- 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.
- **Only DKU students are eligible for these projects.**
- 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 2026-2027 academic year, and on-campus housing for students who are on campus.
- Directly contact the faculty member to discuss the research expectations; it is the supervising faculty member who nominates students for the position.
- **Projects shaded in green or blue still have open positions; those shaded in red are already filled.**
- Your initial contact with the faculty will be important in determining whether or not you will be considered for an open 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.
- If nominated by a SRS mentor, you will 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.
    - 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.
    - 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).
- After receiving the nominations, Academic Services will verify eligibility. Ineligible students include: students graduating in May, students who are on leave of absence, or will be on leave of absence in the fall, students who are taking summer course work at DKU or elsewhere, students who are doing work or an internship, students who did not complete the requirements of previous funding, students who have summer funding from other sources, students who are not in good academic standing, students who will have completed eight or more semesters, or students with any other impediment to actively completing the SRS program.
- Academic Services will send out the confirmation letter, which will also contain program-wide expectations of participating students.
- Some projects have more than one student position available, and faculty with more than one project have some flexibility in how they allocate positions. Faculty are initially limited to supervising three or fewer positions, even if they have more than three projects approved.
- Pay attention to future listings, as there could be additional opportunities added if funding becomes available.

Title: Synthesis, characterization and applications of plant-derived nanoparticles of main-group metals
Faculty Mentor: Floyd Beckford
Status: Open

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 magnesium and manganese NPs.

Title: Citizens, Not Subjects: Promoting Democratic Goods through Creative Action
Faculty Mentor: Quinlan Bowman
Status: Open

Surveys indicate that, in many democracies, most citizens regard policy processes as elite affairs, providing few opportunities for meaningful input or control. Equally, research indicates that many desire greater opportunities for participation. This book project, Citizens, Not Subjects: Promoting Democratic Goods through Creative Action, aims to expand our democratic imaginaries. Exploring case studies from around the world, it aspires to help citizens, practitioners, and scholars to envision political systems that put lay (non-expert) participation at the heart of policymaking. It explores how participation can operate at multiple geographic scales and illustrates how participation at different levels might be linked up. The cases demonstrate how creative lay action can render policy processes more inclusive and effective at mitigating pressing problems. Diverse policy domains are considered, including nature conservation, education policy, urban and rural development, and more.

Title: Uncovering the Adaptive Capacity of Polar-Region Bacteria in a Warming Climate: A Systems Biology Approach
Faculty Mentor: Huansheng Cao
Status: Open

Climate change on a global scale has caused unprecedented consequences. To effectively mitigate these adverse consequences, information on maximum resistant capacity of organisms is of paramount importance. We propose to test the adaptability of three bacteria isolated the Arctic soils, which are also representative species globally distributed. By evolving them under temporary maximum tolerable temperatures at each step of the course of evolution, we will determine the full capacity of their adaptability, the final maximum tolerable temperatures after 500 generations. Critical metabolites and fatty acids conferring resistance will also be determined. Finally, we will integrate genomics, transcriptomics, metabolomics, and lipidomics data into the metabolic network to predict how the observed critical metabolites and fatty acids are produced, thereby to reveal the systems biology mechanism of thermal adaptation.

Title: Completing a Stress–Microglia Circuit Remodeling Dataset: Undergraduate Training in Quantitative Neuroanatomy and Synaptic Analysis
Faculty Mentor: Chia-Chien Chen
Status: Open

This summer research project invites motivated undergraduate students to participate in an ongoing neuroscience study examining how stress reshapes brain circuits, with an emphasis on stable neuronal and synaptic architecture. Students will be trained as research collaborators working with existing Golgi-stained brain tissue and imaging datasets to conduct neuronal reconstruction, dendritic spine analysis, data quality control, and scientific visualization.
The project emphasizes careful observation, quantitative reasoning, and reproducible analysis rather than routine bench work. Students will work closely with the PI in weekly meetings, present progress during the SRS seminar series, and prepare a research poster summarizing their findings. The research contributes directly to an active faculty research program and may support future conference presentations or Signature Work development.
Eligibility: Open to all DKU undergraduates with a strong interest in neuroscience, psychology

Title: Funding State Capitalism: China's Sovereign Wealth Fund in a Global Perspective
Faculty Mentor: Andrew Cheon
Status: Open

China has utilized its financial capital to catapult its state-owned enterprises to global status, and studying its sovereign wealth fund in a global perspective is crucial to understanding how. The study will also have implications for China's geopolitical competition with the United States and leadership in the Global South, as financial capital for investment abroad has long been a central driver of China's Belt and Road Initiative. This project is of particular interest to students of political economy and industrial policy. By analyzing the strengths and weaknesses of state capitalism with a focus on sovereign wealth funds and the institutions currently in place to govern them, we seek to make a substantive contribution to the political economy literature, as well as deliver policy relevant insights. This opportunity will appeal to students who enjoy the creative freedom to contribute to an early-stage work as a coauthor while receiving on-the-job training as a social scientist.

Title: Earth-abundant nanostructured materials for advanced energy and sustainability applications
Faculty Mentor: Kwang Leong Choy
Status: Open

This project involves the development of eco-friendly and earth-abundant nanostructured materials for energy conversion and energy storage applications. These nanostructured materials could provide sustainable solutions for clean energy and facilitate the processing and assembly of low-dimensional materials into energy devices. Various nanostructured materials will be synthesized using a non-vacuum chemical approach and characterized using a combination of XRD, SEM, FTIR, UV-Vis, and Raman techniques. The electrochemical properties of the nanostructured materials will be evaluated. The relationship between process, structure, and properties of the nanostructured materials will be established, and their applications in energy storage and sustainability will be explored.

Title: Skin, Space, Signal: Contact-Based and Contactless Human–Machine Interaction
Faculty Mentor: Ziv Cohen
Status: Open

This study examines the gap between tactile (contact-based) and non-tactile (contactless) human–machine interaction as they appear in contemporary art and design. As our world becomes more machine-engaged, it is increasingly important to analyze the dynamics between contactless interaction and skin-attached sensorial systems, both in creative practice and in functional interface design.
The research aims to generate: a conceptual framework linking embodied perception to interaction reliability; comparative evidence on performance and user experience across interaction modalities; and design principles relevant to both artistic practice and commercial interface design. The research is conducted alongside a creative artwork project that uses a non-tactile system to explore forms of feedback and their engagements with users.
Students from Computational Design, Media Art, or any other major who are interested in the topic and feel comfortable with academic research and writing.

Title: Dynamics of Winfree Oscillators on Higher-Order Networks
Faculty Mentor: Konstantinos Efstathiou
Status: Filled

Synchronization phenomena are ubiquitous in nature and technology, appearing in systems ranging from biological rhythms to power grids. This project studies the dynamics of coupled oscillators on higher-order networks, where interactions occur not only pairwise but also among groups of three or more units. Building on recent advances for Kuramoto-type models, the project focuses on the Winfree oscillator model, which captures biologically realistic pulse-coupled interactions. The student will first study foundational literature on synchronization and higher-order coupling, then perform numerical simulations to investigate how higher-order interactions between Winfree oscillators affect collective dynamics, synchronization transitions, and stability. Prior coursework or self-study in dynamical systems is recommended; basic programming skills (e.g., Python) are required.

Title: Growing Up in the Platform Economy: Supporting Migrant Children (流动儿童) in China's Industrial Communities
Faculty Mentor: Na Fu
Status: Open

What happens to children when their parents become 'shared labor', who circulating between factories, following algorithms, never settling? China's platform economy has transformed manufacturing, but its effects ripple beyond the factory floor into family life, children's education, and community bonds. This project brings students into migrant worker communities to find out and to act. Through partnerships with women workers' NGOs, students will conduct community-based needs assessments, co-design pilot programs with families, and help build foundations for a lasting support organization. This is not extractive research; it is engaged scholarship where communities shape the questions and the solutions. Ideal for students passionate about labor rights, child development, community organizing, or social entrepreneurship. Mandarin proficiency required. Come ready to listen, learn, and build.

Title: "Breathing" Banks: Mapping the Active Biogeochemical Zones of a Regulated Tidal River using a Damköhler Framework
Faculty Mentor: Chuanhui Gu
Status: Open

Tidal rivers function as biogeochemical "lungs," inhaling nitrate pollution during floods and exhaling treated water. However, in regulated rivers like the Qiputang, sluice gates disrupt this natural rhythm. This project seeks to map the "Active Zones" where this natural purification actually occurs. Using the advanced Damköhler Framework, you will determine the scientific threshold for optimal riparian buffer widths. This is a rare opportunity to lead field campaigns, master model-data fusion, and create a "Regime Diagram" that directly informs environmental restoration policy. Ideal for students interested in hydrology, chemistry, or environmental science and engineering. STEM majors who have completed any of BIOL 110, CHEM 110, STATS 101 and MATH 101/105 are especially encouraged to apply. Interested students should send their CV to Prof.

Title: Empirical Inquiry on Sources of Inequality
Faculty Mentor: Ming Gu
Status: Open

This project examines the sources of inequality by focusing on two key topics: the impact of graduating into a housing recession on wealth accumulation and the intergenerational transmission of "good careers." Using large longitudinal datasets, the research explores how macroeconomic shocks and occupational inheritance shape economic mobility and wealth inequality over time. Students involved in the project will contribute to all stages of research, including data collection, cleaning, analysis, and visualization, while receiving training in analytical methods, programming, and academic writing. This study aims to provide insights into labor market dynamics and wealth inequality while offering students valuable research experience in economics and public policy. Prior training and experience with data-related tasks (e.g., scraping, cleaning, analysis) is a plus.

