App ID #: 3102

Mentor: Beem, Randi Email: rbeem@charlotte.edu

Title: Librarian Assistant Professor

Department: Atkins Library- Special Collections and University Archives Atkins Library

Co-mentor: No

Community engaged research: No

Title: Women in the Rare Book Collection

Description: This project focuses on the Rare Book collection that Atkins Library holds and the shape and impact women have given to the collection through ownership. This project replicates a project that was begun by Princeton University with their Rare Book collection at the Firestone Library. While some of our rare books are easily identifiable as being held by women owners, there some of the marks left from female owners of our rare books are less obvious. This problem is the crossroads that has developed the concept behind this research project with a focus on a student building a set of detail-driven skills through looking at the marks that have been left behind by the previous owners. This project will consist of students researching the catalog, looking closely at our rare books one-by-one, and developing a list of key marginalia to look for inside the books to indicate the usage of that book by its female owner. The student who is interested in this project should be open to having a detective-like mindset and an appreciation for details. The duties of this position will include searching in the Atkins Library Search System, focusing on description and detail within an on-going document of rare books, and assisting with catalog description. The student who wishes to work on this project should be interested in history, reading, rare books, or just someone who values curiosity.

Accepting applications for: Either 5 hours or 10 hours per week are acceptable

1 positions available

Anticipated Student Learning Outcomes: Develop research skills of how to utilize the Atkins Library Search System and the databases that we offer. Identify and critically analyze book ownership in the past using evidence found within the rare book collection. Chart the rise of literacy and the role of women's literacy through identifying physical evidence within our rare book collection at Atkins Library. Synthesize the marginalia in the rare book collection and identify the ownership of the rare books through detailed analysis of the books and their catalog records. Students will be taught cursive writing and the ability to read cursive writing.

Required training of 10 hours with Description: Students will just receive training from me on how to handle rare books and do advanced searching in the Atkins Library system. No outside research is needed given no humans will be studied, just books.

Mentoring plan: The student and I will have weekly touch base meetings and the first two weeks of their time as my mentee they will be receiving training from me focused on how to use the Atkins Library catalog as well as how to search for peer-reviewed literature in the database. These two weeks will also focus on getting students to understand how to apply the local materials, rare

books, to the larger literature around the ownership of books and the role of women within literacy. The third week will be spent with the student learning the reading of cursive writing as well as instruction built around marginalia in the rare books. This week is really built to take the abstract into the concrete and build up their skills around detail and understanding of cursive as well as marks of previous ownership of these books. The fourth week will be one that focuses on the student getting comfortable with the rare book collection and will also be some time for exploration. This fourth week will also conclude with us discussing how we should set up the tracking of these marginalia markings in the books and how best for us to synthesize that. From week five to ten, the student will work on looking through our expansive collection of rare books for details left behind in the book by women. We'll also work together to decide if we will focus on building a LibGuide around women's ownership of the books or if we want to work on writing an article together or both. While this mentorship plan includes a fair amount of me building instruction into the plan, I also want the student to build a sense of shared ownership of this project with me and ideally we would build a product together out of this research. I also believe in having weekly check-in meetings to make the student feel comfortable both with me as well as with their own skills and intuitions around research and synthesis of their findings in the Humanities field.

Applicant Requirements: Student should be detail oriented and curious about rare books. Student should be willing to learn how to use the Atkins Library search system to the maximum extent. Student should be interested in English, history, or women's studies. Student should be ready to ask questions and provide input on how to organize information during this projec

Applicant Preferences: In terms of qualifications and preferences for this student, I mostly believe that I want someone who has a sense of curiosity and is willing to be questioning the already established research. I also want someone who is passionate about finding evidence in physical form but someone who is very detail oriented. I also would like someone who is malleable and is willing to make mistakes but also receive corrections for those mistakes. Most importantly, I would like a partner in my research who can appreciate the intersection of women and literacy and how that has changed over time.

Specific Time considerations/conflicts: There are no conflicts when it comes to this type of research.

App ID #: 3059

Mentor: Adams, Nikki Email: nicoleadams@charlotte.edu

Title: Assistant Professor

Department: Special Education and Child Development Cato College of Education

Co-mentor: No

Community engaged research: No

Title: Supporting Families with Children with Disabilities in the U.S.

