Name of Faculty	Name of Supervisor, Position and Department	Project Title	Project Summary	Selection Criteria	Intake of Student in 2019
Business and Finance	**Dr Alan KWAN, Assistant Professor in Finance**	**The host supervisor is looking for students keen on graduate school in economics or finance, quantitative investment management, or data science more generally. A number of projects are available for the right student. Students can also propose their own project and should there be a mutual fit, the host supervisor would be happy to help guide.**	Example projects include: 1. Replicate and extension of empirical asset pricing (e.g. investments) papers to inform investment practitioners of anomalies and optimal risk factor management 2. Summarize trends and build a narrative explaining the global expansion of Asian, European and North American multinationals around the world 3. Find, collate, clean data. Build features using machine learning from an unstructured dataset. Summarize and analyze said data. 4. Summarize literature, compile data and write literature reviews on various topics in corporate finance, corporate governance, investments	Keen on graduate school in economics or finance, quantitative investment management, or data science more generally Ideally have R or Python programming experience and some SQL/ACCESS knowledge; SAS is also fine Experience in data-oriented projects Students without programming experience are welcome to apply for more qualitatively-oriented projects	2-3
Dentistry	**Dr TSOI James Kit Hon, Assistant Professor in Dental Materials Science**	**Analyzing Bacterial Adhesion on Dental Materials with AI Technologies**	Bacterial adhesion on dental materials surfaces can lead to the formation of biofilm, which is a major issue of bone loss and material fracture. Currently, the characterization methods mainly focus on indirect methods which are time-consuming, not accurately focus on the "adhesion", and waste a lot of money. This project aims at developing a new or improving our current AI methods, so that the dental researchers can simplify their laboratory procedures and also improve the accuracies about the "adhesion" by direct observation.	The students should have knowledge of computer programming, bioinformatics, data mining, materials science, microbiology or biophysics. Despite this is an independent project, the students are expected to work together with a team of PhDs.	1 to 2
Engineering	**Dr Kaibin HUANG, Assistant Professor, Department of Electrical and Electronic Engineering**	**Towards an Intelligent Edge: Wireless Communication Meets Machine Learning**	The recent revival of artificial intelligence (AI) is revolutionizing almost every branch of science and technology. Given the ubiquitous smart mobile gadgets and Internet of Things (IoT) devices, it is expected that a majority of intelligent applications will be deployed at the edge of wireless networks. This trend has generated strong interests in realizing an “intelligent edge” to support AI-enabled applications at various edge devices. Accordingly, a new research area, called edge learning, emerges, which crosses and revolutionizes two disciplines: wireless communication and machine learning. A major theme in edge learning is to overcome the limited computing power, as well as limited data, at each edge device. This is accomplished by leveraging the mobile edge computing (MEC) platform and exploiting the massive data distributed over a large number of edge devices. In such systems, learning from distributed data and communicating between the edge server and devices are two critical and coupled aspects, and their fusion poses many new research challenges. In this project, we aims at redesigning new techniques, collectively called learning driven wireless communication, merging the two disciplines and studying their feasibility in practical systems.	Top 10% academic performance.	2
Engineering	**Dr Anderson SHUM, Associate Professor, Department of Mechanical Engineering**	**Droplet Microfluidics for Biomedical Applications**	The Laidlaw Scholar(s) will join a team of researchers in developing droplet-based microfluidic techniques for biomedical applications. The scope of research tasks involve design and characterization of microfluidic chips, high-throughput processing of samples. Students will be exposed to microfluidics and the emerging applications related to screening of compounds and processing of biological entities.	Students who are comfortable with hands-on processing, and can think of creative solutions to technical challenges will be well-suited. Simple knowledge on optics and assembly of machine parts is helpful but not essential.	2
