2022 SUMMER RESEARCH FACULTY PROGRAM
PROJECT DESCRIPTIONS
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Charlotte Food System Challenges and Opportunities

Mentor: Nicole Peterson  
Mentor Title: Associate Professor  
Department: Anthropology

**Project Description:**  
Student researcher would assist with the 2021-2022 State of the Plate food system assessment, including web-based surveys of food-related organizations, interviews with food system participants or policymakers, and analysis of this data. The research assistant would be trained to collect and analyze the survey and interview data, and would also help with the logistics of data collection and analysis and communication of results. This project is being coordinated by the Charlotte-Mecklenburg Food Policy Council, in collaboration with many other organizations around Charlotte.

**Community Partner:**  
Charlotte-Mecklenburg Food Policy Council

**Student Qualifications:**  
None required, but interview or quantitative analysis skills a plus

**Semester:** Summer 2022
Comparative Study of Protein-DNA Interactions

Mentor: Jun-Tao Guo  
Mentor Title: Full Professor  
Department: Bioinformatics and Genomics

Project Description:
Hydrogen bonds play important roles in protein folding and protein-ligand interactions, particularly in specific protein-DNA recognition. Protein-DNA interactions play critical roles in regulation of gene expression, histone packaging, DNA replication, repair, modification and recombination. This project will investigate the difference of hydrogen bonds between protein-ssDNA (single-stranded DNA) and protein-dsDNA (double-stranded DNA) interactions. More specifically, the strength of hydrogen bonds between the two types of protein-DNA complexes will be compared. The study will help better understand the specific protein-DNA interactions. The summer scholar will learn the basics of protein structures and protein-DNA interactions and how to run programs to identify hydrogen bonds in protein-DNA complexes. The scholar will also be involved in data analysis and writing project reports.

Student Qualifications:
Programming and statistical analysis skills. Knowledge in biology and chemistry will be a big plus.

Semester: Summer 2022
Nanosensors

Mentor: Jun Wang  
Mentor Title: Full Research Professor  
Department: Bioinformatics and Genomics

Project Description:  
Prepare nanosensor devices and evaluate the analytical performance of the nanosensor. Their duties include: prepare solution and nanosensor devices, optimization of the nanosensor, and test the nanosensor with standard solutions and establish the analytical performance of the nanosensor including sensitivity, linear dynamic range, and reproducibility, etc.

Student Qualifications:  
Majored in chemistry, biochemistry, biology, or bioengineering and has hand-on skills in a wet lab, research experience in nanotechnology, conducting polymers, electrochemistry, Fluorescence, UV-vs, biosensors, etc. experience with Powerpoint and Excel, etc.

Semester: Summer 2022
Phage Elucidation in Modern Microbialites

Mentor: Richard Allen White III
Mentor Title: Assistant Professor
Department: Bioinformatics and Genomics

Project Description:
Elucidation of novel phage that interact with cyanobacteria that turn carbon dioxide, methane, and nitrous oxide into hard carbonate rocks. Will sequence, characterize, and annotate novel phage genomes including new isolations.

Student Qualifications:
Computer and technical skills.

Semester: Summer 2022
Paleoneurobiology of Olfaction in Non-Avian Dinosaurs and Stem Archosaurs

**Mentor:** Laurel Yohe  
**Mentor Title:** Assistant Professor  
**Department:** Bioinformatics and Genomics

**Project Description:**  
Just under 250 million years ago, the availability of new niches after the Permian-Triassic extinction suddenly exposed primitive archosaurians (ancestral birds, dinosaurs, and crocodiles) to a wide breadth ecological opportunity. Interaction with novel environmental cues and ecological innovation requires the evolution of adaptations that optimize the detection and processing of new sensory signals, requiring specialization of sensory organs (e.g. eyes, ears, nose) and modifications of the receiving brain architecture. Many living birds evolved higher visual acuity and complex auditory processing; crocodilians also exhibit elegant acoustic behaviors. But what about the sense of smell? Relative to vision and hearing, and despite chemosensation being the most ubiquitous sense in animals, olfaction among modern taxa and its evolution is far less understood, let alone in fossils. How did the non-avian dinosaur brain cope with the complex chemical space of its time? Are there osteological proxies to suggest dinosaurs and other stem archosaurs were more or less olfactory inclined? What can we infer about dinosaurian olfaction from the genomic components of the highly divergent olfactory system of crocodilians and birds? The purpose of this project is to explore the molecular, ontogenetic, and morphological diversity of olfaction in non-avian dinosaurs and other stem archosaurs. I will use modern taxa of related clades to trace the evolutionary history of smell and make new inferences of available fossil data to characterize the chemosensory diversity of extinct archosaurians. Students duties will include performing cutting edge staining and imaging technologies (e.g. immunohistochemistry on whole mount embryos) and harvesting genomic regions of archosaurs for sensory-related genes to infer ancestral conditions in dinosaurs.

**Student Qualifications:**  
Molecular lab skills and/or scripting/programming experience is preferred, though not required.  
**Semester:** Summer 2022
Functional Genomic Basis of Olfaction in Aquatic and Terrestrial Turtles

**Mentor:** Laurel Yohe  
**Mentor Title:** Assistant Professor  
**Department:** Bioinformatics and Genomics

**Project Description:**  
The shift from aquatic to terrestrial environments and vice versa is accompanied by major morphological changes in feeding, respiration, and locomotion. Yet, much less is known about how these shifts affect the detection of novel environmental cues. Chemoreceptor genes compose the largest proportion of the vertebrate protein-coding genome and are among the fastest evolving, likely rapidly responding to a diverse and ever-changing chemical space. It has long been speculated, though rarely tested outside of model organisms, that subfamilies Class I and Class II of olfactory receptors show distinct responses to waterborne or volatile chemical cues, respectively. If this were the case, I expect aquatic and semiaquatic animals possess larger repertoires of Class I receptors and the opposite for terrestrial vertebrates. Testudines (turtles and tortoises) exhibit among the largest diversity of chemoreceptors and my preliminary results suggest that aquatic turtles do indeed have more Class I receptors. My project proposes to functionally assay Class I receptor genes in tortoises to determine whether they do more readily respond to waterborne odorant cues. Students will learn wet lab skills and primer design, gene amplification, and bioinformatics. There is also opportunity to learn ways to connect these patterns to morphological data.

**Student Qualifications:**  
Wet lab skills, knowledge of biology and genetics, willingness to learn basic R skills.

**Semester:** Summer 2022
Targeting Inflammation to Prevent Breast Cancer Progression

Mentor: Didier Dreau  
Mentor Title: Full Professor  
Department: Biological Sciences

Project Description:  
The overall goal of the research is to assess the potential of modulating the inflammatory molecules & triggers to prevent breast cancer progression. Additionally, mechanisms of cell-cell and cell-stroma interactions in tumor progression will be determined.

Student Qualifications:  
Ideally, the student will have (1) an interest in the research topic, (2) basic biological background/knowledge including in mammalian cell biology and (3) some research experience is preferred. Some experience with Microsoft Office suite expected.

Semester: Summer 2022
Novel Viruses to Treat Pancreatic Cancer

Mentor: Valery Grdzelishvili  
Mentor Title: Full Professor  
Department: Biological Sciences

Project Description:
Pancreatic cancers, about 95% of which are pancreatic ductal adenocarcinomas (PDAC), have the worst prognosis of all cancers and will soon be the second leading cause of cancer-related deaths in the United States. Current treatment regimens clearly fail to benefit patient survival. Oncolytic virotherapy is a relatively new anticancer approach that utilizes replication-competent viruses to specifically infect and kill tumor cells. Our studies focus on vesicular stomatitis virus (VSV) as a treatment for PDAC. VSV is a promising OV, and several phase I clinical trial using VSV against different cancers are in progress. Our recent studies demonstrated that VSV is effective against the majority of clinically relevant PDAC cell lines tested, both in vitro and in vivo; however, some PDAC cell lines were resistant to virus-mediated oncolysis. These results suggest a need for better "armed" OVs to enhance OV efficacy. Our preliminary studies generated several novel recombinant VSVs expressing human genes, which have anti-tumor and pro-apoptotic properties. In addition, we have identified several promising combinations of viruses with drugs that improve the OV therapy. The proposed experiments will test these novel treatments against a panel of human PDAC cells in vitro. The student will use several cell biology, molecular biology and virology assays to examine abilities of viruses to infect, replicate in, express foreign, and kill cancer cells. We hypothesize that these new viruses will have a significantly increased anticancer efficacies compared to the parental VSV strain. Summer Scholars will directly participate in this project by conducting and analyzing experiments using well-established protocols in Virology, Cell Biology and Cancer Biology. Summer Scholars will be trained and closely supervised by Dr. Grdzelishvili, interact and collaborate with other lab members, and participate in the writing research papers based on the obtained research data.

Student Qualifications:
General knowledge of laboratory techniques, equipment and terminology. Basic knowledge of Virology and previous lab experience working with viruses is preferred.

Semester: Summer 2022
Responses of Coastal Marine Organisms to Environmental Stress

Mentor: Paola Lopez-Duarte
Mentor Title: Assistant Professor
Department: Biological Sciences

Project Description:
Coastal habitats are dynamic environments exposed to predictable (environmental cycles) and unpredictable (environmental stress) processes. We study the adaptations of marine organisms to these cycles as well as responses to stress and the factors that help maintain healthy marine populations. We are particularly interested in saltmarsh habitats, nursery areas where the young of different fish and invertebrates find refuge and abundant food. Students interested in working with us will focus on one project and will have opportunities to help other members of the lab with their projects. Please review the short project descriptions below and indicate your project preference (you can pick one or both) and availability to travel to Georgetown, SC, for over periods of 2-5 days to conduct field experiments (mileage reimbursements and accommodations will be provided). Travelling is not a requirement, but we need this information to plan ahead. Learn more at www.lopezduartelab.com.

1) Thermal Ecology. The objective of this project is to measure behavioral and genetic responses to thermal stress using fiddler crabs as a model system. We do this by exposing animals to different temperature conditions in the field and laboratory. Students working on this project will analyze environmental datasets (temperature, tide predictions) that will inform exposure experiments in the lab and will help to identify the factors that influence responses in the field.

2) Saltmarsh Restoration. The objective of this project is to determine whether newly-created marshes are functionally equivalent to reference sites. We do this by comparing the biodiversity of coastal fish and invertebrates. Students working on this project will take advantage of existing macroinvertebrate collections (small crustaceans, worms, insects, spiders) to sort and identify organisms under a microscope and evaluate biodiversity indices at our study sites.

Student Qualifications:
Curiosity for the natural world and a genuine interest for pursuing research and learning new skills. Training on different field and laboratory protocols, use of instruments, and statistical analysis software will be provided during the course of the program.

Semester: Summer 2022
Mechanisms of Stress Tolerance in Marine Invertebrates

Mentor: Adam Reitzel  
Mentor Title: Full Professor  
Department: Biological Sciences  

Project Description:  
Animals use a variety of molecular mechanisms to respond to their changing environments. Our group uses a combination of lab experiments and molecular techniques to understand how marine invertebrates respond to stressful conditions, including temperature and salinity. For this research we will use an estuarine cnidarian (Nematostella vectensis) to determine pathways involved in acclimating to these environmental variables. The Summer Scholar will immerse in a mentored research experience where they will learn experimental design, molecular assays, and data analysis.  

Student Qualifications:  
No specific qualifications required except an eagerness to learn.  
Semester: Summer 2022
Antibiotic Collateral Sensitivity in Burkholderia Species

Mentor: Todd Steck  
Mentor Title: Associate Professor  
Department: Biological Sciences

Project Description:  
Antibiotic collateral sensitivity occurs when a bacterium that becomes resistant to one antibiotic also becomes more sensitive to a second antibiotic. We are using a combination of microbiology and molecular biology techniques to determine if this phenomenon can be exploited to solve the growing antibiotic resistance crisis.

Student Qualifications:  
Background in biology, strong work ethic, detail oriented.

