given a chance to conduct an individual research project in Professor Ng Keng Chuan’s laboratory. Under his supervision, I discovered that using germinated wheat flour instead of regular one produced bread with significantly higher GABA content, unveiling the potential to make antihypertensive staple food.

Fringed by these experiences, I even extended my undergraduate study by enrolling in the two-year research project (PPP), which trained me to be a logical thinker, thus preparing me for my independent postgraduate research.

Thanks to my current supervisor Dr Chi Bun CHAN, who was my teacher in an undergraduate course on endocrinology, he inspired me to explore the field of metabolsm and motivated me to embark on the research journey.

It has been seven months since I joined the PhD programme, and I fully enjoy the moment. Dr Chan’s research group creates a very comfortable and friendly atmosphere for newcomers, and I am instantly connected and developed a sense of belonging in the lab. Dr Chan is the kind of mentor who always initiates thought-provoking conversations that stimulate me to seek answers on my own rather than spoon-feed me information. Being around him is like having a supportive friend who always offers comfort and guidance to help me overcome adversity. Besides, I am still dazzled at the time by his logical intelligence!

My ultimate research goal is to unveil the interorgan crosstalk in fatty acid metabolism, which plays an important role in the progression of metabolic myopathy, hepatopathy, and adiposity. With the help of collaborators in the chemical and clinical fields, my team could develop novel treatments for these currently incurable diseases and validate the results of the animal model in human clinical studies.

Stipend and Support for the Most Talented Research Elites

HKU Presidential PhD Scholarship (HKU-PS)
As a part of the HKU Presidential PhD Scholar Programme, a prestigious scholarship package, namely, the HKU Presidential PhD Scholarship, is offered to attract top candidates from around the world to pursue full-time PhD studies at HKU.

The HKU Presidential PhD Scholars will receive strong academic and training support from the University, e.g. individualised advisory service, training in teaching, chances to rotate among different research labs/disciplines, and more opportunities to interact with leading scholars. A group of distinguished Faculty members will also give advice, provide additional mentorship and training opportunities, and oversee the academic career paths.

Hong Kong PhD Fellowship Scheme (HKPFS)
Established in 2009 by the Research Grants Council (RGC), the Hong Kong PhD Fellowship Scheme (HKPFS) aims at attracting the best and brightest students in the world to pursue their PhD programmes in Hong Kong’s universities.

Those who are seeking admission as new full-time PhD students in Hong Kong universities, regardless of the University Grants Committee (UGC), irrespective of their country of origin, prior work experience and ethnic background, should be eligible to apply. Applicants should demonstrate outstanding qualities of academic performance, research ability/potential, communication and interpersonal skills, and leadership abilities.

In HKU, the package of recipients of HKPFS will be automatically upgraded to an HKU-PS one.

A generous package for recipients of HKU-PS and HKPFS:

- Cash award to support research & living expenses
- Postgraduate scholarship (PGS) of HK$26,600/month
- Waiver of tuition fees for the whole normative study period (i.e. HK$42,100/year)
- Guaranteed accommodation in year 1
- Travel assistance for the international conference & research-related travel allowance
- Additional support from HKU Science
- For more details, please visit: https://bit.ly/3jWAwY5

DEPARTMENT OF MATHEMATICS

Get to the Bottom of Problems by Asking a Lot of Questions

Aneesh JATAR
Recipient of HKU-PS
Year 1 PhD student from Department of Mathematics
Field of study: complex analysis
Place of origin: India
Supervisor: Professor Tuen Wai NG, whose research areas closely align with complex analysis, in particular, geometric function theory and invariant metrics, complex differential and functional equations, the geometry of polynomials, factorizations and iterations of meromorphic functions.

As a child, mathematics was like an anxiety-inducing chore to me. At some point in my early teens, I realized much of my phobia I had for the subject was actually attributed by my incomprehension of it. — I did not understand why and what I was doing when facing homework problems. In this sense, the dread was inevitable.

Somehow, role modeling and the lack of understanding how these mathematics formulae worked presented me from breaking them to solve equations in the necessary way.

