

2024 Summer Research Scholars (SRS) Funded Project List



1. Read through the project descriptions, and identify any that are of interest. You are not restricted to only your major field. The summer research experience can be an important seed in developing your Signature Work project.
2. Compensation this year for a full summer of research will be in the form of a 5,600 RMB stipend, a 6,200 RMB campus dining card that can be used throughout the 2024-25 academic year, and on-campus housing for students who are on campus.
3. Directly contact the faculty member to discuss the research expectations.
4. Your initial contact with the faculty will be important in determining whether or not you will be considered for a position. Your email should be polite, professional, and concise. It should contain information that clearly shows your interest in the project as well as your capability in being a successful contributing participant.
5. If nominated by a SRS mentor, you will need to provide the mentor with
 - a. A brief description **written by the student** describing the proposed project and his/her role in carrying out the work (250-500 words). This description must **demonstrate the student's understanding of the research to be undertaken, explaining both the research question and the approach**. It should be written in the student's own words and may include references if applicable.
 - b. A brief description **written by the student** of how the research will contribute to the student's signature work and/or future plans, if applicable (250 words maximum).
6. If nominated, you will also need to provide the mentor with your name, NetID, your major (if declared), whether you will require on-campus summer housing, and whether you expect to be remote or in-person.
7. After receiving the nominations, UG Studies will verify eligibility. UG Studies will send out the confirmation letter, which will also contain program-wide expectations of participating students.
8. Some projects have more than one student position available, and faculty with more than one project have some flexibility in how they allocate positions.
9. Pay attention to future listings, as there could be additional opportunities added in the future.

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Project Title, PI, and email	Project Summary
<p>Repetition x Neurons: Examining repetition suppression and enhancement phenomena and related models</p> <p>Sze Chai Kwok sk695@duke.edu</p>	<p>Repetition suppression (RS) and repetition enhancement (RE) constitute foundational neural phenomena that illuminate the dynamic responses of the brain to repeated stimuli. RS is characterized by a reduction in neural activity upon repeated stimulus presentation, whereas RE entails an augmentation of neural activity under similar conditions. This research is dedicated to understand these phenomena in neurons of the dorsomedial posterior parietal cortex. We will also put a focus on scrutinizing some proposed neural and RS models. We welcome students specializing in mathematics, neuroscience, psychology, behavioral science, biophysics, data sciences, and related disciplines.</p>
<p>Molecular mechanisms in uterine myometrial and cervical tumors</p> <p>Anastasia Tsigkou anastasia.tsigkou@dukekunshan.edu.cn</p>	<p>Uterine myometrial tumors (uterine leiomyoma and uterine sarcoma) are the most common in women. In particular, the benign leiomyoma, also named uterine fibroid, has a very high incidence (45-60% of women) and may be treated in a conservative manner by surgical, medical or radiological interventions. The critical clinical question is if and when this benign tumor may become malignant, because uterine sarcoma has a very high mortality. One of the key players is the cross talk of hormones such as Progesterone receptors and oncogenes S1P, p53 and DEK demonstrated from our research that could be a critical player. Students enrolled in area of Molecular Biosciences tracks and Global Health are encouraged to apply. Students must have completed BIO110, BIO 201.</p>
<p>Functional Interactions between the Central Circadian Clock and Recognition Memory Processes in Mice</p> <p>Shu Kit Eric Tam shukiteric.tam@dukekunshan.edu.cn</p>	<p>Light/dark cycles exert profound effects on cellular physiology, and they are powerful modulators of brain network activity and cognitive functions in diurnal and nocturnal species, including humans. In recent years there has been a surge of interest in the role of the central circadian clock in regulating our cognition, especially regarding how learning and memory performance can be optimized at different times of day. In this project, we aim to examine how memory performance in laboratory mice varies at different times of day, and crucially, whether there is any functional interaction between the central circadian clock in the suprachiasmatic nucleus and the hippocampus, driving time-of-day differences in memory performance. This project will allow students to gain hands-on experience in neuroscience research and is particularly suitable for those who want to declare a major in the Behavioral Science - Neuroscience track and those who want to pursue a career in biomedical research.</p>
<p>One Health in China: Lessons from the Implementation of Government Policies to Combat Antimicrobial Resistance</p> <p>Annemieke van den Dool annemieke.van.den.dool@dukekunshan.edu.cn</p>	<p>Antimicrobial resistance (AMR) is a global problem that has been attributed to the misuse of antimicrobials. To address this problem, the Global Action Plan on AMR was launched at the World Health Assembly in 2015. National action plans have subsequently been adopted in several countries, including China. To learn from China's experience of addressing AMR through the lens of One Health, the proposed project maps the country's implementation of relevant policies through (a) a review of Chinese-language and English-language social sciences journal articles, (b) an analysis of relevant national-level and provincial-level policy documents collected through government websites and PKULaw. The overarching research question is: "What policy tools are used to implement China's AMR Action Plans at the national and provincial levels?"</p>

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<p>Community Gardening in China: Policies and Motivations in Kunshan City</p> <p>Annemieke van den Dool annemieke.van.den.dool@dukekunshan.edu.cn</p>	<p>Urban gardening has the potential to contribute to food security, sustainable urban development, health improvement, and community cohesion. Existing research in China confirms social, ecological and health benefits, however, scholars have called for more research to better understand the perceived benefits and obstacles experienced by governments and gardeners. In response, this project identifies relevant government policies and gardener motivations through a case study of a community gardening in Kunshan. Relevant government policies will be collected through relevant government websites and verified with the Kunshan City Urban Planning Department. In addition, we will conduct a survey and interviews with gardeners who participate in the yi mi nong tian project in the Kunshan Forest Park to understand their perceived motivations, benefits, and obstacles. The overarching research question is “What motivates cities and citizens to participate in community gardening projects in China?”</p>
<p>FedCampus: Privacy-preserving Data Ecosystem for Smart DKU with Federated Analytics & Learning</p> <p>Bing Luo bing.luo@dukekunshan.edu.cn</p>	<p>Traditional AI technologies often compromise privacy by centralizing data. FedCampus (can search our video in bilibili), a privacy-preserving data platform for smart DKU developed by Edge Intelligence lab, employs privacy-preserving technologies like federated learning and analytics. It intends to provide insights into DKU community activities without compromising individual privacy. Having recently launched our project 1.0 version, students for this project do not need to learn from scratch, instead, they can quickly grasp what we have developed and build new stuff that makes our APP more robust and diverse.</p> <p>Skills need: 1. Mobile application developer (Flutter), 2. Database/System developer (Django, Python, Linux), 3. Algorithm implementor/researcher (Statistics, Machine Learning, Deep Learning)</p> <p>Outcome: The project will result in students' signature work, system demos, and smart applications. Potential outcomes include patent/paper submissions with students as authors.</p>
<p>Multi-Aerial Robots Collaboration with Reinforcement Learning -Joint project with AWS Self-Driving Platform</p> <p>Bing Luo bing.luo@dukekunshan.edu.cn</p>	<p>Embark on a cutting-edge summer research project in collaboration with AWS Self-Driving Platform, focusing on Cooperative Aerial Robots Inspection (CARI) systems. CARI with Reinforcement Learning will engage students across diverse roles, from ROS development to high-performance computing and Reinforcement Learning, fosters interdisciplinary skills. The practical application of robotics, simulation, and real-world deployment provides hands-on experience, preparing students for emerging fields like collaborative AI and robotics. Through problem-solving in challenging environments, students gain valuable insights into system integration, hardware maintenance, and algorithm deployment.</p> <p>Skills need: 1. Robot operation system (ROS) developer, 2. UAV embedded system developer, 3. Reinforcement Learning research assistant</p> <p>Outcome: The anticipated outcomes, including signature work, system demos, and potential patent and conference submissions with students as authors.</p>