Description: Overall, this project is focused on gathering information to understand the experiences of caregiver who have children with disabilities interacting with special education and disability supports. Often the research is focused on newcomer caregivers, such those who identify as immigrants or refugees. Currently, there are a number of projects that students could engage in. Undergraduates have a variety of opportunities ranging from summarizing literature to co-designing research projects. Project 1: Caregiver Trust in Systems of Care for Children with Disabilities or Chronic Health Conditions Review RationaleOver 13% of children 5-21 years old qualify for special education services based on a disability that impacts their learning. Children with disabilities more readily access healthcare and special education systems. Trust is a major factor in families' experiences in their children's schooling and health care services, thus it is important to understand what research describes related to caregivers' trust in the health and education systems.Caregivers of children with disabilities or chronic health conditions engage with both healthcare and educational systems frequently. Trust in these institutions, and in the professionals who operate within them, is a critical determinant of caregivers' willingness to seek care, adhere to recommendations, and advocate effectively for their children. When trust is compromised, families may disengage from services, which could negatively affect a child's long-term health, development, and educational outcomes.Project objectives and methodologyUsing a systematic scoping review of the literature, this project addresses two main goals: (1) examine levels of trust among caregivers of children with disabilities or chronic health conditions toward healthcare and educational institutions and the professionals working within these systems (e.g., healthcare providers, teachers), and (2) identify psychosocial factors that may strengthen or undermine caregivers' trust in these institutions and individuals. Project 2: Congolese Mother's Experiences with Special Education Systems Rationale The Individuals with Disabilities Education Act (IDEA) requires families to be aware of their parental rights and advocate for their children's educational needs. This requirement is often a misaligned philosophy of newcomer (e.g., immigrant or refugee) caregivers who have children with disabilities. There are systemic barriers that caregivers from diverse cultural and linguistic backgrounds encounter when interacting with special education systems, such as limited language access, Project objectives and methodologyWe are utilizing qualitative methods, using interviews, of mothers to understand how Congolese mothers sought support and information when there were concerns about their child and their experiencing navigating American public school systems to obtain special education support. OUR Student Researcher Contributions and Duties The OUR researcher will be fully integrated into the research lab and will participate in regular (weekly or bi-weekly) meetings. OUR researchers will receive

training on research methods (e.g., systematic literature reviews, qualitative methods) and work on assigned tasks throughout the semester. OUR researchers will have an opportunity to contribute to the project based on their strengths but will set personal goals for the semester's involvement.

Accepting applications for: Only 150 hours over an academic semester (~10h/wk)

2 positions available

Anticipated Student Learning Outcomes: Communicating to peers and faculty in a clear and organized manner.Accountability through individual and team responsibilities.Gather and analyze information to understand the "problem" that the research is attempting to address.Identify and communicate strengths and areas for improvement in research skills.Learn about research ethicsLearn to work as part of a larger, collaborative research teamCultural competency and how to work in a diverse, bilingual environmentLearn how to collaborate with community partnersLearn how to transcribe and code qualitative data

Required training of 5 hours with Description: -All students complete research ethics training (CITI) before on-boarding

-Attend weekly lab meetings where training and mentorship are provided for the different research tasks students will be assigned.

-Meet with mentor to ensure project aligns with student preferences/skills and broader OUR program goals/requirements

Mentoring plan: The goal is to facilitate student growth and connection. We would do this by having collaborative meetings where students and faculty from different backgrounds and stages of their careers will communicate and exchange ideas. Open and frequent communication is encouraged between students and others on the team. The meetings will facilitate learning and collaborating with others.

Applicant Requirements: Required: A strong work-ethic, desire to learn new research skills, ability to use online platforms (e.g., Canva, google, Microsoft), and the ability to collaborate with a larger research team.

Applicant Preferences: It is preferred that we have someone who is interested in multicultural experiences and is open to working on a multidisciplinary and multicultural team.Preferred but not required: Swahili-English bilingual

Specific Time considerations/conflicts: Research team meetings are set up each semester based on the team's schedules.

App ID #: 3064

Mentor: Balmer, Jeffrey Email: jdbalmer@charlotte.edu

Title: Associate Professor

Department: David R. Ravin School of Architecture College of Arts and Architecture

Co-mentor: No

Community engaged research: No

Title: Modeling Moretti: Architectural Analysis of Mid-century Landmarks in Rome

Description: This research project comprises ongoing historical analysis of 2 key works of architecture completed by 20th century Modernist architect Luigi Moretti: the ONB Trastevere building and his 'Casa delle Armi' project, both in Rome, both completed in 1936. Drawn from the comprehensive set of design drawings (sketches and blueprints) of the buildings in the Central State Archives (ACS) in Rome and the Moretti Magnifico Archive (MMA) held at Rome's MAXXI museum, this research project involves 'forensic reconstruction' of the complex evolution of the design process of both buildings. Aiding in this effort, I'll rely on a student research assistant to help me complete detailed digital models and drawings of Moretti's projects, enabling the first comprehensive documentation of the two projects, and to generate series of diagrams and drawings articulating and analyzing the design and subsequent modifications made to both buildings. 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 buildings.

