### FACULTY OF ARTS

**Department of Linguistics and Modern Languages**

<table>
<thead>
<tr>
<th>CUHK Supervisor:</th>
<th>Prof. MOK Pik Ki Peggy</th>
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<tbody>
<tr>
<td>Research Project:</td>
<td>Speech Production &amp; Perception Research</td>
</tr>
<tr>
<td>Project Description:</td>
<td>Depending on students’ background and interests, there are various speech research projects available for students to participate. Students will be able to analyse real production and perception data.</td>
</tr>
</tbody>
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<thead>
<tr>
<th>CUHK Supervisor:</th>
<th>Prof. WONG Chun Man Patrick</th>
</tr>
</thead>
<tbody>
<tr>
<td>Research Project (1):</td>
<td>Brain &amp; Language</td>
</tr>
<tr>
<td>Project Description:</td>
<td>The project will examine the neural basis of language learning and processing by using fMRI and EEG techniques.</td>
</tr>
<tr>
<td>Research Project (2):</td>
<td>Foreign Language Learning</td>
</tr>
<tr>
<td>Project Description:</td>
<td>The project will study how foreign languages are learned and the factors that influence learning success by studying classroom learners and artificial language learning in the lab.</td>
</tr>
<tr>
<td>Research Project (3):</td>
<td>Infant Speech Perception &amp; Language Development</td>
</tr>
<tr>
<td>Project Description:</td>
<td>In this project, students will participate in a cohort study to identify early predictors of language and cognitive development. 300 infants are being longitudinally studied for up to 5 years.</td>
</tr>
</tbody>
</table>

### FACULTY OF EDUCATION

**Department of Educational Psychology**

<table>
<thead>
<tr>
<th>CUHK Supervisor:</th>
<th>Prof. SO Wing Chee Catherine</th>
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<tbody>
<tr>
<td>Research Project:</td>
<td>Robot Based Intervention for Children with Autism</td>
</tr>
<tr>
<td>Project Description:</td>
<td>This project aims to use social robots to train children with autism social and communication skills. Students who are major in special needs education, education or psychology are welcomed to join.</td>
</tr>
</tbody>
</table>

### FACULTY OF ENGINEERING

**Department of Computer Science and Engineering**

<table>
<thead>
<tr>
<th>CUHK Supervisor:</th>
<th>Prof. LEUNG Ho Fung</th>
</tr>
</thead>
<tbody>
<tr>
<td>Research Project (1):</td>
<td>Autonomous Agents &amp; Multiagent Systems</td>
</tr>
<tr>
<td>Project Description:</td>
<td>Students who are interested in autonomous agents and multiagent systems will discuss with the supervisor and identify a specific research.</td>
</tr>
<tr>
<td>Research Project (2):</td>
<td>Text Categorisation</td>
</tr>
<tr>
<td>Project Description:</td>
<td>Students who are interested in text categorisation will discuss with the supervisor and identify a specific research.</td>
</tr>
</tbody>
</table>

**Department of Electronic Engineering**

<table>
<thead>
<tr>
<th>CUHK Supervisor:</th>
<th>Prof. SUN Xiankai</th>
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</thead>
<tbody>
<tr>
<td>Research Project (1):</td>
<td>Novel Photonic Nanostructures for Integrated Photonics</td>
</tr>
<tr>
<td>Research Project (2):</td>
<td>Photonics Based on Two-Dimensional Nanomaterials</td>
</tr>
<tr>
<td>Research Project (3):</td>
<td>Physics &amp; Applications of Nanooptics &amp; Nanooptomechanics</td>
</tr>
<tr>
<td>Project Description:</td>
<td>Students will conduct research in a lab environment under the guidance of the supervisor. Knowledge in physics, optics, acoustics, electronics and/or material science will be an advantage.</td>
</tr>
</tbody>
</table>
CUHK Supervisor: Prof. TSANG Hon Ki

Research Project (1): Frequency Chirp of Silicon Optical Modulators
Frequency chirp is produced when the optical phase is (unintentionally) modulated during the intensity modulation of a continuous wave optical signal. The frequency chirp can interact with optical fibre dispersion to either increase or decrease the intersymbol produced by the signal transmission in optical fibre. In this project there will be both experimental work involving the use of a high speed 20GHz bandwidth coherent optical receiver to measure the frequency chirp of an integrated optical modulator at different wavelengths, and numerical simulations to calculate the frequency chirp and its impact on high speed optical communications.
Students with a background in electrical engineering, electronic engineering or physics are preferred.

Research Project (2): Optical Coherence Tomography System Using Integrated Waveguide Spectrometer
The project aims to build a spectral domain optical coherence tomography (OCT) system for three dimensional imaging. The project will involve the testing of silicon photonic integrated circuits which serve as the integrated spectrometer used in the ICT system.
Students with a background in electrical engineering, electronic engineering or physics are preferred.

Department of Mechanical and Automation Engineering
CUHK Supervisor: Prof. REN Wei

Research Project (1): Development of a Trace Gas Sensor for Environmental Monitoring
In this project, students will be involved in the development of a novel trace gas sensor using laser spectroscopy. The sensor can be used for environmental monitoring with ppbv sensitivity.
Students with a background in electronic engineering and optical engineering are preferred.

Research Project (2): Development of Combustion Diagnostics
In this project, students will be involved in the development of a novel combustion diagnostic tool for studying combustion chemistry in the state-of-the-art facility including shock tube and jet flame.
Students with a background in mechanical engineering and electrical engineering are preferred.

