



**2021-2022 RESEARCH ASSISTANT
PROGRAM
PROJECT DESCRIPTIONS**

2021-2022 Research Faculty Projects Table of Contents

Project descriptions are grouped by department name.

Department

| | |
|--|----|
| ARCHITECTURE | 3 |
| ART & ART HISTORY | 9 |
| BIOINFORMATICS AND GENOMICS | 10 |
| BIOLOGICAL SCIENCES | 16 |
| CHEMISTRY | 18 |
| COMPUTER SCIENCE | 20 |
| CRIMINAL JUSTICE AND CRIMINOLOGY | 23 |
| DANCE | 25 |
| ENGLISH | 27 |
| GEOGRAPHY AND EARTH SCIENCES | 29 |
| HISTORY | 32 |
| KINESIOLOGY | 38 |
| MANAGEMENT | 39 |
| MATHEMATICS AND STATISTICS | 40 |
| MECHANICAL ENGINEERING AND ENGINEERING SCIENCE | 42 |
| MUSIC | 47 |
| OFFICE OF UNDERGRADUATE RESEARCH | 48 |
| PHYSICS AND OPTICAL SCIENCE | 49 |
| POLITICAL SCIENCE AND PUBLIC ADMINISTRATION | 51 |
| PSYCHOLOGICAL SCIENCE | 53 |
| PUBLIC HEALTH | 54 |
| SOCIOLOGY | 57 |
| SOFTWARE AND INFORMATION SYSTEMS | 62 |
| THEATRE | 63 |

2021-2022 OUR Research Assistant Project Descriptions

Project Title: Design Gaze: Spatial Attractors Using Eye Tracking Technology

Mentor Name: Peter Wong

Position: Associate Professor

Mentor Department/College: Architecture/College of Arts and Architecture

Project Description: This proposal extends a multi-disciplinary design study begun in 2016. It constitutes the continuation of a SoA Faculty Interdisciplinary Research grant awarded in 2018, Vague Space: Tracing Eyes, Edges, and the Indeterminate Limits of the Architectural Interior. This second part of the study proposed builds on the findings of the first by actively using design determinants derived from a survey using eye-tracking hardware and software. The results of the study identified five (5) semantic elements of the architectural interior that were found of interest in particular interior scenes. These five criteria included 1) the number of viewers looking at an element, 2) the time it takes to first view an element, 3) the time spent viewing that element, 4) the number of fixations that an element receives, and 5) the number of times a viewer revisits an element.

The study showed that architectural features that define space using apertures and openings in an interior play an important role in the fixation times, and therefore interest, in the scene. These elements are uniquely spatial rather than object-based, as the study showed that areas of interest (AOIs) are tied to space, light, and the contrast between edges, surfaces and spaces beyond. In other words, the findings indicated that architecture (walls, windows, floors, and ceilings) held clues in the way our eyes wander in a scene to make sense of its environment, but more importantly, the areas beyond the enclosed nature of the scene seem to be the most favored.

Research Inquiries:

To further the study, we have taken the position that modern space design is an experience that turns away from the reverence of the “object-hood” of architecture – i.e., a position it focuses primarily on a building’s physical and formal properties. Our inquiry therefore hopes to expose the cognitive impressions that architecture offers given our understanding of spatial affordability as we survey the landscape of the interior realms of buildings. The important questions of such spatial practice for us include: 1) what are the indicators of modern space that allow expansiveness and visual freedom, 2) what forms of space produce indeterminate limits or an impression of an interior larger than its physical dimensions, and 3) how does the reliance on such spatial vocabulary play into a renewed appreciation of the characteristics of modernism within the context of contemporary building practice?

Methodology and Project:

The methods of this study will rely on the interpretation of an analysis from previous research on “indeterminate spaces” that started with human subjects viewing photographic and painterly spatial interiors. In that study, a series of semantic regions of interior scenes were used to understand areas of interests (AOIs) of five different architectural elements. These elements will be incorporated into the design of this new study in order to isolate and focus on significant design criteria for the design of 12 interior habitats. Two-dimensional spaces will be created and rendered in Rhino then prepared for a visual survey with human subjects. Data will be captured via eye tracking locations in the scene as well as an analysis of the location and duration of time spent in each of the identified locations. Such data will be gathered in the eye-tracking software and analyzed to determine the cognitive response to each scene. The significance of such a study might be better understood under practical application. For example, how architecture serves to meet the need for more compact and economical living options, or the ways in which efficient spaces can be both economical and affordable in dense urban settings. As such, our

2021-2022 OUR Research Assistant Project Descriptions

research examines the use of rich spatial scenarios in order to posit more efficient solutions for architecture.

Undergraduate RA:

An undergraduate research assistance is being sought for assisting in creating digital models and renderings of the 12 micro-spaces, including renderings, physical models, and organizing subjects for an eye-tracking study of these designs.

Minimum Qualifications: Computer skills with the ability to learn new programs. Good use of Rhino 6 and v-ray (or equal modeling software). Good time organization, ability to work work with people.

Research Period: Spring 2022 only

Selected Program: I am interested in both the OUR Research Scholar and OUR Micro-Internship programs.

2021-2022 OUR Research Assistant Project Descriptions

Project Title: Architectural Acoustics for the Everyday

Mentor Name: Rachel Dickey

Position: Assistant Professor

Mentor Department/College: Architecture/College of Arts and Architecture

Project Description: Gypsum is one of the most commonly used architectural materials and prevalent in architectural acoustics. However, the reliance on added layers of gypsum wallboard for noise control has generally been viewed solely as a material solution to an acoustical problem instead of as a design opportunity to enhance the visual and auditory qualities of a space. The research project “Architectural Acoustics for the Everyday” addresses this issue by developing a catalogue of acoustical designs and fabrication strategies for unique wallboard surface finishes that can be incorporated into typical methods of construction.

The undergraduate student would contribute to the project by running acoustics simulations, producing drawings and representations of sound behavior, and helping with fabrication studies involving CNC machining wallboard which can fold and bend to enhance the material's visual qualities and acoustic performance.

Minimum Qualifications: Minimum qualifications include completion of the second year of architecture school. This level of education includes skills in computer aided drawing, 3D modeling, and physical model making.

Research Period: Both Fall and Spring (2021-2022 Academic Year)

Selected Program: I am interested in both the OUR Research Scholar and OUR Micro-Internship programs.

2021-2022 OUR Research Assistant Project Descriptions

Project Title: The Material Landscape: Trans-scalar Approaches to Geodesign

Mentor Name: Blaine Brownell

Position: Full Professor

Mentor Department/College: Architecture/College of Arts and Architecture

Project Description: This research project entails help preparing a proposal for a book manuscript. Tentatively titled "The Material Landscape: Trans-scalar Approaches to Geodesign," the proposal is intended for audiences in architecture, landscape architecture, engineering, and construction. The book will investigate the most common building and infrastructural systems from the perspective of global environmental impact, and propose alternative solutions based on recent innovations that would minimize this impact. A student could contribute to the project in some or all of these areas: literature review, case study and precedent research, spreadsheet generation, database compilation, mapping using Global Information Systems (GIS) data, visualizing data (chart, infographics), and graphic design.

Minimum Qualifications: The minimum student qualifications would be research skills, basic knowledge of architectural and engineering materials, and familiarity with design software such as Photoshop and InDesign. Additional (optional) skills would include knowledge of statistics, data science, ecology, urban design, and graphic design.

Research Period: Both Fall and Spring (2021-2022 Academic Year)

Selected Program: I am interested in both the OUR Research Scholar and OUR Micro-Internship programs.

2021-2022 OUR Research Assistant Project Descriptions

Project Title: Phil Freelon Exhibition

Mentor Name: Dr. Emily Makas

Position: Associate Professor

Mentor Department/College: Architecture/College of Arts and Architecture

Project Description: An undergraduate research assistant would help with the design and installation of a physical exhibition as well as the development of a digital companion exhibition as part of a larger multi-year research project exploring the architecture of Phil Freelon.

Though widely publicized, surprisingly little scholarly attention has been paid to the work of the late architect Phil Freelon, with the exception of the Smithsonian National Museum of the African-American History and Culture. This exhibition examines that high-profile museum within the context of other Freelon Group projects exploring African American identity, including museums, cultural centers, and memorial parks across the United States. The research will culminate in an exhibition at the Gantt Center and the North Carolina Museum of Art that explores the relationship between the container and the contained, that is, connections between the forms, materials, and meanings of Freelon's architecture and the histories and cultures exhibited within those sites.

For the exhibition, we will supplement drawings, videos, and photographs borrowed from Freelon's firm with well researched interpretive panels. The exhibition will be thematically organized around four key design strategies that thread through Freelon's work at different scales and types. In addition, we will produce site models of two parks and large-scale sectional models of Freelon's multilayered facade systems, which combine formal symbolism of African and African-American culture and history with contemporary architectural design.

Minimum Qualifications: Architectural student familiar with Adobe Creative Suite, especially Illustrator and Photoshop, and Rhino and ideally with experience building models using the SoA Fabrication Labs.

Research Period: Both Fall and Spring (2021-2022 Academic Year)

Selected Program: I am interested in both the OUR Research Scholar and OUR Micro-Internship programs.

2021-2022 OUR Research Assistant Project Descriptions

Project Title: Modeling Moretti: Architectural Analysis of a Mid-century Masterwork in Rome

Mentor Name: Jeffrey Balmer

Position: Associate Professor

Mentor Department/College: Architecture/College of Arts and Architecture

Project Description: Modelling Moretti: Architectural Analysis of a mid-century masterwork in Rome

This research project comprises an analysis of architect Luigi Moretti's ONB Trastevere building in Rome, completed in 1936. Drawn from the comprehensive set of design drawings (sketches and blueprints) of the building in the Central State Archives (ACS) in Rome, my research will reconstruct the complex evolution of the building's design. Aiding in this effort, I'll rely on a student research assistant to help me 'build' a detailed digital model of Moretti's project, a model that will enable me to visualize the building's complex form, and to generate a series of diagrams and drawings articulating and analyzing the evolution of the building's design. I will work closely with the student research assistant, meeting with them weekly to provide oversight of the student's development of the digital model through joint examination of the archival drawings of the building. This proposal is similar in scope to the OUR research project that I participated in the Fall of 2019 with UNC Charlotte undergrad student Margaret ('Maggie' Martin), who assisted me with the creation of a digital model of architect Giuseppe Terragni's Danteum project.