Title: Multi-User Mobile Sequential Recommendation for Urban Mobility
Faculty Mentor: Pengzhan Guo
Status: Open

Taxicab services play an essential and irreplaceable role in urban transportation systems. For example, New York City alone has over 21,000 licensed taxi drivers and more than 80,000 ride-sharing drivers. Compared with public transportation such as buses and subways, taxis offer greater flexibility, comfort, and time efficiency. As a result, improving vehicle mobility through effective route recommendation has long been a central problem in large metropolitan areas such as New York, Tokyo, and Suzhou. Mobile route recommendation systems have been widely studied and deployed over the past decades to support taxi drivers and reduce traffic congestion. The purpose of this research is to develop a scalable and fair multi-user mobile route recommendation framework that improves urban taxi mobility under dynamic traffic conditions and heterogeneous driver preferences. By integrating multi-agent reinforcement learning with performance-aware coordination strategies, the project aims to generate high-quality, diversified, and balanced route recommendations for multiple drivers simultaneously. Beyond improving routing efficiency and fairness, this research seeks to bridge the gap between theoretical optimization methods and real-world urban transportation systems. The study also aims to advance the design of adaptive agent communication and parallel learning strategies, providing both empirical and theoretical insights. Ultimately, the research contributes to more efficient, equitable, and interpretable urban mobility solutions, with potential applications to other large-scale recommendation and resource allocation problems.

Title: Negotiating Gender and Sexuality in Korean Megachurches: Young Adults, Moral Order, and Protestant Christianity
Faculty Mentor: Hyun Jeong Ha
Status: Filled

This research examines how young adults in their 20s and 30s in South Korea understand and navigate issues of gender and sexuality within megachurches. Although the overall number of Protestant Christians in South Korea has been declining, megachurches continue to thrive, particularly through their active young adult ministries. Many of these churches promote conservative perspectives on gender and sexuality, raising important questions about how young adults navigate these norms. The project seeks three undergraduate students interested in conducting ethnographic fieldwork at a megachurch in Seoul. Research activities will include in-depth interviews and weekly participant observation in church gatherings, such as college, young adult, and women's ministry meetings. Students with an interest in religion, politics, and gender and sexuality are encouraged to apply, regardless of prior expertise in these areas. Fluency in Korean is required to communicate with church members.

Title: Documentary Film on Diasporic Cantonese Opera
Faculty Mentor: Seth Henderson
Status: Open

Documentary Film Project: Cantonese Opera in Diaspora
This documentary chronicles a close-knit Cantonese opera troupe at UCLA, examining how diasporic Hong Kongers, their American-born children, and ethnically non-Chinese performers maintain this centuries-old performance tradition in contemporary Los Angeles. Through cinema, the project explores how the troupe's practice and performance space become a site of cultural memory, revealing tensions between preserving orthodox operatic conventions and adapting to contemporary and international realities.
Students will collaborate with Prof. Seth Henderson throughout post-production (June-August), working on editorial structure, sound design, color grading, and final cut. This intensive collaboration offers hands-on experience with professional documentary workflows and the opportunity to contribute to a 40-50 minute film intended for international festival submission and PBS distribution.

Title: Toward Physically Informed Color Normalization in Retinal Imaging
Faculty Mentor: Hua Xiong Huang
Status: Filled

Major: mathematics or related fields. Prerequisties: differential equations, numerical and data analysis. Skills: coding.
Outline of the project.
(1) Model-based color normalization
The project will study how the Beer–Lambert law, a standard physical model describing light attenuation, can be used to guide color correction. This provides a physically meaningful way to relate observed pixel values to underlying tissue properties.
(3) Algorithm development and evaluation
Based on insights from the physical model and data analysis, several color normalization methods will be implemented and tested. Their performance will be evaluated by:
•Visual consistency across datasets
•Stability of downstream tasks such as vessel segmentation or disease classification
This integrated approach allows theoretical modeling and experimental validation to inform each other.

Title: Granular drag coefficient
Faculty Mentor: Kai Huang
Status: Open

We feel drag force from air while walking, jogging, or riding a bike. The question is to which extend can we predict drag force induced by granular materials, such as sands, powders and grains. This is a follow-up project to SRS2023, in which two DKU students worked on analysing a previous drop tower experimental campaign on projectile impact on granular medium in the normal direction. In addition to their report and poster presentation, this research output is summarized in a recent article [1. Koestler, Zhao, Lyv, et al., "Embedded inertial sensor for tracking projectile impact on granular media"] submitted to Powders and Grains 2021, and a recent manuscript named "Nature of granular drag in microgravity", in which we define drag coefficient for granular media.

Title: X-Ray Tomography of Plant Root in 'Artificial' Soil
Faculty Mentor: Kai Huang
Status: Open

Germinating seeds are active particles capable of adapting themselves to the change of environment. For example, Darwin described how a growing radical seed respond to a square card attached at one tip: "The tip in the act of forming a loop generally rubs against the upper part of the radicle, and pushes off the attached square … being no longer irritated by any attached object." Our ultimate goal is to understand: How to local 'tightness' of root tips is 'designed' by the growth of root tips to facilitate its growth in a heterogenous environment with limited supplies? The answer to this question can help the development of 'microscopic' models for large scale eco-system models for better decision making regarding the response of ecosystem to climate change.

Title: Functional genomics in insect cell models to study cellular pathways
Faculty Mentor: Linfeng Huang
Status: Open

Cell models are essential for understanding biological mechanisms and enabling biotechnological applications. Although immortalized human cancer cell lines are widely used, their genomic instability, altered signaling pathways, and deficient innate immune responses limit physiological relevance. Insect cell models provide a safer and more representative alternative. In this project, we use insect cells, including Drosophila melanogaster S2, Spodoptera frugiperda Sf9/Sf21, and Aedes albopictus C6/36 cells, to study key cellular pathways. To address the lack of genetic manipulation tools in insect systems, we apply a prokaryotic siRNA (pro-siRNA) technology developed in our laboratory, enabling efficient and cost-effective transcriptome-wide RNAi screening across species. High-content imaging–based phenotypic screens will identify genes regulating cell proliferation, apoptosis, and endocytosis, establishing a functional genomics platform for insect cells.

Title: Computation and Design for Baseball Sports Science
Faculty Mentor: Ming-Chun Huang
Status: Open

Are you passionate about baseball and captivated by the potential of Artificial Intelligence? Here's your chance to combine these interests and revolutionize the game! AI is transforming the way baseball players train, perform, and protect themselves from injury. By leveraging motion capture data, game footage, and training analytics, AI can assess biomechanics, identify injury risks, deliver real-time feedback, and develop personalized training plans uniquely tailored to each player's needs. By joining this cutting-edge research initiative, you'll work at the exciting intersection of AI, sports science, and computation and design fields, contributing to innovative solutions that propel junior baseball player development to the next level. Whether you're an athlete, a tech enthusiast, or simply curious about the future of sports technology, this opportunity offers hands-on experience and the chance to redefine the future of baseball training through revolutionary AI advancements!

Title: Kunqu Acoustics: Theatre Design and Studio Recording
Faculty Mentor: Kim Hunter Gordon
Status: Open

This interdisciplinary project examines Kunqu acoustics: how sound quality, space, and recording conditions shape the way Kunqu singing is heard as music. The project has two linked components. One focuses on designing an acoustic theatre that supports unamplified vocal performance without microphones, drawing on historical research and basic acoustic principles. The other involves producing professional-quality studio recordings of a vocational Kunqu singing (without full orchestra), treating the voice as sung poetry for focused listening.
Two undergraduate researchers will work as full collaborators: one from a humanities background (e.g. literature, history, performance, media, China studies) and one from a natural sciences background (e.g. physics, engineering, acoustics). Students will participate in research, design discussion, recording sessions, listening analysis, and presentation of results.

Title: Quantum Metrology - Theory and Design of Experiment
Faculty Mentor: Myung-Joong Hwang
Status: Open

This project asks a fundamental question at the heart of quantum technology: can quantum mechanics be harnessed to design sensors with extreme precision, and what is the ultimate limit of measurement accuracy allowed by the laws of quantum mechanics? In this research project, students will investigate these questions by designing and studying quantum systems that undergo sharp changes in their physical properties, known as quantum phase transitions, and explore how such critical behavior can be exploited to enhance sensing performance. The project will involve analytical modeling of quantum dynamics, and design of concrete sensing protocol. Strong analytical abilities and a commitment to conducting high-quality research are essential. Prior experience with quantum physics is desirable but not necessary. Strong mathematical background (linear algebra, advanced calculus, differential equations, statistics) is desirable as well as basic coding skills (python/mathematica/matlab).

Title: Educational Engagement as a Mediator Linking Trauma Exposure to Mental Health Outcomes among Orphaned and Separated Children
Faculty Mentor: Yeshim Iqbal
Status: Open

This research project examines whether educational engagement (e.g., enrollment, attendance, grade progression) mediates the relationship between trauma exposure and mental health outcomes among orphaned and separated children in low- and middle-income settings. It focuses on testing education as a mediator linking adversity to emotional and behavioral well-being, with attention to how patterns may differ across care contexts (e.g., institutional vs. family-based care). Selected students will support quantitative research tasks including data cleaning, variable construction, and mediation analyses using regression and/or structural equation modeling. Prior coursework in statistics or research methods is expected; experience with STATA is helpful but not required. Students should be detail-oriented, comfortable working with large datasets, and able to write clearly in English.