Accepting applications for: Either 5 hours or 10 hours per week are acceptable

2 positions available

Anticipated Student Learning Outcomes: There are 3 primary anticipated SLOs derived from conducting this research work:1. Improved skill and proficiency associated with the digital modeling (primarily 'Rhinoceros') and digital drawing and diagramming (primarily the Adobe software suite) that the student will use heavily throughout the semester's work. 2. Enhanced skill and proficiency in recognizing and replicating architectural 'drawing conventions', both with respect to the 'close reading' of archival blueprints of the buildings under study, and the generation of new drawings which employ a 'professional level' of drawings reliant upon relevant drawing conventions.3. Enhanced critical thinking, particularly with respect to the careful examination and comparison of archival documents, including blueprints, sketches, photographs and text (translations provided by myself), with the aim of developing comparative analysis and deductive reasoning, supported by an enhanced understanding of the general subject (architectural history, modernist architecture, 20th century Italian architectural and political history).

Required training of 0 hours with Description: Successful applicant will likely be drawn from full-time 3rd or 4th Year undergraduate architecture student, who will therefore possess a relevant level of proficiency in Rhinoceros ('Rhino') digital modeling software, and the related graphic software of

the Adobe suite of applications. "On-boarding" (in terms of getting students up to speed on the background of the buildings under study) will take place during the first several weekly meetings.

Mentoring plan: Student(s) will work directly under my supervision. We will meet for 1-2 hours every week at a time that works within the students' schedule of classes and other commitments. By assisting with archival research within the discipline in which the student is enrolled (full time architectural studies), there is a direct benefit towards a greater facility with digital modeling and drawing tools, an enhanced understanding of the drawing and professional conventions of architectural drawings ('blueprints'), and enhanced critical capacity for examination and analysis of architectural drawings and models. Additionally, students will gain an enhanced historical perspective - learning in the process of the work about the history of modernist architecture, particularly Italian 20th century architecture, and the cultural and political context of these histories. Similar in nature to the high level of one-on-one contact that architecture students engage in with faculty in the design studios (more commonly referred to as 'labs' in other disciplines), the significant contact hours intrinsic to this research assistantship will provide a significant opportunity for both general and 'directed' mentorship for students intent on pursuing either a career as a professional architect, or a related academic field.

Applicant Requirements: Minimum student qualifications for this research proposal would include working knowledge of Rhinoceros ('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.

Applicant Preferences: I've had great success with my OUR scholars in recent years by soliciting my colleagues and upper-year architecture students who are in a position to suggest students interested in (and capable of conducting) the work. I thereafter encourage selected candidates to apply to OUR. A preferred student applicant should possess an appropriate year-level facility with the digital modeling (Rhino) and drawing applications used throughout the undergraduate architecture curriculum. Equally importantly, a preferred student applicant should have optimal time management skills (essential to cope with the simultaneous demands of full-time enrollment in an architecture program plus a research assistantship), critical thinking skills (to ably 'connect the dots' for the work at hand), and personal responsibility (maintaining open and ongoing communication channels, keeping up with progress on assigned work. Perhaps most importantly, the best applicants demonstrate a high degree of curiosity and enthusiasm for the work at hand. Most of the students who have conducted this work via OUR are those who subsequently enroll in the semester study program in Rome that I direct - thus, these students are motivated by the eventual visits to the buildings while they are studying in Rome.

Specific Time considerations/conflicts: I will be flexible in terms of scheduling my weekly meetings with the successful candidate(s), according to their weekly course calendar, and my weekly calendar.

App ID #: 3076

Mentor: Ageenko, Ilieva Email: iageenko@uncc.edu

Title: Senior Lecturer

Department: School of Data Science College of Computing and Informatics

Co-mentor: No

Community engaged research: No

Title: "Designing Trustworthy AI Recommendations for Engineers: Human-in-the-Loop Interfaces and Storytelling".

Description: AI is increasingly used to support decisions in engineering and high-risk industries (e.g., infrastructure, manufacturing, energy, cybersecurity, and safety). These systems can surface recommendations such as "this condition looks risky," "inspect this component first," or "this barrier/control may be weak." But in real practice, engineers don't just need an answer, they need to understand why, how confident, what assumptions were made, and what to do next. If AI recommendations are unclear, users of AI systems may either ignore them or rely on them too much without questioning. Both outcomes can be costly.This multidisciplinary student research project explores how to design human-centered interfaces that help engineers understand, evaluate, and appropriately trust AI recommendations. We will study how different UI storytelling approaches (how information is structured, summarized, and visually presented) affect comprehension and decision quality. We will also explore human-in-the-loop interaction patterns including ways the system can invite feedback, support overrides, and create an audit trail, so AI acts as decision support rather than an unchallengeable authority.Students will contribute to a multidisciplinary research effort spanning Human–Computer Interaction (HCI), human factors/psychology, risk engineering, AI explainability, and information design/storytelling. The goal is to produce practical design guidance and research outputs that can be shared in a poster or conference presentation.What students will do (typical duties):Read and summarize research on trust in automation, explainable AI, uncertainty communication, and storytelling/visual hierarchy in data-driven interfaces.Tool/UI benchmarking: Review and compare how existing AI-enabled engineering/risk tools present recommendations (e.g., explanation style, confidence/uncertainty, user controls, audit trails). Create a scoring rubric and a short comparative report.Prototype UI concepts: Design low-fidelity mockups (using prototyping tools such as Figma) showing alternative ways to present the same AI recommendation.Human-in-the-loop workflows: Propose and test interaction patterns like review-and-approve, structured overrides, disagreement/second-opinion views, and lightweight feedback prompts.Communication & presentation: Produce weekly status updates and contribute to a final poster, slide deck, and/or short paper suitable for a student research showcase or conference submission. By the end of the project, students will have hands-on experience conducting applied research and will help deliver: (1) a taxonomy of effective UI patterns for presenting AI recommendations, (2) evidence-based guidelines for building calibrated trust, and (3) prototype examples that demonstrate "AI recommendations as an auditable story" for engineering decision-making.