Minimum Qualifications: Minimum student qualifications for this research proposal would include working knowledge of RHINO software, or similar digital modeling platform, as well as Adobe Illustrator and Photoshop. This work would be ideally suited to an undergraduate student in their 3rd or 4th year of full-time architectural studies.

Research Period: Fall 2021 only

Selected Program: I am interested in both the OUR Research Scholar and OUR Micro-Internship programs.

2021-2022 OUR Research Assistant Project Descriptions

Project Title: Illustrations and 3D Models for AR/VR Museums

Mentor Name: Heather D. Freeman

Position: Full Professor

Mentor Department/College: Art & Art History/College of Arts and Architecture

Project Description: I am working on two community engaged projects involve AR/VR that require illustration, 3D modeling, and possibly animation; the student will be able to choose which project they engage with, or if they pursue both. These include an AR/VR museum of under-sung Black women during Charlotte's Civil Rights Movement (based on Prof. Debra Smith's book 'Legacies'); and an AR/VR museum advocating for the human rights of the Guarani and Kaiowá indigenous people in Brazil.

Minimum Qualifications: The student should be able create strong illustrations, in diverse styles, using Adobe raster and vector software. The ability to 3D model in Blender or Maya is advantageous, but students can take on an on-line self-paced course to acquire these skills as part of the research. Students will be assisted with texturing and animating 3D models and integrating them into the Unity 3D game engine for AR/VR applications.

Research Period: Both Fall and Spring (2021-2022 Academic Year)

Selected Program: I am interested in both the OUR Research Scholar and OUR Micro-Internship programs.

2021-2022 OUR Research Assistant Project Descriptions

Project Title: Unraveling the Virosphere

Mentor Name: Dr. Richard Allen White III

Position: Assistant Professor

Mentor Department/College: Bioinformatics and Genomics/College of Computing and Informatics

Project Description: Computational tool development, bacteriophage or bacterial isolation.

Minimum Qualifications: python, some wet-lab would be useful

Research Period: Both Fall and Spring (2021-2022 Academic Year)

Selected Program: I am interested in both the OUR Research Scholar and OUR Micro-Internship programs.

2021-2022 OUR Research Assistant Project Descriptions

Project Title: Collective Analysis of the Earth's Viruses from Phage to SARS-CoV-2 (COVID-19)

Mentor Name: Dr. Richard Allen White III

Position: Assistant Professor

Mentor Department/College: Bioinformatics and Genomics/College of Computing and Informatics

Project Description: The project can be remote, in lab, or hybrid. Collective analysis of viruses in humans, soils/rhizosphere's, and microbial mats/stromatolites. Check out our website - www.rawlab.org. We study viruses of all domains of life. They can do computational research of viral metagenomics or COVID-19 data, or weblab on site microscopy (AFM, confocal), flow cytometry, bacteriophage (bacterial virus) isolation and characterization, sequencing phage on nanopore. I am also willing to tailor a project towards their interest in viruses.

Minimum Qualifications: Laboratory skills some (we can train). Or coding skills.

Research Period: Both Fall and Spring (2021-2022 Academic Year)

Selected Program: I am interested in both the OUR Research Scholar and OUR Micro-Internship programs.

2021-2022 OUR Research Assistant Project Descriptions

Project Title: Visualization Tools for Mutations in Microbes

Mentor Name: Dr. Way Sung

Position: Assistant Professor

Mentor Department/College: Bioinformatics and Genomics/College of Computing and Informatics

Project Description: Mutations are a major source of genetic variation and contribute to vast amount of diversity observed in the world. Mutations can also lead to genetic diseases, and as recently shown in the case of COVID-19, can allow pathogens to evade therapeutics and vaccines. The mutation process is very complicated and the rate of mutations can vary across space and time. To better understand the evolution of the mutation process, we propose to develop visualization tools to examine the rate and spectrum of mutations in different regions of Microbes and Viruses. The ultimate goal is to develop predictive models for understanding how bacteria and viruses evolve.

The student would be responsible for developing a online interactive visualization tool for examining the patterns of mutations in microbes. The student would be responsible for data processing, statistical analysis, programming, and web development.

Minimum Qualifications: This student needs programming background, including javascript and python, and has prior understanding of basic biological processes including mutation, DNA replication, and genetic diseases. It would be expected that the student have completed at least a basic undergraduate programming course in any language.

Research Period: Both Fall and Spring (2021-2022 Academic Year)

Selected Program: OUR Research Scholar 13-week program

2021-2022 OUR Research Assistant Project Descriptions

Project Title: Development of a Novel Wearable Biosensor

Mentor Name: Dr. Jun Wang

Position: Full Professor

Mentor Department/College: Bioinformatics and Genomics/College of Computing and Informatics

Project Description: The objective of this project is to develop a novel wearable biosensor-cloud platform for continuous measurement of metabolic biomarkers in sweat. Real time and continuous multiplex measurement of metabolic biomarkers in biofluids is critical for accurate assessment of health status for precision health. Commonly used analytical methods for measuring metabolic biomarker responses in clinical settings are generally time-consuming in data acquisition and cannot offer real time continuous data measurements. Responses of metabolic biomarkers in blood have been found to be well correlated with health status. However, it is currently very challenging to simultaneously and continuously collect multiple real time metabolic biomarker data from blood due to the invasive nature of blood monitoring. Therefore, it is highly desirable to develop innovative analytical approaches for continuous monitoring of health status by measuring a panel of metabolic markers in a noninvasive manner. Toward this end, we will develop a novel electrochemical wearable biosensor-cloud platform for continuous measurement of metabolic biomarkers such as glucose, lactate, etc. in sweat. This platform will be able to perform a series of tasks: (i) real time continuous and accurate multiplex measurement, (ii) visualization of measurement results on a smartphone, and (v) transmission of data to the cloud. Throughout the project's performance period, the research will determine the analytical performance metrics of the wearable biosensor and demonstrate the feasibility of the platform for assessment of health status for precision health. We envision that this platform can be utilized not only in health monitoring, but in exercise, drug screening, and exposure assessment as well. Undergraduates will fabricate the biosensor and evaluate the analytical performance of the wearable biosensor under the PI's guidance. Through the research the student will be exposed to biosensor research environment and gain hands-on skills for biosensor development and learn the advances in biosensor technologies.

Minimum Qualifications: Senior undergraduate students have hand-on skills on wet lab research and have been trained in chemistry, biochemistry, bioengineering. easy to communicate and team player.

Research Period: Both Fall and Spring (2021-2022 Academic Year)

Selected Program: OUR Research Scholar 13-week program

2021-2022 OUR Research Assistant Project Descriptions

Project Title: Underwater Scents: Functional Genomic Basis of Olfaction in Aquatic and Terrestrial Turtles

Mentor Name: Dr. Laurel Yohe

Position: Assistant Professor

Mentor Department/College: Bioinformatics and Genomics/College of Computing and Informatics

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, aquatic and semiaquatic animals should 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. This project proposes to functionally assay Class I receptor genes in tortoises to determine whether they do more readily respond to waterborne odorant cues. This study will shed light on the ecological basis of the largest vertebrate gene family and has implications for understanding how gene duplication can facilitate habitat-specific sensory processing.

Broadly, undergraduates will learn Specifically, undergraduates should expect to learn how to harvest highly duplicated genes from genomes, characterize rates of pseudogenization and gene loss, infer phylogenetic gene trees, measure rates of molecular evolution, and develop models of gene duplication. Functional lab experiments include identifying candidates specific to some species, performing functional assays using turtle odorant cues, and

Minimum Qualifications: Minimum qualifications are introduction to genetics/genomics, familiarity with bash and running scripts from command line is of interest. Interest in evolution and comparative biology is also desirable.

Research Period: Both Fall and Spring (2021-2022 Academic Year)

Selected Program: I am interested in both the OUR Research Scholar and OUR Micro-Internship programs.

2021-2022 OUR Research Assistant Project Descriptions

Project Title: Breast Cancer and Inflammation

Mentor Name: Dr. Didier Dréau

Position: Full Professor

Mentor Department/College: Biological Sciences/College of Liberal Arts and Sciences

Project Description: The research aims to address the roles of inflammation in breast cancer progression and way to prevent it using mainly in vitro models. If on campus, students will participate in cell cultures, and various analytical assays, data analyses including from publicly available datasets. If remotely only, students' participation will focus on will data analyses.

Minimum Qualifications:

- 1- High motivation to conduct biological research,
- 2- Academic background that include cell biology and/or immunology,
- 3- Fluency in routine computer program (e.g. Office suite)

Research Period: Both Fall and Spring (2021-2022 Academic Year)

Selected Program: I am interested in both the OUR Research Scholar and OUR Micro-Internship programs.

2021-2022 OUR Research Assistant Project Descriptions

Project Title: Molecular Ecology of Marine Invertebrates

Mentor Name: Dr. Adam Reitzel

Position: Full Professor

Mentor Department/College: Biological Sciences/College of Liberal Arts and Sciences

Project Description: Our research lab studies the molecular ecology of coastal invertebrates. We focus on a variety of questions and species to better understand how these organisms respond to environmental signals including stressors like temperature or salinity. As an undergraduate researcher you would be involved in a combination of computer and lab research to study one or more of these mechanisms. The specific project will be co-developed by the student and the faculty mentor.

Minimum Qualifications: No specific qualifications required except an interest to dive into research.