Title: Development of Multimodal Interactive Systems for Emotion Recognition and Regulation
Faculty Mentor: Yucheng Jin
Status: Open

This project focuses on the development of multimodal interactive systems for emotion recognition and regulation by integrating visual, motion, physiological, and interaction data in real time. The project involves designing, implementing, and evaluating human-centered AI systems that sense users' emotional and physiological states and adapt system responses accordingly in therapeutic contexts. Students will contribute to multimodal sensing and data processing, machine learning model development for affect and gesture recognition, and system integration. We seek undergraduate students majoring in Computer Science, Data Science, or related fields. Preferred qualifications include programming experience (e.g., Python, JavaScript), familiarity with machine learning, signal processing, or multimodal systems, and an interest in affective computing. Prior experience in AI, data analysis, and LLMs is a plus.

Title: Supporting Reminiscence Therapy for Older Adults through Generative AI Systems
Faculty Mentor: Yucheng Jin
Status: Open

This project explores how generative AI can be designed to support reminiscence therapy for older adults, aiming to enhance emotional well-being, memory recall, and self-expression. Conducted in a human–computer interaction research lab, the project focuses on designing and evaluating AI-driven systems that help older adults create and engage with personalized reminiscence content, such as life stories, images, or music. Students will participate in generative AI model development, interaction and interface design, and prototype implementation and evaluation. We seek undergraduate students in Computer Science, Data Science, Computational Design, Psychology, or related fields. Preferred skills include programming experience (e.g., Python, JavaScript), familiarity with machine learning or generative models, and an interest in human-centered AI. Prior experience in HCI, UX/UI design, aging research, or mental health technologies is a plus.

Title: Hankel Determinants of Certain q-Sequences
Faculty Mentor: Lin Jiu
Status: Open

Hankel determinants is one of the most interesting and important topics in number theory, combinatorics, special functions, orthogonal polynomials, continued fractions and other related areas. As one of my recent research projects, I would like to have 1-2 summer students continue to work on Hankel determinants, with concentration on related q-series. Possible directions include:
1. calculating unknown Hankel determinants of q-sequences;
2. explore q-related transformations;
3. and implement packages in either SageMath or Mathematica
Students majoring in math, data science, and computer science are preferred, but anyone who have finished MATH202 and MATH203/MATH205/STAT211/COMPSCI203 (namely, the sequence and series part) are eligible to apply.

Title: A Systematic Meta-analysis of Biomarkers in Patients with Respiratory Syncytial Virus
Faculty Mentor: Yiu wing Kam
Status: Open

Respiratory syncytial virus (RSV) is a highly contagious respiratory pathogen that causes annual seasonal epidemics worldwide. While it is the leading cause of bronchiolitis and pneumonia in infants, it also infects adults, especially the elderly and those with underlying cardiopulmonary or immunocompromising conditions. Clinically, this results in severe lower respiratory tract disease, hospitalization, and excess mortality. To shorten the diagnostic period and raise the overall diagnostic accuracy, it's essential to figure out clear biomarkers of the virus for laboratory surveillance.
This project focuses on identifying a clear biomarker list for the clinical RSV test. By optimizing the literature search and conducting a meta-analysis, this research will systematically evaluate studies published over the past ten years and synthesize their findings into a research article that updates the current understanding of RSV infection biomarkers.

Title: Explore a Molecular Detection System for Norovirus Surveillance in Kunshan's Water Sources
Faculty Mentor: Yiu wing Kam
Status: Open

Norovirus is a highly contagious virus and a leading cause of waterborne gastroenteritis globally. It is responsible for significant outbreaks linked to contaminated water and food sources. Its transmission is primarily through the fecal-oral route, making water safety a critical public health concern. In rapidly urbanizing regions like Kunshan, increased population density and infrastructural changes raise the risk of waterborne pathogen spread, emphasizing the need for proactive surveillance strategies to prevent outbreaks and protect community health.
This project focuses on developing a molecular detection system specifically designed for norovirus monitoring in Kunshan. The study aims to establish a sensitive and reliable method for detecting norovirus in environmental water samples by developing and optimizing an RT-qPCR assay. The project will also create a standardized field sampling protocol, ensuring the accuracy and reproducibility of future epidemiological studies.

Title: Exploring the Impact of Smoking on Tuberculosis Incidence in China: A Public Health Perspective
Faculty Mentor: Yiu wing Kam
Status: Open

This project investigates the relationship between tuberculosis (TB) and smoking behaviors in China, focusing on how smoking may influence the public risk of contracting TB. Despite an annual decline of 5.28% in TB-related DALYs (Disability-Adjusted Life Years), TB remains a significant public health challenge in China, accounting for 0.34% of the total DALYs according to the Global Burden of Disease Study (2021). Smoking is recognized as a key factor contributing to TB incidence and given China's large population and the increasing prevalence of smoking, it is critical to assess TB as a potential public health risk. Meanwhile, as previous research (Yang et al., 2021) indicates that smoking reduces vitamin D levels. The project involves the blood-based analysis which examines the effect of smoking behaviors on vitamin D levels.

Title: From Design to Delivery: An Integrated Review of Evidence Generation, Regulatory Alignment, and Implementation Barriers for Biomarker-Guided Immunotherapy in Ovarian Cancer
Faculty Mentor: Yiu wing Kam
Status: Open

Biomarker-guided immunotherapies represent a promising frontier in the treatment of ovarian cancer. However, the path from trial design to global clinical adoption is fraught with challenges that can exacerbate global health inequities. On one hand, clinical trials may lack designs aligned with contemporary regulatory science, generate geographically skewed evidence, or impose logistical requirements that exclude Low- and Middle-Income Country (LMIC) sites. On the other hand, even when evidence is generated, profound barriers exist in implementing biomarker testing in routine care, with disparities systematically linked to resource settings. A fragmented analysis of either trial design or implementation barriers provides an incomplete picture, hindering the development of strategies for equitable access to advanced therapies. this project aims to provide a holistic evidence base. The findings will inform relevant global health stakeholders on how to design more inclusive trials.

Title: Elucidating the mechanism of the DNA binding activity of the human ALYREF protein
Faculty Mentor: Ferdinand Kappes
Status: Filled

Investigate the mechanistic basis of DNA interaction by the mRNA export factor ALYREF. Following its identification as a partner for the chromatin protein DEK, this project aims to biochemically define ALYREF's dual-domain DNA-binding capacity and its functional consequence on DNA topology. You will express and purify recombinant ALYREF proteins, followed by rigorous in vitro analysis using DNA binding and supercoiling assays. This work provides foundational training in recombinant protein purification, affinity chromatography, and quantitative biochemical techniques (SDS-PAGE, immunoblotting, agarose gel electrophoresis). Contribute to elucidating a non-canonical role for a key nuclear protein, with direct potential for publication

Title: Illuminating the Dark Proteome: A High-Throughput Functional Annotation Project Using Bacterial Growth Inhibition Screening (BGIS)
Faculty Mentor: Ferdinand Kappes
Status: Filled

Engage in a functional genomics project to characterize unannotated human proteins using an innovative Bacterial Growth Inhibition Screen (BGIS). You will apply a multi-stage experimental pipeline: performing molecular cloning of "dark" protein candidates, conducting high-throughput recombinant protein expression in E. coli, and executing primary toxicity screens. Subsequent validation will involve domain fragmentation mapping and loss-of-function mutagenesis to pinpoint active regions. This project offers hands-on training in modern molecular techniques, bioinformatics, and assay development, contributing directly to a novel platform for de-orphaning protein function.

Title: Testing of a combined inducible protein depletion – Overexpression system in human cells for functional assessment of the DEK oncogene
Faculty Mentor: Ferdinand Kappes
Status: Filled

Utilize a novel, integrated inducible knockout/overexpression (iKO/iOE) platform to perform a systematic functional dissection of the DEK oncoprotein. This project applies Auxin-Inducible Degron (AID) and overexpression systems in isogenic human cell lines to define domain-specific requirements for cellular viability and proliferative capacity. You will execute longitudinal cell survival assays, generate growth curves, and perform molecular phenotyping via immunoblotting and immunofluorescence. The objective is to establish a causal map linking DEK's structural domains—SAP-box, RNA-interaction, multimerization—to essential oncogenic functions. Acquire advanced training in perturbation genetics, quantitative cell biology, and protein analysis within an active research program aimed at defining molecular targets for intervention.

Title: 中国欢迎你 Welcoming Chinese International Adoptees to Birth Country
Faculty Mentor: Yuechi Kelly
Status: Open

Students will help create a website of resources supporting Chinese international adoptees in returning to China for short and long-term stays. Students will begin by learning about the Chinese international adoptee community and developing surveys analyzing Chinese adoptee needs. Based on survey data, students will create website content such as travel guides and language modules in Mandarin and Cantonese. Students must be culturally sensitive and willing to engage critically with themes such as identity, race, ethnicity, language, power, and the family. Aligned with service learning, students must be dedicated to prioritizing the lived experiences of the community being served (Chinese adoptees). Highly sought qualities include: strong desire to make an impact in the Chinese adoptee community; experience with language teaching, website and graphic design, vlogging/social media; and/or native-level proficiency in Mandarin, Cantonese, or other Chinese languages.