FACULTY OF LAW
CUHK Supervisor: Prof. Bryan DRUZIN

Research Project (1): The Future of International Law
This summer project aims at introducing the student to methods of research regarding the emergence of international law. Emphasis will be placed on data collection and analysis. The key outcomes are for the students to:

Project Description:
1. Develop the knowledge and understanding of the core principles of empirical legal research;
2. Learn to interpret and organise research findings;
3. Gain critical knowledge regarding international law.
Research Project (2): Understanding Globalisation
This summer project aims at introducing the student to core methods of empirical research regarding globalisation. Emphasis will be placed on data collection and methods of empirical analysis. The key outcomes are for the students to:

(1) Develop the knowledge and understanding of the core principles of globalisation;
(2) Learn to interpret and organise research findings;
(3) Gain critical knowledge regarding global institutions of governance

CUHK Supervisor: Prof. Benoit MAYER

Research Project (1): Public International Law
Public international law governs the relations of States and international organisations in areas as diverse as trade and investment, human rights, environmental protection, diplomatic and consular relations, borders, etc. Students participating in this summer project will have an opportunity to learn about how international law seeks to address contemporary issues. The student will write a short research report on a specific issue-area to be defined with the supervisor.

Potential issue-areas may include the following:
– Identification of customary international law
– Identification of general principles of law
– The work of the international Law Commission on the protection of the atmosphere
– The principle of sustainable development in international law
– The obligation of States to conduct an environmental impact assessment under international law
– State responsibility for internationally wrongful acts committed by States in concert
– Quantum of reparations in the responsibility of States for internationally wrongful acts
– Dispute settlement mechanisms under the UN Convention on the Law of the Sea

Research Project (2): The International Law on Climate Change
Climate change is arguably the greatest global concern of our time. The entry into force of the Paris Agreement has accelerated efforts to mitigate climate change and adapt to its impacts. Many institutions have been established. But are they effective?

Students participating in this summer project will have an opportunity to learn about how international law responds to climate change. The student will write a short research report on a specific issue-area to be defined with the supervisor.

Potential issue-areas may include the following:
– The Global Stocktaking mechanism under the Paris Agreement
– Review of compliance under the Paris Agreement
– Climate action and the protection of human rights
– The sustainable development mechanism (art. 6 mechanism) and its importance for China
– The integration of the principle of sustainable development in the Paris Agreement and the Paris Rulebook
– The role of non-State actors (e.g. cities, enterprise) in climate change mitigation
– Customary international law on climate change
– Approaches to address loss and damage associated with the impacts of climate change in developing countries
– Public interest litigation
– The possibility of international litigation

FACULTY OF MEDICINE
Department of Medicine and Therapeutics
CUHK Supervisor: Prof. KONG Pik Shan Alice
Research Project: Lifestyle Factors & Glycemic Control in Patients with Diabetes
Project Description: The project will focus on Hong Kong adult patients with type 2 diabetes. The attachment aims to provide students with a clinical research exposure relating to the examination of lifestyle factors, such as diet, sleep, and physical activity, and their impact on physical health of diabetes patients. Through the project, students are expected to gain a better understanding on published evidence relating to various lifestyle factors and physical health in type 2 diabetes patients; study research methodology relating to lifestyle factors and health; analyse descriptive statistics data; learn fundamental principals in statistical analysis to examine correlations; and write up a short conclusion report. Students participating in this project will be required to conduct the research at the Prince of Wales Hospital.

CUHK Supervisor: Prof. Gary TSE
Research Project (1): Clinical Studies into Electrocardiographic & Echocardiographic Markers for Risk Stratification
Project Description: The project will focus on using indices derived from the electrocardiogram (ECG) for risk stratification in stroke and sudden cardiac death, and using strain imaging in echocardiography. Students participating in the project may have the opportunity to publish their work conducted during the research attachment. Students participating in this project will be required to conduct the research at the Prince of Wales Hospital.

Research Project (2): Database Studies on Cardiovascular Outcomes
Project Description: The project will focus on big data analysis using large clinical cohorts for forecasting adverse outcomes in cardiovascular disorders. Students participating in the project may have the opportunity to publish their work conducted during the research attachment. Students participating in this project will be required to conduct the research at the Prince of Wales Hospital.

Research Project (3): Meta-Analysis of Clinical Outcomes for Cardiovascular Disorders
Project Description: The project will focus on a meta-analytical research in cardiovascular disorders. Students participating in the project may have the opportunity to publish their work conducted during the research attachment at CUHK.
Students participating in this project will be required to conduct the research at the Prince of Wales Hospital.

CUHK Supervisor: Prof. YU Jun

Research Project (1): Clarifying the Molecular Pathogenesis & Potential Detection Markers of Non-Alcoholic Fatty Liver Disease

Research Project (2): Identifying Molecular Alterations & Biomarkers in Colon Cancer

Students can work on the research topics under the guidance of the supervisor. Students with a background in biomedicine, genome, molecular biology or pharmacology are preferred.

Prof. CHOW Dick Ho Kiu

Research Project: Effect of Magnesium-Based Implant on Fracture Healing in Type 2 Diabetic Mice Model

Type 2 diabetes (T2D) is the most common type of diabetes and affects an increasing proportion of elderlies. Approximately 40% of the world’s diabetes lives in Asia and China has the highest number of people with diabetes (120 million in 2017). Diabetic patients have 40-70% greater risk of hip fracture and 20% greater risk of non-vertebral fracture despite T2D is associated with normal or higher bone density. Furthermore, T2D impairs fracture healing of bones, including the mandible, hip, and long bones. The impaired fracture healing is characterised with reduced callus size, decreased bone formation, and weakened mechanical strength. Magnesium (Mg) is the most abundant divalent intracellular cation in the cell and the fourth cation in general in human body. Bone matrix stores about 60% of total Mg in the human body. Mg-based implants demonstrated the ability to enhance fracture healing and formation of new bone at the peripheral cortex in osteoporotic rat model, which also has decreased fracture healing potential. The project will base on the hypothesis that an innovative magnesium-based intramedullary nail will enhance fracture healing in Type 2 diabetes mice model with respect to radiological, microarchitectural, histomorphometric, and mechanical analyses. Students who are interested in experiments that involve mechanical testing, histological and image analysis of tissue samples, as well as motivated in pursuing their career as scientists upon graduation are encouraged to apply. Students will participate in research meetings and hands-on experimental work under supervisions.