So I took it upon myself to probe on my shaky foundation in all ways I could, essentially asking ‘why’ repeatedly like a five-year-old child until I got to the bottom of it. Likely, after a very long time, and with the aid of the Internet and some old textbooks, things began to click for me in a way they never had before.

Thanks to an excellent Mathematics teacher I had in high school, my peers and I were exposed to nonstandard ways of approaching problems under his tutelage which inspired me to look beyond ‘school Mathematics’ and think about the possibility of pursuing ‘doing Mathematics’ as my career.

Being encouraged by him, I enrolled on a university course opened to high school students. The style of thinking the course promoted was exciting. Although it had a huge learning curve and left me with more questions than answers, I was pretty much obsessed with it. After many discussions and presentations and discussions and experiments, I have been able to master it. By the time I entered the PhD programme, I was fully equipped to handle the challenges.

As a part of the HKU Presidential PhD Scholar Programme, a prestigious scholarship package, namely, the HKU Presidential PhD Scholarship, is offered to attract top candidates from around the world to pursue full-time PhD studies at HKU.
Ants as Indicator Species of Effects on Environmental Conditions

Researchers // Dr Benoit GUÉNARD, Associate Professor of School of Biological Sciences

In this study, the authors accessed and re-identified specimens collected in the 1990s. This allowed for consistency in the species identity between the two periods and a detailed account for taxonomic updates and changes over time.

Learn more: https://bit.ly/3GwKiom

Invertebrates are crucial for mangrove nutrient cycling and oxygen provision to tree roots; these functions will be lost with a decrease in functional diversity.

Researchers // Dr Stefano CANNICCI, Associate Professor of School of Biological Sciences and Associate Director of the Swire Institute of Marine Science

Collaborator // School of Life Sciences of The Chinese University of Hong Kong

Invertebrates are crucial for mangrove nutrient cycling and oxygen provision to tree roots; these functions will be lost with a decrease in functional diversity.

THE SCIENCE BEHIND

Image credit: Stefano Cannicci

A high functional redundancy is a sort of ‘ecological insurance’ for a given ecosystem since if one species is lost, another can fulfil its function, ultimately keeping the ecosystem viable.

低功能冗餘度是指當一物種消失，可作替代、發揮相似功能的物種不多，令生態環境在氣候或人為變化下備受更大的威脅。

Invertebrates are crucial for mangrove nutrient cycling and oxygen provision to tree roots; these functions will be lost with a decrease in functional diversity.

Researchers // Dr Jiacheng LIU, and his supervisor Dr Joseph MICHALSKI, Associate Professor of Department of Earth Sciences

The Gale crater on Mars was thought by many scientists to be the site of an ancient lake on Mars more than 3 billion years ago. But with the use of chemistry measurements and X-ray diffraction (XRD) measurements from Nasa’s Curiosity Mars rover, in addition to images of rock textures, our geologists conclude that the compositional trends in the rocks actually relate to weathering processes rather than formation in an aqueous lake environment.

Was Gale Crater on Mars Really a Lake? Planetary Geologists Said It was More Like a Small Pond

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These images show Gale crater in High Resolution Stereo Camera (HRSC) images, with elevation colourised in blue. The image on the left shows the standard model where Gale crater is generally assumed to have been a large lake (flooded to at least an elevation of ~4,000m). The image on the right is the model proposed by Liu et al., in which only very small, shallow lakes existed on the floor of Gale crater.

Learn more about the research: https://bit.ly/3rViUmd

THE SCIENCE BEHIND

Image credit: ESA/HRSC/DLR

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THE SWIRE INSTITUTE OF MARINE SCIENCE

Mangroves Are Under Threat Because Their Species Play Too Unique Ecological Roles

Researchers // Dr Stefano CANNICCI, Associate Professor of School of Biological Sciences and Associate Director of the Swire Institute of Marine Science

Collaborator // School of Life Sciences of The Chinese University of Hong Kong

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The team and their collaborators experimentally observed ‘Linked Weyl surfaces’, a novel type of topological phase that exists in five-dimensional space for the first time. This work provides a unique platform for exploring various topological phases, the transition between them, and the corresponding boundary effects in five dimensions. The findings leverage the concept of higher-dimension topology, which can possibly control the propagation of electromagnetic waves in artificially engineered photonic media, such as realising robust integrated photonic circuits for optical information processing that is immune to scattering loss.