Accepting applications for: Either 5 hours or 10 hours per week are acceptable

2 positions available

Anticipated Student Learning Outcomes: Students participating in this project will gain hands-on experience at the intersection of Human–Computer Interaction (HCI), human factors/psychology, engineering risk decision-making, AI explainability, and storytelling/information design. The central learning outcome is that students will be able to explain by using evidence from their own research, how the way an AI recommendation is presented (wording, visuals, uncertainty, and workflow) changes whether users rely on it appropriately. In high-stakes engineering contexts, the goal is not more trust, but calibrated trust: knowing when to use the AI, when to question it, and how to defend a decision.Research and analysis skills. Students will learn how to conduct a structured literature review, summarize and synthesize findings into clear themes, and translate theory into testable research questions. They will learn how to conduct a structured comparison of existing enabled tools and interfaces. They will (1) define evaluation criteria, (2) build a scoring rubric, (3) collect evidence from publicly available documentation, demos, screenshots, and tutorials, and (4) compare solutions consistently across categories such as explanation style, uncertainty communication, usability/workflow fit, user control (human-in-the-loop), and traceability. Students will summarize results in a matrix, identify common UI patterns, and translate findings into design recommendations and prototype concepts. Students will practice maintaining high-quality research records, citations, and reproducibility habits.Human-centered design and human-in-the-loop thinking. Students will develop practical skills in prototyping and iterating UI concepts (e.g., Figma) that present AI recommendations in ways engineers can quickly scan, interrogate, and validate. Students will also study human-in-the-loop workflows including review/approve steps, structured overrides, disagreement views, and feedback mechanisms.Storytelling and professional communication. Students will learn to present AI outputs as an auditable “decision story” tailored to technical audiences. They will produce weekly status updates and contribute to a polished final deliverable such as a poster, slide deck, demo, and/or short paper appropriate for a student research showcase or conference submission. Students will strengthen communication, teamwork, and professional standards.After the project, students will be able to describe concrete outcomes: benchmarking real tools, designing and testing prototypes, and communicating results that prepare them for roles in UX research, product, data visualization, responsible AI, analytics, and applied data science where translating model outputs into understandable, defensible decisions is critical.

Required training of 8 hours with Description: 8 hours. This project does not involve human-subject research (no interviews, surveys, or usability testing with participants). Training time will be used for general research readiness, including responsible conduct of research, data/privacy awareness for handling publicly available materials, accurate record-keeping and citation practices, and any required institutional modules or onboarding relevant to scholarly work and conference-quality dissemination.

Mentoring plan: My mentoring approach is structured, supportive, and designed to help undergraduate students produce work they can be proud of and that is credible enough to share in a showcase, poster session, or conference setting. This project blends AI, human-centered design, and storytelling, and my goal is to help students learn how to translate complex technical outputs into explanations people can understand, question, and responsibly act on.Students should expect planning, frequent feedback, and professional development support. I bring both academic

experience (teaching AI and data storytelling) and industry experience (building and deploying analytics and decision-support approaches in real organizational settings). I also regularly mentor students in professional development and coach undergraduate teams for competitive, real-world analytics work (I am currently coaching a team competing in a global datathon), so I'm comfortable guiding students from early research ideas all the way to polished deliverables.What students can expect from me:Structured onboarding and goal setting: In week 1–2 we will define the project scope, roles, research questions, success criteria, and a realistic timeline aligned with the student's available hours.Regular contact and feedback: Students will have weekly check-ins (30–60 minutes) with me, plus asynchronous support for questions and review of drafts/prototypes. I will provide actionable feedback on writing, research quality, and presentation clarity.Skill development: I will teach students practical research skills (literature review, synthesis, rubric design, study design, basic analysis) and help them build confidence in professional communication (memos, slides, and short presentations).Create an environment where students will feel safe to ask questions, propose ideas, and learn through iteration.