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<p>Photoluminescence and Raman study of NV centers in diamonds</p> <p>Changcheng Zheng changcheng.zheng@dukekunshan.edu.cn</p>	<p>In this summer research project, students will learn how to operate the confocal micro-Raman/photoluminescence (PL) spectroscopy system, integrated with a cryostat with a controllable temperature range down to 4 K. The Raman and PL spectra of a series of NV centers in diamonds will be measured which could provide critical insights on NV center status inside the diamond films. Strain, if exists in samples, will have an important impact on their properties, including potential applications of NV centers in diamonds in quantum devices. The PL measurement will be used to study the transition levels in the sample. During the process, students will also be trained in analyzing spectrum data, building simple models, and performing simulations. Students should have taken PHYS 201. This is an experimental research project, so students should be on campus carrying out the experimental measurements.</p>
<p>Peer Recommendations and Green Financing: An Experiment from a WeChat Mini-program</p> <p>Charles Chang cc672@duke.edu</p>	<p>Climate change crisis requires individuals to take action to reduce their carbon footprint. This project aims to evaluate two incentives or drives in how individuals act. Conventional wisdom credits government policies at both national and subnational level for the reduction of greenhouse gases (GHG) emission. I plan to test two alternative mechanisms related to societal persuasion: peer recommendation and peer competition. To do this, I will conduct a large-scale experiment that uses a novel social media (WeChat) mini-program to both accurately trace individual carbon footprint and target them with recommendations from their acquaintances and rankings among friends. The reduced carbon footprint will be credited through a novel financing program that helps a local NGO plant trees and offset emissions. Students with experiences in WeChat mini-program development and deep learning are particularly encouraged to apply.</p>
<p>The impact of human activities on the benthic community at Lianyungang coastal wetlands in northern Jiangsu</p> <p>Chi yeung Choi chiyeung.choi@dukekunshan.edu.cn</p>	<p>Using benthic community as the indicator of the health of intertidal wetland, we aim to evaluate the impact of tidal wetland destruction on benthic community at Lianyungang by quantifying the species diversity, abundance and biomass of benthic organisms during different destruction stages. The research student will lead the sorting, counting, measuring and identifying of these benthic organisms between June and August 2024. The student will gain valuable first-hand experiences in processing biological samples and handling relevant data. The process of identifying benthic organisms allows the student to learn taxonomical knowledge in zoology – an important discipline that DKU hasn't offered yet as an undergraduate course. The student will also be part of a team with proven success in grant application and publication, further enriching student's research experiences. Applicant should have a strong interest in ecology and have completed relevant course such as BIOL 208 General Ecology.</p>

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<p>The movement pattern and conservation need for migratory waterbirds at Lianyungang coastal wetlands in northern Jiangsu</p> <p>Chi yeung Choi chiyeung.choi@dukekunshan.edu.cn</p>	<p>Quantifying the movement pattern of birds and understanding their habitat-use pattern are critical to their conservation. The effectiveness of conserving waterbirds is compromised if managers fail to take the movement patterns of target species into account by not covering all of the key habitats utilised. In this project, we aim to quantify the local movement patterns of migratory waterbirds in Lianyungang, using satellite tracking data and mark-recapture data. The research students will be responsible for collating data from various sources and conducting spatial analysis. The students will gain valuable first-hand experiences in managing and analysing large spatial datasets, as well as being part of a team with proven success in grant application and publication, further enriching students' research experiences. Applicants should have a strong interest in ecology and have completed relevant courses such as BIOL208, INFOSCI302 or with similar experiences.</p>
<p>The Impact of Sleep Deprivation on Motor Memory: Unraveling the Neural Pathways of Learning and Recall</p> <p>Chia-Chien Chen chiachien.chen@dukekunshan.edu.cn</p>	<p>The Chen NeuroCircuits Lab is seeking two undergraduate students to join our research team during Summer of 2024, with the research focusing on sleep and memory. This projection aims to explore how acquisition and retrieval of motor skills may be affected by the quality of sleep. The recruited students will gain in hands-on experience in the lab, contribute intellectually to the research question, and collaborate with current members of the laboratory. In this project, students will learn to use state-of-the-art microscopes and computing software for behavioral and cellular analyses. To be eligible, applicants should have a strong academic background in neuroscience (e.g., have taken Neuro102), excellent problem-solving skills, and a strong interest in neuroscience or neurobiology. This position is ideal for those intended for graduate school in neuroscience, and/or interested in doing a signature work in the neuroscience field.</p>
<p>Assessing Hyporheic Exchange and Nitrogen Retention in a Tidal River</p> <p>Chuanhui Gu chuanhui.gu@dukekunshan.edu.cn</p>	<p>The tidal river plays a crucial role as a nitrogen source for the coast, and the interaction between the river and its bed can impact the nitrogen load. The primary focus of the project is to investigate how hyporheic exchange governs the transfer and transformation of nitrogen in a tidal river. The study aims to unveil the mechanism of riverine nitrogen transport influenced by tides within intricate natural conditions. This research establishes a theoretical foundation for safeguarding and managing tidal rivers, holding significant implications for scientific pollution control related to coastal red tide and other non-point sources. The project's goal is to quantify the influence of tidal dynamics on hyporheic exchange and nitrogen retention in a coastal river. All STEM majors who have completed BIOL 110 and CHEM 110 are eligible to apply.</p>