Students participating in this project will be required to conduct the research at the Prince of Wales Hospital.

CUHK Supervisor: Prof. LAM Tsz Ping

Research Project (1): Effectiveness of Brace Clinic for Management of Adolescent Idiopathic Scoliosis – Analysis of a Randomised Controlled Trial

There is a general agreement that bracing is effective in treating scoliosis. Important issues are on brace compliance and other determinants that govern bracing effectiveness. It is hypothesised that joint consultation by both an
orthopaedic surgeon and orthotist for follow up of scoliosis patients being treated with bracing will enhance treatment outcome.

The project is a prospective randomised controlled study on adolescents diagnosed with AIS requiring bracing. Patients were already allocated to either one of the clinic settings, namely (a) Brace Clinic with joint consultation by an orthopaedic surgeon and orthotist and (b) Scoliosis Clinic where only an orthopaedic surgeon primarily saw the patient. As the cohort is reaching skeletal maturity when braces are gradually being weaned off, the stage has been reached when treatment outcomes can be compared between the Brace Clinic and Scoliosis Clinic. Cobb angle taken without brace at cessation of bracing will be the primary measurement for comparison.

Students participating in the project will conduct computer-assisted measurement on whole spine radiographs on spinal curvature with the use of the advanced EOS system, and analyse the treatment outcomes for a randomised controlled study.

Students participating in this project will be required to conduct the research at the Prince of Wales Hospital.

Research Project (2): Global Body Alignments in Adults & Elderly with Osteoporosis & Degeneration

Project Description: It has been reported that musculoskeletal degeneration during aging could lead to truncal malalignment. Typically, vertebral collapse could result in mismatch in spinal alignment and standing posture in terms of pelvic incidence and lumbar lordosis and thus causing back pain and compromised quality of life. Correction for these spinal malalignments has become an important goal in surgical intervention.

This study will utilise prospectively collected data and radiographs on adults and elderly, and review body parameters using an advanced imaging technology, i.e. the EOS imaging system. Patients were seen by orthopaedic surgeon with assessment of their physical condition, medical health and body measurements. Correlation between these measurements was made for better understanding of normality against which abnormalities can be referenced.

Students participating in the project will conduct literature review and analysis on spine and body alignment, and computer-assisted measurement on whole body radiographs on skeleton with the use of advanced EOS system. They will also be given the chance to observe how clinicians and nursing staff communicate with patients in real-life clinical setting.

This project will be co-supervised by Dr. Alec HUNG. Students participating in this project will be required to conduct the research at the Prince of Wales Hospital.

Research Project (3): Validation of a Novel Thumb X-Ray Method for Evaluation of Maturity & Prognosis in Children with Adolescent Idiopathic Scoliosis

Project Description: Maturity assessment is important in managing growth disorders that result in spinal deformity and limb length discrepancy as diseases progress mainly during maximum growth at puberty. The commonly adopted physiological and radiological methods are impractical for being too complex for routine clinical use. To solve these problems, we develop a simple thumb x-ray method based on only 3 digital epiphyses in hand. This method was recently reported in the orthopaedic literature to be user-friendly with excellent validity and reliability
as compared to the current gold standard. The aim of this study is to further validate this method in a cohort of children with adolescent idiopathic scoliosis. Retrospective review will be conducted on spinal and hand radiographs obtained from a cohort of adolescent idiopathic scoliosis patients, to measure 1) radiological parameters on spine and limb deformity, and 2) thumb and hand maturity scale. The measurements will be correlated for formulating a practical reference for clinical usage.

Students participating in the project will gain knowledge on radiological measurement on spine/limb radiographs and thumb maturity scale, and also experience in conducting correlation and reliability analysis for a diagnostic and predictive model.

This project will be co-supervised by Dr. Alec HUNG. Students participating in this project will be required to conduct the research at the Prince of Wales Hospital.

CUHK Supervisor: Prof. LEE Kuang Sheng Oscar

Research Project: Establishment of a Novel Nanoresonant Spectroscopic Opto-Fluidic System for Real-Time Investigation of Mechano-Biological Interaction during Osteogenic Differentiation of Mesenchymal Stem Cells

The research group previously demonstrated that Raman spectroscopy facilitated real-time investigation of MSCs during osteogenic differentiation in a label-free and non-disruptive manner. The aim of this project is to develop a novel nanoresonant spectroscopic opto-fluidic system (NSOS), which will incorporate a tunable bio-microfluidic device to study how MSCs respond to fluid shear stimulation during osteogenic differentiation. Students will be guided to work on advanced equipment such as Raman spectroscopy and microfluidic device.

Project Description: Participating students will be required to complete the ‘Principles’ class for subject areas in cell biology, biochemistry and physics. Cell culture experiences will be an advantage. The project will be conducted in English. An oral presentation and written report will be required at the end of programme. Students participating in this project will be required to conduct the research at the Prince of Wales Hospital.