Research Period: Both Fall and Spring (2021-2022 Academic Year)

Selected Program: I am interested in both the OUR Research Scholar and OUR Micro-Internship programs.

2021-2022 OUR Research Assistant Project Descriptions

Project Title: Linking Community and Food-Web Approaches to Restoration

Mentor Name: Dr. Paola Lopez-Duarte

Position: Assistant Professor

Mentor Department/College: Biological Sciences/College of Liberal Arts and Sciences

Project Description: The ultimate objective of our larger research project (restorefoodweb.lumcon.edu) is to guide future marsh restoration efforts by integrating community and food-web approaches into management and planning. One of the project goals is to examine species composition, relative abundances, and food web structure across different-aged created marshes that are influenced by a river diversion. Our study sites are natural and created marshes in southeast Louisiana located along a salinity gradient from a Mississippi River siphon at West Pointe à la Hache. Sampling efforts for this project are scheduled annually in May and include collections of nekton (fish, shrimp, crabs) and macroinvertebrates (e.g., small crustaceans, polychaete worms, insects, spiders). Students at UNCC working on this project will take advantage of these existing collections to learn about different research and data analysis methods. In the lab, students will process macroinvertebrates (e.g., small crustaceans, polychaete worms, insects, spiders) samples. This will involve sorting sampled under a microscope, identifying, and cataloging different species. Students can also work remotely identifying samples using our online catalog, entering, and analyzing data. Students will learn different statistical tests to compare species abundance, composition and biodiversity indices across different sites. Because this project includes laboratory and computer tasks, student participation can be completed remotely, on campus, or as a hybrid

Minimum Qualifications: Students who have completed Ecology/Field Ecology and Statistical courses are encouraged to apply. Knowledge of aquarium care, microscope use, and image analysis software is desired. Training on different field and laboratory protocols, use of instruments, as well as image and statistical analysis software will be provided in the first weeks of the program.

Research Period: Both Fall and Spring (2021-2022 Academic Year)

Selected Program: I am interested in both the OUR Research Scholar and OUR Micro-Internship programs.

2021-2022 OUR Research Assistant Project Descriptions

Project Title: Design of Nucleic Acid Nanoparticles for Biomedical Applications

Mentor Name: Dr. Kirill Afonin

Position: Associate Professor

Mentor Department/College: Chemistry/College of Liberal Arts and Sciences

Project Description: Several different nucleic acid nanoparticles will be assembled, functionalized with therapeutic moieties and tested for their biological activities. The undergraduate student(s) will be trained to work with nucleic acid nanoassemblies, carry out common laboratory techniques, learn how to work cell culture, do data analysis and presentation.

Minimum Qualifications: Laboratory skills (PCR, in vitro transcription, purification of nucleic acids, assembly and characterization of nucleic acids, etc).

Research Period: Both Fall and Spring (2021-2022 Academic Year)

Selected Program: I am interested in both the OUR Research Scholar and OUR Micro-Internship programs.

2021-2022 OUR Research Assistant Project Descriptions

Project Title: Fluorescent Dyes for Molecular Electronics

Mentor Name: Dr. Michael G. Walter

Position: Associate Professor

Mentor Department/College: Chemistry/College of Liberal Arts and Sciences

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.

Minimum Qualifications: 1 yr. general chemistry, 0.5 yr. organic chemistry

Research Period: Both Fall and Spring (2021-2022 Academic Year)

Selected Program: OUR Research Scholar 13-week program

2021-2022 OUR Research Assistant Project Descriptions

Project Title: Building Real-World Assignments for Improved Engagement and Retention of Computer Science Majors

Mentor Name: Drs. Kalpathi Subramanian and Erik Saule

Position: Associate Professor

Mentor Department/College: Computer Science/College of Computing and Informatics

Project Description: This project will contribute to an ongoing effort to build new highly engaging real-world programming assignments spanning introductory courses (CS1, CS2, Data Structures, Algorithm Analysis) in computer science. The goal is to build assignments that clearly illustrate the relevance and potential of computing to incoming majors in computer science, spanning current problems/topics in social, cultural, scientific, entertainment and other domains. The undergraduate student will work on building new assignments using online data sources, such as WikiData(https://www.wikidata.org/wiki/Wikidata:Main_Page). The student will work as part of a research group with other undergraduate and graduate students and participate in weekly meetings for reviews and feedback. The student will gain valuable training in software design, documentation and working on challenging projects and contribute to an assignment repository.

New web technologies will also be explored to make assignments portable and useful across different programming languages, platforms, course levels, and student skills/background.

Minimum Qualifications: The undergraduate student should preferably have Junior standing and must have satisfactorily completed the courses in the first two years in Computer Science. Some knowledge of server side programming, Javascript, web technologies (HTML, CSS) and databases will be helpful. More important, the student should be motivated to learn new languages, technologies and tools, complete tasks on time and be ready work with other members of the research group.

Research Period: Both Fall and Spring (2021-2022 Academic Year)

Selected Program: I am interested in both the OUR Research Scholar and OUR Micro-Internship programs.

2021-2022 OUR Research Assistant Project Descriptions

Project Title: User Interface Design and Visualization Algorithms for the CS Materials System

Mentor Name: Drs. Kalpathi Subramanian and Erik Saule

Position: Associate Professor

Mentor Department/College: Computer Science/College of Computing and Informatics

Project Description: This project will contribute to an ongoing effort to CS Materials (<https://cs-materials.herokuapp.com/>), a system under development to align CS courses with national curriculum guidelines. CS Materials allows CS instructors to use the system to enter and classify their course materials (lectures, exams, quizzes, videos) into the system against the current ACM Curriculum guidelines, which in turn permits assessment of their own courses against the standard, compare their course curriculum to other instructors teaching the same course, or other sections of the same course in their institution. CS Materials provides visualization capabilities that allows interactive visualization of the alignment across different metrics, and provides a deeper understanding of the course(s) as a whole. In the long-term, CS Materials will become a useful tool for understanding how certain courses are taught across the nation.

Minimum Qualifications: The undergraduate student should preferably have Junior/Senior standing and must have satisfactorily completed the courses in the first two years in Computer Science. The student will work on user interface (UI) aspects of the system; experience with web technologies (HTML, CSS, Javascript) is expected and preferably some prior UI design experience. The student will also contribute to designing, assessing and implementing visualization layouts for CS Materials. Most important, the student should be motivated to learn new languages, technologies and tools, complete tasks on time, attend and contribute to weekly meetings, and be ready work with other members of the research group.

Research Period: Both Fall and Spring (2021-2022 Academic Year)

Selected Program: I am interested in both the OUR Research Scholar and OUR Micro-Internship programs.

2021-2022 OUR Research Assistant Project Descriptions

Project Title: Semantic Analysis of Medical Guidelines

Mentor Name: Dr. Wlodek Zadrozny

Position: Full Professor

Mentor Department/College: Computer Science/College of Computing and Informatics

Project Description: Under the guidance of a PhD student (and mine), the undergrad will help with semantic analysis and indexing of medical guidelines. The project will answer questions health policy questions about progression of recommendations, different populations mentioned, average time of universal adoption of innovations in medicine, etc.

Minimum Qualifications: Completed a course on Machine learning, NLP or Artificial Intelligence.

Research Period: Both Fall and Spring (2021-2022 Academic Year)

Selected Program: OUR Research Scholar 13-week program

2021-2022 OUR Research Assistant Project Descriptions

Project Title: Learning to Solve Multiple Tasks

Mentor Name: Dr. Minwoo Lee

Position: Assistant Professor

Mentor Department/College: Computer Science/College of Computing and Informatics

Project Description: Many machine learning models are developed to solve a single problem and it has shown effectiveness of it. Generalization, making one solution to be application other problems, is one of challenges of machine learning, which has many potential benefits. This project will investigate an algorithm design for multitask learning.

Minimum Qualifications: Familiar to python programming and machine learning, interest in solving challenging problems.

Research Period: Both Fall and Spring (2021-2022 Academic Year)

Selected Program: I am interested in both the OUR Research Scholar and OUR Micro-Internship programs.

2021-2022 OUR Research Assistant Project Descriptions

Project Title: Serial Murder: Fact and Fiction

Mentor Name: Dr. Charisse T.M. Coston

Position: Associate Professor

Mentor Department/College: Criminal Justice and Criminology/College of Liberal Arts and Sciences

Project Description: Serial homicide is one of the most sensationalized areas of research in criminology and criminal justice. Understanding the real facts of a case rather than being caught up in the inevitable media glitz has become a difficult task. This project is designed to debunk the myths and to reveal the most current research from stringent reputable researchers regarding this form of criminal homicide.

Minimum Qualifications: Basic knowledge of WORD.

Research Period: Spring 2022 only

Selected Program: OUR Research Scholar 13-week program

2021-2022 OUR Research Assistant Project Descriptions

Project Title: Sensate Technicities: Creative Praxis in South Asian Aesthetics

Mentor Name: Dr. Kaustavi Sarkar

Position: Assistant Professor

Mentor Department/College: Dance/College of Arts and Architecture

Project Description: This research project focuses on prominent aesthetics within the field of choreography in Odissi dance, Odissi is an eastern Indian traditional form. The project entails examining the curvilinear basis of the form as well as its kinesthesia as the dancing body navigates stasis and motility. How does the Odissi body communicate and to what end? How does the choreographer leave a signatory impression on the composition? What is the relationship between the music and the movement? Utilizing choreographic analysis of canonical and innovative dance works created by multiple choreographers, the project argues that curvilinearity is a function of energetic configurations of gestural, postural, and kinesthetic intensities that accrue through sculptural imagery, pedestrian activity, and artistic chiseling. Choreographic labor is invisibilized within South Asian aesthetics given its automatic labeling as traditional and hence historically fossilized. This project shows that choreographic innovations are alive and thriving in the field.