Education	**Supervisor: Susan M. BRIDGES, Associate Professor, Assistant Dean (Learning and Teaching), Faculty of Education** **Deputy Supervisor: Dr. Monaliza M. CHIAN, Postdoctoral Fellow Faculty of Education**	**From University to the Workplace Research topic: Transitions into professional practice**	The Laidlaw Scholars will join a community of interdisciplinary researchers across healthcare (i.e. medicine, dentistry, speech and hearing) and teaching professions who are exploring factors that support and challenge graduates as they transition into professional practice, specifically in their first year of employment. The Laidlaw Scholars will be educated in the conduct of qualitative research which includes, but is not limited to: reviewing literature; conducting fieldwork interviews; transcribing audio recordings; and conducting preliminary analysis. Overarching research question: How and in what ways do graduates across a range of professional programs (healthcare and education) transition from university to their new workplaces? Sub-questions: 1) How did graduates’ degree prepare them for professional working environments? 2) How did graduates’ use of technologies in their undergraduate studies support their transition to professional practice? 3) What new technological demands are present in graduates’ current workplaces and how prepared do they feel in addressing these demands?	Good basic understanding of qualitative research with an interest in learning more about ethnographic approaches. Some familiarity with transcription software and conventions. Undergraduate students from healthcare (MBBS, BDS, BSc Speech and Hearing Sciences) and teacher education programs (PGDE and Bachelor of Education double degree) will be preferred.	4 students: preferably 2 from the health profession and 2 from teacher education
Science	**Dr Ben KANE, Assistant Professor, Department of Mathematics**	**Combinatorial Identities and Asymptotics via Modular Forms and the Circle Method**	In the project, the student(s) will investigate analytic techniques used to prove combinatorial identities and asymptotics. Specifically, the student(s) will search for some such results from partition theory and prove them via the usage of modular forms and the Hardy-Ramanujan Circle Method.	Student should have some familiarity with complex analysis. Some background knowledge (self learning without a formal course) may also be considered.	4
Science	**Dr Takashi NAKAGAWA, Associate Professor, Department of Earth Sciences**	**Thermal and Magnetic Evolution of Exosolar Rocky Planets**	According to recent telescope observations for finding planetary system outside of solar system, large numbers of exosolar planets have been found, which includes the various size of rocky planets such as super-Earths. The main target of this project is to explore a possibility on the inner core growth in exosolar rocky planets and size dependence because the inner core growth is a fundamental process of magnetic field generation caused by dynamo actions in such planets if they may have the Earth-like interior structure. A student may use semi-analytical and/or simple numerical approach to core-mantle evolution modeling of the Earth-like planet.	Applied Mathematics, Physics, Astrophysics and Earth and Planetary Sciences majors are eligible to apply for this project. Knowledge of fundamental mathematics and physics is required. In particular, theoretical backgrounds on thermodynamics and fluid mechanics are highly requested. Knowledge of Earth and Planetary Science and Astrophysics are also helpful but not required.	1
Science	**Professor Quentin A PARKER, Professor, Department of Physics**	**Late Stage Stellar Evolution**	Students would work with the Late Stage Stellar Evolution team led by Prof. Quentin Parker of the Dept. Physics and Laboratory for Space Research (QAP + 4 postdocs and 3 PhD students). Several projects are available to exploit the scientific potential of the Hong-Kong/ AAO/ Strasbourg H-alpha Research Platform (see Parker et al 2016, JPhCS, 727, 2008) that involves the study of Planetary Nebulae.	Must be minimum 2nd year student. Must be doing a science degree. Must ideally have a strong interest in Astronomy and Astrophysics and have taken such courses as part of an undergraduate degree though students with strong Physics background can be considered. Experience with computing technologies and databases advantageous.	3