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<p>Attribution Methods in Finance</p> <p>Dang Xing Chen dangxing.chen@dukekunshan.edu.cn</p>	<p>Axiomatic attribution approaches have been very successful in recent years. Attributions can be fairly allocated to different features by maintaining several required axioms. Despite the success of existing methods, the current emphasis has been on general machine learning models in general applications. The financial sector, however, contains a wide range of important domain knowledge, many closely related to risk. The application of attribution methods in finance should take into account financial knowledge. This project aims to analyze the theoretical performance of attribution methods in finance and propose refined versions if necessary.</p> <p>Requirements: 1. Majors: Mathematics, computer science, and data science, 2. Prerequisite courses: Math 202, 205, 302 or 304, Math/Econ 317, COMPSCI 201, COMPSCI 309 or STATS 302, 3. Skills: The project emphasizes ML methods, coding, and mathematical analysis. Students with awards in math/CS competitions are preferred.</p>
<p>Cell Migration by the Entropic Force Gradient in Polymer Solution</p> <p>Domna Kotsifaki domna.kotsifaki@dukekunshan.edu.cn</p>	<p>From biotechnology to nanotechnology, noncontact manipulation of nano/micromaterials poses a great challenge. We will create a new method of manipulating cells based on diffusiophoresis driven by polymer concentration gradients. Through laser focusing, we will create a sharp gradient of poly(ethylene glycol) concentration in a polymer solution. Our goal is to determine whether a polymer concentration gradient can exert sufficient force to direct the migration of living motile cells through diffusiophoresis. This project requires students to have completed PHYS121, 122, and/or 201, as well as to have attended at least four research seminars (on Friday) at the DNAS (required certificate). The Laboratory Safety training is also required.</p>
<p>Direct Concentration of Micro-/Nanoparticles Using Opto-Thermal-Induced Flow</p> <p>Domna Kotsifaki dk310@duke.edu</p>	<p>The plasmonic microbubbles, generated due to localized heating, can create microscale fluidic flows and induce particle movements. Exosomes are extracellular vesicles known for carrying abundant dsDNA, mRNA, and miRNA of the cells. Recent evidence suggests that dysregulation of the genetic content with exosomes has a major role in tumour progression and in the surrounding microenvironment. However, the nanoscale size of exosomes renders them to remain in a colloidal suspension, which makes effective capture and concentration challenging. In this project, we will demonstrate and evaluate the capability of plasmonic microbubbles for aggregating and concentrating exosomes. The students should have completed PHYS121, PHYS122, and/or PHYS201 as well as attend Friday's research seminars (DNSA). In addition, Laboratory Safety Training is required.</p>

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<p>Improving fairness in graph anomaly detection</p> <p>Dongmian Zou dongmian.zou@dukekunshan.edu.cn</p>	<p>Fairness in deep learning is crucial for ensuring equitable and ethical deployment of artificial intelligence systems, especially in contexts where biased algorithms can perpetuate existing disparities. For instance, biases in hiring algorithms can perpetuate existing disparities in employment by favoring certain demographics over others, hindering diversity and inclusion efforts. The fair graph anomaly detection (GAD) problem is a challenge at the intersection of graph analytics, anomaly detection, and fairness considerations. While current anomaly detection algorithms excel at identifying outliers, they may inadvertently introduce bias, especially against individuals in sensitive subgroups. In particular, according to their regime, it is likely to treat minority groups as anomalies. This project seeks to develop innovative neural network architectures and training objectives to tackle the fair GAD problem. Students should be strongly interested in machine learning and coding.</p>
<p>Hyperbolic neural networks using the Klein model</p> <p>Dongmian Zou dongmian.zou@dukekunshan.edu.cn</p>	<p>Hyperbolic neural networks (HNNs) have demonstrated remarkable efficacy in capturing hierarchical structures inherent in tree-like data that naturally exist in applications like natural language processing, computer vision and biological systems. However, existing HNNs are typically constructed based on the coordinate systems of either the Poincare ball model or the Lorentz model. The selection of a coordinate system significantly influences numerical stability, yet both models encounter certain challenges. This project aims to develop HNNs using the Klein model, wherein geodesics are represented as straight lines. By leveraging the Klein model, we seek to alleviate instability issues present in traditional HNNs and offer more efficient solutions for tasks such as sampling and generative modeling. Students are expected to have a strong interest in the intersection of geometry and machine learning.</p>
<p>The 'Invisible' Female Riders: Algorithms, Gender, and Labor on Food Delivery Platforms</p> <p>Fan Liang fan.liang@dukekunshan.edu.cn</p>	<p>Food delivery platforms like Meituan and Uber Eats have become a key component of the gig economy. Previous studies have explored the tension between workers and platform algorithms, highlighting the precarity and instability of this new kind of digital labor. However, there is little attention paid to understanding the relationship between gender and platforms in the male-dominated working environment. This project adopts quantitative methods combining observations and in-depth interviews to examine how gender intersects with algorithmic control and the features within the gig economy. In the summer, students will work with the faculty to conduct a literature review and 20 in-depth interviews to explore the topic. Students should have experience in qualitative studies and knowledge about new media.</p>

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<p>China's EdTech before and after 2021</p> <p>Fangsheng Zhu fangsheng.zhu@dukekunshan.edu.cn</p>	<p>Summer research scholars will work with the principal investigator to write a paper on how China's 2021 Double Reduction (Shuangjian) policies changed the EdTech industry. Students will systematically collect, organize, and analyze industry and policy documents, while writing extensive notes in the process. If needed, students will also help design and conduct interviews to supplement material-based analysis.</p> <p>Required qualifications: 1. Proficient in Chinese reading, 2. Previous experience in qualitative research Preferred qualifications: 1. Previous experience in education research, 2. Synergy with Signature Work</p>
<p>Synthesis and characterization of plant-derived nanoparticles of zirconium, zinc, copper and silver.</p> <p>Floyd Beckford floyd.beckford@dukekunshan.edu.cn</p>	<p>The entry of nanotechnology into the realm of medicine has been considered as a game-changer from various viewpoints. For example, the possibility of nanoparticles (NPs) as drug carriers have sparked intense research efforts. Plants have a large variety of secondary metabolites. They have a high content of antioxidant compounds, including vitamins, carotenoids, minerals and phenolic compounds, which have been correlated with beneficial health effects. Phenolic compounds are the largest group and includes flavonoids and phenolic acids. With environmental concerns central to modern synthesis, attempts have been made to develop new methods for the synthesis of NPs. In particular NPs fabrication using plant extracts represents an eco-friendly way, utilizing naturally occurring biomaterials. Consequently, the "green" method of using plant extracts in these syntheses is very attractive. This project seeks to investigate the green synthesis and characterization of zirconium, copper and silver.</p>
<p>Contaminants of Emerging Concerns: Pharmaceutical and personal care products in environmental water bodies near DKU campus.</p> <p>Floyd Beckford floyd.beckford@dukekunshan.edu.cn</p>	<p>Pharmaceutical and personal care products (PPCPs) generally pertain to medications and therapeutic drugs that are used to treat or prevent diseases in animals or humans as well as consumer goods such as cosmetics and personal hygiene products. Given their ubiquitous presence in the environment and the lack of scientific information regarding their effects, it is important to detect, identify and measure PPCPs in various environmental spheres. This research proposal is aimed at developing a brand-new line of research inquiry. It seeks to explore an area of emerging environmental concern using broad chemistry (analytical) and toxicological tools. Given the newness of the project, the scope of the research is deliberately broad allowing room for the exploration a number of potential directions. The student will be engaged with the project from design to execution. It is particularly well suited to students who have in interest in chemistry of the environment.</p> <p>Prereq: CHEM 210.</p>