Learn more about the research: https://bit.ly/3ozbbSi

Our research team developed an extensive and widely applicable computational technique using high-level quantum chemistry algorithms to reveal complex electron and energy transfer pathways in photophysical processes. Their findings would promote the optimisation of the performance of photofunctional materials and enhanced solar panel efficiency.

Learn more about the research: https://bit.ly/3LdKYmh

A special obesified mouse model is developed by removing the gene of brain-derived neurotrophic factor (BDNF) exclusively in their skeletal muscle. The team found that the mice without BDNF in their muscle gained more body weight and developed severer insulin resistance when fed with a high-fat diet, concluded that muscle-derived BDNF is a weight-control protein by increasing the energy expenditure and maintaining insulin sensitivity.

Learn more about the research: https://bit.ly/3owp3Nj
Large weight matrices determine the connections between different layers of a deep neural network in deep learning. Sparse learning algorithm can discover a small active set of bases and select important degrees of freedom from a large input space for the quantities of interest. The trained neural network resulted from the sparse learning algorithm will be utilized as a reduced-order multiscale model, thus can significantly reduce computational costs. The shallow neural network trained through the back-propagation algorithm to predict the response of the neural network using the reduced dimension of the matrix will make it possible to reduce computational costs.
Dr Kai HAN
Assistant Professor of Department of Statistics & Actuarial Science
Research interests: computer vision, deep learning, machine learning

I am excited to join the Faculty of Science and become a member of the Department. My interests centre around computer vision and deep learning. The broad goal of my research is to achieve principled and comprehensive visual understanding for real applications of artificial intelligent systems. Outside of work, I enjoy travelling, swimming, and the outdoors. I am looking forward to working with my new colleagues and students at HKU!

Dr Alice C Hughes
Associate Professor of School of Biological Sciences
Research interests: conservation biology, One Health, species epiphylogeny and distribution

It is truly a pleasure to join the HKU Science family! My research broadly has two major different themes. One is on conservation approaches which explore how threats impact on biodiversity at regional and global scales and tries to develop more pragmatic solutions to maintaining biodiversity. The other main strand of my research has focused more heavily on bats, whilst I have worked on for over 15 years, largely focusing on regional ecology. My work aims to span the gap between conservation science and conservation action. I analyse effective targets to be developed, which can stem global and regional drivers of diversity loss, and maximise the synergy between climate goals and ecosystem service provision.

Dr Heath Johnson
Assistant Professor of School of Biological Sciences
Research interests: cell signalling, developmental biology, optogenetics, synthetic biology

Working at HKU is the fulfilment of two dreams I had simultaneously – having my own lab at a great school, and living abroad in one of my favourite cities. My lab will focus on understanding how signalling pathways can be used to encode instructions for cells and developing optogenetic tools and biosensors to manipulate and measure these pathways. Beyond science, I am passionate about food, the outdoors, travel, and video games. Thus, I cannot wait to explore all the food and hiking options here in the city. I look forward to sharing good ideas and food with the faculties and students here!

Dr Eduardo Maeda
Assistant Professor of School of Biological Sciences
Research interests: remote sensing, terrestrial ecosystem dynamics, microclimate, land use change

After spending more than 10 years working in Finland, I am very excited to join the School of Biological Sciences at HKU. My research applies geospatial technologies, such as remote sensing, to understand fundamental patterns in the terrestrial ecosystem dynamics, as well as how humans are affecting natural ecosystems. In my free time, I like to practise Brazilian Jiu-Jitsu, and to spend time with family and friends. I am looking forward to working together with the extremely talented Faculty members of HKU.