Science	**Dr Bayden D RUSSELL, Associate Professor, School of Biological Sciences**	**Transgenerational Adaptation Mechanisms to Global Climate Change in Marine Organisms**	One strong tool that can be used to study adaptations and physiological changes pertaining to long-term global change is to examine transgenerational adaptation mechanisms. The project will involve studying the changes in physiology and reproductive output of a model species, an intertidal copepod, over multiple generations. It aims to examine the variations in respiration rates, fecundity, larval development times, mortality, fatty acid concentrations and potentially gene expression of organisms exposed to variations in CO2 and temperature. The student will be involved in laboratory culture of copepods and measurement of various physiological and reproductive attributes. Some field collections of organisms is also possible.	An interest in intertidal marine ecology. Experience in laboratory techniques for molecular analysis (preferred but not essential). Some knowledge of plankton ecology (preferred but not essential).	2
Science	**Dr Tanja SOBKO, Assistant Professor, School of Biological Sciences**	**Early Environmental Education**	Measuring Connectedness to Nature in preschool children in an urban setting and its relation to psychological functioning. The urban environment has been criticized for promoting ‘nature-deficit’ and ‘child-nature disconnectedness’. Keeping in mind the importance of nature exposure and its extensive health benefits, many environmental programs around the world, hope to (re)connect children with nature. To evaluate the effectiveness of such efforts, valid tools to measure Connectedness to Nature (CN) are needed but do not exist today, especially for use with pre-schoolers. Dr Sobko’s team has developed and validated such tool. The questionnaire is short (16 questions related to nature) and adequately captured four major dimensions: enjoyment of nature, empathy for nature, responsibility toward nature, and awareness of nature. When it was tested against the SDQ, a validated measure for child psychological functioning and identification of children’s problem behaviour, three CNI-PPC factors influenced the SDQ outcomes: (1) the more enjoyment of nature children displayed the less overall distress and impairment they exhibited (β= -.64); (2) the greater responsibility toward nature in children was associated with less hyperactivity, fewer behavioural and peer difficulties and improved prosocial behaviour; (3) the more aware children were of nature, the less emotional difficulties they exhibited. This indicates the developed questionnaire is a valid and reliable instrument to measure CN at an age when children cannot respond for themselves. Further, this simple tool can help researchers/practitioners to better understand how connectedness to nature affects child psychological functioning and wellbeing. The next step is to test it in a broader setting, using the web-based platform SurveyMonkey, which will be the project for the incoming students.	Knowledge and/or experience working with online surveys	4
Science	**Professor Hongzhe SUN, Professors, Department of Chemistry** **Collaborated with University College London (UCL): Professor John Christodoulou (Structural biology and biochemistry) and Professor Shozeb Haider (Computational chemistry, drug design and pharmacy)**	**(1) Development of Novel Inhibitors to Fight Against Superbugs;** **(2) The Role of Metals on Protein Folding and Conformational Changes**	We propose to ask the students to work on the interface of chemistry and biology, and will use the proposed two projects to provide intensive training to students from preparation of research projects to carrying our research work using a variety of biophysical techniques in addition to synthetic chemistry. For the former, we plan to train students on computer-aided drug design as well as bioassay using metallo-beta-lactamase as an example. For the latter, we will offer students to learn the latest techniques such as biological NMR and X-ray crystallography to investigate the role of metal ions on protein folding and conformational changes, and its relation to diseases (e.g. aging). All of us are highly active as revealed from our publications and research grants, and importantly we have complementary expertise. Through a joint effort, we anticipate that we can train the best young scientists. The applicant (Prof. Sun) visited Prof. Christodoulou at UCL several years ago and started to work together on metals in biology.	(1) The candidate shall study one of the B.Sc courses, i.e. Biochemistry, pharmacology, medicinal chemistry with the grade of not less than B; (2) Highly motivated	UCL: 2 students per year (each for Prof. John Christodoulou and Shozeb Haider respectively); HKU: 1 student