CUHK Supervisor: Prof. ONG Tim Yun Michael

Research Project: Is Persistent Quadriceps Muscle Atrophy Related to Failed Myokine Responses in Patients after Anterior Cruciate Ligament Reconstruction?

Persistent quadriceps atrophy can be seen in almost half the patients after ACL reconstruction and can persist beyond 12 months after surgery. Resistance exercises can increase quadriceps muscle bulk, which is primarily mediated by exercise-induced myokines. It is likely that the insufficiency in muscle regain is related to deregulation of myokine-mediated muscle hypertrophy.

The project aims to compare the extent of persistent quadriceps atrophy in patients with and without return-to-play at 12 months after ACLR. The association between exercise-induced changes in serum levels of myokines and the extent of persistent quadriceps atrophy after ACLR will also be explored.
The study will be conducted in English, but communication with some of the patients would require Chinese. Other members of the research team will be able to provide support in translation. Students participating in this project will be required to conduct the research at the Prince of Wales Hospital.

Department of Paediatrics
CUHK Supervisor: Prof. CHAN Wan Yi
Research Project (1): Functional Grouping of Rhinovirus by its Association with Clinical Outcomes
Project Description: The project aims to form functional groups of RVs associated with disease phenotypes and delineate the responsible biological determinants by complete genome sequencing and transcriptomics. Bioinformatics and lab-based work will be involved. Students with immense interest in epidemiology and molecular biology, as well as the motivation in pursuing their career as a scientist upon graduation are welcomed. The student will participate in the research group meeting, journal club, and hands-on laboratory work supervised by a post-doctoral researcher. Students participating in this project will be required to conduct the research at the Prince of Wales Hospital.

Research Project (2): The Differentiation of Viral & Non-Viral Wheeze in the Hospitalised Children by the Evaluation of Immune Signatures in the Nasopharyngeal Aspirate
Project Description: The project aims to differentiate viral and non-viral wheeze in children in the inpatient setting by measuring the host response genes and protein expression in the nasopharyngeal aspirate. The gene and protein candidates selected in this study are based on multiple RNA-sequencing studies performed in children with respiratory infection, wheeze and asthma of various causes. Lab-based work will be involved. Students with immense interest in cell culture and molecular biology, as well as the motivation in pursuing their career as a scientist upon graduation are welcomed. The student will participate in the research group meeting, journal club, and hands-on laboratory work supervised by a post-doctoral researcher. Students participating in this project will be required to conduct the research at the Prince of Wales Hospital.

CUHK Supervisor: Prof. LEUNG Ting Fan
Research Project: Diagnosis & Immunotherapy for Seafood Allergy
Project Description: The current diagnosis of seafood allergy relies on skin prick test, ImmunoCAP and oral food challenges with limited specificity, sensitivity and applicability whereas the treatment strategies of the disorder remain as strict dietary avoidance and rescue medication to relieve allergic symptoms. The research project will focus on developing a component-based diagnostic methods and testing different therapeutic formulations against both fish and shellfish allergies to enhance the predictability of clinical outcomes and advance the clinical management towards seafood allergy. Student participating in the project will have both clinical and laboratory exposure. They will assist in collecting and processing clinical samples, and conducting questionnaires, skin prick tests and oral food challenges. They will also be guided with basic laboratory techniques such as protein preparation,
ELISA, western blotting, qPCR and histological analyses. Overall, the participating students will be able to apprehend the basic immunology of food allergy and the present diagnostic and management strategies of the disorder upon completion of the programme. Students from biomedical, biochemical, biology, or equivalent fields will be preferred. Priority will be given to students with previous laboratory experiences. Applicant should be able to speak fluent Cantonese and English. Students participating in this project will be required to conduct the research at the Prince of Wales Hospital.

<table>
<thead>
<tr>
<th>Department of Surgery</th>
<th>CUHK Supervisor: Prof. POON Chung Yan Carmen</th>
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<tbody>
<tr>
<td>Research Project (1):</td>
<td>An FPGA-Based CNN Inference Accelerator for Diagnosing Multiple Rare Types of Colorectal Cancers during Endoscopy</td>
</tr>
<tr>
<td>Project Description:</td>
<td>The aim of this project is to develop an FPGA-based Convolutional-Neural-Network inference accelerator implemented with the deep learning model to diagnose multiple rare types of colorectal cancers during endoscopy. Students with a background in biomedical engineering, engineering science, electrical, computer and electronic engineering are preferred. Experience in digital system design, computer architecture, digital integrated circuits and chips design, and knowledge in Verilog, Python/C, Keras/Tensorflow/Pytorch will be an advantage. Students participating in this project will be required to conduct the research at the Prince of Wales Hospital.</td>
</tr>
<tr>
<td>Research Project (2):</td>
<td>Predicting Mortality in Acute Upper Gastrointestinal Bleeding Patients by Transferring Knowledge Learned from a Critical Care Database</td>
</tr>
<tr>
<td>Project Description:</td>
<td>The aim of this project is to investigate the transferability of knowledge learnt from a large public critical care database, where abundant patient samples and mortality examples are available, to a patient group of acute upper gastrointestinal bleeding for mortality prediction. Students with a background in biomedical engineering, computer science, engineering science, electrical, computer and electronic engineering, and information engineering are preferred. Experience in PostgreSQL or other database languages, Python, Keras/Tensorflow/Pytorch will be an advantage. Students participating in this project will be required to conduct the research at the Prince of Wales Hospital.</td>
</tr>
<tr>
<td>CUHK Supervisor:</td>
<td>Prof. TEOH Yuen Chun Jeremy</td>
</tr>
<tr>
<td>Research Project (1):</td>
<td>Natural History &amp; Treatment Outcomes of Asymptomatic Renal Stone</td>
</tr>
<tr>
<td>Project Description:</td>
<td>Renal stone is a common urological condition. Treatment options will include extracorporeal shock wave lithotripsy, retrograde intra-renal surgery or percutaneous nephrolithotomy. However, renal stone may not cause any symptoms or complications in long run. This study aims to investigate the natural history and treatment outcomes of asymptomatic renal stone to determine if intervention is really necessary in this group of patients. Students participating in this project will be required to conduct the research at the Prince of Wales Hospital.</td>
</tr>
<tr>
<td>Research Project (2):</td>
<td>Transurethral En Bloc Resection of Bladder Tumour – A New Standard?</td>
</tr>
</tbody>
</table>
### Project Description:

Bladder tumour is conventionally resected in a piecemeal manner. However, piecemeal resection will result in floating tumour cells which may re-implant to the bladder leading to early disease recurrence. En bloc resection (i.e. removal of bladder tumour in one piece) is a potentially superior technique in treating bladder cancer. In this project, students will assist a multi-centre study investigating the role of en bloc resection in patients with bladder cancer. Students participating in this project will be required to conduct the research at the Prince of Wales Hospital.

### School of Biomedical Sciences

<table>
<thead>
<tr>
<th>CUHK Supervisor</th>
<th>Prof. CHAN Leung Franky</th>
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<tbody>
<tr>
<td>Research Project</td>
<td>Long-Term Three-Dimensional (3D) Culture of Prostate Cancer Cells</td>
</tr>
<tr>
<td>Project Description:</td>
<td>The project aims to develop long-term three-dimensional (3D) cultures of prostate cancer cells in order to induce and isolate prostate cancer stem-like cells either with epithelial-mesenchymal transition (EMT) or neuroendocrine (NE) transition phenotypes for further elucidation of mechanisms involved in these processes.</td>
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<tr>
<th>CUHK Supervisor</th>
<th>Prof. CHENG Sze Lok Alfred</th>
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<tbody>
<tr>
<td>Research Project (1):</td>
<td>Mechanism-Based Combination Immunotherapy for Liver Cancer</td>
</tr>
<tr>
<td>Project Description:</td>
<td>The supervisor is interested in delineating the mechanisms of primary resistance of immunotherapies, which has become one of the pillars of cancer therapy. His lab focuses on defining the epigenomic and transcriptional regulation of immunosuppressive cells such as MDSCs in liver cancer development. To address this objective, an integrative experimental approach involving patient-derived immune cells, genetically-modified cell line and mouse models is applied. The long-term goal of our research is to identify new target genes and pathways for effective immunotherapies.</td>
</tr>
</tbody>
</table>

| Research Project (2): | Molecular Mechanisms Underlying Male Predominance of Liver Cancer |
| Project Description:  | The supervisor is interested in understanding why liver cancer is more prevalent in men than in women. His research focuses on defining the genomic, epigenomic and immune-modulatory actions of cell cycle-related kinase (CCRK) in liver cancer development. To address this objective, an integrative experimental approach involving genetically-modified cell lines, mouse models and clinical specimens is applied. The long-term goal of the research is to identify new target genes and pathways for effective therapies. |

### The Jockey Club School of Public Health and Primary Care

<table>
<thead>
<tr>
<th>CUHK Supervisor</th>
<th>Prof. KWOK Kin On</th>
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<tbody>
<tr>
<td>Research Project:</td>
<td>Tackling Antimicrobial Resistance with Multidisciplinary Thinking in Infectious Disease Epidemiology in Hong Kong</td>
</tr>
<tr>
<td>Project Description:</td>
<td>This mega-study aims to explore the determinants in antimicrobial resistance acquisition in different settings in the population. By the end of the project, students should be able to gain specific domain knowledge of antimicrobial resistance, build up skills in performing systematic review, gain hands-on experience with empirical data collection, and build up skills in analysing empirical data.</td>
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</table>
Students participating in this project will be required to conduct the research at the Prince of Wales Hospital.

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<thead>
<tr>
<th>CUHK Supervisor</th>
<th>Research Project</th>
<th>Project Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prof. TSE Lap Ah Shelly</td>
<td>Circadian Disruption, Sleep &amp; Adverse Health Impacts</td>
<td>Circadian rhyme disrupted by long-term nightshift work and sleep disorders have been linked to many health outcomes, such as apple-shape diabetes, breast cancer, and cognitive impairment. This project will be part of the on-going tripartite collaboration between Utrecht University, University of Toronto, and CUHK. Students may need to assist in data input, study subject interview and data collection with research team in Hong Kong. Proficiency in English is required while Chinese is welcome. Students participating in this project will be required to conduct the research at the Prince of Wales Hospital.</td>
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The Nethersole School of Nursing

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<thead>
<tr>
<th>CUHK Supervisor</th>
<th>Research Project</th>
<th>Project Description</th>
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<tbody>
<tr>
<td>Prof. CHOW Ka Ming</td>
<td>Rebuilding Sexuality &amp; Intimacy after Treatment for Gynaecological Cancer, through a Nurse-Led Sexual Rehabilitation Intervention: A Randomised Controlled Trial</td>
<td>The project aims to implement a nurse-led sexuality rehabilitation intervention for gynaecological cancer survivors in Hong Kong. It will also evaluate its effects on sexual functioning as the primary outcome, with marital relationships and the moderation effect of sexual distress as secondary outcomes. Students with a background in nursing are preferred. Students participating in this project will be required to conduct the research at the Prince of Wales Hospital and the Queen Elizabeth Hospital.</td>
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FACULTY OF SCIENCE