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<p>Chemistry and biology of binuclear Ru-Fe organometallic complexes that contain thiosemicarbazone ligands from chalcones.</p> <p>Floyd Beckford floyd.beckford@dukekunshan.edu.cn</p>	<p>Cancer is among the leading causes of death worldwide. So, the design of new antitumor agents and the search for delivery vehicles for new and existing drugs is of paramount importance. The most attractive features of metallodrugs lie in their biological and chemical diversity, which is typically distinct from organic molecules. Ruthenium compounds are well suited to medicinal applications as they can access a range of oxidation states under various physiological conditions. The main topic of the project is to make ruthenium complexes through a multi-step synthesis strategy. However, the scope of this project is not limited to chemical synthesis as it is only one part of a bigger long-term project, which involves investigating their anti-cancer and other biologically relevant properties. It is well suited for students who have an interest in medicinal chemistry from the perspectives of chemistry and biology/molecular science.</p> <p>Prereq: CHEM 201</p>
<p>Synthesis of fluorinated Re(I)-based organometallic releasing complexes for imaging and anticancer applications</p> <p>Floyd Beckford floyd.beckford@dukekunshan.edu.cn</p>	<p>It is now accepted that cancer is a multifactorial disease and that it is not yet fully understood. It makes sense therefore that a multi-faceted approach to better understand the disease is warranted. As a scaffold group 7 metal complexes show high stability, wide structural and diversity, and rich spectroscopic properties, and likewise show good promise for use as alternative chemotherapy agents. This project deals with the synthesis of trinuclear tricarbonyl complexes built around a rhenium or manganese core, towards new anticancer agents. The compounds is also hypothesized to be good cellular imaging agents. The central motif of the compounds will be constructed using a novel set of thiosemicarbazone ligands as the chelating agents. It is well suited for students who have an interest in medicinal chemistry from the perspectives of chemistry and biology/molecular science.</p> <p>Prereqs: CHEM 201</p>
<p>Assessing the Toxicity of Environmental Chemicals in <i>C. elegans</i> and Validating Reporter Genes for DNA Damage Responses</p> <p>Hyun-Min Kim hm.kim@duke.edu</p>	<p>Students will be working in the lab (wet lab) and the project is designed for actual bench work. BIOL 110 (biology lab) is expected for students. You are expected to know basic lab work including pipetting, making simple media, although many of methods will be trained by either research fellows or Prof. Kim.</p>

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<p>Assessing the environmental impacts of water resource recovery facilities</p> <p>Ka Leung Lam kaleung.lam@dukekunshan.edu.cn</p>	<p>“Closing cycles” and reuse of resources from municipal wastewater are increasingly being emphasized globally. These recoverable resources can be water, energy, biopolymers, and nutrients. This represents a paradigm shift to turn conventional wastewater treatment facilities into water resource recovery facilities. Recovery is the process of extracting and/or concentrating useful resources from waste streams. Many technologies exist or are under development for recovering resources from municipal wastewater. This project aims to compare the environmental impacts of different recovery technologies. It involves coupling mathematical modelling of water resource recovery facilities with life cycle assessment (LCA). LCA can systematically quantify the environmental impacts over the whole life cycle of products, processes, or policy scenarios. Eligibility requirement: i) ENVIR203 or ENVIR308, or ii) proficient in Python, or iii) proficient in mathematical modelling and optimization.</p>
<p>Developing ‘smart’ sensors for sustainable DKU</p> <p>Kai Huang kai.huang186@duke.edu</p>	<p>The primary goal for the SRS project is to establish a prototype of AQI monitoring system. More specific objectives are: (1) Learn existing sensing mechanisms; (2) Design housing for the sensing board; (3) Design database and interface for data transmission, storage, analysis, visualization; (4) Compare self-build sensor with existing sensor data; (5) Contribute to the technical part of DKU’s sustainability report, based on the project outcome. Note that the achievement of the project shall close the loop for optimizing indoor air quality control.</p>
<p>Elucidating the mechanism of the DNA supercoiling activity of the human chromatin associated DEK oncogene</p> <p>Kappes Ferdinand Ferdinand.Kappes@dukekunshan.edu.cn</p>	<p>Our laboratory has discovered that the human DEK oncogene, an abundant chromatin-associated factor, introduces positive supercoils into DNA strands. This is achieved by a unique DNA-folding domain in DEK, termed pseudo-SAP/SAP-box. However, the precise mechanism of this activity, which requires no ATP hydrolysis, remains unknown. To elucidate molecular details, we have systematically created a series of amino acid point substitutions within this domain. Resulting mutants will be tested in DNA binding and DNA topology assays for their respective activities. The outcome will shed light on the precise molecular mechanism of this activity, will advance our general understanding of human DNA supercoiling factors and will pave the way for creating molecular tools for downstream analyses in cells. During this project a wide range of molecular biology techniques will be applied, which will allow the student to obtain a highly versatile and transferable molecular biology laboratory skill set.</p>