Title: Evolutionarily Conserved m^6A Reader–Lipid Droplet Mechanisms in Antiviral Defense
Faculty Mentor: Eunyu Kim
Status: Filled

The student will be fully integrated into the IBS-CGE research environment, participate in regular research meetings, receive feedback from researchers, and deliver a final presentation at the end of the program. The project provides training in RNA and lipid droplet biology, as well as computational and structural approaches, and may serve as a foundation for a future Signature Work project.
Preferred background: Biology, biochemistry, bioinformatics, or a related field. Prior coursework in molecular biology is recommended; basic programming or computational experience is helpful but not required.

Title: Linking Attention, Neural Dynamics, and Decision Processes: Computational and Neural Mechanisms of Primate Cognition
Faculty Mentor: Sze chai Kwok
Status: Open

This research project explores how human cognition unfolds over time by studying eye movements, decision behavior, and brain activity. Students will work on one of two closely related components: (1) analyzing eye-tracking data to understand how attention influences decisions, or (2) analyzing neural recordings from the hippocampus to study how brain rhythms support navigation and memory. Using real experimental data, students will learn modern data analysis and computational modeling techniques and contribute to ongoing cognitive neuroscience research. The project emphasizes hands-on collaboration, critical thinking, and scientific communication, with opportunities to contribute to conference presentations or publications. Open to students majoring in psychology, neuroscience, cognitive science, computer science, data science, or related fields. Experience with programming (e.g., Python, MATLAB, or R) or signal/data analysis is helpful. See www.kwoklab.org

Title: Assessing Wastewater Treatment Plants using Satellite Imagery and Machine Learning
Faculty Mentor: Ka Leung Lam
Status: Open

Wastewater treatment plants (WWTPs) are critical for protecting the health of waterways. This project aims to assess WWTPs using satellite imagery and machine learning. The study leverages large, spatially explicit WWTP datasets with detailed attributes such as plant locations, treatment capacities, applied technologies, and effluent quality. By integrating these ground-truth datasets with multi-source satellite imagery, the project will develop and evaluate supervised and self-supervised machine learning models to infer WWTP characteristics and operational performance from remotely sensed features. The resulting framework will enable scalable, consistent monitoring of wastewater infrastructure, supporting research and policy analysis related to water quality, sanitation services, and sustainable infrastructure development. Eligibility requirement: i) proficient in Python and PyTorch, ii) demonstrated experience in machine learning, and iii) ENVIR101 or water chemistry background.

Title: Compiling Life Cycle Inventory using Large Language Models
Faculty Mentor: Ka Leung Lam
Status: Open

Life cycle inventory compilation is a critical yet labor-intensive step in life cycle assessment (LCA), often constrained by fragmented data sources and inconsistent reporting across scientific literature and technical documents. This project aims to develop and evaluate pipelines for compiling life cycle inventory using Large Language Models (LLMs). The project will explore how locally deployed, open-weight LLMs can be used to extract, structure, and standardize inventory data from academic journals, reports, and existing LCA databases. Key tasks include designing prompting strategies, implementing model inference workflows, and validating generated inventories against reference datasets. The project will provide hands-on research training at the intersection of sustainability assessment and artificial intelligence. Eligibility requirement: i) proficient in Python and relevant libraries, ii) demonstrated experience in local deployment of LLM, and iii) ENVIR101 or chemistry background.

Title: Plant-wide Modeling of Resource Recovery from Municipal Wastewater
Faculty Mentor: Ka Leung Lam
Status: Open

This project focuses on plant-wide modeling of resource recovery from municipal wastewater treatment plants (WWTPs) in China. Using the plant-wide modeling software SUMO, the project will simulate the dynamic behavior of WWTPs that integrate resource recovery technologies such as energy and nutrient recovery. The modeling framework will be used to analyze mass and energy flows, process interactions, and system-level trade-offs under different operational and design scenarios. The goal is to quantify resource recovery potentials and evaluate how plant-wide configurations and operating strategies influence treatment performance and sustainability outcomes. The project will provide hands-on experience in wastewater process mathematical modeling and systems analysis and contribute to research on sustainable wastewater management. Eligibility requirement: i) proficient in Python, ii) demonstrated experience in mathematical modeling, and iii) chemistry background.

Title: Genotype to phenotype pipeline with RNA seq and chromatin analysis for iron deficiency
Faculty Mentor: Joohyun Lee
Status: Open

We will isolate homozygous lines from epigenetic TDNA mutants by PCR genotyping and screen them under control, iron deficient, and rescue conditions. Quantitative readouts (root length, biomass, chlorophyll, ferric chelate reductase) will reveal robust iron phenotypes. For top mutants, we will map downstream programs with RNA seq (expression), whole genome bisulfite sequencing (DNA methylation), ATAC seq (chromatin accessibility), and CUT&Tag (histone marks/regulators), integrating signals to nominate key genes linked to FIT, IRT1, FRO2, and IMA pathways. We will establish mechanism using genetic, molecular, and biochemical tests (qRT PCR, isoform specific assays, promoter::reporter, overexpression/knockdown or complementation). Students will learn end to end R/Python analysis, rigorous QC, and bench validation. Deliverables include a curated mutant set, a ranked candidate list with multi omics support, reusable primers/resources, figures, and a student coauthored manuscript draft.

Title: Iron deficiency regulatory programs mapped by HiFi sequencing in Arabidopsis
Faculty Mentor: Joohyun Lee
Status: Open

We will use PacBio HiFi long-read sequencing to read full-length RNA from Arabidopsis under control, iron-deficient, and rescue conditions. Long reads will reveal iron-responsive long non-coding RNAs, alternative splicing, and 3' UTR changes that short reads miss. Supportive short-read RNA-seq and targeted validations will connect new isoforms to key iron genes (FIT, IRT1, FRO2, IMA). Students will learn an end-to-end workflow in R/Python (base processing, isoform/lncRNA discovery, splicing and 3' end analysis, differential expression) and validate at the bench with isoform-specific RT-PCR, qRT-PCR, and simple reporters. Two students will co-lead wet-lab and computation with weekly mentorship. Outputs include a public full-length iron transcript atlas, a student-coauthored manuscript draft, polished figures, and a conference abstract.

Title: Diffusion models for satellite data
Faculty Mentor: Zuchuan Li
Status: Open

This project is to develop diffusion models for raw satellite data with missing values. Student participants are expected to be sufficient in python, machine learning, and deep neural networks. Participants should have taken statstical machine learning and deep learning. Students majoring in data science and computer science are preferred.

Title: Pursuing in-context learning in aquatic metabolism
Faculty Mentor: Zuchuan Li
Status: Open

This proposed study aims to develop deep neural network algorithms that leverage in-context learning to integrate heterogeneous data in scientific applications, using aquatic metabolism prediction as a representative case. Student participants are expect to familiar with python, machine learning, and deep neural networks. Students should have taken statistical machine learning and deep learning. Students majoring in applied math, data science, and computer science are preferred.

Title: Health Information Nudges and Vaccine Hesitancy among Older Adults: A Field-Based Study in Kunshan
Faculty Mentor: Fan Liang
Status: Filled

Vaccine hesitancy has increasingly emerged as a major barrier to achieving population-level protection. This project examines how health information nudges shape vaccine perceptions and uptake among older adults in Kunshan. Using a mixed-methods, community-based design, the study combines qualitative interviews with a survey experiment to capture both the reasoning behind vaccine decisions and the effects of different communication strategies. Phase 1 involves field interviews in urban and rural communities in Kunshan to identify concerns, information sources, and trust dynamics, which inform the design of information interventions. Phase 2 embeds a 2×2 experiment in an offline survey. In the summer, students will work with the faculty to conduct in-depth interviews, design the survey experiment, and write the study report. Students should have experience in qualitative or quantitative studies and knowledge about health communication and public health.

Title: Investigating potential interactions between an oncogenic lncRNA and its target genes in ovarian cancer
Faculty Mentor: Xianzhi Lin
Status: Open

The Warburg effect (a.k.a. aerobic glycolysis) is an emerging hallmark of cancer which redirects glucose metabolism from oxidative phosphorylation to glycolysis even if there is sufficient oxygen. Ovarian cancer, the most lethal gynecological malignancy, reprograms glucose metabolism via Warburg effect that significantly contributes to the disease progression and chemoresistance. Targeting Warburg effect may prevent its progression and chemoresistance. However, the mechanism underlying Warburg effect in ovarian cancer is still not fully understood. Our experimental data suggested that an oncogenic lncRNA plays a role in regulating Warburg effect in ovarian cancer. We are investigating the underlying mechanisms of this oncogenic lncRNA in the Warburg effect in ovarian cancer. Interested students who have completed BIOL 305 and BIOL 315 and/or with expertise in molecular biology/biochemistry and bioinformatics are strongly encouraged to apply.

Title: Transform Waste into Value: Solar Light as A Sustainable Energy Source for Organic Waste Elimination and Recycling
Faculty Mentor: Rui Liu
Status: Open

Halogenated organic compounds are persistent environmental pollutants whose chemical stability and toxicity present major sustainability challenges. This project proposes a solar-driven strategy for waste elimination and recycling based on red and near-infrared light generation of hydrated electrons, among the strongest known reductants for cleaving inert alkyl C–Cl bonds. We will develop bay-substituted perylene diimide dianions as tunable photoredox catalysts that access highly reducing excited states under low-energy light irradiation, avoiding the need for ultraviolet light or ionizing radiation. Through catalyst synthesis, photophysical and electrochemical characterization, and benchmark dehalogenation reactions on model substrates such as chloroacetate and polyvinyl chloride, this work aims to establish a benign and energy-efficient platform for halogenated waste treatment. All students who have taken CHEM201 are welcome to apply.