Science	**Dr Edmund C. M. TSE, Assistant Professor, Department of Chemistry**	**Project (1): How do DNA Repair Proteins Coordinate their DNA Damage Search Process**	Project (1): External and internal DNA damage causes DNA damage in the our genome on the order of millions per cell per day. Our body utilizes diverse teams of proteins to detect and repair lesions in a timely fashion. Recently, an increasing number of DNA-repair proteins responsible for preventing developmental defects and cancerous diseases have been found to contain redox-active [4Fe4S] cofactors. However, how these proteins cooperate with each other to speed up the DNA damage detection process is still not well understood. The ultimate goal of this project is to shed light on this process by visualizing the collaborative search process both in vitro and in vivo. Title of Scholarship Project: Using Optical Tweezer and Fluorescence Microscopy to Visualize DNA-Protein Complex Summary of Scholarship work: The Scholar will work with members of the ET lab to design, overexpress, and purify fluorescently-labeled DNA repair proteins that can be visualized using fluorescence microscopy. The scholar might also contribute to the synthesis and preparation of DNA tethered to glass beads that can be manipulated using an optical tweezer.	Project (1): Good knowledge of biochemistry, protein overexpression, and plasmid design. Ability to operate an optical tweezer and a fluorescence microscope is a plus. Be familiar with Python or similar programming languages. Attention to detail. Diligent.	1

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		Project (2): Feeding the Growing Population	Project (2): A steady supply of clean water and food are key to achieve a sustainable future. As the global population grows, food demand heightens. To this end, the project aims to increase the production of fertilizer in order to boost food production. Title of Scholarship Project: Turning Trash to Treasure Summary of Scholarship work: The Scholar will develop an advanced electrochemical platform to (i) remove nitrates and nitrites from agricultural waste, and (ii) convert nitrates and nitrites into ammonia, which is a key ingredient for the synthesis of fertilizer to boost food production to feed the growing population.	Project (2): Good knowledge of materials preparation and characterization techniques such as electron beam evaporation, sputtering deposition, and scanning electron microscopy. Ability to perform photolithography is a plus. Be familiar with VASP, Gaussian, Origin, or similar calculation packages. Attention to detail. Diligent.	1
		Project (3): Next-Generation Catalyst for Electrochemical Energy Storage and Conversion	Project (3): Renewable energy technologies hold the promise to achieve a sustainable society. To this end, the project focuses on inventing innovative molecular constructs as new catalysts for fuel cell, battery, and electrolyser technology. Title of Scholarship Project: Designer Ligand Framework to Support Intricate Oxygen Reduction Catalysts Summary of Scholarship work: The Scholar will devise and synthesize organic ligands that can host transition metal ions. Depending on the progress, the scholar might have enough time to prepare the metal complex targets and test their catalytic performance.	Project (3): Good knowledge of molecular synthesis and characterization such as nuclear magnetic resonance, electrospray ionisation mass spectrometry, and gas/liquid chromatography. Ability to handle air- and water-sensitive compounds is a plus. Be familiar with ChemDraw, MestReNova, or similar computer programmes. Attention to detail. Diligent.	1
Science	**Dr Tak Kwong WONG, Assistant Professor, Department of Mathematics**	**Analytical and Numerical Study of Nonlinear Partial Differential Equations**	Partial Differential Equations (PDE) describe many interesting phenomena in science and economics. In this project, the student(s) will investigate analytical and numerical techniques for studying PDE. The underlying PDE in this project is flexible, and the student(s) and supervisor will finalize the underlying PDE according to both the student(s)' interest and supervisor's expertise. Examples include but not limited to equations arising from fluid dynamics, kinetic models for galaxies or hot plasma, as well as mean field games.	N/A	At most 4