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<p>Establishment of a combined inducible Knockout – Overexpression system in human cells for functional assessment of the DEK oncogene</p> <p>Kappes Ferdinand Ferdinand.Kappes@dukekunshan.edu.cn</p>	<p>The human DEK oncogene is a unique chromatin-associated protein with a myriad of molecular functions in human cells. Even though it has been shown to be a bona fide oncogene, the precise molecular functions in DEK driving tumorigenesis remain largely obscure. The overarching goal of our laboratory is to create a comprehensive blueprint of DEK functions and regulations. As part of a larger research endeavor, we are currently in the process of establishing a universal cellular testing platform consisting of an inducible Crispr-Cas9 mediated knock-out and inducible overexpression system. Using this platform, we will assess the hierarchical importance of specific domains in DEK for cell survival. You will be working on one or multiple aspects within this cellular platform. A wide range of mammalian cell culture and molecular biology techniques will be applied, which will allow the student to obtain a highly versatile and transferable molecular biology laboratory skill set.</p>
<p>Multilingual Exploration of A Transnational History of Nepal-Tibet War (1855–1856)</p> <p>Lei Lin lei.lin@dukekunshan.edu.cn</p>	<p>Embark on a captivating journey to unveil the hidden history of the Nepal-Tibet War (1855–1856) through a multilingual exploration project. Dive into this transnational event, exposing global dynamics involving influential players like the British and Qing Empires. Led by Professor Lei Lin, the research employs a multidisciplinary approach to scrutinize this overlooked historical gem of early modern international relations. Students will serve as full-time research assistants during the summer, gaining hands-on experience with archival materials and refining translation and textual analysis skills. Proficiency in reading at least one of the following languages is essential: classical Chinese, Manchu, Nepali, or Tibetan. Weekly meetings will nurture collaboration, peer learning, and community building. Join this groundbreaking initiative to illuminate the trans-Himalayan frontier’s history and contribute to a pioneering scholarly frontier.</p>
<p>Title: Dissemination of Chinese Language and Culture in Belt and Road Countries in the Post-Pandemic Era</p> <p>Lianyun Pang lianyun.pang@dukekunshan.edu.cn</p>	<p>The purpose of this research project is to provide a comprehensive understanding of the dissemination of Chinese language and culture in the Belt and Road Initiative (BRI) participating countries. The study analyzes the intellectual value and contribution to global cultural exchange and educational practices. It will explore the impact of Chinese language and culture dissemination on the participating countries, contributing to the existing knowledge on cultural diplomacy and global connectivity. Each student will play an active role in the research process, including literature review, data collection, and analysis. Students will also be responsible for conducting interviews, contributing to case study analysis, and participating in field research. Their involvement as active collaborators will be integral to the success and depth of the research. Applicants should have a major or academic background related to the Chinese language, international relations, or East Asian studies.</p>

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<p>Long-term effect of a primary-care based mobile-health enabled intervention on stroke management in rural China</p> <p>Lijing Yan lijing.yan@duke.edu</p>	<p>A research team led by Professor Lijing L. Yan developed and evaluated the System-Integrated Technology-Enabled Model of Care (SINEMA) to manage stroke in rural China. From 2016 to 2019, the team implemented this technology-driven model in Nanhe County, Hebei Province, which used a phone app for village doctors and voice messages to improve stroke secondary prevention. The team plans to conduct the second follow-up of the SINEMA trial to investigate the long-term effect of the SINEMA intervention on stroke patients. We plan to recruit two students to conduct summer research including literature review, data analyses, manuscript and report writing, and (optional) fieldwork. If you are interested in stroke and electronic health technology research, you won't want to miss this opportunity to join us. You are expected to have experience in quantitative and qualitative data analyses or be a fast learner. We offer opportunities for publications and signature work.</p>
<p>Exploring the Management of Comorbid Non-Communicable Diseases in China's Aging Population</p> <p>Lijing Yan lijing.yan@duke.edu</p>	<p>This project aims to address the challenges of managing comorbid non-communicable diseases (NCDs) among China's aging population. It involves a combination of systematic reviews and qualitative interviews to identify effective management strategies for these complex health conditions. The project will engage various stakeholders, conduct fieldwork, and gather data for comprehensive analysis. This initiative is crucial in developing sustainable healthcare solutions for elderly individuals with comorbid NCDs, with the goal of producing 1-3 manuscripts. It offers students practical research experience in literature review, interviews, data analysis, and manuscript writing, contributing significantly to their educational development in health science research. If you are interested in research on non-communicable diseases and comorbidities, you don't want to miss this opportunity to join us.</p>
<p>Investigation on cancer-dependent genes by RNAi screen</p> <p>Linfeng Huang linfeng.huang@dukekunshan.edu.cn</p>	<p>Cancer is an important disease and can have a profound impact on both the patient and the society. RNA technology uses small interfering RNA (siRNA) to inhibit gene expression in a precision manner. This project aims to use a customized siRNA screen method (pro-siRNA screen) to identify cancer-dependent genes. We will use high-throughput RNAi screen to find the genes, when silenced by siRNAs, can reduce the proliferations or fitness of cancer cells. The cell death phenotypes, induced by siRNAs, will be assayed by a high-content screen platform. Upon validation of cancer-dependence, we will further investigate the mechanistic functions. Students in Molecular Bioscience major are preferred.</p>

2024 Summer Research Scholars Projects

Project Title, PI, and email	Project Summary
<p>Long-term Care in China</p> <p>Meifang Chen meifang.chen@dukekunshan.edu.cn</p>	<p>The DKU Community Health Service Lab hire students to work on an interdisciplinary SRS project, entitled “Long-term Care in China” led by Professor Meifang Chen. China has one of the fastest growing aging populations in the world, which implies a heavy care load for families and society. In this project, the students will be responsible for 1) conducting a series of research on topics like the development of long-term care policy and workforce, and the integration of long-term care into current health system, and 2) building an interactive long-term care website as a resource portal for policy makers, researchers and publics. Both undergrad and grad students who are interested in ageing-related issues, self-motivated, hardworking, fast learner, proficient and experienced in literature review, policy analysis, and website development, with strong writing and communication skills, able to work with multidisciplinary team with good manners and remotely are eligible to apply.</p>
<p>The impact of pandemic on the quality of future physicians</p> <p>Ming Gu ming.gu@dukekunshan.edu.cn</p>	<p>Physician quality matters. In China, a necessary condition of becoming a physician is enrolling in a clinical medicine undergraduate program. High school graduates apply for specific college programs with test results from the National College Entrance Examination, known as Gaokao. As the annual admission quota of each program has little variation, we monitored the dynamic quality of medical students by observing changes in the lowest Gaokao test rank among the admitted students for each program. The COVID-19 pandemic has posed serious occupational risk, which may cause qualified students to turn away from a career in medicine. This study assesses the dynamic quality of supply physicians and how it was affected by the pandemic. Interested students should have taken some basic quantitative courses utilizing empirical data. Students who have data scraping skills are highly encouraged to apply.</p>
<p>Intelligent Speech Processing</p> <p>Ming Li ming.li369@dukekunshan.edu.cn</p>	<p>We will recruit two UG students to work on two different tasks, namely speech synthesis with cross modality reference and audio-visual target speech separation. We will use the Pytorch platform to study advanced deep learning algorithms, propose new ideas and outperform the state-of-the-art systems on large-scale open scale benchmarking datasets. Summer research scholars will join the research team of our lab and work with graduate students together. By the end of this summer, they should be able to complete an initial version of a conference paper draft. Hopefully, each student can submit a conference paper in the coming fall semester. And since they will continue the research work in their senior year as signature works, I think there might be more papers coming out from them in the senior year. Students of class 2025 who have completed COMPSCI 304 (or equivalent self-learning experience in speech processing) and COMPSCI 302 (or equivalent machine learning courses).</p>