Minimum Qualifications: Skills in qualitative research such as interviewing and transcribing. Be proficient in reading scholarly prose and articles for conducting substantial literature review. Have archival skills in order to archive existing video recordings in stacks compatible to library storage. Be well-versed in choreographic analysis to sift through movement across hours of archival video footage.

Research Period: Both Fall and Spring (2021-2022 Academic Year)

Selected Program: I am interested in both the OUR Research Scholar and OUR Micro-Internship programs.

2021-2022 OUR Research Assistant Project Descriptions

Project Title: Dance and SEL Curriculum Design

Mentor Name: Dr. Marissa Nesbit

Position: Assistant Professor

Mentor Department/College: Dance/College of Arts and Architecture

Project Description: In this Action Research project, we are designing, implementing, and refining curriculum modules that meet the needs expressed by community partners for integration of dance and social-emotional learning for elementary students. In an elementary dance curriculum, students create, perform, respond, and connect dance learning to other areas. Social-emotional learning refers to learning that supports the whole child in the areas of self-awareness, self-management, awareness of others, relationship skills, and responsible decision making. Dance can offer multiple opportunities for children to develop and practice SEL skills; in this project, we will explicitly design dance lessons to focus on the SEL skills identified for focus by our partners, while also addressing curriculum standards in arts education in a purposeful and sequential way. We will identify dance concepts and activities that can clearly and explicitly support the development of SEL competencies. We will incorporate feedback from teachers and students to create curriculum modules that can be shared as a model for other schools and organizations looking to purposefully integrate arts education and SEL.

An undergraduate student participating in this project will be an active contributor to planning and teaching pilot lessons and collecting documentation regarding the project.

Specific duties of an undergraduate student may include: conducting literature search and review of existing studies and curriculum linking dance and arts education to social-emotional learning; interviewing teachers at the community partner; co-planning and co-teaching new dance lessons with elementary children, including developing materials to support the lessons; writing teaching reflections based on the lessons; collecting and analyzing feedback from teachers and children on their perceptions of dance and SEL lessons; preparing curriculum materials for dissemination to other schools and organizations; assisting with development of conference presentation.

Minimum Qualifications: Prior experience teaching or working with elementary-age children is expected. Some prior experience in performing arts and/or physical education is helpful.

Research Period: Both Fall and Spring (2021-2022 Academic Year)

Selected Program: I am interested in both the OUR Research Scholar and OUR Micro-Internship programs.

2021-2022 OUR Research Assistant Project Descriptions

Project Title: Black Women's Archives: Stories from UNC Charlotte

Mentor Name: Dr. Janaka Lewis

Position: Associate Professor

Mentor Department/College: English/Women's and Gender Studies Program/College of Liberal Arts and Sciences

Project Description: In conjunction with the Center for the Study of the New South (CLAS) and Atkins Library, Student would work with Special Collections (already interested in the program) to collect stories of Black women faculty and staff at UNC Charlotte and also anything around founding of the Afro American Cultural Center by Dr. Bertha Maxwell Roddey and Dr. Mary Harper, who were both faculty members at Charlotte. Specific questions would be what resources Drs. Roddey and Harper used in the founding of the Afro American Cultural Center and its tenure (now the Gantt Museum), who was involved, but also the specific legacies that they created at UNC Charlotte. In addition to Atkins, an undergraduate student would reach out to the departments (AFRS and English) where Roddey and Harper were to gather information about their presence and legacy there and also create a timeline/story of Black women faculty and staff at UNC Charlotte across the University. The student will use information to envision what an archive or legacy collection (between the library and Center) and any related outreach/programming might look like in a two year period (research would also inform any grant funding applications or or sponsorship around the archive).

Minimum Qualifications: Willingness to communicate with leadership across departments and with special collections librarians required, archival research (recommended but not required), humanities (English, History, WGST or related) courses recommended but not required.

Research Period: Spring 2022 only

Selected Program: I am interested in both the OUR Research Scholar and OUR Micro-Internship programs.

2021-2022 OUR Research Assistant Project Descriptions

Project Title: 19th C. Women in Science & Technology

Mentor Name: Dr. Alan Rauch

Position: Full Professor

Mentor Department/College: English/College of Liberal Arts and Sciences

Project Description: The fact the women in the 19th century were dismissed as intellectual contributors to culture, is now generally accepted. But what is less appreciated is what most women themselves knew and that is that they had been providing intellectual content to their own offspring for generations. At home, however, women were burdened with a feminine curriculum centered on "proper" female skills. Nevertheless "permissible" subjects included foreign languages and the sciences, which opened doors on other cultures and new genres. These female "mentors" translated new and unfamiliar worlds, in travel narratives, memoirs, and in science texts to educate eager young minds. Many of these women began their careers as translators of "foreign" texts into English, but they also acted as "conceptual" translators of complex ideas in science and culture. Despite obstacles, women found outlets for "translating" their own intellect by applying themselves to genres which had been deemed "acceptable" in a cultural milieu dominated by male authorship. The three genres that are most striking and most frequent are: 1.) translation; 2.) works for children; and, 3.) travel memoirs/narratives. Taken together, they all mediate the unfamiliar in ways that render new and unfamiliar content accessible. In short, they are all "translations."

Minimum Qualifications: Minimum Qualifications: Students should have an interest in archival research to explore the as yet undiscovered or at least unexamined texts by women motivated to write about science. Given the time period, late 18th to mid-nineteenth centuries, student should be historically engaged as well. If a student has language skills, say in French or German that would be useful

Research Period: Both Fall and Spring (2021-2022 Academic Year)

Selected Program: I am interested in both the OUR Research Scholar and OUR Micro-Internship programs.

2021-2022 OUR Research Assistant Project Descriptions

Project Title: Quantifying Water Quality and Hydrology in Urban Beaver and Stormwater Ponds

Mentor Name: Dr. Sandra Clinton

Position: Research Assistant Professor

Mentor Department/College: Geography and Earth Sciences/College of Liberal Arts and 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.

Minimum Qualifications: Comfortable walking in rivers in the Charlotte area (field days can be 2-4 hours); comfortable working in a laboratory setting; familiarity with Excel for data entry.

Research Period: Both Fall and Spring (2021-2022 Academic Year)

Selected Program: I am interested in both the OUR Research Scholar and OUR Micro-Internship programs.

2021-2022 OUR Research Assistant Project Descriptions

Project Title: Examining Change in Migrant Foodscapes

Mentor Name: Dr. Colleen Hammelman

Position: Assistant Professor

Mentor Department/College: Geography and Earth Sciences/College of Liberal Arts and Sciences

Project Description: This project investigates the impact of urban growth and neighborhood change on migrant food landscapes in Atlanta, Charlotte, and Washington, DC. Utilizing mixed methods (analysis and mapping of demographic, property and education data, and in-depth interviews, field surveys, and focus groups), it seeks to address the following research questions: 1) in what ways are migrants' foodscapes changing as a result of urban restructuring? 2) where in the city are migrants constructing new foodscapes? and 3) what are the implications of this relocation for migrant economic outcomes, social service provision, and neighborhood integration? Given the evolving influences of the global coronavirus pandemic, this research will also consider how migrant placemaking practice has been differentially impacted by the pandemic. The undergraduate research scholar or intern will ideally contribute to mapping secondary data, building a database of ESRI StoryMaps, and supporting interview and focus group data collection and analysis for research in Atlanta. There may be opportunities to work on data in other cities as time allows.

Minimum Qualifications: Minimum qualifications include experience with ArcGIS applications and qualitative research methods. Spanish language skills are a plus.

Research Period: Both Fall and Spring (2021-2022 Academic Year)

Selected Program: I am interested in both the OUR Research Scholar and OUR Micro-Internship programs.

2021-2022 OUR Research Assistant Project Descriptions

Project Title: Fracture Analyses of Rocks Weathering in Different Climates

Mentor Name: Dr. Martha-Cary Eppes

Position: Full Professor

Mentor Department/College: Geography and Earth Sciences/College of Liberal Arts and Sciences

Project Description: This project is a component of two multidisciplinary (Engineering & Geology/Earth Sciences) NSF – Funded research projects whose aims are to characterize natural rock cracking evolution over time, and under different climates (in Antarctica and along a climate-transect in the deserts and mountains of California).

Field data and samples were collected in California in 2019 and 2020 - and in Antarctica in 2018. In the field, we recorded visible cracks on the surface of boulders of different ages and in different climates. Rock samples were brought back to Charlotte and thin sections (light-transmissible wafers) were prepared. (Additional samples were collected from large, dated boulders in 2020, and will be collected in summer 2021, but have not yet been prepared and analyzed.). Using these thin sections, we hope to understand if/how microscopic cracks relate to the macroscopic cracks we measured in the field, in order to understand and quantify the evolution of the cracking through time and space.

I am seeking a student to to (1) use a Covington slab saw to cut rocks for thin section preparation; (2) learn and use basic petrographic microscope techniques to collect mineralogy and grain size data of the thin sections; and (3) map cracks visible in thin sections and 4) import data into freely available FracPaQ software.

Thus – the student will gain training and experience in 1) hands-on rock sample preparation; 2) standard thin-section analyses of mineral grains 3) novel thin-section analyses of fractures and 4) using shareware computer code to analyze linear data.

Minimum Qualifications: Completion of Mineralogy and/or Petrology courses - or equivalent experience with petrographic microscope; average or above average proficiency with Microsoft Excel or equivalent spreadsheet software. Other skills will be learned during project training.

Research Period: Both Fall and Spring (2021-2022 Academic Year)

Selected Program: I am interested in both the OUR Research Scholar and OUR Micro-Internship programs.