Title: AI-Driven Multi-Agent World Simulation Game System
Faculty Mentor: Ye Lu
Status: Open

The purpose of our project is to address a fundamental challenge in dynamic virtual environments: balancing structured system control with user agency in digital simulations. Traditional virtual environments face a critical limitation: they either rely on rigid pre-scripted behaviors that limit user freedom or employ AI systems that generate unpredictable outputs without maintaining system coherence. This creates a significant gap in creating truly responsive yet controlled simulation experiences. In the year 2025, we will develop a prototype that demonstrates how this architecture can create dynamic, responsive environments while maintaining system coherence. The project will establish new techniques for integrating LLMs into multi-agent systems in ways that enhance rather than replace structured control. This work has the potential to advance both academic research in multi-agent systems and practical applications in simulation, education, and digital environments.

Title: ChatDKU: RAG-Agent AI Chatbot for DKU Community
Faculty Mentor: Bing Luo
Status: Open

ChatDKU (demo video on YouTube and BiliBili), developed by our DKU Edge Intelligence Lab, aims to enhance DKU community's access to accurate and campuss pecific information through an AI-powered assistant tailored to the unique needs of students, faculty, and staff.
A key differentiator of ChatDKU is its fully in-house development and deployment, ensuring that all information, user queries, and system responses are processed and stored locally within DKU infrastructure. This design enables full compliance with university data privacy and security regulations.
In 2026, we aim to develop a ChatDKU mobile application to provide convenient services for campus users. Additionally, we will enhance ChatDKU's agent capabilities and integrate more Model Context Protocols (MCPs), enabling it to handle more complex tasks and a more intelligent user experience.
We welcome students to join our project with related skills witht the role of LLM-based Agent Developer or Full-Stack Developer.

Title: Modes of Atmospheric Energy Cycle
Faculty Mentor: Ding Ma
Status: Open

This research project investigates the fundamental drivers of atmospheric circulation by exploring the coupling between different modes of large-scale variability. While previous research has identified distinct phenomena like the barotropic and baroclinic annular modes within the atmospheric energy cycle, these have often been studied in isolation. Our goal is to identify integrated modes of the atmospheric energy cycle to provide an improved physical interpretation of climate variability.
Participants will utilize cutting-edge big data analysis and machine learning techniques on a dedicated supercomputer. Students will work in teams for data collection and lead individual sub-projects, with the expectation of producing first-author journal articles and conference presentations.
Requirements: Strong interest in atmospheric or environmental science. Statistical and programming skills preferred.

Title: Speech Unlearning for Privacy-Preserving Speech Foundation Models
Faculty Mentor: Xiaoxiao Miao
Status: Open

Modern speech foundation models are trained on massive datasets that may contain personal and sensitive information, raising serious privacy and regulatory concerns. This project investigates speech unlearning, a new research direction that enables trained models to selectively forget specific speakers, recordings, or content categories without retraining from scratch. The project involves implementing and evaluating existing unlearning methods, analyzing privacy leakage and model utility, and exploring improved techniques on speech foundation models for tasks such as speaker, language, and emotion recognition. Outcomes include potential conference publications, open benchmarks,
Preferred majors: Computer and Data Science.
Prerequisites: Machine/Deep Learning
Skills: Python, basic deep learning (PyTorch preferred), and interest in speech/audio processing.

Title: Interdisciplinary Digital Humanities Analysis of the Archives of the Royal Asiatic Society (RAS) Shanghai
Faculty Mentor: James Miller
Status: Open

This research investigates the archives of the Royal Asiatic Society (RAS) Shanghai through a hybrid digital humanities and traditional method. Utilizing a corpus of recently digitized materials developed through a collaboration between the DKU library and the RAS, the study explores the transnational production of knowledge about China during the late 19th and early 20th centuries.
The project employs a hybrid framework of digital humanities (DH) and traditional methods. We seek one student researcher to use computational tools such as topic modeling and frequency analysis to identify macro-level intellectual shifts across the Society's archives over several decades. We seek a second student to use traditional close-reading techniques interrogate the nuances, biases, and philosophical depth within specific digitized manuscripts.
Under the joint supervision of faculty and the university archivist, student researchers will bridge the gap between archival science and historical inquiry.

Title: Building Cost-Efficient Algorithm Selection Models for Molecular Docking using Active Learning
Faculty Mentor: Mustafa Misir
Status: Open

This project develops a computationally efficient Algorithm Selection (AS) framework for molecular docking using Active Learning (AL) and molecular embeddings to dramatically reduce computational costs while maintaining accuracy. Two summer research positions available: Position 1 implements state-of-the-art (SOTA) AL strategies to intelligently choose which docking computations to perform; Position 2 integrates pretrained molecular embeddings with AS models and develops adaptive querying mechanisms. Eligibility requirements: strong Python programming skills, foundational Machine Learning (ML) knowledge demonstrated through STATS 302/ COMPSCI 309/ MATH 405, and familiarity with deep learning frameworks, PyTorch / TensorFlow. Chemistry background beneficial but not required. Students will gain hands-on experience with cutting-edge AI methodologies in drug discovery while contributing to a peer-reviewed article making computational drug discovery more accessible.

Title: EEG-AS: Algorithm Selection Framework for EEG Foundation Models
Faculty Mentor: Mustafa Misir
Status: Open

This project aims at developing EEG-AS, an Algorithm Selection (AS) framework to automatically identify optimal EEG foundation models for brain signal analysis tasks such as motor imagery, sleep staging, emotion recognition, seizure detection, and Alzheimer's Disease classification using benchmark data of EEG-FM-Bench. One summer research position available focusing on executing benchmark experiments across 14 EEG datasets and implementing AS methodologies to build a practical model recommendation system. Eligibility requirements: strong Python programming skills, Machine Learning (ML) / Deep Learning (DL) knowledge demonstrated through STATS 302/ COMPSCI 309/ MATH 405, and experience with DL libraries of PyTorch/TensorFlow. Signal processing background advantageous but not required. Student will gain hands-on expertise in DL, neurotechnology applications, and cross-domain AI transfer while contributing to a peer-reviewed article.

Title: GTAS-PORT: Graph Transformer-Based Algorithm Selection with Automated Deep Reinforcement Learning Portfolio Construction for Stochastic E-Waste Collection
Faculty Mentor: Mustafa Misir
Status: Open

This project develops a Graph Transformer system for automated Algorithm Selection (AS) from Deep Reinforcement Learning (DRL) portfolios constructed via Automated Machine Learning (AutoML) / Hyper-parameter Optimization (HPO) methods to solve stochastic e-waste collection problem. Two summer research positions available both requiring experience with Deep Learning libraries of PyTorch / Tensorflow: Position 1 develops Graph Neural Network (GNN) Transformers for AS; Position 2 focuses on automated portfolio construction using state-of-the-art AutoML/HPO techniques to identify complementary DRL configurations. Eligibility requirements: strong Python programming skills, foundational ML knowledge demonstrated through STATS 302/ COMPSCI 309/ MATH 405, and background in optimization algorithms. Students will gain hands-on experience with cutting-edge AI methodologies while contributing to a peer-reviewed article on critical environmental sustainability challenges in e-waste management.

Title: ST-GNN-AAS: Spatio-Temporal Graph Neural Networks for Anytime Algorithm Selection – A Case Study on Traveling Salesperson Problem
Faculty Mentor: Mustafa Misir
Status: Open

This project develops a Spatio-Temporal Graph Neural Network (ST-GNN) system for Algorithm Selection (AS) of anytime algorithms solving the Traveling Salesperson Problem (TSP). Following our GNNAS-TSP setup and other graph-based AS systems, this AS research models time-evolution of algorithm performance across public benchmarks to outperform leading TSP solvers. One summer position available: implement ST-GNN architectures with temporal dynamics, process performance trajectories from multiple solvers, and conduct rigorous evaluations. Eligibility: strong Python skills; foundational Machine Learning (ML) / Deep Learning (DL) knowledge via STATS 302/ COMPSCI 309/ MATH 405; experience with DL libraries, PyTorch / Tensorflow; optimization background beneficial. Student gains hands-on expertise in DL, GNNs, combinatorial optimization, GPU computing, and scientific writing while co-authoring a peer-reviewed publication in an AI/optimization venue.

Title: BABIES: Building Air-safe Breathing Indoor Environments for Sweethearts
Faculty Mentor: Claudia Nisa
Status: Open

This project proposes the development, implementation and evaluation of a WeChat mini program to be disseminated in 2 Maternity and Child Hospitals in Kunshan. The initiative aims to educate parents and family members about the harmful effects of smoking on babies and toddlers and to promote smoking cessation within households. Upon visiting the hospital, families will be encouraged to scan a QR code to join the program before departure. Once enrolled, users will receive bi-weekly content, including persuasive videos and messages, designed to raise awareness of the detrimental effects of secondhand smoke on children and offer encouragement and resources to reduce or quit smoking. Changes in smoking behavior will be measured through self-reported short surveys to track reductions in cigarette consumption and implementation of smoke-free home policies. User engagement data from the mini program will be analyzed to assess participation and utilization of resources.

Title: "In the Tradition" the Abolitionist Tradition and the Roots of Pan-Africanism, 1830-1945
Faculty Mentor: Jesse Olsavsky
Status: Open

My current project deals with the intellectual history of abolition's afterlives in the Pan-African Movement. Following the abolition of Atlantic slave systems, western empires, particularly the US and British, sought to distort or forget the memories of abolition, as they began to compensate for their economic loss of slave labor by overthrowing interracial democracy in the US (1876) and partitioning Africa (1884-85). "In the Tradition" argues that Pan-Africanism, which was one international response to this reconstitution of empire, emerged, at least in part, by remembering and reviving abolitionism, and re-interpreting its history for a new generation.