Dr Kin Sum Leung
Assistant Lecturer of School of Biological Sciences
Teaching areas: food and health, analytical methods for food quality, food processing and food technology

I am delighted that I can contribute back to my alma mater where I completed both my undergraduate and PhD. Food Science has always been my interest as the close-to-daily-life, multidisciplinary area includes food safety, health and nutrition, food security, etc. I am interested in studying the methods of measuring different components in food, studying their interactions during food processing and storage, and elucidating the effects of food nutrients after consumption. I hope my lectures can help students understand the principles and inspire them to explore more.

Dr Kenneth K H Ng
Lecturer of Department of Chemistry
Teaching areas: chemical biology, synthetic chemistry

I read Natural Sciences during my undergraduate at the University of Cambridge and followed on to pursue a PhD in Organic Chemistry. After spending ten years in the UK, I returned to my hometown to join HKU, diving into the field of Chemical Biology and focusing my research on the modulation of innate immunity. Over the years in HKU, it made me feel all positive about devoting my full attention to becoming a mentor; a confidant and a friend to our undergraduates – and here I am now! Besides being a lecturer, I am also a father of two.

Dr Mathew Seymour
Assistant Professor of School of Biological Sciences
Research interests: environmental DNA (eDNA), biodiversity spatial and temporal dynamics, biomonitoring, aquatic ecosystems

Originally from the USA, I did my undergraduate in Wyoming, my Masters in Iceland, PhD in Switzerland, and postdoctoral positions in the UK and Sweden. I am excited to finally join HKU at the SBS. My research focuses on understanding the processes and mechanisms that shape biodiversity patterns. With recent advancements in molecular and analytical methodologies, I have expanded my research to utilise eDNA to facilitate biodiversity research while also looking to further our understanding of eDNA itself and how we can best utilise it for wider scientific research.

Faculty of Science Scoops Four Awards in 2021/22 Collaborative Research Fund (CRF) Group Research Projects
Professor Vivian Wing-Wah Yam and Dr Jinyao Tang from Department of Chemistry, Professor Shuning Shen from Department of Physics, as well as Dr Joseph Michalski from Department of Earth Sciences, secured a funding of over HK$24.8 million from the Research Grants Council (RGC) 2021/22 funding exercise under the Collaborative Research Fund (CRF). Their success is a clear demonstration of the research competitiveness of the Faculty.

Scientists Awarded Environmental and Conservation Fund to Explore Green Solutions
Dr Louise Amy Ashton and Dr Simon Yung Wa Sin from School of Biological Sciences, Professor Aleksandra Djurisic from Department of Physics, as well as Professor Zheng Xiao Guo and Dr Ho Yu Au Yeung from Department of Chemistry, secured HK$5.4 million from the Environmental and Conservation Fund (ECF) of the HKSAR Government, under the funding scheme ‘Environmental Research, Technology Demonstration and Conference Project 2021’, paving ways to explore effective means to protect the environment and natural resources.

Learn more: https://bit.ly/36YNw8O

Learn more: https://bit.ly/3jdcdQZ
To meet emerging needs of society and cultivate students who want to enhance their competitiveness in the high-tech industry, the Faculty of Science will launch two new taught postgraduate programmes, Master of Science in Artificial Intelligence and Master of Science in the field of Physics in the academic year 2022-23, providing students with a solid foundation to enter the two highly multi-disciplinary fields with promising employment opportunities.

**New Taught Postgraduate Programmes**

**Cultivating the Next Generation of High-Tech Scientists**

The Master of Science in Artificial Intelligence is an interdisciplinary taught postgraduate programme jointly offered by the Department of Mathematics (host), the Department of Statistics & Actuarial Science and the Department of Computer Science. Its academic focus is promoting the applications of mathematics, statistics and computer science to facilitate AI in decision-making and problem-solving for various organisations and enterprises within the private and public sectors.