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Project Title, PI, and email	Project Summary
<p>Advanced Computing for Precision Health and Medicine Research</p> <p>Ming-Chun Huang mingchun.huang@dukekunshan.edu.cn</p>	<p>Precision health and medicine is a rapidly growing technology that refers to the use of technology to exchange information and improve healthcare services and medical outcomes. It will provide great benefits to patients, such as greater access to healthcare and medical services and reduced healthcare costs. In the SRS study, we will take the first steps towards developing a real-world precision health and medicine research tool by leveraging the digital twin concept. This research project will lay the foundation to explore a real-world precision health and medicine solution using digital twin technology that can monitor human health conditions through daily life activities (e.g., brainwaves, human activity, and voice sensing). The ideal candidate should have the ability to think creatively about research and commercialization. Candidates must demonstrate a strong ability to conduct outstanding independent research and show promise for excellent project engagement and management.</p>
<p>Dissipation induced frustration in open quantum systems</p> <p>Myung-Joong Hwang myungjoong.hwang@dukekunshan.edu.cn</p>	<p>In physics, a system is said to be frustrated when its components are subjected to incompatible constraints that cannot be simultaneously satisfied. In this project, we aim to devise experimentally realizable schemes to make quantum systems frustrated and to discover novel quantum phenomena induced by frustration. In particular, we will find innovative ways where the noises and losses that are present in experimental systems can be used as resources to create frustration. We will theoretically investigate the nature of dissipation-induced frustrated quantum phases and examine the feasibility of observing such phases in cutting-edge quantum technological platforms.</p> <p>Doing a cutting-edge research in theoretical quantum physics is a challenging task. Professor Hwang, together with experienced members of quantum science group at DKU, will help you to jump start your research career in quantum physics, even when you don't have any prior experience or knowledge on quantum physics.</p>
<p>Viscoelastic Properties of Silk Music Strings</p> <p>Paul Stanley paul.stanley@duke.edu</p>	<p>This project involves making direct measurements of the viscoelastic properties of the silk strings that might be used in a musical instrument. The information can be used to characterize the tonal properties of a plucked string. The summer research will involve the construction of apparatus to drive a vibrating string at various frequencies. The relative phase between the driving frequency and the tension will be identified with the use of a lock-in amplifier. A participating student should have completed Phys 122, be willing to learn and work with electronic measuring equipment, and be willing to design and construct tabletop apparatus.</p>

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Project Title, PI, and email	Project Summary
<p>Pre-trained large language models for question answering</p> <p>Paul Weng paul.weng@dukekunshan.edu.cn</p>	<p>Large language models (LLMs), pre-trained on large corpus of text, have proven to be powerful tools for designing natural language processing applications. The goal of this project is to evaluate various methods to efficiently adapt LLMs for question answering about a given text. One particular focus of this project will be to explore how reinforcement learning methods can help in this task.</p> <p>Eligibility requirements: computer science or data science major, strong capability and motivation to learn and self-study the necessary background knowledge in machine learning.</p>
<p>Origins of Collective Bargaining and Industrial Labor Strikes in Urban China</p> <p>Peiyuan Li peiyuan.li@dukekunshan.edu.cn</p>	<p>Prof. Peiyuan Li (Assistant professor of Political Economy, Duke Kunshan University) is currently seeking two Research Assistants for a project on labor strikes in 20-century China. These projects involve the collection and analysis of data from historical and contemporary documents. Two students will be assigned the task of utilizing state-of-the-art OCR technology to convert data from PDFs into a digital format initially. Leveraging the newly created digital data, these students will assist in generating tables and figures for the academic paper. The investigator will provide guidance to the students in employing advanced empirical technology for the analysis of the data. Students are encouraged to utilize the data they have generated to draft their signature works.</p> <p>RESPONSIBILITIES: Assist in manually inputting data from historical documents, Conduct data analysis, Regularly meet with the project director to discuss progress.</p>
<p>Innovations in Democratic Governance</p> <p>Quinlan Bowman bq12@duke.edu</p>	<p>Innovations in Democratic Governance (with Mark Bevir, University of California, Berkeley) envisions a participatory polity, where citizen participation and deliberation are at the heart of policymaking. Drawing on case studies from around the world, the book manuscript explores how public participation can operate at multiple geographic scales – from the local to the global – and illustrates how participation at different levels might be linked up. The case studies also illustrate ways in which citizens can craft their own rules for participation, monitor those rules and the policies they help generate, and cooperatively implement their own local policies. Summer Research Scholars will revise and update case studies for the manuscript, perform fact-checking, help to interview experts, and assist in developing the book's theoretical framework. Students in Political Economy, Institutions and Governance, Environmental Science, and Ethics and Leadership are especially encouraged to apply.</p>

2024 Summer Research Scholars Projects

Project Title, PI, and email	Project Summary
<p>Is social mix a golden remedy for all urban communities? A systematic literature review of social mix in East Asian metropolitan cities</p> <p>Seongkyung Cho seongkyung.cho@dukekunshan.edu.cn</p>	<p>Join the research project exploring the impact of 'social mix' in East Asian cities! I am looking for three dedicated students, each representing an East Asian country/city (e.g., China, South Korea, Japan, Taiwan, Hong Kong, Singapore, etc.). Eligible candidates should possess a deep understanding of their chosen country/city, fluency in English writing, and proficiency in the local language. This exciting opportunity is ideal for students in public policy or social sciences, those interested in housing/urban policy. Dive into the realm of urban development and contribute to a systematic literature review. While prior experience in conducting a systematic literature review is preferred, it's not a must, as I welcome students who are willing to learn. Be part of a diverse team shaping the future of urban communities! The project aims to be published in an academic journal. If requested, participants will have the opportunity to utilize this experience for their signature work projects.</p>
<p>Have a grasp of the pain: transform invisible pain feelings into tangible hand grasp</p> <p>Shan Wang shan.wang579@dukekunshan.edu.cn</p>	<p>Pain is a subjective, personal experience that is invisible to others. We need to express our internal pain experiences to seek help and care. In addition to verbally communicating pain, nonverbal signals, such as hand grasp, may provide valuable insight into the somatosensory processes of pain. In this project, we will analyse grip force and finger movements of human hand grasping during pain and examine the association between hand kinematics and pain perception. Two student researchers are needed for data analysis and visualisation. The students need to have (1) a good understanding of quantitative research methods, (2) strong skills in data processing and analysis and (3) successful experiences in using MATLAB, R or Python for data analysis and visualisation.</p>
<p>Operant Light Seeking in Mice—a Model for Behavioural Addiction</p> <p>Shu Kit Eric Tam shukiteric.tam@dukekunshan.edu.cn</p>	<p>Operant Sensation Seeking (OSS)—in which an animal persistently performs an instrumental response to obtain a brief sensory stimulation—may provide a relevant model for studying new forms of non-substance-based addiction in our modern societies, such as excessive use of smartphones and gaming addiction. Among the different sensory modalities, light is particularly relevant to these disorders, as light signals are projected to certain retinorecipient brain regions involved in reward processing that regulate hedonic behaviour. In this SRS project, students will conduct a preliminary investigation to examine the rewarding properties of light in a free-operant conditioning task in mice, validating an animal model that is relevant to the study of behavioural addiction to sensory stimulation in humans. This project is suitable for those who want to gain hands-on experience in animal neurosciences as well as for those who want to choose a major in Behavioural Sciences - Neuroscience track.</p>