Medicine	**Dr Joshua W. K. HO, Associate Professor, School of Biomedical Sciences, Li Ka Shing Faculty of Medicine**	**A Mobile App for Heart Sound Analysis**	The widespread availability of mobile smartphones has opened up the opportunity to use the in-built microphones to record heart sounds, without the use of a traditional stethoscope. In this project, we aim to build a mobile application to record and process heart sounds obtained from the in-build microphone on mobile smartphones with a focus on applying modern signaling processing techniques. We aim to develop a mobile app that is able to capture, process and visualise heart sound recording. The app will be useful for downstream application of artificial intelligence and big data techniques to a variety of medical problems. Summary of scholarship work: This project is largely a software development and algorithm development project. It will involve design and implementation of a mobile app that is useful across a number of standard devices and operating systems. Students will be exposed to the concepts and methods for processing heart sound data. Outputs expected of scholar: A mobile app that can accurately record, process and visualise heart sound from a variety of commonly available mobile devices.	A student in this project needs to have experience with computer programming. Experience with mobile app development and signaling processing is highly desirable but not essential.	1 to 2
Medicine	**Prof Anskar LEUNG, Clinical Professor, Department of Medicine**	**Identification of Personalised Treatment Protocol for Patients with Acute Myeloid Leukaemia (AML)**	The proposal aims to identify and repurpose novel therapeutic regimen for diverse subtypes of AML based on in vitro drug screening, mechanistic studies and patient-derived xenograft model. The selected student will have hands-on experience in handling primary patient blood and bone marrow samples, cell cultures, flow-cytometry, genome editing as well as xenotransplantation.	Third year undergraduate with satisfactory undergraduate performance.	1
Medicine	**Dr Julian TANNER, Associate Professor, School of Biomedical Sciences**	**Innovative Technologies for Robust Point-of-Care Diagnostic Devices for the Developing World**	Our lab performs research in nucleic acid evolution to develop aptamers – nucleic acids which can recognize disease biomarkers – which can be used in various innovative modalities for diagnostics. We have focused on aptamers for the diagnosis of malaria which we have incorporated in 3D printed devices that are inexpensive, robust, simple to use. In this project you will have the opportunity to create better approaches for malaria diagnosis that could have a significant impact on society, which might also be more widely applied for point-of-care biosensing.	Some university level STEM discipline study experience.	1
Medicine	**Dr WANG Weiping, Assistant Professor, Department of Pharmacology and Pharmacy** **Dr. Li Dak-Sum Research Centre, HKU Karolinska Institutet Collaboration in Regenerative Medicine**	**Near-infrared Light-triggered Drug Delivery for Cancer Therapy**	Photoresponsive drug delivery systems allow precise control over the timing, location, and dosage of the drug delivery, which enhances the therapeutic efficacy while minimizing side effects. Light in the wavelength range from 650 to 900 nm, also known as the near-infrared (NIR) window, has the maximum tissue penetration depth. The project aims to develop NIR light-responsive polymeric nanocarriers for controlled drug delivery in cancer therapy. The selected student will have hands-on experience in simple organic synthesis, nanoparticle preparation and characterization, cell cultures and testing therapeutic effects in vitro.	Third year undergraduate with satisfactory undergraduate performance and basic chemistry background.	2
Social Sciences	**Prof Maggy S Y LEE, Professor, Department of Sociology** **Dr Victor Shin, Assistant Professor, Department of Sociology**	**The Second Life of Urban Prisons**	As aging buildings of confinement become unfit for use or obsolete, many urban prisons around the world have been reinvented as museums, hotels, wedding venues, other commercial or residential developments. This pilot research project examines the revitalisation of the Central Police Station and prison compound as a centre for heritage and arts (Tai Kwun) in Hong Kong. In what ways does Tai Kwun memorialise the past (e.g. ideas about crime, justice and punishment) and engage with the social (e.g. connections with people and places)? And what does the transformation of urban prisons tell us about the wider processes, characteristics and contradictions of urban renewal? Tasks: - Desktop research and literature review - Data collection at Tai Kwun - Produce a summary of key results	A sense of curiosity, good writing skills, critical analytical skills	1