Semester: Summer 2022
Identify Genes Involved in Symbiosis Establishment by Single-Cell Transcriptomics

**Mentor:** Ting ting Xiang  
**Mentor Title:** Assistant Professor  
**Department:** Biological Sciences

**Project Description:**
Many genomes of cnidarian host species (corals and sea anemone Aiptasia) and algal symbionts have been sequenced in the past decade, but our understanding of the symbiosis genes lags far behind. In cnidarian animals, the symbiotic interactions between the host and symbiont specifically occur in the gastrodermal cells, which are estimated as ~5% of the total number of cells in the coral animal. However, current knowledge of potential symbiosis genes were based on bulk RNA Sequencing (RNA-seq) analysis from multicellular hosts, which mute many symbiosis specific responses due to the inclusion of host cells that do not harbor symbionts but may comprise 95% of the whole cell population, and lost the real molecular features of symbiotic cells. As a result, there is an urgent need to conduct comparative analysis using single-cells to uncover unique genes in symbiosis. This aim will fill this knowledge gap by utilizing the single-celled ciliate Euplotes. Experimental Approach: We will utilize the single-celled model ciliate Euplotes which can be symbiotic or aposymbiotic to conduct single-cell RNA-seq to assess changes in the transcriptome during the transition from symbiotic to aposymbiotic status. This approach will identify differentially expressed genes which may be potential symbiosis-associated genes. Undergraduate students’ duties: 1) complete routine experimental rearing and generate cultures of symbiotic and aposymbiotic cells. 2) the simplified workflow of the single-cell RNA-seq library construction kit allows the students to complete the single-cell RNA-seq library construction. 3) students will conduct differential gene expression analysis using our established RNA-seq analysis pipelines for short reads mapping and data interpretation. The project can be a hybrid form with part 1 and 2 on campus and part 3 remotely.

**Student Qualifications:**
Laboratory skills including pipetting, PCR; Demonstrate habits of cleanliness and neatness; Ability to keep detailed records; Ability to follow oral and written instruction in English; Understanding the techniques required to care for cell cultures; Computer experience to maintain experimental records and other documents.  
**Semester:** Summer 2022
Constructing Redox Active Organometallic Polymers from Artificial Metalloenzymes

Mentor: Christopher Bejger  
Mentor Title: Associate Professor  
Department: Chemistry

Project Description: 
This main aim of this project is to prepare and characterize a series of new organometallic polymers comprising metal-sulfur cubane clusters and Janus-like N-heterocyclic carbenes (NHCs). Synthetic Fe4S4 clusters exhibit electronic, magnetic, and structural features found in native metalloenzymes. Additionally, such clusters can undergo multiple redox processes that are important for catalytic and energy storage applications. New, porous polymers made from these cluster building blocks are also expected to have enhanced stability and surface areas. Such features are useful for preparing functional materials such as supercapacitors or high surface area catalysts. Students working on this project will learn a series of organic, inorganic, and air-free synthetic techniques using glovebox and Schlenk line protocols. They will be trained in areas of molecular and material characterization including NMR, UV-vis, and IR spectroscopies, X-ray diffraction, thermogravimetric analysis, and scanning electron microscopy. Finally, students will perform electrochemical analysis on all new compounds and materials.

Student Qualifications: 
Qualified applicants will have successfully completed General Chemistry (1251 and 1252) and Organic Chemistry (CH 2131 and CH 2132) with corresponding laboratory courses.

Semester: Summer 2022
Synthesis of Novel Hydrocarbon Cage Compounds as Carbon Nanothread Precursors

Mentor: Markus Etzkorn  
Mentor Title: Associate Professor  
Department: Chemistry

Project Description:
Carbon nanothreads represent a unique one-dimensional hydrocarbon framework with desirable physicochemical properties (such as extreme tensile strength) for numerous applications in chemistry, engineering or material science. While several nanothreads have been accessed by high pressure procedures, organic synthesis offers a potential entry to some unique cage hydrocarbon scaffolds that would allow the preparation of novel nanothreads that are otherwise not yet accessible. The research project will introduce the participant to preparative organic chemistry, contemporary analytical techniques for the unequivocal identification of all reaction products, and structural characterization techniques. The goal of the project will be the preparation of important building blocks toward a novel cage hydrocarbon, or possibly the target compound itself. The research student would carry out standard and advanced organic chemistry protocols along a linear sequence, purify intermediates and products, and characterize any novel compounds. The project could potentially result in collaborative efforts with physicists to evaluate the high-pressure behavior of the envisioned target compounds.

Student Qualifications:
CHEM 2131 and CHEM 2131L required  
CHEM 2132 and CHEM 2132L (or CHEM 2136) desirable  
Semester: Summer 2022
Asymmetric Silicon Complexes for OLED Applications

Mentor: Tom Schmedake  
Mentor Title: Full Professor  
Department: Chemistry

Project Description:  
We will be synthesizing asymmetric silicon pincer complexes to be used as electron transport and electroluminescent components of organic light emitting diodes, OLEDs. The OUR summer scholar will be involved in synthesizing the new compounds, purifying them, and characterizing their molecular properties. If time permits, the student will also be involved in fabrication of thin films and OLEDs containing the new compounds and in measuring the performance of the devices.

Student Qualifications:  
Eligible students shall have completed General Chemistry I and II (CHEM 1251 and CHEM 1252). Preference would be to have also completed at least one semester of Organic Chemistry (CHEM 2131). Prior research experience is not necessary.

Semester: Summer 2022
Development of Bacterial Targeting Agents

Mentor: Jerry Troutman
Mentor Title: Full Professor
Department: Chemistry

Project Description:
Projects in the laboratory range from microbiology to synthetic chemistry with specific interests in developing materials to detect and/or target bacteria based on their unique glycan surface composition. Researchers will learn techniques in PCR, HPLC, LC-MS, and gene expression and protein analysis and purification.

Student Qualifications:
B or above in General Chemistry II.
Semester: Summer 2022
Synthesis of Novel Photosensitizers for Photodynamic Therapy

Mentor: Juan Vivero-Escoto  
Mentor Title: Associate Professor  
Department: Chemistry

Project Description:
Photodynamic therapy (PDT) is a well-known therapeutic technique used to treat a wide variety of diseases including cancer and wound infections. One of the main components for the success of this technique is the photosensitizer, which is a molecule that absorbs light and transfers the energy to produce reactive oxygen species. Novel photosensitizer molecules are needed to enhance the therapeutic effect of PDT. The goal of this project is to develop novel photosensitizers using silane derivatives to modify their physicochemical and photophysical properties. Our initial approach has been focused on the use of polyhedral oligomeric silsesquioxane (POSS) molecules. The participation of the undergraduate student(s) on this project will be focused on the synthesis and characterization of porphyrin-based POSS molecules that will be used for PDT. The undergraduate student(s) will learn the synthesis and characterization of these molecules using a variety of analytical techniques such as ESI-MS, NMR and FT-IR. Moreover, the student(s) will also develop skills to characterize the photophysical properties of those compounds using absorbance and fluorescence spectroscopy. Finally, the student will be involved in testing the PDT properties of porphyrin-POSS compounds in vitro settings.

Student Qualifications:
The undergraduate student(s) working in this project needs to have completed CHEM 2131 with a grade of B or above.

Semester: Summer 2022
Photochemistry of Thiazolothiazole Voltage Sensing Dyes

Mentor: Michael G. Walter
Mentor Title: Associate Professor
Department: Chemistry

Project Description:
This project is directed towards examining the photophysical properties (absorption and fluorescence emission/excitation spectra) of several newly synthesized thiazolothiazole (TTz) dye systems. Students working on this project will model structures using a computational software package (Spartan). This project will initially focus on optimizing the geometry of the thiazolothiazole materials using molecular mechanics followed by higher-level density functional theory calculations. The student working on this project will prepare solutions of TTz molecules and examine their steady-state absorption / fluorescence spectra to elucidate the charge transfer states of the dyes. The donor-acceptor properties of the charge-separated states will be determined using pump-probe picosecond time scale transient absorption spectroscopy. Students working on this project will also be exposed to some organic synthetic chemical transformations, small molecule characterization techniques, and dye sensing properties.

Student Qualifications:
1 yr. general chemistry, 0.5 yr. organic chemistry.
Semester: Summer 2022
Sorbent Tests for Capturing Emerging Contaminants in Water

Mentor: Mei Sun
Mentor Title: Assistant Professor
Department: Civil and Environmental Engineering

Project Description:
In this project, the Summer Scholar will test the capability of different solid sorbents in capturing a group of emerging organic contaminants in water. The sorbents with the best performance will be used to build sampling devices in further studies to measure the concentrations of these contaminants in the environment.

Student Qualifications:
Have taken Chemistry I and Chemistry I lab with a minimal grade of B for both courses. Preferred but not required: Have taken CEGR3141 and CEGR3155 with a minimal grade of B for both courses.
Semester: Summer 2022
What is Racial Equity in Professional Development?: Racial Equity Seminars, Curriculum, and Events for PK-12 Teachers

Mentor: Scott R. Gartlan
Mentor Title: Executive Director
Department: Col Liberal Arts Science-Dean

Project Description:
The Charlotte Teachers Institute (CTI), the CTI Teacher Steering Committee, and partners have committed to offering racial equity-focused seminars that produce curricula written by teachers for their students and other colleagues. Since 2017, CTI has offered 18 seminars centered on racial equity themes for hundreds of CMS teachers, who in turn, taught tens of thousands of PK-12 students. This research project will unpack the concept of racial equity in teacher professional development by examining seminar descriptions, teacher-written curricula, interviews, and videos. The purpose will be to shed light on what racial equity looks like for teachers and professors and to define key elements of racial equity professional development from teachers and professors who are doing the work. Students will be responsible for crafting a research question, developing a data collection plan, and carrying out that plan to completion. Student will complete a IRB application before data collection, including required human subjects research training.

Community Partner:
Charlotte-Mecklenburg Schools and Johnson C. Smith University

Student Qualifications:
Novice student researcher accepted, of course, any research experience will be helpful. A passion for racial equity work and a commitment to the value of public education, particularly teachers, are strongly recommended.

Semester: Summer 2022
Coordinated Exploration with Teams of Robots

**Mentor:** Srinivas Akella  
**Mentor Title:** Full Professor  
**Department:** Computer Science

**Project Description:**  
In the Robotics Lab, we are developing algorithms and software to explore and inspect indoor and outdoor environments with teams of coordinated robots (drones, mobile robots). Summer Scholars will work on cutting edge research in robotics and learn about optimization and machine learning algorithms and ROS (robot operating system). Summer Scholars will implement and evaluate algorithms, and potentially deploy the resulting software on real robots and to the cloud. Applications include inspection of critical infrastructure (e.g., power lines, roads) and search and rescue (e.g., during fires).

**Student Qualifications:**  
Coursework in Algorithms and Data Structures (ITSC 2214), Linear Algebra (MATH 2164), and Multivariable Calculus (MATH 1242). Experience in Robotics and/or Computer Graphics will be a plus. Should be comfortable with programming in C++ and/or Python.

**Semester:** Summer 2022
Text Analysis: What can be Learned Quickly and Automatically from Short or Large Texts?

**Mentor:** Mohsen Dorodchi  
**Mentor Title:** Full Teaching Professor  
**Department:** Computer Science

**Project Description:**  
Textual data is exchanged through different forms of social media such as Twitter or through private dedicated channels such as emails, customer feedback, etc. The goal of this undergraduate research is to overview syntactic and semantic-based analysis methods of texts for different forms and sizes of texts. An overview of Natural Language Processing/Natural Language Understanding will be followed by practicing some of the best-practices on different forms of data.  

**Student Qualifications:**  
ITSC 2214 is required, Familiarity with Python or willing to learn Python.  
**Semester:** Summer 2022
Developing a Privacy Safeguard for Sensing Data

Mentor: Liyue Fan  
Mentor Title: Assistant Professor  
Department: Computer Science

Project Description:  
Sensing data captured by smartphones and cameras is largely used by commercial as well as research applications. Such data may contain sensitive, personal information, the disclosure of which may lead to severe privacy breaches. For example, read “The dark side of geo: PleaseRobMe.com?” published on CNET in 2010. The objective of the project is to develop novel privacy-enhancing solutions to safeguard private information while sharing sensing data. Specifically, the summer scholar will study literature in location privacy and computer vision, develop new privacy methods to hide sensitive information in the data, and conduct empirical analysis using large scale datasets. The scholar will work in a lab with established multi-institutional and multi-disciplinary collaborators. The scholar will report research findings periodically during lab meetings and whole project-team meetings.

Student Qualifications:  
Interests in computer security and data privacy; experience with data structure/algorithms (such as covered in ITSC 2214); sufficient programming skills in python or Java; good communication and interpersonal skills.

Semester: Summer 2022
Machine Learning for Brain Computer Interfaces

Mentor: Minwoo Lee
Mentor Title: Assistant Professor
Department: Computer Science

Project Description:
Brain Computer Interfaces (BCI) aim to direct communication between human brain and AI. This project aims to develop machine learning methods to facilitate BCI for diverse applications.

Student Qualifications:
Programming (in Python), familiar to machine learning, Interest in BCI.

Semester: Summer 2022
Revenge Pornography: An Examination of State Statues

Mentor: Charisse Coston
Mentor Title: Associate Professor
Department: Criminal Justice & Criminology

Project Description:
An examination of the state laws against revenge pornography.