Department of Mathematics

<table>
<thead>
<tr>
<th>CUHK Supervisor</th>
<th>Research Project</th>
<th>Project Description</th>
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<tbody>
<tr>
<td>Prof. LAM Kei Fong Andrew</td>
<td>On Mathematical Models for Collective Dynamics</td>
<td>This project studies mathematical models for collective dynamics, such as the Cucker-Smale model for flocking and the Kuramoto model for synchronisation. These models use systems of ordinary differential equations to describe the interactive motion of agents, and under certain settings some type of collective dynamics can emerge. The objectives of the project is to review relevant journal articles and compose a report summarising the main result for these models. Participating students are expected to use numerical simulations to demonstrate the emergence of collective dynamics. Students with some knowledge in ordinary differential equations and calculus would be helpful.</td>
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Department of Physics

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<tr>
<th>CUHK Supervisor</th>
<th>Research Project</th>
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<tbody>
<tr>
<td>Prof. CHING Shuk Chi Emily</td>
<td>Analysis of Cultured Neuronal Networks Reconstructed from Measurements</td>
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</tbody>
</table>
The study of networks has emerged in many branches of science. Many systems of interest consist of a large number of components that interact with each other. These systems can be represented as networks with the individual components being the nodes and the interactions between the components as the links joining the nodes. The overall behaviour of the systems depends crucially on the interactions or the network structure depicting how the nodes are linked with each other. In this big data era, a vast amount of measurements has been made on the dynamics of the nodes of various systems. A great challenge is to reconstruct the network structure from these measurements and to analyse the network to gain understanding of the systems.

In this project, students will learn to apply concepts of network theory to analyse real-world networks – in vitro networks of neurons in culture that we have reconstructed from experimental measurements using a method developed by the host supervisor’s research group. Knowledge of computer programming is required and experience with MATLAB will be an advantage.
performance nanocrystal products at different amount scales is essential. The supervisor’s research team has made tremendous efforts over the past decade on the development of synthetic methods for colloidal metal nanocrystals. Several types of highly uniform colloidal Au and Ag nanocrystals have been synthesised and their plasmonic properties have been investigated and elucidated. A variety of plasmon-enabled applications has been explored and the supervisor’s research team is currently intensively exploring the applications of colloidal plasmonic metal nanocrystals in the control of light at nanoscale (nanoantennas), plasmon-enabled colour switching, magnetic plasmon resonance, and plasmonic photocatalysis.

Students participating in this project will explore the wide application of colloidal plasmonic metal nanocrystals. Students who are interested in interdisciplinary research are preferred.

Earth System Science Programme

CUHK Supervisor: Prof. TAI Pui Kuen Amos

Research Project (1): Impacts of Climate Change & Air Pollution on Ecosystem Health & Food Security Using a Computational Approach
Project Description: The aim of the project is to examine how important ecosystem functions including carbon uptake, crop production and pollutant removal will be affected under various scenarios of climate, land use and air quality changes in the coming century using a numerical computer model and multivariate statistical analysis. Students with a background in programming and scientific computing are preferred.

Research Project (2): Impacts of Climatic & Vegetation Changes on Air Quality Using a Computational Approach
Project Description: The aim of the project is to examine how meteorological changes as well as plant biophysical and biochemical changes influence the formation, transport and deposition of air pollutants and thus affect air quality across the world using a high-performance numerical computer model and multivariate statistical analysis. Students with a background in programming and scientific computing are preferred.

School of Life Sciences

CUHK Supervisor: Prof. CHAN King Ming

Research Project (1): Analysing Diet Composition of White Collard Crow (Corvus torquatus) & House Swift (Apus niaplensis) in Hong Kong Using Prey DNA in Faecal Sample
Project Description: Molecular approaches by analysing prey DNA in faecal sample proved to be feasible, non-invasive and relatively reliable ways for diet analysis of birds. Studies have been carried out by sequencing mitochondrial DNA in the faeces samples of birds. By comparing the sequences with the records in gene bank database, diet composition can be obtained and even allow identification down to the species level.

Corvids population increases with the degree of urbanisation all over the world. Interestingly White Collard Crow, Corvus torquatus, a species which is near
endemic to China, declines in population with the intensifying urbanisation in China. By analysing the diet composition of Corvus torquatus in Hong Kong using molecular approach, important local resources for the crows could be identified, which are valuable for saving the crows on the edge of extinction. Meanwhile, the diet composition of house swift, a common species in Hong Kong with the largest colonies found on CUHK campus, will also be studied and compared with White Collard Crow.

Research Project (2): Microplastic Pollution in Oyster Samples

The host research team has been collecting water samples and biota samples in Victoria Harbour, aiming at identifying microbeads in them. Meanwhile, seafood samples are also planned to be collected this summer to evaluate the potential risks of consuming seafood, with the focus on oysters available to local citizens.

Project Description:
Students participating in this project will gain experience in field study in the coastal areas and wet markets in Hong Kong, as well as conducting sample processing, and microplastic identification and counting.

Research Project (3): Toxic Effects of Sunscreen Chemicals on Zebrafish

UV filter is a type of material that is used to protect the human skin and hair from the harm of UV, and it is widely applied in a variety of personal care products. This material has been discharged to the environment continuously as daily care products. Commonly used UV filters are Benzophenone (BP-1, BP-2, BP-3, BP-4), Octocrylene, 2-Phenyl-5-benzimidazolesulfonic acid (PBSA) and 2-Ethylhexyl-4-methoxycinnamate (EHMC). Previous studies have shown that BP has toxic effect on Planula and causes endocrine disruption by modulating estrogen receptor signalling pathways of fish. Zebrafish is a well-established model to study molecular genetics, toxicology, and trans-generation effects of chemicals. In this study, zebrafish embryo-larvae, adults and a liver cell model of ZFL cell-line are employed to investigate the potential risks of benzophenone and the molecular mechanism of its toxic effects.