Applicant Requirements: I am looking for undergraduate students who are curious about how people interact with AI recommendations and who can help translate research into clear, practical interface ideas. This project is not about building new AI models; it focuses on literature review, tool/UI benchmarking, and prototype design. The strongest applicants will be organized, reliable, and able to communicate clearly in writing and presentations.Required skills, characteristics, or experiences (necessary for success):Strong written communication (ability to summarize papers, document findings, and write clear short memos)Ability to synthesize information across sources and identify patterns (turn readings and examples into themes and guidelines)Basic AI/data literacy (understands what an AI recommendation is, and the importance of uncertainty, assumptions, and limitations)Interest in human-centered design and usability (willingness to iterate and improve how information is presented)Strong attention to detail in record-keeping (citations, organized notes, versioned files)Professionalism: consistent engagement, meeting deadlines, and respectful teamwork

Applicant Preferences: Preferred / recommended skills, courses, or experiences:Because the project is multidisciplinary, we welcome students from multiple majors. Ideally, we will recruit two students with complementary backgrounds: An engineering-oriented student (industrial, mechanical, civil, systems, safety, or related) who can bring an engineering/risk perspective and help evaluate what explanations, evidence, terminology, and workflows would be credible and usable for engineers in high-stakes settings.A human-centered or computing-oriented student who can help translate research into usable interface concepts. This student may come from psychology, human factors, cognitive science, communication, HCI/UX, information science, or data science/computing with a clear interest in the "human side" of AI: decision-making, trust calibration, cognitive load, and how people interpret uncertainty. This student will support structured benchmarking, organize findings, and help convert insights into prototype interface designs and decision story presentation formats.Additional preferred preparation (either student):Interest in human-centered design, usability, and/or behavioral decision-making (automation bias, trust, mental models)Experience with data visualization or information designFamiliarity with Figma (preferred) or willingness to learn a prototyping/wireframing toolStrong writing and presentation skills (students may contribute to a poster/demo)Organized work habits:

careful documentation, citations, and versioned artifactsAdditional “nice-to-have” preparation includes coursework or experience in data visualization, HCI/UX, cognitive psychology/human factors, technical communication, or AI fundamentals, as well as familiarity with Figma or similar prototyping tools. Interest in presenting work (poster/demo format) is a plus.

Specific Time considerations/conflicts: n/a

App ID #: 3099

Mentor: Akella, Srinivas Email: sakella@charlotte.edu

Title: Professor

Department: Computer Science College of Computing and Informatics

Co-mentor: No

Community engaged research: No

Title: Autonomous Robotic Coverage, Inspection, and Informative Path Planning

Description: In this project, the undergraduate students will learn about state-of-the-art algorithms for autonomous robot coverage, inspection, and informative path planning. The goal is to develop and implement new online approaches that incorporate streaming sensor data. Applications include autonomous vehicles, inspection of critical infrastructure (e.g., power lines, roads) and search and rescue (e.g., after disasters). Students will work on cutting edge research in robotics and learn about optimization and machine learning algorithms and ROS (robot operating system). The research will be conducted in the Robotics Laboratory in the Computer Science Department. In addition to validation of the algorithms in simulation, there will be opportunities to implement and demonstrate the algorithms on wheeled mobile robots, autonomous surface vehicles, and drones.

Accepting applications for: Only 150 hours over an academic semester (~10h/wk)

2 positions available

Anticipated Student Learning Outcomes: The students will learn to perform research by participating in and contributing to ongoing robotics research projects. The students will be exposed to cutting-edge research in robotics and AI at UNC Charlotte and learn to do literature surveys of related research. They will have access to a wide variety of robots (mobile robots, drones, manipulator arms) in our active Robotics Lab. They will closely interact with graduate students. They will gain experience with ROS 2 (Robot Operating System).

Required training of 20 hours with Description: The students will work through ROS 2 tutorials and read selected research papers as preparation. They will also be exposed to relevant robot software and hardware.

Mentoring plan: The mentor will meet with the student on a regular basis (weekly or more frequently if needed). The student will also have the opportunity to interact with graduate students involved in robotics research. They will attend research presentations and will be encouraged to present progress reports on their work. The student will receive guidance on their research and will be taught how to write research abstracts, posters, and present their research work.

Applicant Requirements: Familiarity with algorithms and data structures, and a proficiency in C++/Python is preferred. A good background in math (linear algebra, calculus) is desirable. Familiarity with the Robot Operating System (ROS 2) or ArduPilot is a plus. Familiarity with robot electrical design is also a plus.

Applicant Preferences: Coursework in Algorithms and Data Structures (ITSC 2214), Linear Algebra (MATH 2164), and Calculus III (MATH 2241). Experience in Robotics (ITCS 4150: Mobile Robotics or ITCS 4151: Intelligent Robotics) and/or Artificial Intelligence (ITCS 3153) or equivalent courses will be a plus. Should be comfortable with programming in C++ and/or Python. Enthusiasm and willingness to take on open-ended projects.