2024 Summer Research Scholars Projects

Project Title, PI, and email	Project Summary
<p>Mystery of Cu Nanocrystal Synthesis</p> <p>Tan Zhang tan.zhang@dukekunshan.edu.cn</p>	<p>Copper (Cu) nanocrystals are of great interest and importance to many industrial applications owing to their superior physical and chemical properties. Cu nanocrystals exhibit strong localized surface plasmon resonance which is widely used for optoelectronics, sensors, and quantum computers. Despite the wide application of Cu nanocrystals, the synthesis mechanism remains debated. The classic theories failed to explain how Cu ions are reduced in a hydrothermal environment. In this study, we will explore the mystery of this redox reaction, and produce high-quality Cu nanocrystals for advanced technologies. The candidate should be majored in material science with either chemistry or physics track.</p>
<p>Converting Biomass Wastes to Value-Added Products</p> <p>Tan Zhang tan.zhang@dukekunshan.edu.cn</p>	<p>Biomass wastes consist of the byproducts of biorefining/food production, and the wastes from the agriculture/forestry industries. Nowadays, most of the biomass wastes are landfilled or incinerated. In this project, biomass will be treated through chemical modification, and their catalytic effect in various reactions will be evaluated. The obtained biomass-containing materials will be fabricated to obtain value-added products. How much value do you want to add into the products? Come, try, and answer the question by yourself!</p>
<p>Bio-inspired Solar Evaporation with Responsive Stomata</p> <p>Weiwei Shi weiwei.shi@dukekunshan.edu.cn</p>	<p>Solar evaporation is an attractive technology that combines the two most abundant resources on Earth: solar energy and water. It has enabled an array of emerging applications, including contaminated water purification, sea water desalination, electric generation, steam sterilization, and fuel production. The work will focus on the design and fabrication of the bio-inspired responsive materials to achieve the solar evaporation, in response to external stimuli, e.g., light, temperature, humidity. Obviously, this project would be tremendously attractive from both an economic and an environmental standpoint, to investigate the conversions of the solar energy into the sustainable applications, e.g., water-harvesting, solar desalinations, or passive pump. Students should have the fundamental knowledge of chemistry, materials, and physics. Prerequisite courses are PHYS 121 Integrated Science – Physics, CHEM 110 Integrated Science – Chemistry, or MATSCI 201 Fundamentals of Materials Science.</p>
<p>Translating Destiny of Rebirth: Women and Writing in Late Imperial China (II)</p> <p>Wenting Ji wenting.ji@dukekunshan.edu.cn</p>	<p>This project aims to translate the rhymed novel "Destiny of Rebirth" from Chinese to English. Authored by Chen Duansheng in 18th-century China, this novel holds cultural and research significance comparable to contemporaries like "Dream of the Red Chamber." Despite its value, it remains untranslated in English. Besides translating, we will compose "cultural notes" explaining historical and cultural aspects within the text, while also formulating research questions for future studies. The final product, comprising translations and cultural notes, will be published on our website under Duke site. Two types of positions are available: (1) Translators, preferably native Chinese speakers proficient in classical Chinese with adequate English writing skills; (2) Editors, preferably native English speakers interested in Chinese literature, having completed Chinese 202 or equivalent proficiency. Applicants with experience in managing blogs, websites, or SNS accounts are encouraged to apply.</p>

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Project Title, PI, and email	Project Summary
<p>Spatial decision-making of transport infrastructure investment</p> <p>Wumeng He wumeng.he@dukekunshan.edu.cn</p>	<p>Looking for 2 students to collaborate on a research project studying spatial patterns of transport infrastructure investments (e.g., highways, railroads) in China. Explore economic, social, and environmental reasons behind these investments. Gain practical experience working with spatial data and conduct analysis. Candidates with backgrounds or strong interests in economics, political economy, geography, and/or public policy are preferred. Candidates with experience in GIS and statistical analysis are preferred. The collaboration is remote-friendly, allowing flexibility—students are not required to be on campus for the entire summer.</p>
<p>Design and fabrication of low-bandgap thermophotovoltaic cells</p> <p>Xiawa Wang xiawa.wang@dukekunshan.edu.cn</p>	<p>This project explores high performance heterojunction germanium cells for photovoltaic applications. Thermophotovoltaic (TPV) cell is defined as one kind of photovoltaic diode cell to convert various thermal sources (solar energy, industrial waste heat etc.) into electricity directly. This project put forward a novel fabrication of TPV cell, guarantees unique design in methodologies, lower fabrication cost (less than tenth of GaSb cell), comparable conversion efficiency, feasibility in large scale manufacture, which would greatly broaden the application areas and the commercial market of TPV cells. A student should have basic material science background and is interested in hands-on experiences with solar cells.</p>
<p>Investigation of bulk photovoltaic effects using ZrSiS</p> <p>Xiawa Wang xiawa.wang@dukekunshan.edu.cn</p>	<p>This project investigates the anomalous bulk photovoltaic effect of nodal line semimetal ZrSiS. The bulk photovoltaic effects uses a completely different energy generation principle from semiconductors to convert light into electricity. The efficiency has the potential to break the S-Q theoretical limit present in conventional solar cells. Traditional materials that show this effect are usually ferroelectric materials, which have domain walls and poor electrical conductivity. In this project, we will explore the effect of nodal line Weyl semimetal ZrSiS, which have been reported as narrow bandgap quantum materials with very high electrical conductivity and are expected show bulk photovoltaic effect. In this summer research projects, we will have one student to measure the current generated by solar and blackbody illumination. The student working on this project is expected to have related experience and a basic understanding of the current generation mechanism for this effect.</p>
<p>Developing safe and novel electrolyte materials for lithium-metal batteries</p> <p>Xinrong Lin xinrong.lin@dukekunshan.edu.cn</p>	<p>Energy is of paramount importance for humans as it is intricately linked to all aspects of modern life. The development of advanced batteries plays a crucial role in the storage and conversion of renewable energy technology. In this project, we will develop lithium metal batteries using novel and safe electrolyte materials that address the long-standing safety issue in lithium battery technologies and access next generation and high-performance energy storage devices. Students who carry out this project should have taken Chem 110. Knowledge in Chem 201 and 150 would be a plus. Ideally majored in materials science – chemistry track.</p>