Social Sciences	**Dr Tommy TSE, Assistant Professor, Department of Sociology**	**Rethinking Precarisation as a Diverse Process: Emerging Challenges and Responses of Cultural/Creative Labour in China**	The cultural and creative industries (CCI) in today's globalised economy are widely perceived by opinion leaders as increasingly significant sources of economic growth and employment. Since China opened up its market to the forces of globalisation and joined the WTO, the country's CCI have been high on the Government's strategic development agenda for more than 15 years. CCI's total workforce rose from 8.73 million employees in 2004 to 17.59 million in 2013. Importantly, CCI initiatives are not implemented solely for economic reasons, but also to achieve the political goal of exporting China's cultural power to the world through a soft power-building agenda, contributing to a unique mode of cultural production and labour process. Since then, creative work has been glorified as an esteemed career among the younger generation. However, scholarly research worldwide has revealed that, CCI's increasing contribution to GDP and the growing number of creative workers do not always reflect the real predicament of CCI workers. The proposed research will investigate if creative work has become increasingly insecure and contingent in China, as being observed in empirical research of other social settings analysing creative labourers' work conditions and experiences. Our interviews and observations will focus on four key questions: (i) How are the interwoven effects of cultural, economic, political, social and technological changes in post-socialist China materialised as objective conditions within specific institutional, industry, sub-sectorial and organisational settings, which shape full-time creative workers' subjective perceptions of work-related insecurity? (ii) How do specific environmental, institutional and organisational factors as well as social interactions with multiple actors and stakeholders produce specific types of precariousness, which habituate workers to accept a life of unstable labour and a continuous state of insecurity and anxiety? (iii) How do these embodied labourers actually respond to and resist such precarious conditions? (iv) How are their various levels of labour agency shaped by such sociological factors as age, socioeconomic status, cultural background, education, gender, place of origin, work experience and lifestages? The project's major theoretical contribution will be exploring precarisation as a diverse process and contextualisation of precariousness with empirical specificity (Alberti et al., 2018). In practical terms, this project will signal more effective public-private partnerships to acutely challenge and transform the structural norms and constraints within the sector. Key tasks - Literature review and extraction - Online data search (key focus: major technology companies in China, e.g. Alibaba, Tencent, Baidu, Sina) - Data analysis and thematic classification (e.g. written field notes, visual data, transcribed formal and informal interviews) - Chinese-to-English Translation - Other research tasks relevant to the applicants' interests	- Undergraduates who major (or minor) in Sociology, Anthropology, Cultural Studies, Media and Communication, East Asian Studies, China Studies, Psychology, Computer Sciences, Human Resources Management and/or Business Administration are preferred - Critical thinking, attention to detail, team player, willingness to learn - Proficiency in written/spoken English - Proficiency in written/spoken Chinese (Mandarin/Simplex Chinese) is a plus	1 to 3
Social Sciences	**Prof Karen Joe LAIDLER, Professor and Deputy Head, Department of Sociology**	**The Gendered Nature of Fraudulent Online Intimacy**	There is increasing public awareness and concern around fraud and deception in online romance and intimacy as reflected in media reports. In Hong Kong, it appears that these deceptions are of a gendered nature such that women tend to be victims of online romance frauds while men are more likely to be victims of fake compensated dating and naked chat. This pilot project seeks to understand, from media reports, the emergence, characteristics and patterns of these phenomenon, and media portrayals/characterizations of victims, fraudsters, and situations. The project seeks to establish, from media data, a preliminary profile of the similarities and differences in fraudulent online intimacy between men and women, and how this comparison may help better inform education and reporting practices. Tasks: - Desktop research - tracking, collating, and analyzing media reports - Produce a summary of key results - Possibly assisting/conducting a few interviews with police and/or other front line workers.	A sense of curiosity, good writing skills, critical analytical skills.	1
Social Sciences	**Prof Pun Ngai, Professor, Department of Sociology**	**TBA**	TBA	TBA	TBA

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