**Programme Features**

- 1.5-year-full-time programme, offering fast-track completion (1-year-full-time)
- Acquire the underlying theories and hands-on applications of artificial intelligence
- Interdisciplinary and comprehensive curriculum: could select electives from Mathematics, Statistics and Computer Science
- A capstone project with real-life application
- Guest lectures by distinguished scholars and industry experts
- Internship opportunities in the AI industry and academia
- Graduates will be well prepared for careers such as software engineers, consultants and research scientists in AI and related fields such as big data and financial technology
- Expected graduation period for normal course of studies (1.5 years): Summer (July)

**Programme Details**


**New**

**Master of Science in ARTIFICIAL INTELLIGENCE**

Nurturing talents in artificial intelligence

Offered by the Department of Physics, this programme is innovative and well-designed, which provides a solid education on theories, techniques and frontier developments, emphasising a balanced and flexible approach. With a strong focus on catering to the academic and career aspiration of students, developing their own specialty in subject knowledge and technical skills.

**Programme Features**

- An innovative and well-designed MSc programme that prepares quality physicists for the high-technology workplace
- Provides a flexible yet solid education on theories, techniques and frontier developments in physics including:
  - astrophysics
  - computational physics
  - condensed matter physics
  - device and nanophysics
  - photonics and quantum information
- Strengthens students’ background to cope with ever-evolving challenges
- Prepares graduates to pursue another master or doctoral degree in a wide range of science or engineering disciplines
- Highly valued by many employers for MSc degree holders in physics with advanced preparation in mathematics, laboratory skills, and programming
- Promising employment opportunities, especially in the high-technology industry
- Expected graduation period for normal course of studies (1 year): Winter (November / December)

**Programme Details**

https://bit.ly/3wWH38F

**Host**

Department of Physics
Simulate Your Performance with an AI Interviewer

Facial expression is another crucial indicator. Having applied the CNN model, this analyser incorporated six emotions in the training process. The analyser can tell who are more confident and passionate about their topics. By measuring the focal point of the candidates' vision, an essential cue to determine important nonverbal behaviors, the analyser makes good use of eye gaze, an important way to assess the overall performance of candidates during mock interviews. Eyes sometimes speak louder than words. This analyser makes good use of eye gaze, an essential cue to determine important nonverbal behaviors. By measuring the focal point of the candidates’ vision, the analyser can tell who are more confident and passionate about getting the job, alone with the gaze and eye contact they trade.

Facial expression is another crucial indicator. Having applied the CNN model, this analyser incorporated six emotions in the training of facial expression dataset, namely anger, disgust, fear, happiness, sadness, and surprise, allowing the trained model to predict the self-confidence level of candidates.

Our creativity and dreams in game design should never be hindered by the seemingly overwhelming codes,’ said Davis, the Chief Gaming Officer of Imaginebit. ‘I believe that a fun game can be created even with the simplest tools.’

Jasmine, the co-founder of Imaginebit said the team devoted a lot of efforts to make the Dragon Racer the best learning and fun experience. ‘It is a truly unique playset, and I hope young children will find the engaging principles of the racer interesting, and most importantly, enjoy playing with it’!

Members of the team: Mr. Jason Jin An Chan, Mr. Tsz Hin Chan, Miss Si Man TONG, Mr. Tsz Wai YAU and their mentor Dr. Adela LAU.

Video presentation of the project: https://youtu.be/Rpmk8R4uKSE

Learn more about the competition: https://bit.ly/30txcLX

Reconstructing How Dinosaurs Fed and Grew

Dinosaur embryo was about to hatch!

On the left | Baby Yingliang measures 10.6 inches (27 cm) long from head to tail and rests inside a 6.7 inch-long egg at the Yingliang Stone Nature History Museum in China.

On the right | Fion applied digital modelling and functional analysis to study the feeding mechanics of theropod dinosaurs. Image credit: Gabriel Uygeto.

Her discovery sparking international media attention

Recently, Fion co-led an international team to study the oviraptorosaur ‘Baby Yingliang’, one of the best-preserved dinosaur embryos ever discovered and figured it was about to hatch its egg at the time. The team suggested that the bird-like posture of ‘Baby Yingliang’ may indicate a similar prehatching behaviour in oviraptorosaurs and modern bird embryos and that the avian tucking behaviour could have originated among dinosaurs. Again, this shows that the features previously thought unique to modern birds could have first evolved among their dinosaurian ancestors.