Student Qualifications:
Student who is a Junior.
Semester: Summer 2022
Applying the Research Literature to a Case of Serial Murder

Mentor: Charisse Coston  
Mentor Title: Associate Professor  
Department: Criminal Justice & Criminology  

Project Description:  
The student will apply research to an actual case of a serial murder.  

Student Qualifications:  
Student who is a Junior  
Semester: Summer 2022
Odissi’s Transnational Intersections

**Mentor:** Kaustavi Sarkar  
**Mentor Title:** Assistant Professor  
**Department:** Dance

**Project Description:**  
The project focuses on archiving the transnational travels of the eastern Indian dance form of Odissi and how it has shaped cultural production elsewhere. Odissi is a globally popular art form with professionals emerging from people of non-Indian origins as well. Odissi has influenced other cultures since its infusion within the Afro-Brazilian dance technique called Silvestre is well-known. The Malaysian artist Ramli Ibrahim has made Odissi dance his home and spread the dance all over the world. This project hopes to identify the global travels of Odissi and focus on its various styles, that is, lineages belonging to Guru Kelucharan Mohapatra, Guru Debaprasad Das, Guru Pankaj Charan Das, and Guru Mayadhar Raut. The duties of the student will be to archive, curate, and help systematize the conference proceedings for an upcoming conference "Pluralism in Odissi" hosted by the Open Conference Systems at Atkins Library from June 20-27 2022. In addition, the student will focus on one linguistic intersection of Odissi. That is, the student will focus on Odissi in Brazil or France depending on the student's linguistic abilities.

**Student Qualifications:**  
The position requires research skills and completion of dance history courses in the Department of Dance. The student will need interviewing skills and ability to collect data in an online archive. The student needs to be multilingual (Spanish, French, or Portuguese preferred in addition to English).  
**Semester:** Summer 2022
Mapping Black Land in the American South

**Mentor:** Janaka Lewis  
**Mentor Title:** Associate Professor  
**Department:** English

**Project Description:**
This component of my research project on Black women and land wellness will be to create a digital map and descriptions of Black owned farms (or, general nature-based experiences) in Georgia, North and South Carolina. Some can be located through Black Farmers NC and SC organizations and farmers markets, where vendor lists can also be used. Desired information is location, digital presence (website, social media), products available and method of distribution, and contact information available. The plan is to use the digital map as a basis for a National Endowment for the Humanities grant proposal and eventually a conference or symposium on Black women's roles in land ownership, use and wellness/well-being.

**Student Qualifications:**
Use of Microsoft and Google suite (docs, sheets, website), comfort with self-directed research.

**Semester:** Summer 2022
Early Modern English Culture and Book Trade Probate

Mentor: Kirk Melnikoff  
Mentor Title: Full Professor  
Department: English

Project Description:  
In the wake of William Caxton bringing the first printing press to London at the end of the fifteenth century, England experienced a communication revolution in the sixteenth and seventeenth centuries that transformed its economy and culture. A prime engine of this transformation were the printers, booksellers, publishers, and wholesalers who worked in London's ever burgeoning book trade. When they died, many of these men and women left extensive wills, and these open an essential window onto the practices and networks of this early trade. Within the next few years, the Book Trade Probate project (BTP) will provide a searchable online database of will transcriptions along with informative essays and resources related to the Early Modern English Book Trade. This coming summer the selected summer research scholar will contribute to this project. He/she/they will (1) learn how to read early modern secretary hand, (2) transcribe a number of sixteenth- and seventeenth-century book-trade wills, and (3) produce a short research essay on book-trade probate material that will eventually be published (with their name) as part of this database.

Student Qualifications:  
Applicants should have some familiarity with sixteenth- and seventeenth-century English culture (i.e. with the period's social practices, recreations, and/or book trade). Ideally, they should also have some experience with secretary hand, XML tagging, and basic word processing.

Semester: Summer 2022
Modeling and Data Analytics for Predicting Water Infrastructure Conditions

Mentor: Nicole Barclay
Mentor Title: Assistant Professor
Department: Engineering Technology & Construction Management

Project Description:
Dr. Nicole Barclay and Dr. Michael Smith are jointly seeking to mentor a promising undergraduate researcher on their project that addresses the critical problem of aging water infrastructure facing communities across North Carolina, bringing an increased risk of flooding and road washouts to municipalities constrained by tightening budgets and time. This project develops novel data-driven models for predicting water infrastructure conditions and identifies at-risk pipelines. The student's duties will include gathering and sorting relevant peer reviewed literature on the topic, collecting and analyzing data, writing summaries of their work, and collaboration with the research team through regular meetings, as directed.

Student Qualifications:
The student must be competent in Microsoft Excel, have strong communication skills (oral and written), and demonstrate keen data organization skills. Alternatively, students with proficiency in software applications such as Matlab, Python, and ArcGIS are desired and would be strongly considered. Training can be provided to students who are willing to learn.

Semester: Summer 2022
Water Quality Monitoring Instrumentation Platform for Data-Informed Aquaculture

Mentor: Michael Smith, Ph.D.
Mentor Title: Assistant Professor
Department: Engineering Technology & Construction Management

Project Description:
This project is focused on addressing the need for improved water quality monitoring (WQM) in North Carolina via a cost-effective instrument platform. An Internet of Things (IoT) strategy can be used to support data-driven decision making. Expanding the accessibility of WQM offers the opportunity for improvements in several focus areas, such as agriculture, drinking water, leakage detection, and aquaculture. This research focuses on the development of cost-effective WQM solutions that can be implemented in the aquatic environment (fisheries), so that (1) real-time data availability is increased, (2) the resolution of data mapped across an area is increased, and (3) additional process variables can be monitored for data-driven decision making. Dr. Michael Smith is seeking to mentor a promising undergraduate researcher on this project. Research tasks will include design, fabrication, and experimental testing of an instrument package platform to house the sensors (integrated sensor package) in a cost-effective robust network for coastal environment deployment. The student's duties will include performing literature review on the topic, designing / building / testing a WQM instrument platform, collecting and analyzing data, writing summaries of their work, and collaborating with the research team through regular meetings, as directed.

Student Qualifications:
The student must be competent in standard software applications (e.g., Microsoft Excel), have general knowledge of instrumentation/sensor, have strong communication skills (oral and written), and demonstrate clear data organization skills. Students that are familiar with Matlab, Python, and Arduino hardware/software are desired and would be strongly considered. Training can be provided to students who are willing to learn.

Semester: Summer 2022
Quantifying Water Quality and Hydrology in Urban Beaver and Stormwater Ponds

Mentor: Sandra Clinton  
Mentor Title: Research Assistant Professor  
Department: Geography and Earth Sciences

Project Description:  
Cities across the United States are struggling with issues of storm water because buildings and roads cannot soak up rain like soil. To solve this problem many cities invest in green infrastructure such as stormwater ponds. However, across the southeastern U.S., beaver live in urban streams, and they build ponds, too. Beaver are considered a nuisance species and are often killed, even though their ponds may be similar to storm water ponds for slowing water and improving water quality. The goal of this project is to compare how well beaver ponds store water, nutrients and sediments during both dry and wet periods compared to storm water ponds. The student working on this project will have 3 main tasks: 1) work with graduate students to collect water quality samples from 3 beaver ponds and 3 stormwater ponds in the Charlotte region; 2) process water samples in the lab for nutrients and total suspended solids, and 3) enter data into the shared project database. To determine if the ponds function in similar ways in different cities, this work is also being conducted in Atlanta, GA, Charlotte, NC, and Raleigh-Durham-Chapel Hill, NC. The student on this will be able to meet and interact with this larger interdisciplinary group of researchers.

Student Qualifications:  
Comfortable working outside during hot and rainy weather; Comfortable walking across vegetated and muddy landscapes; Lab experience (through coursework) is desired but not required; Knowledge of MS Excel.

Semester: Summer 2022
Idealized Simulations of High Shear, Low-CAPE Supercell Thunderstorms in Great Plains and Southeastern U.S. Environments

Mentor: Casey Davenport  
Mentor Title: Assistant Professor  
Department: Geography and Earth Sciences

Project Description:  
Severe thunderstorm environments that are characterized by strong vertical wind shear, yet minimal atmospheric instability (otherwise known as high-shear, low-CAPE [HSLC] environments) provide a significant challenge for operational weather forecasters; predicting when and where storms will form, and whether they will be able to produce severe weather has much uncertainty. The goal of this study is to compare and contrast the intensity, duration, and severe weather production of HSLC supercell thunderstorms occurring in two different geographic locations: the Great Plains and the Southeastern U.S. This will be accomplished by running idealized model simulations of supercells using background conditions from either the Great Plains or Southeastern U.S., and then testing the sensitivity of thunderstorm outcomes to various aspects of the kinematic and thermodynamic profiles.

Student Qualifications:  
Students must have completed METR 4105 (Meteorological Computer Applications), with a high level of comfort/proficiency working with the Fortran programming language in the Linux environment needed. Students should possess a willingness to run and debug complex computer code. Experience plotting meteorological data in Matlab, GrADS, or Python preferred. Students with additional coursework in meteorology (including Atmospheric Thermodynamics and Dynamic Meteorology) also preferred.

Semester: Summer 2022
The Ecosystem Services Provided by Trees in Charlotte Neighborhoods

Mentor: Sara Gagne  
Mentor Title: Associate Professor  
Department: Geography and Earth Sciences

Project Description:  
The goal of our project is to assess the benefits and disadvantages of trees on public and private property in some of Charlotte’s oldest neighborhoods. Our target neighborhoods are those with an average housing age of 60 years. We are particularly interested in assessing the trees in neighborhoods that vary in household income and their proportion of residents that identify as African American or Black. Next summer, we will be recording the diameter at breast height, species, and location of each tree in participating yards. This data will be plugged into the United States Forest Service's i-Tree tool to estimate the ecosystem services provided by trees in Charlotte. A summer research assistant would participate in fieldwork, data management, using iTree, and interacting with residents and neighborhood associations, as well as other project partners. The data collected by our project will be instrumental in helping Charlotte and its residents maintain an equitable distribution of tree canopy throughout the city.

Student Qualifications:  
Willingness to regularly travel across Charlotte and be outdoors, ability to work safely and independently in the outdoors under a wide range of conditions and weather types, willingness to participate in training, proficiency in Microsoft Office Suite; bonus if able to use a GPS unit, able to interact with trees, preferred course: Field methods or field methods equivalent.

Semester: Summer 2022
The Plastic Content of Urban Vulture Diets

Mentor: Sara Gagne  
Mentor Title: Associate Professor  
Department: Geography and Earth Sciences

Project Description:  
Some of our previous research has shown that black vulture and turkey vulture populations are choosing to roost in areas with more developed land cover and lower deer carcass density, indicating that vultures may be more reliant on urban areas and the resources and food sources that they provide. This project is investigating the diet composition and plastic consumption of vulture populations with respect to the amount of urban land cover surrounding vulture roosting sites to identify differences between populations and the impacts that plastics may have on vulture behavior, health, and reproductive success. A Summer Scholar would collect vulture pellets from several roosting sites around the Charlotte Metropolitan Area and dissect the pellets and identify all natural and anthropogenic materials contained. The Scholar would be responsible for maintaining an organized dataset, assisting with data analysis, and preparing a manuscript for journal submission.

Student Qualifications:  
The student must have access to a vehicle for transportation to and from field sites and the laboratory. They must be able to work in the field and the laboratory with minimal supervision and be able to use Microsoft Excel and Word. An introductory statistics course is required and experience with R is preferred. The student should have good written communication skills and be able to read, comprehend, and use scientific evidence in support of an argument.

Semester: Summer 2022
Equity Planning in Charlotte

**Mentor:** Fushcia Hoover  
**Mentor Title:** Assistant Professor  
**Department:** Geography and Earth Sciences

**Project Description:**  
The project examines the relationship between urban planning, green infrastructure, and property development. The first stage of the work will begin with a content analysis of City of Charlotte planning documents both including the recently accepted 2040 plan as well as existing sustainability and comprehensive plans. The student will compile planning documents from the city into a qualitative/quantitative coding software program. They will identify specific language within the documents based on predefined criteria to be determined over the summer. The student will also assist the professor with other data management tasks, including an existing database of city plans. This is part of a pilot program so additional opportunities will be available should the student wish to continue on the project.

**Student Qualifications:**  
Min: Proficient in word, excel and PowerPoint, strong interest in environmental justice and urban planning, comfortable working independently with guided tasks, Preferred: experience with Nvivo, Dedoose or other qualitative/quantitative coding software.  
**Semester:** Summer 2022
Newspaper Survey in Charlotte and Gaston County Concerning 1929 Loray Mill Textile Strike in Gastonia

Mentor: David Goldfield  
Mentor Title: Full Professor  
Department: History

Project Description:  
I'm researching a book on Ella May, a union organizer in Gaston County and a folk singer, and her legacy.  