2021-2022 OUR Research Assistant Project Descriptions

Project Title: Mandatory Minority: The Armenian Community in Palestine, 1920-1948

Mentor Name: Dr. Ella Fratantuono

Position: Assistant Professor

Mentor Department/College: History/College of Liberal Arts and Sciences

Project Description: What happens to communities after genocide? How do states make use of refugees? In 1915, the Ottoman Empire systematically deported and murdered more than one million Armenians. In the wake of the Armenian Genocide, refugees joined diaspora communities around the world, including ones in British ruled Mandatory Palestine (1920-1948), a territory roughly coterminous with what is now Israel and the Occupied Territories. The Armenian presence in Palestine dates to the fourth century. During and after WWI, Armenian refugees joined historic communities in Haifa, Jaffa, Nazareth, and Jerusalem. This project explores the Armenian community's relationship to British rule during the tumultuous years of the mandate, a topic scholars of the period have virtually ignored. It considers the dynamics of the Armenian community and assesses how that community fit into British governance of the territory. The history of the mandate is often narrated simplistically as a prelude to an Arab-Jewish/Palestine-Israel saga, to the detriment of considering the histories of other groups that endured war, navigated shifting territory and governance, and participated in local, regional, and imperial politics.

For this OUR research program, I am seeking an undergraduate assistant to help me systematically gather and catalogue research materials related to this project. During the research period, the student will collect and analyze relevant English-language primary sources from several online archives, including records from the British Foreign Office, United States Foreign Relations Records, and The Jerusalem Post. We will meet weekly to discuss the student's findings.

Minimum Qualifications: History Major who has completed HIST2600; interest in Middle East history/Armenian Genocide; excellent reading and writing skills.

Research Period: Fall 2021 only

Selected Program: I am interested in both the OUR Research Scholar and OUR Micro-Internship programs.

2021-2022 OUR Research Assistant Project Descriptions

Project Title: Making Enemies and Allies: The Impact of the Bolivian Agrarian Reform in Latin America

Mentor Name: Dr. Carmen Soliz

Position: Associate Professor

Mentor Department/College: History/College of Liberal Arts and Sciences

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 Odría, 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 unsettled 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 Manuel Odría 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.

Over the past two summers I took thousands of photographs in the archives of La Paz (Bolivia), Quito (Ecuador), and Lima (Peru) about the effects of the Bolivian Agrarian Reform in the region. A undergraduate student will help me organizing the information by topics and by years, transcribing quotes from those sources, and summarizing the information. This project will give a student the opportunity to work with primary sources, processing and summarizing the information. All basic steps to write an academic article."

Minimum Qualifications: The student needs to speak Spanish. All sources are in Spanish. I prefer a History or Latin American major.

Research Period: Fall 2021 only

Selected Program: I am interested in both the OUR Research Scholar and OUR Micro-Internship programs.

2021-2022 OUR Research Assistant Project Descriptions

Project Title: Carolina's Militiamen, 1865-1898

Mentor Name: Dr. Gregory Mixon

Position: Full Professor

Mentor Department/College: History/College of Liberal Arts and Sciences

Project Description: The primary research is to examine newspapers of the mid to late 1860s, all of the 1870s and some of the 1880s collecting newspaper articles chronicling the evolution of African American political participation in South Carolina and North Carolina. political participation is the broad focus, the narrow focus involves following the creation and evolution of black militia units as instruments of black political power. The student will be reading newspapers of the time and collecting articles electronically and through interlibrary loan reading microfilm that will be utilized to construct book chapters of a projected monograph. They will also need to put the articles in historical context by familiarizing themselves with secondary sources on North Carolina and South Carolina state histories. The project will involve also writing about what black people were engaged in doing as they defined freedom, citizenship, belonging, and being members of local and statewide communities. The student may be able to present a conference paper based on this primary source research at the annual meetings of the Association for the Study of African American Life and History in September 2022 or the National Council for Black Studies in spring 2022 or spring 2023.

Minimum Qualifications: Students should have completed undergraduate History or Africana Studies courses, especially History 2161 African American History Survey and some Historical research done with primary sources in the 19th century and worked with microfilm readers in Atkins Library. While this would be the ideal student, students with an interest in African American History before 1900 and a willingness to spend a lot of time reading old newspapers and reading a book or two or some related articles during the semester should apply.

Research Period: Both Fall and Spring (2021-2022 Academic Year)

Selected Program: I am interested in both the OUR Research Scholar and OUR Micro-Internship programs.

2021-2022 OUR Research Assistant Project Descriptions

Project Title: Climate Refugee Stories: Charlotte Histories, Just Futures

Mentor Name: Dr. Kristina Shull

Position: Assistant Professor

Mentor Department/College: History/College of Liberal Arts and Sciences

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 a National Geographic Documenting Human Migrations education grant. 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."

Minimum 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

Research Period: Both Fall and Spring (2021-2022 Academic Year)

Selected Program: I am interested in both the OUR Research Scholar and OUR Micro-Internship programs.

2021-2022 OUR Research Assistant Project Descriptions

Project Title: Chinese-American Tea Trade

Mentor Name: Dr. Dan Du

Position: Assistant Professor

Mentor Department/College: History/College of Liberal Arts and Sciences

Project Description: Dr. Du is doing research on the Chinese-American tea trade in the 19th century. She needs a research assistant to gather information on tea shops and tea prices in U.S. cities from the 19th-century historical newspapers. The student also needs to enter the data into several Excel files. Dr. Du will provide access to historical newspaper datasets, excel templates, and background information about different types of tea consumed in the U.S.. This entry-level job requires the applicant to have enough knowledge of Excel spreadsheet and a vigorous attitude to data collection.

Minimum Qualifications: History research skills, completion of HIST2600, and computer skills.

Research Period: Both Fall and Spring (2021-2022 Academic Year)

Selected Program: I am interested in both the OUR Research Scholar and OUR Micro-Internship programs.

2021-2022 OUR Research Assistant Project Descriptions

Project Title: Creativity within Confinement: The Culture of Internment in WWI America

Mentor Name: Dr. Heather Perry

Position: Associate Professor

Mentor Department/College: History/College of Liberal Arts and Sciences

Project Description: I am looking for a student to help me with researching the cultural and leisure activities of German-speaking internees in the U.S. during the First World War. This can be for either one semester or two semesters.

From 1917-1919, over 4,000 German civilians and sailors as well as hundreds of German-Americans were held captive in 4 different POW internment camps. This student will help me to analyze how these interned Germans passed their time during confinement. In addition to studying their work details and camp records, the student will help me to collect and analyze the camp newspapers, photographs, art & crafts, music, theatre, sport and gardens which these (mostly) men created. In particular, I am interested in how captives negotiated and/or resisted the conditions under which they lived and how this impacted their understanding of the United States, Germany, and their place in both countries -- thus students will need to spend time reading and analyzing these artefacts and then writing research summaries.

German nationals in the US first experienced enemy alien status and civilian internment in the Fall of 1917 -- after more than 3 years of being belligerents in a neutral America. Through a study of diaries and letters, as well as the cultural products they left behind (photographs, literature, and newspapers), we will be determining among other things how civilian identities and lives were impacted by their internment. We will then try to trace how these internment experiences impacted migration patterns of these men and women after the war by using genealogy databases. Did they remain in the country to which they immigrated, but then were ultimately confined? Or did they return to the homeland they had left years before the war and no longer completely identified with?

Minimum Qualifications: Students should have strong organization and communication skills. They should be familiar with using Excel spreadsheets and MS word processing programs. They should also have some experience or familiarity using newspaper and other research databases. Preference will be given to someone who can read and understand German; however, German language skills are not a requirement for the position.

Research Period: Both Fall and Spring (2021-2022 Academic Year)

Selected Program: I am interested in both the OUR Research Scholar and OUR Micro-Internship programs.

2021-2022 OUR Research Assistant Project Descriptions

Project Title: Health Risk Assessment Testing Outreach Program

Mentor Name: Dr. Trudy Moore-Harrison

Position: Clinical Assistant Professor

Mentor Department/College: Kinesiology/College of Health and Human Services

Project Description:

- 1) To identify health risk factors associated with conditions such as type 2 diabetes, cardiovascular disease, and obesity.
- 2) To provide immediate feedback and education to tested individuals concerning their health risk numbers, referring them to their primary care physicians if immediate risk is high.

Duties: Complete training then complete health risk assessments, and data collection.

Minimum Qualifications: Interest in health/science field recommended.

Research Period: Both Fall and Spring (2021-2022 Academic Year)

Selected Program: I am interested in both the OUR Research Scholar and OUR Micro-Internship programs.

2021-2022 OUR Research Assistant Project Descriptions

Project Title: Enterprise Performance Measurement and Management for All Stakeholders

Mentor Name: Victor Zitian Chen

Position: Associate Professor

Mentor Department/College: Management/College of Business

Project Description: This project is to conduct systematic reviews of the literature on the measurement of enterprise performance concerning all stakeholders (investors, customers, employees, suppliers, and the community), as well as the drivers in these performance indicators. The findings will be organized into a knowledge graph data ready for developing machine reading. The student will be trained to conduct rigorous reviews, and organize findings into a format for both human researchers and natural language processing (NLP) modeling.

Minimum Qualifications: English as the first language, Excel, Word, excellent communications.

Research Period: Both Fall and Spring (2021-2022 Academic Year)

Selected Program: OUR Research Scholar 13-week program

2021-2022 OUR Research Assistant Project Descriptions

Project Title: Uncovering Patterns in School Discipline Data

Mentor Name: Dr. Anthony Fernandes

Position: Associate Professor

Mentor Department/College: Mathematics and Statistics/College of Liberal Arts and Sciences

Project Description: School discipline disproportionately affects African American students in school. The undergraduate student will do a literature review of school discipline and examine publicly available datasets on discipline to uncover patterns in these data. They will need to have a working knowledge of R and Excel and be willing to learn CODAP. The undergraduate student will also prepare activities that can be used within teacher preparation to both, develop preservice teachers' knowledge about statistics and the issue of school discipline.

Minimum Qualifications: Student should have a working knowledge of R and Excel and be willing to learn CODAP.

Research Period: Fall 2021 only

Selected Program: OUR Research Scholar 13-week program

2021-2022 OUR Research Assistant Project Descriptions

Project Title: The Convexification Method to Identify Anti-personnel Explosive Devices Buried Under the Ground.