Title: From Peer Interaction to Intercultural Learning: A Process-Oriented Case Study of the Language Partner Program at Duke Kunshan University
Faculty Mentor: Lianyun Pang
Status: Open

This SRS project explores how intercultural learning emerges through structured peer interaction in the Language Partner Program (LPP) at Duke Kunshan University. LPP pairs Chinese and international students for sustained, task-supported interaction in a co-curricular setting. The project focuses on how students experience, reflect on, and make sense of intercultural interaction.Student researchers will work with the faculty mentor to analyze reflective writing, interview data, and pre- and post-program survey responses. Tasks include data organization, qualitative analysis, and basic quantitative analysis. Students will receive training in research methods and academic writing, and may have opportunities to be acknowledged as collaborators or co-authors on future research outputs, subject to contribution and academic norms.Interest in intercultural communication, language learning, education, or social sciences is preferred.We welcome reliable, detail-oriented, and motivated students.

Title: Psychedelic effect of Lanmaoa asciatica in a rodent model and its possible antidepressant properties
Faculty Mentor: Pedro Rada Rincon
Status: Open

Lanmaoa asiatica is a mushroom native to the Yunnan region of China that is traditionally used in local cuisine. When undercooked, it can produce psychedelic effects without known systemic toxicity. Interest in psychedelics has increased due to evidence that single exposures to compounds such as LSD or ketamine may produce sustained antidepressant effects.
This lab-based project will use a dietary intervention in mice with Lanmaoa asiatica to examine its psychoactive properties and relevance to depression-related behaviors. Behavioral testing will include the open field test, elevated plus maze, forced swim test, and operant behavioral paradigms. Given sex differences in depression vulnerability, outcomes will be compared between male and female mice, with hormone cycle tracking in females.
This SRS project is intended for students in the Neuroscience track within the Behavioral Science or Molecular Bioscience Majors

Title: Equal Pay Laws, Returns to Education, and Fertility Decisions: Evidence from U.S. State-Level Equal Pay Acts
Faculty Mentor: Camila Fernanda Saez Muller
Status: Open

This project studies how equal pay legislation reshaped women's educational and fertility decisions by altering the expected returns to market work. Exploiting variation in the timing of state-level Equal Pay Acts prior to the 1963 federal reform, the analysis examines whether improvements in wage equality increased women's incentives to invest in education, delay marriage, and reduce fertility. Building on recent evidence that equal pay laws narrowed gender wage gaps, this study extends the focus beyond labor market outcomes to longer-run life-cycle choices. By linking labor market institutions to human capital formation and family behavior, the project provides new evidence on how gender-equality policies can generate broad demographic and economic change.

Title: When Does Gender Disadvantage Emerge? Educational Transitions, Rural Contexts, and Women's Attainment in China
Faculty Mentor: Camila Fernanda Saez Muller
Status: Open

Why do rural women in China end up with the lowest levels of education, even when boys and girls appear to be treated similarly in childhood? Using nationally representative data from the China Family Panel Studies (CFPS), this project investigates when gender inequality in education actually emerges, focusing on key transitions such as moving from primary to middle school, high school, and university. By linking children's family backgrounds and early educational experiences to later outcomes, the study explores how rural context, parental decisions, and economic constraints shape educational trajectories over time. Students involved in this project will gain hands-on experience with longitudinal data, applied quantitative analysis, and real-world questions about gender, inequality, and social mobility in contemporary China.

Title: The Bio-Inspired Solar Evaporators based on the Smart Responsive Materials
Faculty Mentor: Weiwei Shi
Status: Open

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, seawater desalination, electric generation, steam sterilization, and fuel production. The work will focus on the design and fabrication of bio-inspired responsive smart materials to achieve the high performance of solar evaporation, in response to external stimuli, e.g., light, temperature, and humidity. Obviously, this project would be tremendously attractive from both an economic and an environmental standpoint, to investigate the conversions of solar energy into 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 Mat

Title: Early Language Mixing and Theory of Mind in Bilingual and Monolingual Preschool Children in Uzbekistan
Faculty Mentor: Irina Soboleva
Status: Filled

This Summer Research Scholars project examines whether early bilingual experience (Uzbek + Russian) is linked to children's social perspective-taking, known as Theory of Mind. Working with local schools and kindergartens in Uzbekistan, we will compare 4–7 year-old bilingual and monolingual children using short, game-like tasks and a brief parent language questionnaire. Students will collaborate as co-researchers: in the first half of summer on campus they will review literature, finalize instruments, pilot procedures, prepare IRB materials, pre-register hypotheses, and write R code for the pre-registered analysis; in the second half of summer they will conduct field data collection in Uzbekistan (recruitment, task administration, scoring, data entry). In Fall 2026, students will help analyze results and co-author a poster and manuscript. Eligibility: native/near-native Russian and Uzbek; behavioral science or social science major.

Title: Brain Mechanisms of Sleep versus Wake Memory Consolidation and Their Regulation by Environmental Light
Faculty Mentor: Shu Kit Eric Tam
Status: Open

Life on Earth has evolved under a rhythmically changing cycle of day and night. As a result, virtually all organisms have evolved internal biological clocks with a period of about 24 hours. These rhythms enable organisms to anticipate and adapt to predictable changes in their daily cycles. In many diurnal and nocturnal species, including humans and rodents, light/dark cycles exert profound effects on internal clocks and sleep, which determines brain states and cognitive functions that are essential for survival, such as acquisition of new information (i.e. learning) as well as consolidation and retention of recently acquired memories. This proposed work aims to investigate how 12-h:12-h light/dark cycles (T24) and non-24-hour cycles (mimicking light pollution) may affect memory consolidation mechanisms. This work will advance theoretical understanding of memory consolidation in the mammalian brain.

Title: The Historical Legacy of Communism and Electoral Support for Far-Right Parties in Germany and Poland
Faculty Mentor: Jason Todd
Status: Open

In April 1989, East Germany and Poland were closed regimes on the other side of the Iron Curtain with four decades of historical experience with Soviet-style communism. A mere 18 months later, both were newly democratized. Despite these reforms, the legacy of communism still affects social, political, and economic realities. This project aims to examine the strength of the correlations between historical communist legacies and contemporary electoral support for far-right parties, contrasting the experiences of Poland and Germany. In Poland, we will compare regions with deeper communist footprints to those less impacted; in Germany, we will compare the former East Germany to the former West Germany. Student researchers must possess intermediate skills in Microsoft Excel and RStudio. Familiarity with German or Polish is a plus, but not required. Social science majors and students demonstrating patience, attention to detail, and digital literacy are preferred.

Title: "Be Your Own Doctor": Urban Wellbeing and Self-Care Techniques in Contemporary China
Faculty Mentor: Sajida Tuxun
Status: Open

There is increasing interest in public health and individual empowerment in urban China of the post pandemic era. This project explores how urban Chinese citizens take personal responsibility for their health and the evolving self-care landscape in contemporary urban China. Using online data collection and on-site fieldwork in wellness oriented food spaces (restaurants & aromatherapy centers), students will be trained in data collection, qualitative interviews, fieldnotes writing, and analysing research data into a theoretical academic argument. One student will work remotely on online data collection, while another (fluent in Mandarin and preferably familiar with anthropology/sociology) will join on site fieldwork in Shanghai, Changzhou, and Zhengzhou, conducting interviews, attending activities, and writing fieldnotes. This project is ideal for students interested in food, environment, and public health who wish to enhance their data collection, qualitative research, and analysis skills.

Title: Green Urban Transitions: Media Narratives of Bicycling in China
Faculty Mentor: Annemieke van den Dool
Status: Open

To better understand exactly how bicycling is perceived in China, this project analyses news media and social media on this topic. The project evolves around the following research question: How is cycling framed in China in news and social media? Students from any major are welcome to apply.

Title: Urban Green Transitions: Exploring Policies to Support Community Gardening in China
Faculty Mentor: Annemieke van den Dool
Status: Open

Although urban gardening has the potential to contribute to food security, sustainable urban development, health improvement, and community cohesion, such projects are not yet widely implemented in China. To better understand how to engage more people in community gardening in China and how to overcome existing obstacles, this project conducts a survey and interviews with people involved in such projects in Kunshan city. The overarching research question is: "What motivates individuals in China to participate in community gardening projects, what obstacles do they face, and how can cities better support these projects?"

Title: The Solar System is a Mountain: A Chinese Monk's Vision of the Cosmos
Faculty Mentor: Ben Van Overmeire
Status: Filled

This project examines the modern Chinese Buddhist monk Taixu's (1890–1947) distinctive vision of the cosmos, focusing on his attempt to reconcile traditional Buddhist cosmology with modern astronomy. While Taixu is widely studied as a reformer of Chinese Buddhism and a thinker engaged with science and Western political philosophy, scholars have rarely examined how these influences shaped his understanding of outer space. Central to this project is Taixu's claim that the traditional Buddhist "world mountain" should be understood as our solar system—a move that preserves Buddhist cosmology rather than abandoning it in the face of modern science. Building on groundwork completed last summer, this research centers on reading, translating, and analyzing key cosmological passages from Taixu's under-studied essay Essay on the True Nature of Reality, which has never been translated into English. The project will result in a collaboratively authored, peer-reviewed journal article.