Student Qualifications:  
Research skills, good writing.  
Semester: Summer 2022
First World War: History of Society & Culture

**Mentor:** Heather Perry  
**Mentor Title:** Associate Professor  
**Department:** History

**Project Description:**  
**Title:** World War I & the Re-Shaping of Culture & Society

I am working on the History and Memory of U.S. culture and society during the First World War -- primarily in North & South Carolina. I am looking for students to help me with two kinds of research: 1) research in online databases (historical newspapers, magazines, and government documents); and 2) research in the Atkins Library Special Collections. Students will help in identifying and collecting materials on topics such as: Camp Greene (army training camp in Charlotte); the role of the Red Cross & YMCA during the war; the role of children’s groups and educational institutions; and the history of the WWI internment camp in Hot Springs, NC. Students will also help develop materials for the online Digital History website: Carolina in the Trenches.

**Student Qualifications:**  
Students need: 1) experience using Atkins Library online research databases; 2) familiarity with using GoogleDocs, GoogleSheets, and GoogleDrive; 3) excellent organizational skills; 4) excellent communication skills in person, in writing, and via email; 5) genuine curiosity and interest in how men, women, and children on the United States *homefront* experienced the war. Students who can read and understand German are encouraged to apply.

**Semester:** Summer 2022
Climate Refugee Stories

Mentor: Tina Shull
Mentor Title: Assistant Professor
Department: History

Project Description:
Climate Refugee Stories is a digital history (multimedia narrative, archiving, and education) project directed by Dr. Tina Shull, Assistant Professor of Post-1960 US History, and supported by grants from NC Humanities and National Geographic Society. The project documents local and global stories of people who have been displaced by direct or indirect impacts of climate change and the ways communities are responding to compounding crises, including the COVID-19 pandemic. Stories are published on the project website in multimedia formats (oral history film and audio interviews, written testimonies, maps, timelines, photo essays, etc.), supported by historical research and educational materials (K-12 and college curriculum). The undergraduate student research assistant will assist Dr. Shull in project and research plans; researching Charlotte and North Carolina histories relating to themes that may include migration, environmental changes and environmental racism, race, family, segregation and gentrification, urban development, education, prisons and policing, and social justice activism; community outreach; story production; and digital publication contributing to a Charlotte-based component of the project to be titled "Charlotte Histories, Just Futures" that will be on exhibit at the Levine Museum in Charlotte and at Atkins Library in the Spring of 2023.

Community Partner:
Levine Museum of the New South

Student Qualifications:
I will work with the student to align their skills with appropriate research activities. The following qualifications are highly preferred: History, Sociology, English, Africana Studies, Latin American Studies or related major/minor, completion of some methods coursework (HIST 2600 or higher; LBST 2301), strong communication skills (both written and verbal), interest in environmental and/or social justice, immigrant rights, human rights, youth and education, ability to handle sensitive information with care and discretion, a community service ethos. The following are also desired but not required: Spanish-language proficiency, experience with web design, film editing, and/or digital file management, experience or training in journalism, oral histories, and/or archival research

Semester: Summer 2022
Changing Latin America from the Margins: The Legacy of the Bolivian Agrarian Reform in Latin America

Mentor: Carmen Soliz
Mentor Title: Associate Professor
Department: History

Project Description:
In September 1953, a month after Bolivian President Victor Paz Estenssoro signed a decree on agrarian reform that dismantled feudal haciendas in the western highlands, abolished the system of forced peasant labor, and redistributed expropriated lands to peasants, the National Federation of Peasants of neighboring Peru wrote to congratulate his decision to sign such a decree and requesting a copy. It was not surprising to find that Bolivia’s decree appealed to Peruvian peasants. Like Bolivia, Peru had a majority Indian population subject to peonage in large haciendas. General Manuel Odra, conservative President of Peru, was so afraid of the destabilizing political effects Bolivia’s agrarian reform could have in his country that he jailed the signatories of the letter to Paz Estenssoro and few months later closed the border with Bolivia. This event was one of a number of multiple episodes that disturbed Bolivia’s diplomatic relations after the Nationalist Revolutionary Movement (MNR) seized power in April 1952.

My research explores Bolivia’s international relations with its neighboring countries at the time of the Bolivian National Revolution (1952-1956). It analyzes the effects that MNR’s policies such as universal suffrage, peasant unionization, and land distribution had in the region. In particular, it examines Bolivia’s tense relations with the conservative President Manual Odra of Peru and the growing alliance with the nationalist and leftist President Jacobo Arbenz of Guatemala. I argue that the MNR’s iconic reforms not only reshaped Bolivia’s economic and social structure but also affected the political stability of neighboring countries because they powerfully encouraged those countries to rethink key questions about economic nationalism, democratization, and concentration of land in few hands.

This research, which stems from my previous work on Bolivian agrarian reform, contributes to historiography on diplomatic relations and studies about democratization in Latin America. Previous scholars drawn to the study the Bolivian National Revolution have sought to understand the impact of the revolution within the confines of Bolivia itself. When they have sought to understand the international context, they have focused on Bolivia's complicated relationship with the United States. While it is impossible to understand Bolivian politics without recognizing the undeniable influence of the United States, I argue this focus has obscured a number of other conflicts between Bolivia and other countries that have yet to be studied. These include: the role of the political exiles in shaping the diplomatic crisis between Bolivia and Peru, the destabilizing effect of the MNR’s decree on universal suffrage and unionization had on a region that widely continued to marginalize to the political voice women and Indian populations; the reaction the agrarian reform created among peasants and landlord elites of other countries, and the diplomatic conflict that Bolivia faced when the MNR started expropriating large estates that were in the hands of Argentinian, Chilean, Peruvian, and sometimes European landowners.

Over the last two summers I worked at the archives in Bolivia (Office of Foreign Affairs) and Guatemala (Centro de Investigaciones Regionales de Mesoamerica). I have collected hundreds of hundreds of photos. I am looking to have an undergraduate research assistant that could help me to organize and systematize the information by topics in three areas of analysis: universal
suffrage, peasant unionization, and land distribution. I don't think the student can work with both collections in ten weeks, but I certainly hope the student can help me to systematize the information of one of the above-mentioned archives. I also think that the process of organizing big piles of documents, summarizing the findings, can show the student the process of research and writing in history.

**Student Qualifications:**
All sources are in Spanish, this means that the student needs to be fluent in Spanish. I also prefer a student that has a background in history or Latin American studies.

**Semester:** Summer 2022
Risk of Female Athlete Triad

Mentor: Joseph Marino
Mentor Title: Associate Professor
Department: Kinesiology

Project Description:
The female athlete triad (FAT) is a combination of caloric insufficiency (or disordered eating), menstrual cycle irregularity or amenorrhea, and loss of bone density. Female athletes engaged in weight-regulated and volume-heavy athletics are at greatest risk for developing the FAT. The purpose of this study is to determine the risk of developing and prevalence of the FAT among the UNCC female athlete population. The data gathered from this study will help determine the level of risk and prevalence of the FAT between different sports so staff could be aware of the overall health of their athletes and which training constructs place athletes at highest risk. Furthermore, the dissemination of this data in a relevant peer-reviewed open access journal, will help sports performance specialist and strength and conditioning coaches provide a more wholistic approach to training. Our objective will be addressed through a combination of surveys and physiological measurements. Surveys will gather information of eating behavior, menstrual cycle regularity, and training. Physiological measurements will include a dual x-ray absorptiometry (DEXA) scan for bone density and body composition. The majority of the data collection will take place during the summer (data collection will begin mid spring semester) to avoid conflicts with scheduling athletes during their season. Since collegiate athletes maintain their training volume through the season, and sometimes increase their volume, this is a great opportunity to capture data related to the 3 components of the FAT. A summer scholar will be dedicated to this project, which will expedite data collection. Currently, Samantha Brooks, a dual Honors student (University Honors and Departmental Honors), is conceptualizing this project for her Honors thesis. Funding through the summer will allow her to dedicate the time required to complete this project and grow as a scientist and professional.

Student Qualifications:
English speaking, proficient in Microsoft office programs, prior coursework in research methods.
Semester: Summer 2022
Health Risk Assessments for Adults in the Greater Charlotte Community

Mentor: Trudy Moore-Harrison
Mentor Title: Clinical Assistant Professor
Department: Kinesiology

Project Description:
Community Health Risk Assessments will be completed at Mecklenburg County Parks and Recreation sites and on campus in the Health Risk Assessment lab. Health Risk Assessments consist on blood pressure, heart rate, pulse oximetry, pulmonary function, body composition, aerobic capacity, and blood analysis measurements. The Summer Scholar would be trained to fully assess individuals.

Community Partner:
Mecklenburg County Parks and Recreation

Student Qualifications:
The Summer Scholar will complete CITI training modules and be trained to complete health risk assessments. First Aid and CPR training will be required.

Semester: Summer 2022
Biofeedback and External Attentional Focus Training to Improve Biomechanics and Self-Reported Function in Patients with Chronic Ankle Instability

Mentor: Abbey Thomas Fenwick  
Mentor Title: Assistant Professor  
Department: Kinesiology

Project Description:
Lateral ankle sprains are the most common injury sustained by physically active individuals. An estimated 70% of people who sprain their ankle go on to develop a condition known as chronic ankle instability (CAI), which is characterized by recurrent bouts of instability and giving way of the ankle following an initial ankle sprain. Persons with CAI become are less physically active than their peers and often go on to develop osteoarthritis at the ankle. This project seeks to break the cycle of repetitive ankle sprains and pathway to long-term disability associated with osteoarthritis by introducing a novel form of biofeedback during standard of care rehabilitation for patients with CAI. Traditional rehabilitation following an ankle sprain uses an internal focus of attention, whereby the patient watches themselves in a mirror to receive feedback about how they are moving during the performance of a particular task. This process ultimately constrains the way people move and limits their ability to adapt to any changes in their surrounding environment, which is problematic during sports. Our biofeedback and external attentional focus training (BEAT)-infused rehabilitation forces the patient to focus on the environment in which they are moving. This method encourages patients to freely adapt to their surroundings and encourages longer-term retention of improved biomechanics in order to reduce reinjury risk. Participants in this study will undergo biomechanical and patient-reported function assessment at baseline and 1-, 4-, and 12-weeks following a 4-week intervention using either traditional or BEAT-infused rehabilitation. Summer research assistants will have the opportunity to interact with participants during testing sessions, getting hands-on data collection experience. Research assistants will also help with processing and analyzing already collected data. Basic computer skills, specifically using Microsoft Excel, are required. All other data collection and processing skills will be taught by the faculty mentor. Basic anatomical knowledge as would be learned in human anatomy and physiology is preferred.

Student Qualifications:
Basic computer skills (e.g., Microsoft Excel) required. Completion of anatomy and physiology preferred.
Semester: Summer 2022
Synthesizing Knowledge from Science for Performance Management Decisions

**Mentor:** Victor Zitian Chen  
**Mentor Title:** Associate Professor  
**Department:** Management

**Project Description:**  
This project seeks to extract, deconstruct, and synthesize causal insights from social sciences, business, and healthcare literature into decision models concerning healthcare and hospital performance. It will make three intellectual contributions. First, it has the first high-performance machine reading system for causal insight synthesis in the fields of social, behavioral, and economic sciences; it will automatically extract causal statements from textual data, deconstruct the causes and effects, cluster them based on semantics, and connect them into a logic network. Second, the system has the first knowledge graph-based reasoning system for enterprise management to identify hidden causal relations and make intervention recommendations; it will have an innovative integration of inductive knowledge from practitioners' mental models and deductive knowledge from the scientific literature. Third, the system has a novel approach to making statistical causal inference. Combining the causal knowledge graph with a large sample of healthcare system data, it will create a synthetic counterfactual from observatory data for each healthcare system and run causal analysis to identify the most effective actions for a given set of performance objectives. The role of the Summer Scholar(s) will be to help design and implement the knowledge extraction, deconstruction, and synthesis into a knowledge graph database. Their duties will include literature review, data collection from the literature, and preparation of the data into nodes and links ready for knowledge graph representation.

**Community Partner:** Premier Inc.

**Student Qualifications:**  
At least B+ in CGPA. English as the first language.

**Semester:** Summer 2022
Image Processing: Filters and Convolutions

**Mentor:** Xingjie Helen Li  
**Mentor Title:** Associate Professor  
**Department:** Mathematics and Statistics

**Project Description:**  
In summer 2022, the student and I will study the matrix convolution with application to imaging and video streaming data. We will study various popular filter kernels to understand their effects on imaging data. We will also study the google CoLab and implement tensor flow to utilize convolution neural network for data procession.