Mentor Name: Dr. Loc H Nguyen

Position: Assistant Professor

Mentor Department/College: Mathematics and Statistics/College of Liberal Arts and Sciences

Project Description: The student will do research in the area of computational mathematics that can be applied to the problem of identifying anti-personnel explosive devices buried under the ground. The experiment leading to this problem is as follows. We first send an optical wave to the area we want to inspect. The reflected wave carries the information of the explosive device. Collecting the reflected wave, we aim to identify that hidden device. I will train the student about differential equations so that the student understands the proposed algorithm. The student's responsibility is to write the computational code on Matlab and then test the efficiency of the resulting software. I have experience supervising undergraduate students. I have published one paper with an undergraduate student P. M. Nguyen in 2020 (see P. M. Nguyen and L. H. Nguyen, A numerical method for an inverse source problem for parabolic equations and its application to a coefficient inverse problem, *Journal of Ill-posed and Inverse Problems*, 38, 232-339, 2020). Moreover, the paper with another undergraduate student William Powell has been accepted for publication (see T. T. Le, L. H. Nguyen, T-P. Nguyen and W. Powell, The quasi-reversibility method to numerically solve an inverse source problem for hyperbolic equations, to appear on *Journal of Scientific Computing*, see also arXiv:2011.04855, 2021).

Minimum Qualifications: The students who pass Math 2241, Math 2164 and Math 2171 with the grade A are eligible.

Research Period: Fall 2021 only

Selected Program: OUR Research Scholar 13-week program

2021-2022 OUR Research Assistant Project Descriptions

Project Title: Characterization and Modeling of Battery Safety Behaviors

Mentor Name: Dr. Jun Xu

Position: Assistant Professor

Mentor Department/College: Mechanical Engineering & Engineering Science/College of Engineering

Project Description: This project is part of US DOE sponsored research project. The major research contents for this OUR research project is to actively involve into the mechanical and electrochemical experiment and conduct the modeling of batteries. Students can contribute both the experiment and theoretical modeling parts and will benefit through rigorous training and prepare them for future graduate studies.

Minimum Qualifications: Students need to have a solid calculus, physics, mechanics and chemistry knowledge (preferably all A's in those courses).

Research Period: Both Fall and Spring (2021-2022 Academic Year)

Selected Program: OUR Research Scholar 13-week program

2021-2022 OUR Research Assistant Project Descriptions

Project Title: Experimental Hypersonics: Study of Boundary Interactions Layers

Mentor Name: Dr. Jerry Dahlberg

Position: Assistant Professor

Mentor Department/College: Mechanical Engineering and Engineering Science/College of Engineering

Project Description: The project is to answer the question: "How does chemical nonequilibrium, ionization, etc within laminar (hypersonic) boundary layers affect the transition location where the turbulent boundary layer sets in (and where heat transfer to the vehicle surface spikes)? The student would do an in depth literature review and assist the faculty with the development of a set of experiments, which could be conducted in the UNCC hypersonic wind tunnel to test the question.

Minimum Qualifications: Basic computer skills, laboratory skills, critical thinking and perform analysis of published results. Desire to learn fluid mechanics and hypersonic flow.

Research Period: Both Fall and Spring (2021-2022 Academic Year)

Selected Program: I am interested in both the OUR Research Scholar and OUR Micro-Internship programs.

2021-2022 OUR Research Assistant Project Descriptions

Project Title: Modeling and Data Analytics for Predicting Water Infrastructure Conditions

Mentor Name: Dr. Nicole Barclay and Michael Smith

Position: Assistant Professor

Mentor Department/College: Engineering Technology and Construction Management/College of Engineering

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.

Minimum 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.

Research Period: Both Fall and Spring (2021-2022 Academic Year)

Selected Program: I am interested in both the OUR Research Scholar and OUR Micro-Internship programs.

2021-2022 OUR Research Assistant Project Descriptions

Project Title: Computational Investigation of Electron Cloud Distortion-induced Viscosity Generation in Simple Liquids

Mentor Name: Dr. Russell Keanini

Position: Full Professor

Mentor Department/College: Mechanical Engineering and Engineering Science/College of Engineering

Project Description: An article recently published by our research group ['On the physical mechanisms underlying single molecule dynamics in simple liquids', Keanini, Dahlberg, and Tkacik, Scientific Reports, vol. 11, 258 (2021)] presents physical arguments, along with comparisons with experimental data, suggesting that viscosity in non-metallic simple liquids (i.e., those composed of molecules having no permanent dipoles), is generated due to tangential/glancing collisions between adjacent molecules. This proposed picture of molecular-scale viscosity emergence answers a question that has long baffled physicists: What are the single-molecule-scale mechanisms that produce stickiness - viscosity - in liquids? [The mechanism underlying viscosity emergence in gases has been well-understood since Boltzmann's work in the latter 1800's.]

The objective of the proposed OUR project centers on building a computational chemistry model that allows detailed, rigorous testing of the proposed mechanism of viscosity emergence in simple liquids.

Although I don't have a formal background in Computational Chemistry, I believe that my training in computational fluid dynamics and numerical modeling of physical processes, as well as my ongoing research in molecular hydrodynamics and nonequilibrium statistical mechanics, will allow me to both supervise an undergraduate student, as well as learn in parallel as the student builds an appropriate model.

Our task will be greatly enabled, and in fact made possible by the availability of a large number of Computational Chemistry software packages. Indeed, our first task will center on identifying an appropriate package that, for example, allows ab initio modeling of molecular pair (weak) collisional interactions. References that provide practical guidance on building such models - for example, Computational Chemistry, by Lewars - will be heavily relied upon.

In summary, the proposed OUR project will provide a crucial impetus to our group as we continue our push towards building a rigorous understanding of single-molecule-scale dynamics in liquids.

Minimum Qualifications:

a) A junior or senior undergraduate in Mechanical, Electrical, or Civil Engineering, or in Chemistry or Physics would have sufficient background for undertaking this project.

b) Ideally, the student will have had exposure to one or more scientific/engineering software packages. Additionally, the student will have had experience writing code for computationally solving engineering/scientific problems.

c) At minimum, a student should have taken two semesters of undergraduate, calculus-based physics. One of these courses should have covered the principles of electricity and magnetism.

d) Ideally, the student will have had some exposure to the basics of quantum mechanics. However, this is not a requirement."

2021-2022 OUR Research Assistant Project Descriptions

Research Period: Both Fall and Spring (2021-2022 Academic Year)

Selected Program: OUR Research Scholar 13-week program

2021-2022 OUR Research Assistant Project Descriptions

Project Title: Recovering Lost Voices: Testimony of Holocaust Survivors from the Theresienstadt Ghetto

Mentor Name: Dr. James A. Grymes

Position: Full Professor

Mentor Department/College: Music/College of Arts and Architecture

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 as Terezín). Working with the mentor, the OUR 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.

Minimum Qualifications: Familiarity with Google drive, Google docs, and digital audio software.

Research Period: Both Fall and Spring (2021-2022 Academic Year)

Selected Program: OUR Research Scholar 13-week program

2021-2022 OUR Research Assistant Project Descriptions

Project Title: The Housing Crisis in Charlotte: Promoting Self-efficacy and Advocacy among Habitat Charlotte Region Homeowners

Mentor Name: Dr. Erin Banks

Position: OUR Assistant Dean

Mentor Department/College: Office of Undergraduate Research/University College

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.

Minimum 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.

Research Period: Both Fall and Spring (2021-2022 Academic Year)

Selected Program: I am interested in both the OUR Research Scholar and OUR Micro-Internship programs.

2021-2022 OUR Research Assistant Project Descriptions

Project Title: Thermal Stabilization of Biological Products Using Light Assisted Drying

Mentor Name: Dr. Susan Trammell

Position: Full Professor

Mentor Department/College: Physics and Optical Science/College of Liberal Arts and Sciences

Project Description: Vaccination against infectious disease has eliminated smallpox worldwide and prevents an estimated 2.5 million deaths per year from diphtheria, whooping cough and measles. However, the vast majority of vaccines must be stored and transported at temperatures between 2-8°C from the point of manufacture to the point of use. Thermal excursions outside of this temperature range can decrease vaccine potency. This system of controlled temperature distribution is expensive and is especially burdensome in low resource settings due to a lack of available infrastructure. Inadequate access to cold storage is one of the leading causes of under-vaccination globally. There is a need for new methods that can provide thermally stable vaccines.

One method for developing thermally stable vaccines involves engineering antigens that can maintain their stability without preservative adjuvants. Engineered vaccines are labor intensive, still have relatively short shelf lives when stored at ambient temperatures, and each newly developed vaccine must obtain governmental approval. Other strategies use freeze drying, foam drying, spray drying, or sugar films after the addition of preservative adjuvants and glass forming sugars and/or polymers to stabilize vaccines. Freeze drying, spray drying, and foam drying all expose vaccines to extreme temperatures and/or pressure conditions. All of these drying techniques, including sugar films, require long processing times and some of the formulations used require a large number of adjuvants that can increase the cost and complexity of the vaccine product.

Light-assisted drying (LAD) is a new technique that is used to prepare vaccines for dry-state storage at room temperature in a sugar glass. We are applying the LAD processing technique to vaccine stabilization. During LAD processing, vaccine antigens suspended in a droplet of trehalose solution are irradiated with a near-IR laser to speed drying. As water is removed, the trehalose forms a protective matrix. The laser allows for careful control of the energy deposition into the sample and thus sample temperature, to avoid thermal damage. LAD is a one step process that can dry small volume samples in less than 60 minutes. The process avoids the extreme temperatures and pressures inherent to freeze drying, foam drying and spray drying.