Hope of returning home…

Currently pursuing her PhD study at University of Birmingham, Fion would like to continue her research career after graduation by applying complementary techniques to further explore topics on vertebrate dietary evolution and dinosaur growth. Although no dinosaur fossils are known in Hong Kong, as a Hong Kong-born palaeontologist, Fion still hopes to return to Hong Kong for research development, because Hong Kong would serve as a great base station for her research as East Asia is home to many vertebrate fossils, especially dinosaurs.

Fion wishes to study the fossils of Hong Kong alongside her research on vertebrate palaeontology. ‘Hong Kong has over 400 million years of geological history with diverse fossils, including vertebrates, invertebrates, plants, and microfossils that I would like to contribute to enriching it,’ she added.

Fion Wai Sum MA

More than 99% of the species ever lived on Earth are extinct. However, these extinct organisms are exceedingly important to our understanding of the total biodiversity and transitions in the history of life. As a researcher in vertebrate palaeontology, Fion Wai Sum MA, our alumna from Department of Earth Sciences, uses fossil records to study evolutionary processes in vertebrate history.

Hong Kong-born palaeontologist ‘hatched’ from HKU Science

During her time as an undergraduate at HKU, Fion was supported by a Summer Research Fellowship (SRF) and an Overseas Research Fellowship (ORF) to gain her first research experience. For two summers, she conducted research locally and at the Institute of Vertebrate Paleontology and Paleoanthropology (IVPP), the Chinese Academy of Sciences in Beijing. These experiences ignited her growing interest in this field and encouraged her to become a vertebrate palaeontologist.

Fion was under the supervision of palaeontologist Dr. Michael PITTMAN.

Hong Kong has over 400 million years of geological history.
According to the QS World University Rankings by Subject 2022, HKU Science continues to excel in a wide array of science disciplines. The rankings symbolise the relentless effort of all Faculty members, and we will not be complacent but devote to achieve teaching and research excellence, creating knowledge and impacts.

Ranking summary:
- Biological Sciences: #62
- Chemistry: #41
- Earth & Marine Sciences: #51-100
- Environmental Sciences: #31
- Geology: #51-100
- Life Sciences & Medicine: #49
- Materials Science: #53
- Mathematics: #56
- Natural Sciences: #57
- Physics & Astronomy: #67
- Statistics & Operational Research #47

In collaboration with the Stable Isotope Laboratory at School of Biological Sciences (SBS), a start-up business 'isoFoodtrace' founded by PhD graduates Dr Colin Chung-Lim LUK and Dr Inga Elizabeth CONTI-JERPE from SBS, has been awarded HK$200,000 by the Innovation and Technology Commission’s Technology Start-up Support Scheme for Universities (TSSSU) 2022-2023 exercise. Their start-up provides testing services for food products using stable isotope technology to determine their source and production method, detecting food fraud, and ensuring food safety.

In Loving Memory of Professor Douglas PAYNE

It is with deep sadness that we mourn for the passing away of Professor Douglas PAYNE on March 6, 2022 at his advanced age of 97 in London. We honour the memory of Professor Payne in many aspects, be it his contributions for the Faculty development as the Dean of Science (1968-1974), or his relentless commitment in advancing the Department of Chemistry as our longest serving Head (1966-1982).

Professor Payne's passing is a great loss to the HKU community. As one of our most respected, beloved and influential teachers in the Faculty, he was loved by generations of students – the establishment of the Douglas Prizes in Chemistry for undergraduate students by his former students in early 1990s was the best proof for that. We believe the Prizes will have ongoing influence in the academic realm and Professor Payne's spirit will continue to ignite our young bright students.