**Student Qualifications:**  
The students must have a minimum GPA of 3.3. The students must take calculus I and II, linear algebra, differential equations and must take at least one programming course such as python, R, MATLAB.  
**Semester:** Summer 2022
Building and Validating a Chat Bot using Natural Language Processing (NLP) for Mathematics

Mentor: Michael Smalenberger  
Mentor Title: Adjunct Lecturer  
Department: Mathematics and Statistics

Project Description:
The undergraduate researcher will facilitate building a chat bot conversational agent that can be embedded in an intelligent tutoring system for college algebra. Intelligent tutoring systems (ITS) are computer-based platforms which can incorporate artificial intelligence to provide step-by-step guidance as students practice problem-solving skills. ITS have been used in mathematics education to either provide feedback and/or hint messages while solving a math problem. Conventional chat bots are applications which can conduct conversations via text. In essence, chat bots formulate responses to text or speech-to-text inputs, and typically utilize natural language processing (NLP). The main research aim is to add a chat bot feature to an ITS so that when users are solving college algebra problems and get stuck they can ask the ITS for hints through the chat bot. The role of the undergraduate researcher will be to conduct the necessary data input, data cleaning, and tagging of existing data. The student researcher can also subsequently facilitate the building, testing, and validation of the NLP models. This project will give significant experience on how handle large data sets, build a chat bot from scratch, and also give valuable introductory experience on research in a hot area in artificial intelligence and machine learning, namely NLP.

Student Qualifications:
The student researcher must have a very strong command of college algebra, and ideally have recently earned high grades in subsequent math/stats courses or have teaching/tutoring experience with college algebra. The student researcher should also have experience with data input and cleaning and Microsoft Excel, or have a strong desire to learn since this task involves a very significant amount of data processing. Having experience with NLP and LightSide is a plus, but not required.

Semester: Summer 2022
Identifying, Verifying, and Facilitating Solution Paths and Vocabulary use in College Algebra Problems

**Mentor:** Michael Smalenberger  
**Mentor Title:** Adjunct Lecturer  
**Department:** Mathematics and Statistics

**Project Description:**
The main aim of this research is to facilitate mathematics students to use proper math vocabulary on math problem solution paths in college algebra courses. A common component of mathematics instruction is the verbal description of steps taken to complete a math problem. For example, instructors use math vocabulary to describe what they are doing while demonstrating how to solve a math problem, or students might use such vocabulary when identifying where in a problem they need help or to suggest next steps. Both instruction and learning become impeded when the use of this math vocabulary is inaccurate, avoided, or omitted entirely. The undergraduate researcher will use an already established large data set to identifying inaccuracies or ommittances of such vocabulary in student descriptions of mathematics procedures, determine potential corrective actions to elicit proper vocabulary use and descriptions by the students, and facilitate establishing an intelligent tutoring system. Intelligent tutoring systems (ITS) are computer-based platforms which can incorporate artificial intelligence to provide step-by-step guidance as students practice problem-solving skills. ITS have been used in mathematics education to either provide feedback and/or hint messages while solving a math problem. This project will not only give significant introductory experience on pedagogical practices for math instruction, but also in a hot area in artificial intelligence and machine learning research.

**Student Qualifications:**
The student researcher must have a very strong command of college algebra, and ideally have recently earned high grades in subsequent math/stats courses or have teaching/tutoring experience with college algebra. The student researcher should also have experience with handling large data sets using for example Microsoft Excel, or have a strong desire to learn since this task involves a very significant amount of data processing.

**Semester:** Summer 2022
Tensile Test Characterization of 3D Printed Ceramic-Polymer Composites

Mentor: Erina Baynojir Joyee
Mentor Title: Assistant Professor
Department: Mechanical Engineering & Engineering Science

Project Description:
Conventional ceramic manufacturing methods have severe limitations such as high cost, long processing times, and lack of ability to form complex geometries due to extreme hardness or brittleness of the material, not to mention the difficulty to achieve good surface quality and dimensional precision. In comparison, additive manufacturing (AM) or 3D printing offers a unique platform to fabricate ceramic based composite materials (ceramic-polymer) in a discrete layer by layer manner, with unique capability to realize complex geometries and structural architectures. A prime example is multi-material stereolithography (SLA) method that has facilitated high-resolution printing of ceramic with precision geometry and fine control of part shape and size ideally, in ceramic AM, high-volume fraction of ceramic-fillers in the matrix is favorable since it enhances ceramic densification as well as promotes desirable mechanical properties of the printed objects. However, the addition of ceramic fillers can cause printing failure and non-uniform porosity in the printed parts. Towards this challenge, this project aims to determine the relationship between ceramic filler volume ratio and the mechanical characteristics of 3D printed ceramic-polymer parts. The students will i) prepare samples of various ceramic-polymer printing ink with different ceramic volume ratio; ii) use SLA to print 1mm thick discs (with 20mm layer thickness), of various ceramic-polymer volume ratio; and iii) conduct tensile test characterization to analyze the mechanical strength of the printed ceramic-polymer objects. The SLA printing will be conducted using a custom SLA printer and the tensile characterization will be conducted using an Instron material testing machine.

Student Qualifications:
Experience with mechanical design software preferred (solidworks/creo), prior experience with conducting experiments in a lab setting preferred (especially handling materials), strong communication skills preferred

Semester: Summer 2022
Design and Test an Obstacle Avoidance Algorithm on a Semi-Automated Vehicle

Mentor: Amirhossein Ghasemi  
Mentor Title: Assistant Professor  
Department: Mechanical Engineering & Engineering Science

Project Description:
Unmanned ground vehicles (UGVs) hold promises for increasing mission performance and guaranteeing personnel safety. This project aims to develop and test path following and obstacle avoidance algorithms on a semi-automated vehicle. To this end, the students are required to develop a set of codes that can read the data from onboard sensors such as lidar, camera, and GPS to determine the position of the vehicle and the relative position of the vehicle with respect to a static obstacle. Additionally, the students shall develop a steering controller and test on a motorized steering wheel. In particular, using this controller, the motorized steering wheel shall follow the desired steering trajectory. The students shall also use models of vehicles such as bicycle models to determine steering control commands for path following and obstacle avoidance applications knowing the position of the vehicle with respect to the road and obstacles. Finally, the students shall combine this controller and algorithms to generate a unified path following and obstacle avoidance controller for a semi-automated vehicle. Specifically, using the data gathered by the sensor, the steering control command shall be determined. This command will then be passed through the steering controller to maneuver the vehicle. Here, the human operator only controls the speed of a vehicle but the automation controls the steering command. The test bed for this project is a golf cart with a motorized steering wheel.

Student Qualifications:
Familiarity with Mechatronics, sensors, programming in Arduino, electronics, Matlab programming.

Semester: Summer 2022
A Scaled Smart City for Experimental Validation of the Next-Generation of Transportation Networks

**Mentor:** Amirhossein Ghasemi  
**Mentor Title:** Assistant Professor  
**Department:** Mechanical Engineering & Engineering Science

**Project Description:**
The landscape of mobility and transportation systems is changing dynamically at an unprecedented speed, enabled by advances in computer science and engineering, a deeper understanding of societal and environmental needs, and advances in the learning sciences. While the full deployment of autonomous vehicles may take a while, it is vital for the researchers in this field to validate the models and algorithms as realistically as possible so that they can better predict the behavior of next-generation mobility and transportation systems. To this end, the proposed project aims to develop a scaled smart city at the University of North Carolina at Charlotte. This scaled smart city will bridge the gap between simulation and full-scale implementation of mobility systems. The proposed project aims to explore the acquisition and processing of vehicle-to-vehicle (V2V) and vehicle-to-infrastructure (V2I) communication in different traffic scenarios. To this end, the students will equip the scaled smart city with various types of sensors and actuators, such as controlled traffic lights, motion-tracking cameras. The students will also develop a set of miniaturized autonomous vehicles and equip them with GPS and Lidars. Once the miniaturized autonomous vehicles are developed, the students will develop a set of codes that can track the vehicle in the scaled city using the motion tracking cameras. The students will also develop will develop a set of V2I and V2V protocols to manage and coordinate the miniaturized autonomous vehicles.

**Student Qualifications:**
Familiarity with Mechatronics, sensors, programming in Arduino, electronics, Matlab programming, and IoT.

**Semester:** Summer 2022
Collaborative Multirobot Coordination for Search and Rescue

Mentor: Amirhossein Ghasemi  
Mentor Title: Assistant Professor  
Department: Mechanical Engineering & Engineering Science

Project Description:  
Autonomous or teleoperated robots have been playing increasingly important roles in civil applications in recent years. Across the different civil domains where robots can support human operators, one of the areas where they can have more impact is in search and rescue (SAR) operations. This project aims to use two quadcopters and ground vehicles in a search and rescue project. To this end, the students shall implement existing path-following algorithms for both ground vehicles and quadcopters to allow them to go from point A to point B autonomously. The students shall also develop communication protocols wherein each agent can receive and send its position and velocity to the other vehicles. The students then need to combine these two algorithms and test them in a search and rescue problem using two quadcopters and ground robots.

Student Qualifications:  
Familiarity with Mechatronics, sensors, programming in Arduino, electronics, Matlab programming.

Semester: Summer 2022
Further Development of Macroscopic Analog Molecular Hydrodynamics: Dynamic Structure Factor in Vibrated Grain Beds

Mentor: Russell Keanini  
Mentor Title: Full Professor  
Department: Mechanical Engineering & Engineering Science

Project Description:
Over the last ten years, our research group at UNC Charlotte has been developing experimental and theoretical evidence that confined beds of high restitution grains, subject to low amplitude, high frequency vibration, exhibit single-particle and collective, multi-particle dynamics similar to those known and predicted, at molecular scales, in small-molecule liquids, e.g., water and liquid nitrogen. The objective of the proposed OUR Summer Research Project centers on exposing the so-called dynamic structure factor underlying the dynamics of vibrated grain beds. Any dynamical system comprised of numerous, densely packed, non-bonded, randomly moving particles will, absent external forcing, remain in a state of (statistical mechanical) equilibrium, i.e., no time-average collective motion will take place. By contrast, when these systems are slightly perturbed by an external agent, for example, a laser light source impinging on a macroscopically quiescent liquid, sustained collective motion does emerge. Physically, the structure factor captures the collective response of such systems to small perturbations from equilibrium. [Mathematically, the dynamic structure factor corresponds to the Fourier transform of the momentum, mass, and energy conservation equations governing collective motion, recast in terms of a space-time correlation of (in-system) particle density fluctuations.] Crucially, experiments and molecular dynamics simulations carried out in the 1970's showed that the molecular-scale (collective) response of small-molecule liquids to, e.g., laser forcing, produces a signature (long-wavelength) structure function. The key question to be addressed in the proposed project centers on determining whether and/or to what extent the structure factor extracted from our experimental measurements of vibration-driven grain motion corresponds to that observed in molecular liquids. To date, we have demonstrated that: a) single grain dynamics, observed over short time scales (on the order of, and shorter than the characteristic time between inter-grain collisions) are nominally identical to short time scale, single molecule dynamics in liquids, and b) collective grain dynamics, observed over time scales long relative to the inter-grain collision time, likewise mimic long time scale collective molecular dynamics (as captured by the Navier-Stokes equations). The proposed project will study the short time scale collective dynamics of vibrated grains, as captured by the structure factor. If we can demonstrate that collective, short time scale grain dynamics are similar to those in molecular liquids, we would essentially prove that vibrated grain beds can be used as directly observable, experimentally accessible dynamical analogs for studying molecular hydrodynamic systems - a huge step forward in this fundamental field! Using measured (area-averaged) collective grain velocities, measured in our lab, the Summer Research Student will first (numerically) calculate space-time correlations of measured grain velocities, and then transform the correlation to (Fourier) wave number-frequency space. These calculations will provide what we believe will be the first experimentally-based measurement of the dynamic structure factor in a macroscopic, non-molecular, dense-packed dynamical system. Importantly, we anticipate that the research will close the problem that we set for ourselves ten years ago: To what extent can vibrated grain beds be used as analogs for studying molecular hydrodynamic systems?
Student Qualifications:
We would prefer working with a student (or students) having junior, senior, or masters level training in engineering or physics.
Semester: Summer 2022
Efficient Robotic Locomotion via Machine Learning

**Mentor:** Scott David Kelly  
**Mentor Title:** Full Professor  
**Department:** Mechanical Engineering & Engineering Science

**Project Description:**  
This project will apply machine learning, specifically reinforcement learning, whereby computers have famously learned to outperform humans at video games and chess, to the task of identifying efficient swimming gaits for a simple fishlike robot. In collaboration with the faculty mentor and at least one PhD student, the Summer Scholar(s) will construct a solar-powered swimming robot, equip this robot with the capacity to sense its own motion, and deploy the robot to develop a repertoire of swimming gaits autonomously in a large outdoor body of water.