Specific Time considerations/conflicts: Students should be prepared to come to the lab between 9 am and 5 pm on weekdays. This will enable face-to-face communication in the lab, mentoring by the mentor and graduate students, and the opportunity to attend research presentations.

App ID #: 3100

Mentor: Cheng, Qiong Email: qcheng1@charlotte.edu

Title: Teaching Assistant Professor

Department: Computer Science College of Computing and Informatics

Co-mentor: No

Community engaged research: No

Title: A Semantic-Hybrid Knowledge Graph Approach to Curriculum-Industry Alignment

Description: Background: This Research-to-Practice Full Paper addresses the persistent misalignment between university computing syllabi and rapidly evolving industry requirements. Coursera addresses industry requirements through direct industry partnerships and real-time skill tracking. It uses a "Career Graph" that maps millions of labor market data points to its course taxonomy, ensuring that "Skills Tracks" align with actual job tasks. However, it has limitations in reflecting "full" industry readiness and often lacks the comprehensive career services. As engineering and computing educators strive to maintain curriculum relevance, there is a critical need for scalable, automated tools that can map academic learning objectives to professional development resources, finding the right industry-aligned course within a catalog of 7,000+ options. This study introduces an intelligent course recommendation framework designed to bridge this gap by providing contextually aware, pedagogically aligned course suggestions from massive open online platforms.Research-to-Practice: Grounded in Natural Language Processing (NLP) and Knowledge Engineering, we implemented a multi-stage semantic-hybrid pipeline. The system utilizes an LLM-assisted Knowledge Graph (KG) extraction process to build a domain model from over 700 computer science concepts. This framework informs three distinct algorithmic architectures: a semantic-bi-encoder for high-recall retrieval, a Wikipedia-based KG for concept expansion (2-hop reasoning), and a Cross-Encoder for high-precision re-ranking. By integrating pedagogical constraints such as Difficulty Alignment Scoring and Maximal Marginal Relevance (MMR), the practice ensures that recommendations are not only relevant but also diverse and level-appropriate.Method of Assessment: The system was evaluated using a dataset of 7,734 Coursera courses against complex engineering syllabi (e.g., Cloud Computing for Data Analysis). We compared three models: Accurate (Feature-rich), 1CR (Efficiency-optimized), and 2CR (Hybrid-Elite). Assessment metrics included precision, recall, and F1-scores, alongside a comparative analysis of computational complexity. We specifically measured the "precision boost" provided by the Cross-Encoder re-ranking stage and the "diversity gain" from MMR optimization.Implications: This work can provide a robust framework for automated curriculum alignment and intelligent tutoring. For engineering educators, it will offer a tool to verify syllabus coverage against industry standards and provide students with curated, diverse learning paths. The findings suggest that semantic-hybrid approaches can drastically reduce the manual labor of curriculum mapping while maintaining high pedagogical precision.

Accepting applications for: Either 5 hours or 10 hours per week are acceptable

2 positions available

Anticipated Student Learning Outcomes: Students will gain practical experience in building and navigating Knowledge Graphs (KG)using Large Language Models as components in an AI systembuilding AI agents for recommendationapplying and integrating diverse optimization algorithms developing a deep understanding of the global computing landscape and the "Career Graph" logic.After the project, students will feel confident in building AI agent systems.

Required training of 16 hours with Description: I will provide a starter package, refer to a Knowledge Graph paper, and set up the timeline for the project.

Mentoring plan: I view our relationship as a research partnership. Students can expect transparency, high standards, and consistent availability.You will work directly with me and potentially a master or PhD student specializing in Knowledge Engineering. You will be part of a "Semantic-Hybrid" sub-group. You can expect a weekly 1-on-1 "Sprint Meeting" (30–60 mins) to review your logic, troubleshoot pipelines, and set goals for the next week. I maintain an "open-door" policy via Google Chat or Email, where you can expect a response within 24 hours.You are expected to present a "Progress Demo" at our bi-weekly lab meetings. This is a low-stakes environment to practice articulating technical concepts. If your contributions lead to significant findings, I am committed to supporting you in co-authoring a paper for submission to venues like ASEE (American Society for Engineering Education) or FIE (Frontiers in Education).On my side, I will commit to ensuring you leave this experience with a portfolio-ready understanding of Semantic Search and LLM-assisted Knowledge Extraction—skills currently in massive demand; I will teach you the "why" behind the "how." You won't just learn to build a recommender; you'll learn the ethics of Difficulty Alignment and curriculum mapping. Besides, Upon successful completion of your milestones, I commit to being a dedicated advocate for your next steps—whether that is providing a detailed letter of recommendation or connecting you with my professional network in the EdTech and AI sectors.