CUHK Supervisor: Prof. Michael CHAN

Research Project: Crystal Immobilised Enzymes for Industrial Catalysis

The research project involves producing Cry-enzyme fusion crystals (e.g. Cry-lipase crystals for biodiesel conversion) and measuring their activity, stability, and recyclability. Student with a background in chemistry and biochemistry is a requirement.

CUHK Supervisor: Prof. Laura FALKENBERG

Research Project: Effects of Future Climates on Marine Organisms

The research project focuses on studying climate change effects (e.g. ocean warming, ocean acidification, extreme weather events) on marine animals and ecosystems. The research focus will be on invertebrate species (e.g. copepod, gastropod, or urchin) with a view to understand how they, and the ecosystems they are found in, may operate differently in the future. The project will consider the response observed within a wider context that encompasses physiology (e.g. growth, metabolism), behaviour (e.g. feeding interactions), and ecology (e.g. habitat use, competition, trophic cascades). To explore these organism responses, the students will use tank experiments within which
organism are held, and conditions manipulated. The experimental work will, therefore, include establishing the experimental set-up (with organisms), measuring and maintaining experimental treatments, and quantifying organism responses. Students with a background in marine biology and/or ecology, with some understanding of basic oceanic water chemistry are preferred. The experimental work will be conducted at Simon F.S. Li Marine Science Laboratory.

**CUHK Supervisor:** Prof. JIANG Liwen  
**Research Project:** Organelle Biogenesis & Function  
**Project Description:** The research project focuses on understanding the underlying mechanisms of protein trafficking, organelle biogenesis and function in eukaryotic cells (e.g. plants) using a combination of imaging, cellular, molecular, biochemical and genetic approaches. Students will have the opportunity to learn and involve in a specific project while working together with senior researchers in the lab.

**CUHK Supervisor:** Prof. KANG Byung Ho  
**Research Project (1):** Microscopic Analyses of Mitochondrial Defects in Parkinson’s Disease Model System  
**Project Description:** Parkin is a protein involved in damaged mitochondria, and its mutation is responsible for Parkinson’s disease in human. Mutation in C. elegans parkin causes defects in damaged mitochondria, providing insight into the relationship between Parkinson’s disease and mitophagy. In this project, students will characterise the abnormal mitochondria elimination using microscopic techniques to elucidate functions of the Parkin homolog. Students interested in cell biology or medicine are welcome to join.  
**Research Project (2):** Three-Dimension (3D) Architectures of Cells & Organelles Determined by Electron Tomography  
**Project Description:** One of the specialities of the host lab is in 3D electron microscopy of membranous organelles. In this project, students will have opportunities to collect high-resolution microscopic data from frozen cells and determine morphometric features of organelles and macromolecular complexes using the 3dmod and MatLab software packages. Students interested in cell biology or image processing are welcome to join.

**CUHK Supervisor:** Prof. LAM Hon Ming  
**Research Project (1):** Functional Characterisation of a Plant Unconventional G-Protein (YchF1) which Plays Roles in Both Biotic & Abiotic Stresses  
**Project Description:** YchF is an unconventional G-protein, which is very conserved among all kingdoms of life except Archaea and thus this descendant of an ancient protein probably plays vital roles in nearly all lives. However, its physiological role still remains unclear. Rice YchF1 protein (OsYchF1) was the first plant YchF protein reported with physiological functions. It acts as negative regulator in both biotic and abiotic stresses. In addition, its interacting partners were found to function in global protein metabolism. How these interaction leads to plant YchF function as negative regulator in stress responses is the next question to answer. To achieve this end, site-directed mutagenesis was adopted to
construct transgenic Arabidopsis with mutated AtYchF1 expressed. By characterising these mutant AtYchF1 which no longer binds to particular interacting partner under stress conditions, the mechanism of YchF proteins relating to global protein metabolism and finally playing role as negative regulator in stress responses would be delineated.

Students with knowledge in molecular biology, plant physiology and/or genetic engineering will be an advantage. Research works will include plantation, plant abiotic and biotic treatments, phenotypes characterisation and data analysis.

**Research Project (2): Phenotypic Study of Soybean Populations**

The phenotype of a plant is a term used to describe observable characteristics, such as height, biomass, and leaf shape and so on. Modern techniques for crop improvement rely on both DNA sequencing and accurate quantification of plant traits to identify genes and germplasm of interest. This study is to collect the phenotypic data of soybean population to build the phenotypic database for QTL or GWAS analysis.

The research works will include plantation in green house or field sites in Hong Kong, investigation of phenotypes of soybean accessions, data collection, data entry, database construction and analysis.

**CUHK Supervisor:** Prof. NGO Chi Ki Jacky

**Project Description:**

Students with knowledge in molecular biology, plant physiology and/or genetic engineering will be an advantage. Research works will include plantation, plant abiotic and biotic treatments, phenotypes characterisation and data analysis.

**Research Project:** Studying the Inhibitory Mechanism of a Covalent Kinase Inhibitor in Cancer Cells

The supervisor’s research team has recently developed a covalent inhibitor that targets pre-mRNA splicing kinases to inhibit angiogenesis. In this project, students will investigate the inhibitory mechanism of this inhibitor in different cancer cell lines.

Students with a background in biological or biomedical sciences are preferred.