**Student Qualifications:**  
The ideal candidate(s) will have experience with the Arduino and Raspberry Pi platforms and with the manufacture and assembly of basic mechanical parts. Familiarity with reinforcement learning, potentially to be achieved through independent study prior to the summer is desirable but not required.  
**Semester:** Summer 2022
Autonomous Quadrotor Wind Sensing

**Mentor:** Artur Wolek  
**Mentor Title:** Assistant Professor  
**Department:** Mechanical Engineering & Engineering Science

**Project Description:**  
This project will involve coding, electromechanical assembly/design, and hands-on testing of 1-3 autonomous quadrotors on UNC Charlotte's campus. The drones serve as a research platform for mapping wind fields in urban environments. The student will conduct supervised research in the Autonomous Robots and Systems Laboratory (ARSL) in support of this effort. Visit https://go.uncc.edu/arsl for more information.

**Student Qualifications:**  
Preferred qualifications include knowledge of at least one programming language (e.g., MATLAB, Python, C++), willingness to conduct outdoor field work, experience with electromechanical integration for robotics (e.g., soldering, basic circuits, Arduino). Mechanical/electrical engineering and computer science students are encouraged to apply.

**Semester:** Summer 2022
Micro Unmanned Underwater Vehicles (microUUVs)

Mentor: Artur Wolek  
Mentor Title: Assistant Professor  
Department: Mechanical Engineering & Engineering Science

Project Description:  
This project will involve coding, electro-mechanical assembly/design, and hands-on testing of microUUVs and related instrumentation for a 5,000-gallon water tank located on UNC Charlotte's campus. The microUUVs will serve as a testbed for cooperative control research. The student will conduct supervised research in the Autonomous Robots and Systems Laboratory (ARSL) in support of this effort. Visit https://go.uncc.edu/arsl for more information.

Student Qualifications:  
Preferred qualifications include knowledge of at least one programming language (e.g., MATLAB, Python, C++), willingness to conduct outdoor field work, experience with electro-mechanical integration for robotics (e.g., soldering, basic circuits, Arduino). Mechanical/electrical engineering and computer science students are encouraged to apply.

Semester: Summer 2022
Experimental Investigation and Analysis of Battery Safety Issues

**Mentor:** Jun Xu  
**Mentor Title:** Assistant Professor  
**Department:** Mechanical Engineering & Engineering Science

**Project Description:**  
Students will have the full exposure to battery safety research facility at UNC Charlotte. The major task for students is to learn to conduct mechanical abusive experiments on various batteries to have a full investigation of the internal short circuit and thermal runaway behaviors.

**Student Qualifications:**  
This task requires good hands-on experience and good understanding of fundamental math, physics and mechanics.  
**Semester:** Summer 2022
Mentor: Heather Coffey
Mentor Title: Full Professor
Department: Middle Grades Secondary & K-12

Project Description:
Despite growing diversity among U.S. public school children, and the relatively unchanged demographics of teachers (primarily middle class, monolingual, White females), critical approaches to teacher preparation are crucial. We propose to facilitate discussions related to social justice (Nieto, 2006) and culturally-proactive (Garcia & O’Donnell-Allen, 2015) pedagogies through our Critical ELA Educators Collaborative (CEEC). Supported through our English teaching methods courses and conceived in the summer of 2021, CEEC pairs ELA teacher candidates with novice teachers who are developing their own social justice-oriented, culturally-proactive approaches to curriculum and pedagogy.

Data collection will include: pre- and post-experience surveys, written reflections, virtual group discussions, and bi-directional interviews. Using a mixed methods approach, we will quantitatively analyze surveys and qualitatively code written reflections and interview transcripts using a grounded theory approach. The project has the potential to a) enhance teacher candidates’ understanding of and sense of efficacy in culturally-proactive teaching for social justice; b) provide a model for enhancing candidate preparation for teaching in urban school settings with diverse student populations; c) recruit a more diverse pool of ELA teaching candidates; and d) provide leadership opportunities for practicing ELA teachers.

For this project, the Summer Scholar will assist with administration of post-survey, data analysis of survey results, and selection of one finding to disseminate in a manuscript for an undergraduate research journal. Additionally, the Summer Scholar will also be responsible for communicating study details with Cohort 2 and setting up monthly meeting schedule. The Summer Scholar will also administer pre-survey for Cohort 2 and analyze survey data.

Community Partner:
Critical English Educator Collaborative (CEEC)

Student Qualifications:
The Summer Scholar should be familiar with Google docs (spreadsheet and forms) as well as will need strong writing skills.

Semester: Summer 2022
Recovering Lost Voices: Testimony of Holocaust Survivors from the Theresienstadt Ghetto

Mentor: James A. Grymes  
Mentor Title: Full Professor  
Department: Music

Project Description:  
Victims of trauma often turn to art as a coping mechanism. The act of creating and sharing art serves as a form of resistance, if only through the preservation of a sense of normalcy and the reinforcement of cultural identity. This was certainly true during the Holocaust, when Jewish prisoners in Nazi camps and ghettos reacted to their suffering through poetry, visual art, and most of all music. This project will explore a community of amateur and professional singers who came together to make music in the Nazi ghetto of Theresienstadt (also known in Czech as Terezín). Working with the mentor, the OUR Summer Research Scholar will transcribe and analyze the testimonies of Holocaust survivors who, while imprisoned in the Theresienstadt Ghetto, performed in an astonishingly large number of orchestral concerts, operas and oratorios, chamber music recitals, and cabarets. These testimonies were recorded between 1984 and 2000 in Canada, Denmark, Germany, Israel, Sweden, Switzerland, and the United States by David Bloch, musicologist and founder/director of the Terezín Music Memorial Project. After Professor Bloch’s untimely death in 2010, his family donated his collection, including the recorded testimonies, to the United States Holocaust History Museum, where they have gone largely ignored by the scholarly community. Through this project, however, the survivors’ voices and stories will not only be heard once more, but also documented for posterity. The result will be a presentation- and publication-ready scholarly paper that details how Jewish prisoners in the Theresienstadt Ghetto expressed resistance and resilience by making music together.

Student Qualifications:  
Familiarity with Google drive, Google docs, and digital audio software.  
Semester: Summer 2022
The Housing Crisis in Charlotte: Promoting Self-efficacy and Advocacy among Habitat Charlotte Region Homeowners

Mentor: Erin Banks
Mentor Title: OUR Assistant Dean
Department: Office of Undergraduate Research

Project Description:
This project will be a collaboration between the Office of Undergraduate Research and The Habitat Charlotte Region’s Neighborhood Revitalization Group. This project will help to 1) identify the impact rapid home price appreciation and socioeconomic status is having on Habitat Charlotte Region’s residents 2) identify factors that are contributing to displacement of current homeowners and 3) provide a resource guide for current homeowners to use as they navigate issues related to buying/selling and maintaining homeownership. Undergraduate Students involved in this project will assist in project planning/development, implementation and evaluation phases of this project. Duties may consist of but not be limited to the following: conducting literature searches and/or writing a literature review, collecting and reviewing data, survey development, assisting with focus groups and community interviews and social media/marketing.

Student Qualifications:
Students on this project will need: excellent communication and interpersonal skills, writing skills, familiarity with MS Office Suite, and an interest in community engagement.

Semester: Summer 2022
Alternative Grading Strategies for an Anti-Black Institution of Higher Learning

Mentor: Elisabeth Paquette
Mentor Title: Assistant Professor
Department: Philosophy

Project Description:
The goal for this research project is to develop an archive of materials (books and articles) that offer alternative strategies for grading (course assessment). Specifically, we seek to develop an archive of materials that are attentive to the ways in which assessment can perpetuate white supremacy and settler colonialism. The Summer Scholar, along with the professor, will survey existing materials, evaluate and collect them in one place (DropBox). These materials will be used by professors the following academic year.

Student Qualifications:
The Summer Scholar should be able to locate books and articles on a particular topic online, and have the skills to evaluate these documents. As well, the Summer Scholar should be familiar with DropBox and Google Sheets/Docs.

Semester: Summer 2022
Alternative Grading Strategies for an Anti-Racist Institution of Higher Learning

Mentor: Elisabeth Paquette
Mentor Title: Assistant Professor
Department: Philosophy

Project Description:
The goal of this research project is to develop an archive of materials (books and articles) that describe the benefits, and offer examples, of alternative grading strategies that are not punitive. It is widely recognized that current dominant grading practices prioritize certain students, and as a result further marginalize already marginalized students. We seek to develop an archive that can be used by professors at the University of North Carolina in order to learn a new way of evaluating, assessing, and teaching students. This research project will be part of a larger workshop in which professors will attempt to implement various strategies in their classrooms. The summer scholar will be responsible for collecting various materials for this archive.

Student Qualifications:
Research skills, library skills, ability to assess articles and books quickly and efficiently.

Semester: Summer 2022
Development of Optical Feedback Systems for Laparoscopic Laser Sealing of Vascular Tissues

Mentor: Nathaniel Fried, Ph.D.
Mentor Title: Full Professor
Department: Physics and Optical Science

Project Description:
Over 80% of the 15 million laparoscopic surgical procedures performed worldwide each year use electrosurgical and ultrasonic, energy-based devices. These devices are used to thermally seal and bisect vascular tissues during numerous minimally invasive surgical procedures (e.g. hysterectomy, colonectomy, nephrectomy, lobectomy, thyroidectomy, etc.). However, these energy-based devices have several major limitations, including excessive thermal spread to adjacent healthy tissues (e.g. nerves) and slow device cooling times in between procedures. Our laboratory is developing an alternative method using infrared laser energy to more precisely and rapidly seal and cut blood vessels. The undergraduate student will work alongside the professor and a Ph.D. student to design, build, and characterize real-time, closed-loop, optical feedback systems to de-activate the laser once a strong vessel seal has been achieved. Work will include computer design, construction of benchtop setups using basic optical components (e.g. mirrors, lenses, filters, detectors, etc.), and gathering experimental data for analysis. The student will learn how to operate lasers, prepare optical fibers, align optical components, use test measurement equipment (e.g. oscilloscopes, function generators, power meters, etc.), dissect tissue samples, and conduct destructive mechanical vessel burst pressure measurements for direct comparison with the non-destructive optical feedback systems being developed.

Student Qualifications:
Student with major in Physics, Electrical Engineering, or Mechanical Engineering, who is interested in Biomedical Engineering laboratory research. Previous experience with machine shop, electronics, and/or computer programs (Matlab, Labview, or Solidworks) a plus, but not required.

Semester: Summer 2022
Simulating Quantum Trajectories in Confined Regions

Mentor: Donald Jacobs  
Mentor Title: Full Professor  
Department: Physics and Optical Science

Project Description:
This project involves simulating quantum trajectories of interacting particles confined to a small region of space using Bohmian mechanics. One aspect of the project is to implement numerical methods to calculate particle trajectories and the second part of the project is to rationalize how quantum effects appear through the non-local quantum potential. The concept of conditional wavefunctions will be applied, leading to a set of coupled one dimensional Schrodinger equations. The set of coupled ordinary differential equations will be numerically solved to calculate the equations of motion for each particle in the system. Fundamental questions about the nature of quantum effects will be addressed in the analysis of the particle trajectories, contrasting their characteristics from the trajectories predicted by classical equations of motion. The focus of the project is to explore the quantum measurement process as the system complexity is gradually increased, where Bohmian mechanics eliminates the enigma-concept of an "observer" collapsing a wavefunction. The student will be modifying and extending existing MATLAB code, running the code, interpreting the results by comparing to known phenomena, and documenting the results in the form of reports.

Student Qualifications:
The student should have taken differential equations, familiar with basic concepts of complex analysis, linear algebra, and have moderate experience in programing.

Semester: Summer 2022
Quantifying Molecular Interactions with Microscale Thermophoresis (MST)

Mentor: Irina Nesmelova  
Mentor Title: Full Professor  
Department: Physics and Optical Science  

Project Description:  
Chemokines form a large family of proteins that guide the migration of leukocytes in our body. We need chemokines to fight the infection, but they can also play a negative role by promoting autoimmune and allergic inflammatory reactions, cancer, atherosclerosis, or other inflammatory disorders. Chemokines act individually or interact to form heterooligomers. We use MST to assess interactions of different chemokines in order to design molecules that will block (or enhance) the interactions, because we believe that it may lead to the development of more targeted, anti-inflammatory pharmacological agents with minimal side effects. We also study plant defensins. As with chemokines in humans, plant defensins are the part of plant immune response against fungi, bacteria, and insects. Furthermore, some plant defensins have revealed anticancer activity. In general, plant defensins are non-toxic to plant and mammalian cells and interest in using them for biotechnological and medicinal purposes is growing. We use MST to assess the interactions of plant defensins with their lipid and polysaccharide targets on pathogen cell walls. Our research area is experimental biophysics. By nature, the research is highly interdisciplinary. Typically, students in the lab also learn other spectroscopic techniques (Nuclear Magnetic Resonance (NMR), circular dichroism (CD), fluorescence), molecular modeling, and gain basic biochemistry skills.