Applicant Requirements: While we will provide training on the specific semantic-hybrid pipeline, a baseline level of computational literacy is critical to avoid being overwhelmed by the codebase. I look for a student who is interested in human-centered AI, passionate about python programming, and responsible.

Applicant Preferences: I look for a student who already completed Data Mining, Cloud Computing for Data Analysis, Intro to Artificial Intelligence, or Machine Learning with an "A".

Specific Time considerations/conflicts: Friday afternoons for team meetings.

App ID #: 3033

Mentor: Cotroneo, Domenico Email: dcotrone@charlotte.edu

Title: Professor

Department: Computer Science College of Computing and Informatics

Co-mentor: No

Community engaged research: No

Title: Is AI-Generated Code Safe? Benchmarking Vulnerability Detection Tools

Description: Everyone is using AI to write code, but almost no one is asking: "Is this code actually safe?" While AI assistants like ChatGPT and GitHub Copilot are incredibly fast, they often suggest solutions that contain hidden security flaws, leaving the door open for hackers.In this project, the student will act as an AI Security Analyst. They will put AI-generated code to the test using DeVAIC (a tool developed in our lab: github.com/dessertlab/DeVAIC). The mission is to discover the "security gap" in code suggested by machines and compare how different professional tools handle these modern threats.Proposed Project Plan To ensure a successful research experience, the project is structured into six progressive phases.Phase 1: Foundation & Vulnerability Training Deep dive into Software Security fundamentals, focusing on the OWASP Top 10 and CWE (Common Weakness Enumeration). Configuring the local development environment and setting up the DeVAIC repository.Phase 2: Tool Scouting & Classification Exploring industry-standard open-source tools such as Bandit (Python), Flawfinder (C/C++), or SonarQube. Learning to classify tools into Traditional (Rule-based) vs. AI-driven (LLM-based) detection systems.Phase 3: Framework & Metrics DefinitionLearning how to define performance metrics like Precision, Recall, and False Positives. Designing a fair benchmarking "battleground" to ensure consistent testing across all tools.Phase 4: Dataset Collection & Curation Identifying AI-generated code snippets from repositories like OSS Forge or specialized security benchmarks. Categorizing the dataset by vulnerability type (e.g., SQL Injection, Buffer Overflow).Phase 5: Execution Mass-testing the dataset against DeVAIC and the other scouted tools. Recording which tools caught which bugs and where they failed to identify vulnerabilities.Phase 6: Analysis & Reporting Analyzing the “Security Gap” by investigating if AI struggles more with certain types of vulnerabilities. Visualizing results and documenting findings

Accepting applications for: Only 150 hours over an academic semester (~10h/wk)

1 positions available

Anticipated Student Learning Outcomes: Anticipated Student Learning OutcomesBy the end of this research experience, the student will have achieved a comprehensive set of technical and professional milestones:1. Mastery of Software Security FundamentalsThe student will develop a deep understanding of common software vulnerabilities. They will be able to identify, categorize, and explain risks such as those found in the OWASP Top 10 and CWE (Common Weakness Enumeration). They will move beyond just "writing code" to "writing secure code."2. Proficiency in Automated Security ToolsThe student will gain hands-on experience with industry-standard static analysis tools (SAST) like Bandit, SonarQube, or Flawfinder. They will learn how to configure these

tools, interpret their reports, and distinguish between true security threats and "false positives"—a skill highly valued in the cybersecurity industry.3. Critical Evaluation of AI-Generated CodeAs AI becomes a standard tool for developers, the student will learn the critical skill of AI Literacy. They will be able to scientifically evaluate the output of Large Language Models (LLMs), understanding specifically where AI excels and where it fails in terms of security and logic.4. Research Methodology and Data AnalysisThe student will learn how to conduct a structured technical benchmark. This includes:Defining measurable metrics (e.g., Precision, Recall).Curating datasets from open-source platforms.Documenting experimental results in a way that is reproducible by other researchers.5. Communication and Professional PortfolioThe project will result in several tangible outcomes for the student's career:Experience in presenting technical findings at a university symposium or poster session.The ability to document research findings and tool comparisons clearly and professionally.

Required training of 5 hours with Description: The student will need to complete the mandatory CITI Responsible Conduct of Research (RCR) training module before starting the data collection and analysis.