2024 Summer Research Scholars Projects

Project Title, PI, and email	Project Summary
<p>Deep generative models for marine ecosystem dynamics</p> <p>Zuchuan Li zuchuan.li@dukekunshan.edu.cn</p>	<p>Marine ecosystems provide ecosystem services that are essential to sustainability. However, our understanding of the marine ecosystem dynamics is limited by scarce data in part due to our inability to leverage heterogeneous big data. The overarching goal of this proposed study is to learn marine ecosystem dynamics through deep generative models trained using domain knowledge, and big data acquired by satellites and BGC-Argo floats. We expect that deep generative models will improve our understanding of the marine ecosystems by the marriage of big data with domain knowledge. The outcomes will be made publicly available through PI's website to support other applications, published in peer-reviewed journals, and presented in PI's courses (i.e., Introduction to Data Science, Bayesian and Modern Statistics, and Environmental Data Analytics). The project will teach student participants to solve real-world problems by leveraging machine learning and heterogeneous big data.</p>
<p>Why Dehumanization Predicts Harm: A Developmental Approach</p> <p>Wen Zhou wen.zhou@duke.edu</p>	<p>Dehumanization is the psychological process that denies others' full humanity. Its prevalence and power to predict harmful acts across ages have been exposed by recent research. But why dehumanization enables harm still needs a compelling explanation. One proposal conceives that those who dehumanize deny victims' mental capacities of suffering, and the consequential indifference towards victims' suffering justifies violence and cruelty. However, in both adults and children, outcomes of dehumanization involve actions that cause pain and require acknowledging suffering. This project will address the paradox by testing an alternative: Besides overlooking mind, dehumanization also captures social undesirability which particularly contributes to atrocities like inflicting pain. We will take a developmental approach to investigate this mechanism in children using behavioral experiments, aiming to prevent entrenchment of harmful acts from early life. Pre-requisites: PSYCH203, PSYCH204.</p>
<p>Eco-friendly and earth abundant nanostructured materials for renewable energy applications</p> <p>Kwang Leong Choy kwang.choy@dukekunshan.edu.cn</p>	<p>This project involves the development of eco-friendly and earth abundant nanostructured materials for energy conversion and energy storage applications. Such nanostructured materials could help to provide sustainable materials for energy storage and facilitate the processing and assembly of low dimensional materials into energy devices. Various nanostructured materials will be synthesized using non-vacuum chemical approach, and characterized using a combination of XRD, SEM, FTIR, UV-Vis, Raman and electrochemical methods. The electrochemical properties of the nanostructured materials will be assessed. The process/structure/property of the nanostructured materials will be established and their applications for energy storage and renewable energy applications will be explored.</p>

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Project Title, PI, and email	Project Summary
<p>AI Economist: Advancing Economics with Cutting-Edge Artificial Intelligence, Blockchain, and Computational Innovations</p> <p>Luyao Zhang luyao.zhang@dukekunshan.edu.cn</p>	<p>In an era where humans navigate increasingly intricate systems, traditional economics face profound challenges, resulting in impossibility theorems. Our interdisciplinary employs artificial intelligence (AI), blockchain, and computational advancements to make the impossible possible. Our methodology is threefold: we first apply machine learning and causal inference to critically examine economic mechanisms informed by natural experiments during policy shifts and the wealth of data available on blockchain platforms. Next, we integrate algorithmic game theory with reinforcement learning to identify optimal designs within complex systems that defy traditional economic methods. Finally, we probe behavioral economics through human-computer interaction and advanced behavioral studies, utilizing tools such as large language models, privacy-preserving computation, and distributed data systems. This research aspires to craft a digital economy of efficiency, equity, and sustainable development.</p>
<p>Examining the neural underpinnings of meta-motion using diffuser tensor imaging (white matter) data</p> <p>Sze chai Kwok sk695@duke.edu</p>	<p>Metaemotion is defined as the process of evaluating one's emotional state, evaluating one's recognition of emotional states, or responding emotionally to one's own emotions. Here we aim to investigate the neural underpinnings of metaemotion using diffusional tensor imaging data to examine the relationship between white matter tracts in the brain and metaemotion. Through studying the inter-regional communication with reference to these tracts, we will also investigate whether different emotions rely on different tracts, giving us a deeper look at how meta-emotion is variably processed and computed in the brain. We welcome sophomores and juniors majoring in neuroscience to join us. Preference will be given to those with solid quantitative and programming skills.</p>
<p>Functional relationship between pupil dilation and neural activities of posterior parietal cortex in declarative memory in Rhesus monkeys</p> <p>Sze chai Kwok sk695@duke.edu</p>	<p>Declarative memory, associated with the conscious recollection of facts and personal experiences, involves the posterior parietal cortex (PPC). Our research aims to uncover the correlation between pupil behavior and neural data in the context of declarative memory. We have conducted a 3AFC task experiment, measuring both pupil size and neuronal activities in the PPC. Through aligning behavioral and neural data, our objective is to discern any correlation between pupil dilation and neural activities during the task. We welcome sophomore and junior majoring in neuroscience to join us, especially those interested in memory topics. Preference will be given to students with previous research experience and programming skills.</p>

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Project Title, PI, and email	Project Summary
<p>Full genome sequencing and alignment of influenza virus in Suzhou and database sequence comparison</p> <p>Yiu wing Kam yiuwing.kam@dukekunshan.edu.cn</p>	<p>Infectious diseases represent one of the major public health concerns globally. Influenza is very familiar to humans, and many of us are likely to get it at least once during the year. Throughout history, humans have experienced several influenza pandemics in history. Due to the rapid mutation of the influenza virus genome, vaccination against the influenza virus needs to be given annually. Therefore, it is particularly important to perform full genome sequencing for local influenza viruses, and this will help to analyze the mutation patterns of influenza viruses and provide important information to local public health departments to make targeted policies and actions to better respond to the epidemic. The objectives of this project include three parts: collect influenza virus samples from local areas in Kunshan, Suzhou, China; develop a PCR assay protocol and perform full genome sequencing of the collected virus; sequence alignment and comparison with the known virus sequence.</p>
<p>Epidemiological comparison of COVID-19 vaccination strategy and vaccine efficacy</p> <p>Yiu wing Kam yiuwing.kam@dukekunshan.edu.cn</p>	<p>This research study investigates the relationship between the epidemiological pattern of COVID-19 and the efficacy of the vaccines among the different manufacturers. We will examine the design, technology, clinical trial results, and real-world effectiveness of vaccines from manufacturers like Pfizer-BioNTech, Moderna, AstraZeneca, and others at a population level. The study will also explore how efficacy varies among different populations, and age groups, and against emerging variants. This narrowed focus allows for a detailed, in-depth analysis within the broader context of vaccine development and epidemiology. This independent study deviates from regular coursework to foster a deep, interdisciplinary understanding of vaccine developments, policy design, and the complex dynamics that underpin epidemiology study, imparting essential analytical and research skills for advanced studies and future careers in the public health sector.</p>