Student Qualifications:  
Students from Physics, Chemistry, and Biology  
Semester: Summer 2022
Quantifying Biomolecular Interactions with Microscale Thermophoresis

**Mentor:** Irina Nesmelova  
**Mentor Title:** Full Professor  
**Department:** Physics and Optical Science

**Project Description:**  
Microscale Thermophoresis (MST) is the most versatile of existing methods to quantify biomolecular interactions. MST will be used to quantify biomolecular interactions in two families of proteins, chemokines and plant defensins. Chemokines form a large family of proteins that guide the migration of leukocytes in our body. We need chemokines to fight the infection, but they can also play a negative role by promoting autoimmune and allergic inflammatory reactions, cancer, atherosclerosis, or other inflammatory disorders. Chemokines act individually or interact to form heterooligomers. We use MST to assess interactions of different chemokines in order to design molecules that will block (or enhance) the interactions, because we believe that it may lead to the development of more targeted, anti-inflammatory pharmacological agents with minimal side effects. We also study plant defensins. As with chemokines in humans, plant defensins are the part of plant immune response against fungi, bacteria, and insects. Furthermore, some plant defensins have revealed anticancer activity. In general, plant defensins are non-toxic to plant and mammalian cells and interest in using them for biotechnological and medicinal purposes is growing. We use MST to assess the interactions of plant defensins with their lipid and polysaccharide targets on pathogen cell walls. Our research area is experimental biophysics. By nature, the research is highly interdisciplinary. Typically, students in the lab also learn other spectroscopic techniques (Nuclear Magnetic Resonance (NMR), circular dichroism (CD), fluorescence), molecular modeling, and gain basic biochemistry skills.  

**Student Qualifications:**  
Students from Physics, Chemistry, and Biology, interested in summer research and extension to 3900 and 3900H  
**Semester:** Summer 2022
Thermal Stabilization of Biologics Using Light Assisted Drying

Mentor: Susan Trammell  
Mentor Title: Full Professor  
Department: Physics and Optical Science

Project Description:  
Many new biological products including protein-based drugs, assays, vaccines and nanomedicine products require cold storage to maintain viability. Cold storage strategies can be challenging and expensive for the transportation and storage of biological products and for their use in low-resource environments. Freeze drying has also been used to stabilize some biologics; however, this process remains costly, complex and the process generates a variety of stresses that can damage biological products. An inexpensive, simple processing method that enables near ambient temperature storage is needed. We are developing a new processing technique, light-assisted drying (LAD), to prepare biologics for dry-state storage in a trehalose amorphous solid matrix at ambient temperatures. LAD avoids a freezing step during processing that can be damaging to biologics. During LAD processing, the biologics are suspended in a droplet of trehalose solution and then irradiated with a near-IR laser to speed drying. As water is removed, the trehalose forms an amorphous solid protective matrix. We are currently optimizing the LAD process for a variety of biologics. Undergraduate researchers will conduct experiments to determine appropriate laser and other parameters for LAD processing. In addition, they will use polarized light imaging and Raman spectroscopy to characterize the resulting matrix and assess the viability of the matrix for long-term storage. This project will provide hands-on research experience and training in good laboratory practices. Students will participate in experimental design and troubleshooting, data acquisition and data analysis.

Student Qualifications:  
Completion of PHYS 3141 required; completion of PHYS 3281 preferred  
Semester: Summer 2022
State Bans on Critical Race Theory

Mentor: Jason Giersch
Mentor Title: Associate Professor
Department: Political Sci & Public Admin

Project Description:
In 2021, nearly half the state legislatures in the U.S. passed or considered passing laws intended to ban the teaching of Critical Race Theory in public schools. From a political science perspective, I would like to know more about what led these laws to appear in some states and not others. I would also like to know what the implications are for teachers, especially history teachers, as they navigate teaching required course content while not running afoul of the restrictions in these new laws.

The summer scholar would be involved in gathering data from the states on one or both of the following two topics: (1) What political and policy characteristics are correlated with the passage of anti-CRT laws? The scholar would build a database, state by state, of details of the laws as well as political conditions in the state and policies related to curriculum, teacher professionalism, union strength, and school choice. (2) How narrow is the path between each state's CRT ban and their required history curriculum? By comparing the text of the relevant documents, the scholar will describe how much flexibility teachers have in each state.

Student Qualifications:
The student must be very competent in searching for, identifying, comprehending, summarizing, and analyzing documents regarding state legislation and/or curriculum materials. Basic familiarity with how American public schools teach history and how laws are passed in the United States are essential.

Semester: Summer 2022
Campaign Money and Corruption in American Politics

Mentor: Eric Heberlig  
Mentor Title: Full Professor  
Department: Political Sci & Public Admin

Project Description:  
I have developed a data that combines data on campaign donations from the Federal Election Commission, legislative effectiveness scores, voting records, and institutional positions of members of the House from 1996 through 2014. There are a number of analyses I’m working on and on which a student could collaborate. The main theme of the project analyzes the relationship between interest group money and legislative effectiveness. Access-oriented interest groups (especially corporations) have traditionally concentrated their campaign contributions on legislators with specific characteristics: members of the majority party, members serving on committees with jurisdiction over their agendas, and legislators who are more centrist ideologically. The political environment has changed substantially over the past decade, with Congress polarizing ideologically and great power being concentrated into the hands of party leaders. These changes undermine the viability of corporate Political Action Committees (PACs) strategies. I seek to analyze how and why their contribution strategies have adapted to the new environment. I hypothesize that contributions are increasingly oriented towards Republicans (ideologically aligned with corporations and the majority party), elected party leaders, and legislatively effective Democrats. Second, and relatedly, despite the reputation of corporate PACs being access-oriented, they clearly have greater policy agreement with Republicans. So, we are analyzing how business PACs can target their donations strategically and selectively to certain Democrats who can help them achieve their goals while giving less enthusiastically to Democrats who could help the Democrats win majority party status. Third, we are analyzing how donors are reacting to the increased diversity of Congress, especially the increase in women and racial minorities. There is substantial evidence in psychology that people are threatened by powerful women, particularly in man dominated professions (like politics). Do donors evaluate and reward women (or minority) legislators? accomplishments (legislative successes, institutional posts) in the same way they do men’s?

Student Qualifications:  
Completed POLS 2220 (or equivalent) with a B or higher. Familiarity with data management and analysis programs such as Excel and SPSS and/or STATA.  
Semester: Summer 2022
Biobehavioral Approaches to Health

Mentor: Jeanette Bennett  
Mentor Title: Associate Professor  
Department: Psychological Science

Project Description:
Globally, my research lab, StressWAVES, examines how our experiences "get under the skin" via stress and affects our health, both physical and mental. Although chronic stress can harm the body and mind, acute or manageable stress improves our cognitive, emotional, mental and physical functioning. We attempt to understand how acute, healthy stress becomes derailed and toxic as well as investigate innate individual differences that inhibit or reverse the negative effects of stress, whether acute like job loss or major like traumatic events. If concepts like mind-body, stress, blood pressure, trauma, resilience, depression, cortisol, are interesting to you, you should consider this opportunity. It is especially good for those who envision a career in biopsychology, health psychology, psychoneuroimmunology, or a health-related field.

Psychosocial, culture, and emotional as well as biological factors are assessed in all studies, including but not limited to handling and processing of blood or saliva, guiding participants through data collection protocols, as well as data entry, cleaning, and analysis. Over the summer, you will assist with data collection on several on-going projects: (1) ERRICO examining the role of racial minority socialization experiences on relationship between discrimination and health, (2) multi-component intervention to enhance health and well-being among Black and White females, and (3) ESRA 2.0 where we are examining the effects of emotion regulation trait and ability during an acute stressor. Research scholars will conduct literature reviews, engage with participants, analyze data, and disseminate findings. For a summer student’s research project, already completed data will be used and compromises of the following areas: emotions and caffeine exposure, emotional stressors/trauma and well-being, or effects of discrimination on health.

Community Partner:  
Habitual Roots

Student Qualifications:  
Required: Entry level biology courses (e.g., BIOL 1110/1115), entry level psychology courses (e.g., PSYC 1101), willingness to work on lab protocols where biological specimens (e.g., saliva, blood, etc.) are collected, work collaboratively with a team of research assistants including other undergrads and graduate students both at the Master’s and PhD levels.  
Preferred: Biopsychology courses (e.g., PSYC 2113) with B or better, research methods course (e.g., PSYC 2101/2103) with B or better OR previous research experience, experience with SPSS, Qualtrics and proficient in Microsoft Excel/Word  
Semester: Summer 2022
Assessing the Effect of Task Goals on Interpersonal Coordination During Collaboration

Mentor: Alexia Galati  
Mentor Title: Assistant Professor  
Department: Psychological Science

Project Description:
This project assesses the effect of task goals on how people coordinate what they say and what they are attending to when working together. It examines whether interpersonal alignment helps task performance in different contexts. The benefits of interpersonal alignment on task performance are documented in tasks that require partners to closely monitor each other’s perspective, consistent with a prominent view that as task partners align their behavior they converge conceptually. However, it is still underexplored whether the benefits of alignment generalize to other tasks: for example, in joint visual search, performance could benefit from a divide and conquer strategy. In an experiment for which we have completed data collection, we examine this question directly by manipulating task goals as dyads interact with maps. Dyads completed 10 trials with their eye-movements tracked and conversations audio-recorded. Five trials involved planning a route from an origin to a destination (route planning) and 5 involved searching for landmarks (visual search). To quantify interpersonal alignment in speech, we will be transcribing the exchanges of task partners and coding for different linguistic phenomena of interest, including the types of spatial expressions used, references to landmarks, and metacommments about the state of the task and problem-solving strategies. Our findings will illuminate how alignment and complementarity in language use can serve task goals. The summer research scholar is expected to be involved in assisting with audio processing of the recordings, transcribing dialogues, coding expressions or events of interests in the transcripts, getting experience in coding for statistical analysis, and in scientific writing and presentation.

Student Qualifications:
Research Methods courses in the student’s major (e.g., Research Methods I and II for Psychology majors); introductory Statistics or similar course. Courses in linguistics, qualitative methods, and ethnomethodology are appropriate alternatives.

Semester: Summer 2022
Researching Problematic Alcohol use Among College Students

Mentor: Jessamyn Bowling  
Mentor Title: Assistant Professor  
Department: Public Health Sciences

Project Description:
Problematic alcohol use among college students, including behaviors related to drinking or amount of drinking, can lead to other negative health outcomes. This NIH-funded study seeks to examine the ways college students understanding problematic alcohol use and how they help others who are engaging in problematic drinking. We conducted focus group discussions starting in fall 2021 and the OUR Summer Scholar will be qualitatively coding the data. The team will be trained in qualitative approaches. We will first create a codebook based on emerging themes from the data. We will code in teams after all students are trained. We will then work on data dissemination through the development of manuscripts.

Student Qualifications:
Excellent writing skills  
Previous experience with reading peer-reviewed/academic journal articles  
Familiarity with alcohol use and contexts (either self or friend’s use)

Semester: Summer 2022
The Impact of COVID-19 on Knowledge, Awareness, and Barriers in Accessing Healthcare Services for Timely Treatment of Breast Cancer.

**Mentor:** Monika Sawhney  
**Mentor Title:** Associate Professor  
**Department:** Public Health Sciences

**Project Description:**
While most states in the United States of America (USA) experienced a decline in death rates from breast cancer between 2001 and 2010, death rates from breast cancer for many states across the United States have remained unchanged (Ma & Jemal, 2013). Mecklenburg County in North Carolina faces significant health challenges concerning dealing with health outcomes in this area. Furthermore, Mecklenburg County is currently projected unable to meet the Healthy People 2020 (HP2020) targets for late-stage incidence rate and has a large percentage of linguistically isolated, Black/African-American, and foreign-born women. (Community Profile report 2015, Charlotte, Susan G Komen Foundation). The existence of intra-state disparity further makes breast cancer a significant issue and of even greater interest in North Carolina (specifically in Mecklenburg County). Furthermore, the COVID-19 pandemic has impacted the entire care consortium (prevention, treatment, and follow-up). Most women do not currently know the alternate resources and support groups while dealing with preventive and curative aspects of breast cancer during the current pandemic. This research exercise aims to explore these unmet needs for increased education, awareness, outreach initiatives, and available support groups. The proposed research project will further strengthen Dr. Sawhney’s ongoing commitment in this area of work. Dr. Sawhney’s plans of sharing these results with various community partners, will result in collaborations to design and implement programs for breast cancer. It will also serve as the foundation for the activities proposed for this research initiative.