**CUHK Supervisor:** Prof. ZHUANG Xiaohong

**Project Description:**

Autophagy & Autophagosome in Plants & Green Algae

Derived from the Greek word meaning ‘self-eating’, autophagy acts as a cleaning-up process by breaking down damaged or unwanted proteins/cellular structures, thereby balancing cellular homeostasis in almost all eukaryotes. The research team works to unveil molecular mechanisms of autophagy as potential targets for future application in sustainable agriculture and renewable energy production. The project will focus on developing tools such as gene editing, fractionation, in vitro reconstitution and confocal/electron microscopy to investigate the architecture of the autophagosome formation at both molecular and structural levels. Students will work with graduate students on a specific project.

**FACULTY OF SOCIAL SCIENCE**

**Department of Geography and Resource Management**

**CUHK Supervisor:** Prof. CHAN Chung Shing

**Research Project (1): Comparing the Paths from Perceived Image to Locational Decisions by Hong Kong & Shenzhen University Students across Cities in Guangdong-Hong Kong-Macao Greater Bay Area**
**Research Project (1):**

The Effects of Global Change on Soil Greenhouse Gas Exchange in a Subtropical Forest of Hong Kong

**Project Description:**
In this project, students will conduct field and/or lab measurements to examine the effects of changing temperature, rainfall and litterfall on soil greenhouse gas fluxes in a subtropical forest.

**Research Project (2):**

The Role of Soils in Greenhouse Gas Dynamics of Subtropical Coastal Wetlands

**Project Description:**
In this project, students will conduct field and/or lab measurements to investigate the processes and governing factors of greenhouse gas production in wetland soils.

**Research Project (3):**

The Status of Microplastic Pollution in Hong Kong Environments

**Project Description:**
In this project, students will conduct field sampling and lab analysis to assess the extent of microplastic pollution in various habitats in Hong Kong.

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**Department of Social Work**

**Research Project:**

Parental Employment, Parenting, & Child Development: Evidence from the China Family Panel Studies

**Project Description:**
As a follow-up study of a 2018 SURP Project, this research project will investigate whether and how parental employment affects parental involvement in children’s education, which may in turn influence children’s developmental outcomes, based on data from the China Family Panel Studies (CFPS).
Students are expected to conduct literature reviews on relevant theories and previous empirical studies. They will also have an opportunity to manage and analyse large-scale data sets (i.e. CFPS).

School of Journalism and Communication
CUHK Supervisor: Prof. LIAO Xueting Sara
Research Project: Digital Feminist Activism in China: Promises, Pitfalls, & Futures

Digital technologies and social media platforms are playing important roles in a variety of social movements and protests across the globe. Especially for feminist activists, digital media provide them new toolkits and cultivate new skillsets to dialogue, network, and organise against patriarchy, sexism, and misogyny in contemporary society. The proliferation of hashtag activism has brought renewed attention to the power of digital activism in shaping public discourse, promoting racial and gender awareness, and making people’s lived experience visible.

This research project examines feminist activism, digital media, social movements, and contentious politics through critically investigating the ways Chinese feminists turn to digital media to put forward feminist agendas to the public arena. It attempts to evaluate these strategies feminists employed to advance their political goals, providing insights into the pros and cons of digital technologies in provoking feminist movements.

Students from the social science and humanities disciplines, with knowledge and interests in gender studies, cultural studies, area studies (China/Asian studies), media and communication, and popular culture will be preferred. Some hands-on experience in qualitative research methods such as textual analysis, discourse analysis, in-depth interviews, and research tools such as NVivo, and language capabilities in Chinese will be advantageous.

ART MUSEUM, INSTITUTE OF CHINESE STUDIES
CUHK Supervisor: Prof. YIU Chun Chong Josh
Research Project: Museum Research

The Art Museum of CUHK seeks and offers a dynamic candidate to engage in multi-faceted museum research. Known for its world-class collection of Chinese art and rigorous exhibition and publication program, the museum will introduce the student to curatorial, educational, collection management, and outreach work. Depending on the interest and skill-set of the student, the focus of the project will be adjusted accordingly. Knowledge of art and Chinese will be a plus, but not a requirement. A successful candidate will have the following attributes: passion for learning, can-do attitude, independent and critical mindset, and attention to details.

INSTITUTE FOR TISSUE ENGINEERING AND REGENERATIVE MEDICINE (ITERM)
CUHK Supervisor: Prof. LEE Chien Wei
Research Project (1): Therapeutic Applications of Exosomes from Mesenchymal Stem Cells for Obesity-Induced Nonalcoholic Fatty Liver Disease

Obesity and its related diseases, such as nonalcoholic fatty liver disease (NAFLD), cause heavy socioeconomic burden and an alarming global health problem. In our pre-clinical study, mesenchymal stem cell (MSC)-based
therapies were able to treat high-fat diet induced NAFLD and acute liver diseases. MSC-derived exosomes (MSC exosomes), with high liver organotropism, may serve as a powerful cell free therapeutic agent in acute and chronic liver diseases by directing targeting hepatocytes or modulation of immune responses. This study aims to evaluate whether MSC-exosomes possess therapeutic potential in HFD-induced NAFLD mediated through direct targeting hepatocytes or modulation of immune responses. This study will also explore the fingerprint of cargos in MSC-exosomes through advanced molecular technology and bio-informatics.

Participating students will be required to complete the ‘Principles’ class for subject areas in cell biology, biochemistry and physics. Cell culture experiences will be an advantage. The project will be conducted in English. An oral presentation and written report will be required at the end of programme. Students participating in this project will be required to conduct the research at the Prince of Wales Hospital.