Undergraduate students will participate in LAD processing samples using lasers and characterizing the samples using techniques such as polarized light imaging. Students will be involved with experimental design and data analysis using MATLAB. Students will be expected to present their work at the Undergraduate Research Conference and will be included on any publications that result from the work. In addition to working in the lab with graduate students, undergraduate students will attend weekly lab meetings and meet individually with Dr. Trammell.

Minimum Qualifications: Completion of PHYS 2102 required, completion of PHYS 3141 and PHYS 3282 preferred. Some experience with MATLAB helpful but not required.

Research Period: Both Fall and Spring (2021-2022 Academic Year)

Selected Program: I am interested in both the OUR Research Scholar and OUR Micro-Internship programs.

2021-2022 OUR Research Assistant Project Descriptions

Project Title: Building a Quantum Trajectory Simulator

Mentor Name: Dr. Donald Jacobs

Position: Full Professor

Mentor Department/College: Physics and Optical Science/College of Liberal Arts and Sciences

Project Description: This project involves solving several quantum mechanics problems using Bohmian mechanics. The first aspect of the project is to introduce the student to scientific computing, where the Schrodinger equation is solved numerically followed by integrating the equations of motion for quantum trajectories. The student will help develop a publicly assessable program to aid teaching how quantum mechanics works by visualizing quantum trajectories of several standard problems covered in an introductory quantum class. This work is already in progress. These problems will include one and two-dimensional single particle scattering problems, the two-body problem in two and three dimensions, as well as the quantum harmonic oscillator problem. Solving these problems will provide the opportunity to verify the code is correct, and this will familiarize the student with both theory and coding. The second aspect of the project is to apply Bohmian mechanics to a system of particles where standard methods are difficult to calculate. The focus here will be 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. This work aims to improve numerical simulation of quantum phenomena, including electron transport in condensed matter physics, and chemical dynamics within the framework of molecular dynamics. To this end, the computational complexity and accuracy of the model will be evaluated. The student will be modifying and extending MATLAB code, running the code, interpreting the results by comparing to known phenomena, and documenting the results in the form of reports.

Minimum Qualifications: Programming experience (preferably MATLAB, but python, JAVA, C or C++ will suffice). Junior level or higher in Math, Physics or Engineering majors would be required due to the mathematical skills needed in solving a partial differential equation numerically.

Research Period: Fall 2021 only

Selected Program: OUR Research Scholar 13-week program

2021-2022 OUR Research Assistant Project Descriptions

Project Title: Bio-social Responses to Conspiracy Theories

Mentor Name: Dr. Zachary Mohr

Position: Associate Professor

Mentor Department/College: Political Science/College of Liberal Arts and Sciences

Project Description: The student would work in the POLS Lab collecting biological data on research subjects and assisting with the online intervention. The student will collect data as needed and may be asked to further clean and work with the data as appropriate and based upon the student's abilities.

Minimum Qualifications: Student needs a basic understanding of collecting data; experience with inputting data into spreadsheets or databases is a plus.

Research Period: Both Fall and Spring (2021-2022 Academic Year)

Selected Program: OUR Research Scholar 13-week program

2021-2022 OUR Research Assistant Project Descriptions

Project Title: Volunteer Management & COVID-19

Mentor Name: Dr. Jaclyn Piatak

Position: Associate Professor

Mentor Department/College: Political Science & Public Administration/College of Liberal Arts and Sciences

Project Description: Interested in volunteering and how COVID-19 impacted volunteer management?

Working with the association of state volunteering commissions, this study examines: How did the COVID-19 pandemic influence nonprofits management of volunteer? Did nonprofits communicate more and recruit more volunteers to serve communities or move to remote or put a hold on volunteering?

A Charlotte Research Scholar would help analyze the data and examine the open-ended comments from nonprofits about how COVID-19 impacted their organization and volunteer efforts a survey administered over the summer of 2021. In addition to pandemic related questions, we include best practices in volunteer management, measures of inclusion, and organizational capacity.

Findings have implications for understanding volunteer management and inclusion as well as how nonprofits shifted during COVID-19 and how that influences their organizational capacity. This work will help organizations better serve and utilize their volunteers to advance their mission and serve their community.

Minimum Qualifications: Ability to work with Excel; SPSS or STATA skills would be a plus.

Research Period: Both Fall and Spring (2021-2022 Academic Year)

Selected Program: OUR Research Scholar 13-week program

2021-2022 OUR Research Assistant Project Descriptions

Project Title: Task Constraints on Interpersonal Coordination: Effects of Task Goals on Alignment in Speech

Mentor Name: Dr. Alexia Galati

Position: Assistant Professor

Mentor Department/College: Psychological Science/College of Liberal Arts and Sciences

Project Description: In this project, we examine how interpersonal coordination in joint tasks influences task performance. 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 instead. In this project, we examine this question directly by manipulating task goals as dyads interact with maps. In half of the trials, the dyads planned a route from an origin to a destination (route planning); in the other half, they searched for landmarks (visual search).

To quantify interpersonal coordination in language use, we transcribe and code the dyads' dialogues as they complete these two tasks. Because we are interested in linguistic alignment in reference, spatial perspective, and problem-solving strategies, we code for references of landmarks, the perspective of spatial expressions, and meta-comments about the state of the task. We hypothesize that dyads will exhibit alignment in their language use when they are engaging in route planning (vs. visual search), and that alignment will be more beneficial to performance in that task.

The undergraduate student involved in the project will contribute to the transcription and coding of dialogues, and gain experience in audio annotation (using open-source software ELAN), quantified discourse analysis, statistical analysis (using open-source statistical platforms R), and project management. The student will also gain experience in conducting a literature search, in writing progress reports, in scientific presentation, and—depending on their level of interest and involvement—in scientific manuscript preparation as a co-author.

Minimum Qualifications: Research Methods courses in the student's major (e.g., Research Methods I and II for Psychology majors; coursework in qualitative methods is also acceptable). Introductory Statistics or similar course.

Research Period: Both Fall and Spring (2021-2022 Academic Year)

Selected Program: I am interested in both the OUR Research Scholar and OUR Micro-Internship programs.

2021-2022 OUR Research Assistant Project Descriptions

Project Title: Quantifying the Impact of Electronic Health Record Data Quality and Bias to Support Reliable Personalized CVD Risk Prediction for Patients with Diabetes

Mentor Name: Dr. Franck Diaz-Garelli

Position: Assistant Professor

Mentor Department/College: Public Health/College of Health and Human Services

Project Description: Patients with diabetes represent 12-14% of U.S. adults and are at increased cardiovascular disease (CVD) risk. This population is likely to benefit from routine personalized CVD risk prediction due to the changing nature of their risk factors over time. Under current clinical guidelines, patients with diabetes are considered “risk-equivalent” (i.e., have the same risk of CVD events as an adult with a prior CVD event but without diabetes). However, existing evidence suggests that the elevated risk is not uniform across patient populations with diabetes.

Personalized CVD risk prediction for patients with diabetes can be explored efficiently by leveraging existing Electronic Health Record (EHR) databases. These data sources hold great promise due to the availability of large numbers of patients with longitudinal data. This type of approach has the potential to enable improved CVD prevention, care and outcomes through via patient-centric learning healthcare practices including data-driven personalized medicine, real-time clinical decision support and real-world evidence-based comparative effectiveness-base practices. However, reusing EHR data reliably presents two core challenges related to their quality (e.g., is it accurate) and bias (e.g., there are more sick people and EHR than out in the world).

The impact of quality and bias on risk prediction accuracy is yet to be fully understood in general populations and it is much less clear in increased risk populations with diabetes. To understand this, we will:

- 1) Characterize the quality and bias in EHR data necessary for CVD risk prediction in patients with diabetes.
- 2) Quantify the impact of data quality and bias CVD event risk prediction using EHR and cohort study data from patients with diabetes.

This project is ideal for students from technical/quantitative majors seeking to enter medical school or graduate school at a health science center.

Minimum Qualifications: An understanding of excel, programming and data analysis using R or python is useful but not essential.

You will likely be interviewing clinicians and supporting health data analysis projects.

Research Period: Both Fall and Spring (2021-2022 Academic Year)

Selected Program: I am interested in both the OUR Research Scholar and OUR Micro-Internship programs.

2021-2022 OUR Research Assistant Project Descriptions

Project Title: Understanding the Flow of Diabetes Information in Electronic Medical Records

Mentor Name: Dr. Franck Diaz-Garelli

Position: Assistant Professor

Mentor Department/College: Public Health/College of Health and Human Services

Project Description: An individual's Electronic Health Record (EHR) data tells the story of a patient, but when aggregated in a population this 'big data' has the power to inform healthcare practice. However, there are major challenges when implementing big data technology in healthcare. For example, deriving reliable information from existing EHR data is often challenging as they contain coded and free-text entries which often contradict each other. Diagnosis (DX) data is the simplest, most fundamental EHR data entry (i.e., selection from a list of DX codes and descriptions) and is, therefore, the ideal target for rigorous data entry accuracy research. Our previous work shows that variability and accuracy depend on the EHR segment (e.g., problem list DX and visit DX are less accurate than DX attached to clinical orders). The variability seems non-random and may follow clinical practice patterns such as reliance on clinical notes over structured DX data.

In this project, we will aim to find out how DX information diffuses from clinical notes to other EHR segments (e.g., problem list and order DX) with decreasing accuracy rates through predictable diffusion mechanisms. Specifically, we will:

- 1) Assess the accuracy of DX information contained in clinical notes. Clinical staff will review patient charts to extract DX information and assess for accuracy.
- 2) Compare the accuracy rates between DX data from clinical notes and other segments of the EHR system such as encounter and problem list DX. The accuracy of data from multiple EHR segments will be compared using statistical regression modeling.
- 3) Build and validate a mathematical model of information diffusion of DX data in EHRs

The goal of this project is to provide foundational information needed to develop learning healthcare systems capable of leveraging data produced during patient care to support population health research by building a more granular understanding of accurate data entry processes in EHRs. A better understanding of data accuracy will pave the way towards trustworthy, real-time data access needed to support clinical decisions, reduce healthcare costs, and improve health outcomes.