Title: Novel Optoelectronic Materials Design and Fabrication for High-Performance Heat Harvesting
Faculty Mentor: Xiawa Wang
Status: Open

This SRS project explores high-performance heat harvesting using advanced optoelectronic thermophotovoltaic (TPV) concepts. Students will work on designing and testing a vertical junction module (VMJ) integrated with fluidic cooling (cold plates or microchannel-based cooling blocks) to improve power density, reduce thermal accumulation, and enhance operational stability under high heat flux. The project combines module fabrication/assembly, thermal–fluidic co-design, and electrical performance evaluation (I–V curves, output power, stability). Outcomes include a full experimental dataset and a technical report/paper, supporting future publications/patent filings.
Eligibility/Requirements: Engineering/physics/materials background preferred. Skills in MATLAB/Python, basic electronics measurement, and/or COMSOL/ANSYS simulation are highly desirable. Students should be motivated for hands-on experimental work with pumps/sensors/thermal testing setups.

Title: Spin-Regulated Oxygen Evolution Catalysis for Accelerated Water Splitting and Green Hydrogen Production
Faculty Mentor: Xiawa Wang
Status: Open

This SRS project focuses on developing high-performance oxygen evolution reaction (OER) electrocatalysts to enable faster and more energy-efficient water splitting for green hydrogen production. Unlike conventional catalyst optimization (e.g., surface area engineering or noble-metal loading), this project explores magnetism/spin-regulated catalysis, where magnetic ordering and spin polarization can influence charge transfer, adsorption energetics, and reaction kinetics in multi-step OER. Students will synthesize transition-metal oxide catalysts with tunable magnetic properties and evaluate performance with and without external magnetic fields. Key measurements include LSV, EIS, chronoamperometry, and ECSA, supported by materials characterization (SEM/TEM/EDS; XRD/XPS if available) and/or ab-initio calculations (VASP/Quantum Espresso).
Eligibility/Requirements: Material physics/chemistry background preferred.

Title: Ethics of AI in Global Health and the Biosciences
Faculty Mentor: Daniel Weissglass
Status: Open

This project aims to explore a cluster of vital, related issues in global health ethics and bioethics surrounding the use of artificial intelligence to improve health and drive basic research in the biosciences. There are no strict prerequisites or requirements, but priority will be given to students who:
(1) Have a related major (e.g., global health, economics, ethics and leadership, etc.)
(2) Have completed a course in Global Health Ethics or Bioethics
(3) Have demonstrated skills in applied ethical analysis
(4) Have other related course work.

Title: Learning to Solve Large Combinatorial Optimization Problems
Faculty Mentor: Paul Weng
Status: Open

Solving combinatorial optimization problems (e.g., Traveling Salesman Problem) is important because those problems are ubiquitous (e.g., bioinformatics, logistics). Since they are often NP-hard, a more practical and achievable goal is to learn to quickly generate good solutions for these problems. This project aims at developing novel deep reinforcement learning-based solvers, which can scale to large instances of these combinatorial optimization problems.
Eligibility requirements: computer science or data science major, excellent programming skills, strong capability and motivation to learn and self-study the necessary background knowledge in machine learning.

Title: Emotional Journeys and Identity Shifts: Student Teachers' Voluntary English Teaching in Xinjiang or Tibet
Faculty Mentor: Zhenjie Weng
Status: Filled

Led by Dr. Zhenjie Weng from LCC, this research project explores student teachers' emotional journeys and professional identity shifts during semester-long English volunteering teaching in Xinjiang or Tibet K-12 schools. The research intends to recruit one DKU college student to help collect relevant literature, monthly reflections, mid-semester interviews, and classroom artifacts; additionally, the student will be responsible for securely organizing electronic data, assisting with transcription, and contributing to qualitative analysis. You will gain hands-on experience in education research, cultural diversity studies, and ethical data management.

Eligibility:

- DKU college students (sophomore or junior; above 18 years old)
- Interest in language education, teacher development, or cultural diversity
- Strong organizational & communication skills
- Proficiency in data management
- Basic qualitative analysis awareness (preferred, not required)
- Commitment to data confidentiality

Title: Rural Queer Health: Ethnographic Research on HIV Prevention and Aging in Yunnan, China
Faculty Mentor: Andrew Wortham
Status: Open

Despite major advances in HIV prevention in China, infection rates continue to rise among older men who have sex with men (MSMs). This summer, our team will conduct ethnographic fieldwork in rural Yunnan Province examining how community-based organizations provide HIV prevention to older MSMs. We will work closely with local queer communities to document how HIV prevention is adapted to address social stigma, limited access to prevention medications, and the embodied experience of aging and sexuality. The project aims to produce publishable research that expands understanding of HIV prevention beyond urban centers and highlights the importance of grassroots health interventions in contemporary China. Students will be trained in ethnographic research methods and contribute directly to an ongoing, multi-year research program, with preference given to those able to work long-term and speak southwest Chinese dialects.

Title: Labor Regulation, Gig-Work Incentives, and Consumer Experience: Evidence from Proposition 22 and California TNC Data
Faculty Mentor: Qian Wu
Status: Open

The rapid expansion of the gig economy has raised fundamental questions about how labor classification affects worker welfare, consumer experience, and overall social surplus. In California, Proposition 22 (passed in November 2020) created a unique labor regime by exempting Uber and Lyft drivers from employee classification, introducing a new compensation formula, and substantially lowering labor costs for platforms.
This project leverages detailed regulatory microdata to study how a major labor policy shock, which effectively "pushed drivers further away from employee status", changed the behavior of drivers and the experience of consumers. This question is central to ongoing debates on whether gig workers should be treated as employees and what the welfare implications of such policies are.
Eligible students should have taken at least one programming course and can program in one of the following languages: R, STATA, Python. All majors are welcome.

Title: Bridging the Evidence Gap: A Comparative Quantitative Analysis of Global Health Disparities Between the Younger-Old (65-79) and Older-Old (80+)
Faculty Mentor: Lijing Yan
Status: Open

As the global population ages, the "older-old" (80+) are becoming the fastest-growing demographic, yet their health profiles remain under-researched compared to the "younger-old" (65-79). This project utilizes large-scale longitudinal cohort data (e.g., CLHLS, CHARLS) to quantify disparities in disease patterns and epidemiological trends between these groups, contributing to evidence-based geriatric public health. Ideal candidates are students majoring in Global Health, Data Science, or related fields with a basic understanding of epidemiology. Proficiency in R or Stata for data cleaning and regression modeling is highly preferred, as students will be deeply involved in secondary data analysis and manuscript preparation for peer-reviewed publication.

Title: Comparative Analysis of Environmental Sustainability in Radiation Oncology: A Cross-Institutional Study between U.S. and Chinese Hospitals
Faculty Mentor: Yanran Yang
Status: Open

Healthcare contributes to greenhouse gas emissions, yet department-level energy footprints are rarely measured—especially in energy-intensive specialties such as radiation oncology. This project will develop and pilot an energy- and equipment-focused evaluation matrix for radiation oncology departments in China and the United States. Two DKU undergraduates will: (1) synthesize literature to define indicators (e.g., duty cycles, idle-load share, energy per treatment); (2) build a data dictionary and scoring framework; and (3) pilot-test the matrix with simulated data and/or available operational information from Kunshan hospitals, producing preliminary analyses and visualizations. Students will gain experience in literature review, applied sustainability research, and research communication. Majors/interests in Environmental Science, Computational and Design, Global Health, or related fields are welcome; basic Excel/R/Python preferred.

Title: Uncertainty-Guided Abdominal Segmentation: Anatomy-Variation Simulation, Benchmarking, and Clinician-Oriented Visualization
Faculty Mentor: Zhenyu Yang
Status: Open

Accurate abdominal organ segmentation is essential for medical imaging workflows, but today's auto segmentation algorithm can produce convincing-looking results that are wrong in subtle ways. This project will build an easy-to-use "uncertainty map" that visually flags where an auto-segmentation is most likely unreliable, so users can focus checking and correction on a small number of key regions. Using only public abdominal CT datasets, we will clean and standardize the data, create realistic anatomical variations, and measure how consistently different models make the same prediction—turning disagreement into an uncertainty heatmap. Undergraduate researchers will be full collaborators and will lead major parts of the work, including dataset curation, running large-scale experiments, and building clear visualization tools. Recommended majors: CS, Data Science, Mathematics, Skills: Python required; basic machine learning helpful but not required.

Title: How a Cell's "Recycling Center" Helps Control Inflammation: A Student-Collaborative Study of TLR4 Immune Signaling
Faculty Mentor: Jianbo Yue
Status: Open

We are recruiting student researchers for a project investigating how a cell's "recycling center" (lysosome) helps control inflammation. Immune cells use the receptor TLR4 to sense bacterial signals (LPS) and trigger defense responses, but TLR4 produces different outputs depending on whether it signals at the cell surface or after being internalized into endosomes. This project tests whether a lysosomal calcium signaling module (LAMTOR1–NAADP–TPC2) regulates TLR4 trafficking and interferon-related signaling, shaping inflammatory outcomes. Students will gain hands-on experience with macrophage culture, immune stimulation, qPCR/ELISA or Western blotting, and/or microscopy-based trafficking assays, with opportunities for conference presentation and publication contribution. Eligibility: majors in biology related fields preferred; coursework in cell biology and/or molecular biology recommended; basic lab skills required; prior experience with qPCR, immunoblotting, or fluorescence imaging i

Title: Digital Innovation and Mechanism Design for the Global Nomad Economy
Faculty Mentor: Luyao Zhang
Status: Open

The World Economic Forum identifies digital mobility as transforming global labor markets while exposing regulatory gaps in taxation, housing, and infrastructure, especially in emerging economies. This project addresses these challenges using mechanism design, a Nobel Prize–winning framework for designing institutions under strategic behavior and limited information. However, existing theory assumes fixed populations and jurisdictions, making it poorly suited for highly mobile, globally distributed workers. This research advances the field by integrating economic modeling with computational tools and data-driven policy simulations that explicitly account for mobility and cross-jurisdictional incentives. Students will participate as research collaborators on data construction, visualization, causal analysis, and computational simulations, contributing to open and reproducible research outputs. Open to students in economics, data science, computer science, and digital media.