Learn more:

AWARDS & DEVELOPMENTS FOR STUDENTS & ALUMNI

Four Chemistry Research Postgraduate Students Won the Best Presentation Awards at The 28th Symposium on Chemistry Postgraduate Research

Mr Rajat WALIA, PhD student from Department of Chemistry, was awarded the third prize in oral presentation at The 28th Symposium on Chemistry Postgraduate Research with his research ‘Ab-initio DMRG’s Perspective for the fundamentals and Analysis of Singlet Fission’, whilst three other PhD students from the same Department, Ms Yingnan CAO, Mr Yulin DENG and Ms Cathay Chai AU-YEUNG, also received awards at the poster presentation session. The symposium is an annual event for postgraduate students to discuss the most recent advancement in postgraduate research in chemistry, and to exchange research ideas foster collaborations and build up networks.

Our Alumnus Dr Zhongjian WANG won the ‘2021 Hong Kong Mathematical Society (HKMS) Best Thesis Award’ by his research ‘Robust Lagrangian numerical schemes in computing effective diffusivities for chaotic and random flows’, supervised by Dr Zhiwen ZHANG of Department of Mathematics. HKMS is supported by local mathematicians working in local universities and schools, and it has been a member of the International Mathematical Union since 1982.

In collaboration with the Stable Isotope Laboratory at School of Biological Sciences (SBS), a start-up business ‘isoFoodtrace’ founded by PhD graduates Dr Colin Chung-Lim LUK and Dr Inga Elizabeth CONTI-JERPE from SBS, has been awarded HK$200,000 by the Innovation and Technology Commission’s Technology Start-up Support Scheme for Universities (TSSSU) 2022-2023 exercise. Their start-up provides testing services for food products using stable isotope technology to determine their source and production method, detecting food fraud, and ensuring food safety.

Learn more:
In the time of quantum technology and big data, scientists start to integrate Artificial Intelligence (AI) and computational approaches into the fundamental research about our mother Nature and Universe. To unfold such interesting discovery processes, the Faculty co-organised a public lecture on the topics with Hong Kong Science Museum in January 2022, two scholars from Department of Physics were invited to talk about how modern quantum material research could be used for next generation innovations, as well as how we can use simulated Universe to better interpret observations from our real Universe and understand its origin.

For lecture highlight and recap, please visit here: https://youtu.be/UhTyWceZsMjU

The silent sea is responding swiftly to global climate change. Check out this video about a research project conducted by School of Biological Sciences and The Swire Institute of Marine Science about how some species evolve more rapidly to cope with future ocean acidification.

How to do math a thousand times faster with a pencil? Our physicists from Department of Physics will tell you all about it in this video.

A team of international botanists including our experts from School of Biological Sciences cracked the code of how guard cell chloroplasts obtain energy. The speaker in this video, Professor Nigel BRANDON from Imperial College, is the founder of two companies from his academic work: Ceres Power, a fuel cell company now valued at over £2.5B, and RFC Power, developing the world’s lowest-cost flow battery. Watch this video and learn from his huge success!

As story-telling through videos have become a popular trend in our lives, the Faculty has been creating more videos to cater the interest of the audience with this powerful tool. Check out the videos below and learn more about the work of our dedicated researchers and revisit some valuable lectures you might have missed out!

As a co-organiser of the (BEST) programme, the HKU Laboratory for Space Research (LSR) joined hands with HKU Academy for the talented and Orion Astropreneur Space Academy to give local secondary school students a chance to explore the wonders of space. The programme is a 6-months project started in September 2021 and completed in April 22, 2022. It comprised workshops at secondary schools, webinar workshops, as well as show-and-tell workshops at LSR. Students of 23 teams from 21 high schools were given a chance to apply basic physics knowledge to some very practical challenges, including building a CubeSat and preparing a proposal for potential investors – which can help provide solutions to global issues. There was a competition with awards and prizes for the team with best CubeSat concept and proto-type. Students were also offered the opportunities to consult with advisor experts such as engineers, entrepreneurs, and HKU student advisors.

On January 17, some school teams were gathered to attend a workshop at LSR on how to use computer-aided design tools to build and prototype a CubeSat. The programme received positive feedback from students, who felt fascinated by this eye-opening experience.

Learn more about the BEST programme: https://cubesat.hku.hk