**Student Qualifications:**
Basic computer skills, readiness to learn and sharpen their research skills, at least a junior standing, diligent, self-motivated, passionate about making change through research, ability to work independently and collaboratively in a team environment.  
**Semester:** Summer 2022
Assessing the Impact of COVID19 on the Health and Well-being of Healthcare Professionals

Mentor: Monika Sawhney
Mentor Title: Associate Professor
Department: Public Health Sciences

Project Description:
The COVID19 pandemic has taken a huge toll in some shape or form on major aspects of life. One group of individuals bearing substantial impact are the healthcare professionals. A lot of recent research work focuses on COVID19 patients and their care providers. However, not much work has been done to understand and assess the impact COVID19 has on the well-being of healthcare professionals. The proposed research assignment aims to explore the impact COVID19 has on the health and well-being of healthcare professionals. The summer scholar will work closely with the faculty mentor as well as professional staff members from the community partner organizations, to conduct a thorough literature survey, maintain databases, evaluate available instruments, and assist other team members in setting up the background work for this research. The Summer Scholar will also have the opportunity to collaborate with the UNCC stakeholders [such as the library staff and the Institutional Review Board (IRB)] and community partners in finalizing the research protocols, setting up online data collection tools, and administering the data collection protocols for the successful implementation of this research assignment. Finally, working closely with the faculty mentor, the summer scholar will gain skills in analyzing the data and preparing professional information for dissemination to various stakeholders. **Please note this is a community-based project working with Independent Physicians of the Carolinas.

Community Partner:
Independent Physicians of the Carolinas.

Student Qualifications:
Basic computer skills, readiness to learn and sharpen their research skills, at least a junior standing, diligent, self-motivated, passionate about making change through research, ability to work independently and collaboratively in a team environment.

Semester: Summer 2022
Exploring Elementary Teachers' Beliefs and Practices in Mathematics

**Mentor:** Drew Polly  
**Mentor Title:** Full Professor  
**Department:** Reading & Elementary ED

**Project Description:**  
This project will include the collection and analysis of data related to elementary school teachers' beliefs and instructional practices in mathematics. The data collection will include interviews and focus groups completed over Zoom. Further, there will be work related to creating instructional materials and resources for teachers that will then be used in interviews and focus groups to get feedback from teachers.

**Student Qualifications:**  
Some experience with Google documents; Background or experience in education- prefer Elementary Education.  
**Semester:** Summer 2022
Making an Impact: Cross Campus Collaboration on Entrepreneurial Thinking

**Mentor:** Laura Smailes  
**Mentor Title:** Assistant Director, Ventureprise/ Adjunct in CLAS  
**Department:** Research & Economic Dev VC

**Project Description:**
Design and implementation of a cross campus entrepreneurial pipeline focusing on entrepreneurial mindset, research/innovation and student engagement. The focus of the research is examining ways to expand innovation training, engagement of faculty and students in social impact, entrepreneurship and research commercialization. The research will be working with data collected from a Spring 2022 course, Making an Impact: Ideas to Action and a Spring 2022 Micro Badging Pilot. Students would examine and pair data from course surveys, assist in coding and continue research on practices of competency-based micro-credentialing systems, experiential learning and immersive experiences of other college campuses. Further engagement would include designing and implementing a survey for UNC Charlotte students and faculty examining entrepreneurial mindset and interest and reporting on those results.

**Student Qualifications:**
Research Skills  
Survey design, implementation and results  
Communication Skills (Oral and Written)  
Computer Skills (Zoom, Google Meet)  
**Semester:** Summer 2022
Off-grid Home for One Eleuthera Foundation

Mentor: Jose Gamez  
Mentor Title: Full Professor  
Department: School of Architecture

Project Description:  
This project will explore options and develop an off-grid house for One Eleuthera Foundation in the Bahamas. This house will be designed and developed in collaboration with a student researcher who will also create plans, sections, and elevations of the project.

Community Partner:  
One Eleuthera Foundation

Student Qualifications:  
Computer drafting skills are needed as is fluency with the Adobe Creative Suite.

Semester: Summer 2022
Looking at Connections: Interactions between Robot Dogs, Older People with and without Dementia, and their Caregivers

Mentor: Meredith Troutman-Jordan
Mentor Title: Associate Professor
Department: School of Nursing

Project Description:
Students will gain experience with qualitative research techniques, communication (skills) used with persons with dementia and their caregivers, and content analysis techniques, as they participate in our current research project exploring caregivers' and persons with dementia's interactions with pet robot cats and dogs. Tasks will include interviewing and observing persons with dementia and/or their caregivers as they interact with pet robots, recording these interviews, and participating in content analysis of transcribed interviews.

Community Partner:
Centralina Area Agency on Aging

Student Qualifications:
Ability to speak and write English, enter data into Microsoft Word, operate a recording device required. Though not required, anyone fluent in a less commonly taught language.

Semester: Summer 2022
Designing Interventions to Reduce Problematic Alcohol use Among College Students

Mentor: Annelise Mennicke
Mentor Title: Associate Professor
Department: School of Social Work

Project Description:
In this study, students will work on a NIH funded project to design a bystander intervention program aimed at reducing problematic alcohol use among college students. Drinking is a serious concern for college students, leading to many deaths. Bystanders are often aware of concerning situations, but often do nothing. The goal of this bystander intervention program will be to teach students how to notice a risky situation, know what to do in response and feel confident in doing something, and to actually do something. We will gather feedback from content experts and college students to design a mass media campaign, online gamified intervention, and in-person or virtual reality skill-based component. We are seeking creative experienced undergraduates to help us come up with something that will be realistic, fun, and most importantly, work!

Student Qualifications:
Excellent writing skills, previous experience with reading peer-reviewed/academic journal articles, familiarity with alcohol use and contexts (either self or friends’ use)
Semester: Summer 2022
Debt & Career Choices

Mentor: Scott Fitzgerald  
Mentor Title: Full Professor  
Department: Sociology

Project Description:  
The purpose of this study is to investigate the effects of financial anxiety and debt on the educational and career experiences of college students and young workers. In this first phase of the project, we seek to determine the effects of debt on the academic and career choices of college students. We are interested in analyzing how college students make sense of debt, because it can potentially provide insight into how debt is related to financial literacy and how these factors impact experiences such as college major choice, decisions to work while attending college, and the post-graduation job search. We employ the use of semi-structured qualitative interviews (n=78), as well as an electronic survey that assesses financial literacy. Our guiding research question for this phase of the study is: What are the effects of financial anxiety and debt on the academic and career decisions of college students? Educational lenders, along with credit card lenders and banks, have actively worked to enable the increasing indebtedness of Americans and young adults are especially susceptible to accruing significant amounts of debt while attending college, entering a career path, and seeking financial independence from their families. As the borrowing limit for students and families increases, so does concern from students, parents, policymakers, and the public regarding the potential consequences of this issue. Further, the effects of student loan debt may vary by gender, race, class, and educational backgrounds and can result in individuals experiencing lowered self-esteem and self-worth, along with feelings of being out of control of their financial future. Scholars will be a part of a research team coding and analyzing the interview data, conducting a literature review and writing a paper to present these findings at an academic conference.

Student Qualifications:  
Advanced students (any major) with strong writing skills preferred.

Semester: Summer 2022
Identifying Mechanisms of Employment Socialization in Mother-Child Dyads

**Mentor:** Candace N. Miller  
**Mentor Title:** Assistant Professor  
**Department:** Sociology

**Project Description:**  
In this project, we explore how racialized and gendered work experiences shape the discussions that Black mothers and their children have about work. Through this research, we aim to understand how Black women's labor market experiences shape the messages, behaviors, and values that they convey about work and race to their children, which has several implications for multigenerational work decisions. During Summer 2022, we will endeavor to recruit 36 Black mothers who were employed during the COVID-19 pandemic and their adolescent children of legal working age to participate in approximately six focus groups. The Summer Scholar will be expected to help with participant recruitment, running focus groups, and managing research and participant data. In addition, the summer scholar will also have the opportunity to assist in the drafting and dissemination of research findings. And, because this is a pilot study, the Summer Scholar may also have the opportunity for continued engagement with the project.

**Student Qualifications:**  
Summer Scholar should have completed an introductory social science course (i.e. Introduction to Sociology, Introduction to Psychology). Summer Scholar should also have familiarity with word processors and cloud storage.

**Semester:** Summer 2022
Creating Equitable Systems of Care that Promote Young Black and Latino Child Development in the Rapidly Changing U.S. Southeast: Generating Generalizable Lessons from Charlotte, NC

**Mentor:** Stephanie Potochnick  
**Mentor Title:** Associate Professor  
**Department:** Sociology

**Project Description:**
Aim 1. Create an inventory of PN-5 services, policies, and service use patterns across key policy domains: Food/nutrition, health, education, and income supports. To identify service gaps, we will compile a comprehensive list of county-wide PN-5 services, related policies (local, state, and federal), and program enrollee characteristics (e.g., race/ethnicity).
Undergraduate role: Help compile the list of services and policies by searching non-profit IRS tax records, reports, and websites. May also call organizations to confirm services.
Aim 2: Conduct a landscape analysis of PN-5 service accessibility for low-income Black and Latino families. To identify underserved neighborhoods and populations, we will map the PN-5 landscape, overlaid with sociodemographic, COVID-19, and transportation data.
Undergraduate role: Help collect US Census data on neighborhood demographic characteristics and other data with Covid-19 infection rates of different neighborhoods and prepare summaries of different the characteristics (e.g., poverty rate) of different types of neighborhoods (e.g., Latino vs. Black dominant neighborhoods). Aim 3: Learn local low-income Black and Latino parent and? on-the ground? stakeholder perspectives on opportunities and barriers relevant to PN-5 service utilization. To empower Black and Latino voices, we will conduct focus groups with low-income Black and Latino parents and direct service provider (e.g., ECE teachers) and include them in the research design (i.e. Project Management team; community report out?).
Undergraduate role: Help with different focus group logistics? Recruit focus group participants by attending (with other research team members & assume safe with Covid) parent/child events (e.g., fairs); coordinate focus group schedules and call interested parents to schedule focus group session; take field notes during focus group sessions (if in-person); engage in focus group training and practice sessions. Assist with focus group analysis including transcribing focus groups and coding focus groups using Nvivo.

**Community Partner:**  
Smart Start

**Student Qualifications:**  
Self-motivated and eager to learn, organized and friendly/social demeanor for focus group logistics and recruitment , value diversity, equity based-research, Microsoft Excel basics.
Preferred if possible but not required: Spanish fluency, STATA or other statistical software experience (e.g, SPSS), Nvivo or other qualitative software experience (e.g., Atlas.ti)

**Semester:** Summer 2022
Social Impact of the Arts in Charlotte

Mentor: Vaughn Schmutz
Mentor Title: Associate Professor
Department: Sociology

Project Description:
Description: In this project, we are exploring the varieties of arts-based programs in Charlotte that time to make a social impact of some type, including their goals, motivations, and beliefs about the impact of the arts on social mobility. We also work with community-based arts programs to examine the impact of their programs on the outcomes of interest for the organizations. Interviews with providers and participants in the arts-based programs are the main data source. The OUR Summer Scholar will play a role in researching arts programs in Charlotte, analyzing survey and qualitative interview data, visiting and observing arts programs, recruiting participants for interviews, conducting interviews with young participants and families, cleaning and managing data, and providing practical support to arts programs as needed.

Community Partner:
Arts Impact CLT (university-community partnership that includes several community-based arts programs)

Student Qualifications:
An interest in the arts and in social science research is essential. Experience or coursework in research methods is a plus but not required.

Semester: Summer 2022
Revol: Revisiting a Performance Project as a way of Examining Racist Emblems in the Southeastern United States

Mentor: Carlos Alexis Cruz
Mentor Title: Associate Professor
Department: Theatre

Project Description:
This Sumner the Nouveau Circus project will re-examine a performance/research piece in which we question the presence of confederate emblems in public spaces. The questions at hand- when are these historical, or when are these mainly pure provocation? We will center this research piece particularly examining the confederate flag as a divisive symbol here in Charlotte. The work with our research assistant will extend to gathering local stories as a way of collecting data but also as a way to root the artistic presentation in authentic voices and experiences that currently live in this city in relation to said emblems. Pros and cons, amicable conversations and contentious arguments are all within and something that we must explore/research/discuss as a way of collective liberation, and ideally, a step towards community unity.

Community Partner:
Blumenthal, Arts and Science Council, West Charlotte neighborhoods

Student Qualifications:
Research skills, language skills, community-based research skills.
Semester: Summer 2022