Title: Mission Possible: Interfaces for catalytic, electronic, and biomedical applications
Faculty Mentor: Tan Zhang
Status: Open

Interfaces are a thin boundary that separates two phases. They exist everywhere in our world. Guess what, your fingers must be touching a solid-air interface while reading this paragraph. Do you know that interfaces can change the behavior of molecules completely? Liquid water can behave like ice if it migrates to an interface, and a stable molecule can be reactive by relocating to an interface. By engineering an interface, we can make many impossible missions possible (like what Tom Cruise did in Mission: Impossible). In this project, you will create different interfaces and explore their applications in catalysis, nanomaterials, and biomedical applications. The minimum course requirement is CHEM 110, and the major in Materials Science or Environmental Science – Chemistry track is preferred.

Title: Carrier recombination channels and dynamics in GaAs/AlGaAs quantum wells
Faculty Mentor: Changcheng Zheng
Status: Filled

How do electrons and holes recombine in GaAs/AlGaAs quantum wells? Using photoluminescence (PL) and Raman spectroscopy, two undergraduate researchers will map radiative vs non-radiative recombination pathways, excitonic features, and phonon-assisted processes as functions of temperature and excitation power. Raman will identify phonon modes/strain/composition and carrier–phonon coupling; PL will quantify emission energies, linewidths, and intensity trends. Students work as a team (lead/assist alternately), analyze data in Python/OriginLab, and produce a final report and poster suitable for DKU Signature Work and/or conference submission. Eligibility: complete or about to complete PHYS 201 (or equivalent); comfort with basic programming/data analysis and lab work; careful experimental note-keeping.

Title: Defect induced photoluminescence (PL) in 3C-SiC and its impact on the Raman peaks
Faculty Mentor: Changcheng Zheng
Status: Filled

We seek 2 undergraduates for a 9-week summer project on defect-induced photoluminescence (PL) in 3C-SiC and how lattice strain/disorder alters the polarization dependence of PL and Raman peaks. After literature review and training on PL/Raman systems, polarization optics, and temperature control, students will acquire matched temperature-dependent PL and polarization-resolved Raman spectra and analyze peak positions/linewidths and polarization contrast to correlate optical signatures with lattice perturbations. Student A leads PL; Student B leads Raman; both assist, cross-train, and co-author a final report. Students should have taken or be about to take PHYS 201 or equivalent.

Title: Optical simulation for assessing the causes of myopia in the human eye
Faculty Mentor: Changcheng Zheng
Status: Filled

This project explores the optical consequences of eye shape remodeling to better understand the causes of myopia. Using optical simulation software (Zemax/ COMSOL), the student will model different geometric growth paths of the eyeball—such as axial elongation and posterior scleral deformation—and analyze their effects on image quality and aberration structure. This research aims to test whether axial length alone is sufficient to describe myopic progression. The project is simulation-based, but work needs to be done on campus for accessing the software and in time discussion. Students should have taken PHYS 122 or equivalent.

Title: A Top-Down Approach for Detecting Unaccounted Urban Ethane Emissions from Oil and Natural Gas Activities in China Using Hyperspectral Satellite Observations and Physics-Informed Neural Networks
Faculty Mentor: Tongshu Zheng
Status: Open

This project quantifies unaccounted urban ethane emissions from oil and natural gas activities in China using satellite observations and machine learning. Ethane is an important contributor to air pollution and a key tracer of natural gas leaks. Students will develop a novel ethane retrieval method that combines hyperspectral satellite data with physics-informed neural networks to map ethane over major Chinese cities. By comparing satellite-retrieved ("top-down") estimates with official emissions inventories ("bottom-up"), the project will reveal underestimated emissions and assess the effectiveness of recent energy policies in China. Students will run atmospheric chemistry and physics models (UNL-VRTM and GEOS-Chem), train neural networks in PyTorch, and work on DKU Compute Cluster. Open to computer science, math, data science, physics, environmental science majors. CS101 and CS201 required; ENVIR101(2) recommended. Prior experience with remote sensing or deep learning is desirable.

Title: Cognitive Basis of Self-Categorization in Autistic and Typically Developing Children
Faculty Mentor: Wen Zhou
Status: Open

Autism Spectrum Disorder (ASD) is a neurodevelopmental condition characterized by differences in social communication and interaction. Although many children with ASD attend mainstream schools to promote inclusion, they often experience persistent peer difficulties. Prior research in adults highlights the tendency to represent oneself as a group member as a key mechanism supporting social interaction. Emerging evidence suggests that autistic traits are associated with reduced self-categorization, potentially due to weak central coherence (WCC), a cognitive style favoring local over global processing. However, empirical tests of this account in children, particularly those with a clinical ASD diagnosis, remain scarce. The present project examines the relationship between WCC and self-categorization in autistic children compared to TD peers. Students need to take PSYCH203 and 205 before joining this project.

Title: The role of status in the development of dehumanization
Faculty Mentor: Wen Zhou
Status: Open

Dehumanization is a powerful predictor of intergroup aggression. Recent work indicates that dehumanization and its link to harmful intent emerge early in childhood. However, how children come to see other groups as less human remains unclear. A central insight from adult research is that dehumanization is built upon a desire to maintain social dominance, functioning as a psychological mechanism that legitimizes inequality by portraying lower-status groups as less fully human and therefore less morally deserving. While children demonstrate sensitivity to inequality from a young age and use status information to guide their social evaluations, it remains unknown whether hierarchy-related beliefs similarly drive dehumanization in children. The present project thus aims to investigate whether perceived inequality and dominance beliefs shape children's tendency to dehumanize and their engagement with intergroup harm. Students must complete PSYCH203 and 204 prior to join the research.

Title: Assessing the Cognitive and Pedagogical Impacts of Short-Form Video
Faculty Mentor: Yisu Zhou
Status: Open

This project conducts a systematic literature review on the relationship between students' attention behaviors and learning strategies resulting from short-form video (SFV) consumption (e.g., TikTok, Instagram Reels). The researcher will synthesize qualitative and quantitative empirical studies covering diverse topics, ranging from "TikTok self-control failure" and "academic-media multitasking" to the potential of SFVs as "microlearning tools." This project serves as preparation for students conducting "Signature Works" in educational psychology, sociology, media studies, or digital literacy. Beyond peer-reviewed articles, the student will engage with foundational texts to build a robust understanding of pedagogy and the science of learning.

Title: Book Project: Future of the Workers: New Village Movement and the Building of the Chinese nation, 1919-1936
Faculty Mentor: Qian Zhu
Status: Filled

This research initiative investigates the history of grassroots community-building and state-sponsored public housing for migrant workers and the urban poor during the Republican era in China. The project seeks to map the development and impact of these social and spatial interventions through archival analysis and digital humanities methods.
Research Responsibilities:
Selected student researchers will contribute to the following core tasks:
•Conducting targeted online archival research to identify and gather relevant primary sources.
•Processing primary materials through translation (Chinese to English) and systematic documentation.
•Creating clear summaries and performing categorical organization of materials by year and city.
•Assisting in the development of interactive digital maps to visualize community and housing project locations and data.
Qualifications:
Applicants must be currently enrolled majors in either Global China Studies or Society and Culture. Additionally, candid

Title: Geometric-Aware Representation Learning for Neural Manifolds
Faculty Mentor: Dongmian Zou
Status: Open

This project studies neural manifolds using representation learning methods that preserve their geometry and shape, rather than relying on linear projections such as dPCA. Neural activity is treated as a structured object where distances, neighborhoods, and global organization carry important information. The student will explore geometry-based methods that compare manifolds through their internal distance patterns (e.g., Gromov–Wasserstein distances) and shape-based methods that describe the overall structure of the data using topological summaries. These geometric and topological features will be used for tasks such as visualization of neural manifolds and understand how brain works through neural manifolds. The project frames neural manifolds as rich data objects and applies modern machine learning tools to learn representations. Students are expected to have working knowledge in machine learning and an interest in this topic.

Title: Neural Networks Inspired by Harmonic Transformations on Curved Spaces
Faculty Mentor: Dongmian Zou
Status: Open

This project uses harmonic transformations as the foundation for designing neural networks. Instead of viewing geometry as a constraint for embedded data, it treats data as signals defined directly on curved spaces. In fact, classical convolutional neural networks are closely related to harmonic transforms such as the Fourier and wavelet transforms. Building on this connection, the project explores how ideas from Fourier and wavelet analysis can guide the design of neural layers on manifolds, including hyperbolic space and the space of symmetric positive definite (SPD) matrices. The emphasis is not on embedding data into curved spaces, but on learning and processing functions defined on these spaces. This perspective shows how new neural architectures can be systematically derived from geometric principles and harmonic analysis. Students are expected to have working knowledge in machine learning and interested in this topic.