This project is ideal for students from technical/quantitative majors seeking to enter medical school or graduate school at a health science center.

Minimum Qualifications: An understanding of excel, programming and data analysis using R or python is useful but not essential.

You will likely be interviewing clinicians and supporting health data analysis projects.

Research Period: Both Fall and Spring (2021-2022 Academic Year)

Selected Program: I am interested in both the OUR Research Scholar and OUR Micro-Internship programs.

2021-2022 OUR Research Assistant Project Descriptions

Project Title: Improving Heart Disease Risk Prediction in Patients with Diabetes

Mentor Name: Dr. Franck Diaz-Garelli

Position: Assistant Professor

Mentor Department/College: Public Health/College of Health and Human Services

Project Description: The current population burden of diabetes (12-14% of U.S. adults, depending on criteria) makes it a particularly important risk factor of cardiovascular diseases (CVD). Though CVD mortality in the United States has declined over the last decades, the prevalence of diabetes increased. CVD rates have also declined in diabetic populations but the rates remain higher compared to populations without the disease. Findings from prior Multi-Ethnic Study of Atherosclerosis (MESA) research provide evidence against the idea that all adults with diabetes have a high absolute rate of incident CVD in the short term. Treating all individuals with diabetes as high CVD risk patients may be inefficient with healthcare resources, unnecessary and potentially harmful to patients with low CVD risk. Though there are benefits of guiding preventive therapies through personalized CVD risk assessment using Coronary Artery Calcification (CAC) scores, CAC scans are currently not a routine part of clinical practice.

In this project, we seek to find out if CAC predictors can be used to indirectly estimate CVD risk for individuals with diabetes. We propose to identify clinical-level predictors of CAC and of CVD outcomes that can be used in clinical practice to be exploited using informatics methods. The long-term goal of this study is to leverage these predictors to develop and implement automated CVD risk stratification algorithms in Electronic Health Records to support personalized CVD prevention and treatment in diabetic patients.

Research Questions

- Are CAC scores in participants with diabetes predictable with linear regression models using clinical-level variables (i.e., data routinely collected during clinical care)?
- Are CVD events predictable based on these CAC score predictions at accuracy rates beyond those provided by the Pooled Cohort Equations for Atherosclerotic Cardiovascular Disease (ASCVD) predictions?
- Are both these models reliable across gender and race/ethnicity?

This project is ideal for students from technical/quantitative majors seeking to enter medical school or graduate school at a health science center.

Minimum Qualifications: An understanding of excel, programming and data analysis using R or python.

Research Period: Both Fall and Spring (2021-2022 Academic Year)

Selected Program: I am interested in both the OUR Research Scholar and OUR Micro-Internship programs.

2021-2022 OUR Research Assistant Project Descriptions

Project Title: Arts and Social Mobility in Charlotte

Mentor Name: Dr. Vaughn Schmutz

Position: Associate Professor

Mentor Department/College: Sociology/College of Liberal Arts and Sciences

Project Description: A wide variety of artists and arts organizations in Charlotte provide programs that aim to increase the cultural capital of disadvantaged individuals and communities through a diverse range of creative activities (e.g., music training, visual arts lessons, community-based cultural events, and other types of arts education and experience). The purpose of this project is to explore how individuals and organizations in Charlotte conceptualize the impact of arts-based programs on economic opportunity, how they assess that impact, and how that informs patterns of creative engagement and cultural participation. Based on in-depth interviews with providers and participants in these arts-based programs, I seek to understand the beliefs, motivations, and experiences of individuals, families, and organizations in Charlotte with regard to cultural capital and its potential effects. The project has academic implications for theories about the relationship between arts participation, cultural capital, and social inequality as well as practical implications for efforts in Charlotte to increase economic opportunity.

An undergraduate student could assist in observing arts-based programs, creating reports, conducting interviews with participants, transcribing interviews, and/or coding and preliminary analyses of data.

Minimum Qualifications: Good communications skills and an interest in community-engaged work are essential. Interest in arts is a plus, but not required. Proficiency in Spanish would be helpful, but not required.

Research Period: Both Fall and Spring (2021-2022 Academic Year)

Selected Program: I am interested in both the OUR Research Scholar and OUR Micro-Internship programs.

2021-2022 OUR Research Assistant Project Descriptions

Project Title: Debt and Career Choices

Mentor Name: Dr. Scott Fitzgerald

Position: Full Professor

Mentor Department/College: Sociology/College of Liberal Arts and Sciences

Project Description: The purpose of this study is to investigate the effects of debt on the educational and career experiences of college students and young workers. Further, we are interested in how debt is related to financial literacy. In order to investigate this, we are conducting qualitative, semi-structured interviews in two phases, the first with college students at a public research university and the second with young workers. After interviews, we will then administer an electronic survey that collects demographics as well as assess financial literacy. Our guiding research questions are: "What are the effects of debt on the academic and career decisions of college students?" and "What are the effects of debt on the career experiences of young workers?"

The undergraduate RA duties include: conducting interviews, transcribing interviews, coding transcripts, analyzing data and reporting findings. Training will be provided for all of these activities and the student will be a member of the research team.

Minimum Qualifications: Some background in Sociology or other Social Sciences. Basic word processing skills required.

Research Period: Both Fall and Spring (2021-2022 Academic Year)

Selected Program: OUR Research Scholar 13-week program

2021-2022 OUR Research Assistant Project Descriptions

Project Title: Measuring Emotions through Two Methods

Mentor Name: Dr. Lisa Walker

Position: Full Professor

Mentor Department/College: Sociology/College of Liberal Arts and Sciences

Project Description: The project uses survey data to address the best ways to measure people's experience of emotions. We have completed two waves of data collection and now need to analyze and synthesize the data.

Minimum Qualifications: Would prefer to work with a sociology or psychology students who has taken coursework in quantitative analysis/statistics.

Research Period: Both Fall and Spring (2021-2022 Academic Year)

Selected Program: I am interested in both the OUR Research Scholar and OUR Micro-Internship programs.

2021-2022 OUR Research Assistant Project Descriptions

Project Title: Promoting Black and Latino Prenatal to Age 5 (PN-5) Health and Well-being: Using Data to Identify Solutions for Equitable Systems of Care in Charlotte, NC and Beyond

Mentor Name: Dr. Stephanie Potochnick

Position: Assistant Professor

Mentor Department/College: Sociology/College of Liberal Arts and Sciences

Project Description: We are working with Black, Latino and early childhood education (ECE) stakeholders in Charlotte to create a more equitable pre-natal to age 5 (PN-5) system of care for Black and Latino families. Focusing on Charlotte as an example of overall diversity transformations occurring in the U.S. Southeast (i.e. rapid Latino immigrant growth), this effort has local and broad implications. We have the following 3 aims with undergraduate student roles specified below each one:

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 undeserved 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 and possibly conduct focus groups themselves.

Minimum 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:
 - o Spanish fluency
 - o STATA or other statistical software experience (e.g, SPSS)

Research Period: Both Fall and Spring (2021-2022 Academic Year)

2021-2022 OUR Research Assistant Project Descriptions

Selected Program: I am interested in both the OUR Research Scholar and OUR Micro-Internship programs.

2021-2022 OUR Research Assistant Project Descriptions

Project Title: Computer Science Research and Underrepresented Student Support (CSR & US)

Mentor Name: Dr. Dale-Marie Wilson

Position: Associate Professor

Mentor Department/College: Software and Information Systems/College of Computing and Informatics

Project Description: CSR & US is a community that increases the pursuit of computing research by black students. This project will continue evaluation of pilot year of community and implement adaptations based on feedback and analysis of data. To facilitate increasing the number of students, interested in, and equipped to pursue computing research we have 5 objectives grounded in activities that lead to the recruitment and retention of underrepresented minority graduate students in computing:

1. Expose students to Computing Research opportunities
2. Encourage students to participate in Capstone or REU experiences
3. Mentor students in the preparation of graduate school applications
4. Create accessible digital resources to support a community of practice for recruiting, mentoring and training black students pursuing graduate degrees
5. Build a pipeline between non PhD granting MSIs and PhD granting institutions

The student will read and evaluate relevant publications that are part of the project's literature review. They will also assist with the design and analysis of the project's pilot year evaluation. They will also contribute towards any adaptations and or enhancements to the current project design and the continued deployment of the project.

Minimum Qualifications: Web development skills (HTML, CSS, JavaScript, jQuery, database administration). Proficiency in Java.

Research Period: Both Fall and Spring (2021-2022 Academic Year)

Selected Program: I am interested in both the OUR Research Scholar and OUR Micro-Internship programs.

2021-2022 OUR Research Assistant Project Descriptions

Project Title: Accessibility in the Performing Arts

Mentor Name: Aly Amidei

Position: Associate Professor

Mentor Department/College: Theatre/College of Arts and Architecture

Project Description: I have two research projects underway at the moment, both dealing with accessibility and the performing arts. One is focusing on improving access in performing arts education. I am conducting surveys and interviews to gather the experiences of arts practitioners who either have access needs or teach/work with individuals with access needs. A student research assistant could be responsible for creating interview transcripts, helping analyze the data, survey distribution, and doing research in support of the work around access and performing arts pedagogy.

My second related project deals more specifically with costumes and improving accessibility for performers with disabilities. For this study, I am also interviewing individuals as well as doing research. A research assistant could help create transcripts and assist in compiling data for me.

Minimum Qualifications: Transcription skills: listening, typing, editing. Research skills: searching for sources, creating bibliographies, proofreading. Organization skills. Interest in improving access for individuals with disabilities. Understanding of the concepts of universal design would be a plus. Does not need to be a theatre or arts person. I think it would be wonderful to have a student studying education or health on board.

Research Period: Fall 2021 only

Selected Program: I am interested in both the OUR Research Scholar and OUR Micro-Internship programs.