Mentoring plan: 1. Mentorship ApproachMy goal is to provide a supportive environment where the student can grow from a learner to an active contributor. I aim to be a guide, providing the necessary technical resources while encouraging the student to explore their own ideas within the project. I want them to feel comfortable asking questions and making mistakes, as that is where the best learning happens in research.2. Communication and SupportThe student will have my full support throughout the semester. We will meet once a week (in-person or virtually) to chat about how things are going, celebrate small wins, and look at any technical challenges together. These meetings are meant to be a relaxed space for dialogue.We will use code reviews as a way to learn together. I'll provide tips on how to improve their scripts and share best practices used in the cybersecurity field.3. Involvement in the LabI want the student to feel like a valued member of our research efforts. They will be invited to participate in our lab's informal discussions, where they can see firsthand how new ideas are brainstormed and how we tackle security problems as a team.4. Sharing the ResultsOne of the most rewarding parts of research is sharing what you've found. I will help the student prepare their findings for a local presentation, such as the UNC Charlotte Undergraduate Research Conference. This is a great, low-pressure way for them to practice public speaking and build confidence. 5. Commitment to the StudentI am committed to being a reliable resource for the student. Beyond the technical work, I am happy to offer advice on career paths in AI and Security or help them navigate their future academic choices. My success as a mentor is defined by the student feeling they have gained valuable, real-world skills and a positive outlook on research.

Applicant Requirements: Technical BackgroundThe core of this project involves testing and running security analysis tools. Therefore, a foundational knowledge of programming in either Python or C++ is essential. The student should be comfortable reading code, understanding basic logic, and managing small scripts. Experience with (or a willingness to learn) Git and GitHub is highly encouraged, as the project will be hosted and documented there.2. Curiosity and MindsetBeyond technical skills, the most critical characteristic for success in this project is curiosity. We are looking for a student who is:Analytical: Someone who enjoys "puzzles" and is interested in finding why a piece of code might be vulnerable.Self-Motivated: Research often involves troubleshooting

tool installations or debugging environments; a "can-do" attitude toward technical problem-solving is key.Interested in AI and Security: A genuine interest in how Large Language Models (like ChatGPT) work and how they impact software quality will make this experience much more rewarding for the applicant.3. Academic FoundationsWhile no specific advanced courses are strictly required, having completed (or being currently enrolled in) Data Structures, Introduction to Computer Science, or Software Engineering would provide a helpful context for the work we will do.4. Commitment to LearningWe do not expect the student to be a cybersecurity expert on day one. We are looking for someone who is eager to learn about software vulnerabilities (OWASP/CWE) and is excited to contribute to an open-source project that has a real-world impact.

Applicant Preferences: Requirements & Preferences1. Technical BackgroundThe core of this project involves testing and running security analysis tools on diverse codebases. Therefore, a foundational knowledge of programming in either Python or C++ is essential. The student should be comfortable reading code, understanding basic logic, and managing small scripts. Experience with (or a strong willingness to learn) Git and GitHub is highly encouraged, as the project will be managed through these platforms.2. Curiosity and Analytical MindsetBeyond technical skills, the most critical characteristic for success in this research is curiosity. We are looking for a student who is:Analytical. i.e., someone who is interested in investigating why a piece of code might be vulnerable.Self-Motivated, i.e., research often involves troubleshooting tool installations or debugging environments; a proactive attitude toward technical problem-solving is key.Interested in AI and Security, i.e., a genuine interest in how Large Language Models (like ChatGPT) function and their impact on software quality will make this experience much more rewarding.3. Academic FoundationsWhile no specific advanced courses are strictly required, having completed (or being currently enrolled in) Data Structures, Introduction to Computer Science, or Software Engineering would provide a helpful context for the tasks involved.4. Commitment to LearningWe do not expect the applicant to be a cybersecurity expert on day one. We are looking for a student who is eager to learn about software vulnerabilities (OWASP/CWE) and is excited to contribute to an open-source project that has a tangible, real-world impact.

Specific Time considerations/conflicts: The research activities are designed to be flexible to accommodate the student's academic course load; however, the following commitments are required for successful participation:

Weekly Research Sync (1 hour). The student must be available for a mandatory weekly progress meeting. The specific day and time (e.g., Friday morning or Monday afternoon) will be coordinated at the beginning of the semester based on the student's class schedule to ensure no conflicts.

Availability for Communication. While the technical work can be performed asynchronously, the student is expected to check and respond to project communications (Slack/Email) at least once every 24-48 hours during the business week.

No Lab Bound Times. There are no "clinical sampling" or specific laboratory equipment shifts required. The research is computationally focused, allowing the student to perform the majority of their work at times that best suit their productivity, provided they meet the weekly milestones.

App ID #: 3027

Mentor: Fan, Liyue Email: lfan4@charlotte.edu

Title: Associate Professor

Department: Computer Science College of Computing and Informatics

Co-mentor: No

Community engaged research: No

Title: Risks and Mitigation Solutions for Generative AI Models

Description: Large language models and vision-language models are examples of generative artificial intelligence (AI). They are effective at learning data distributions and can be applied widely from medicine to financial services. However, misuse of generative AI techniques may lead to harmful results. Recent research shows that adversaries may extract accurate training data by interacting with generative AI models, such as GPT2 and diffusion models. Furthermore, data generated by AI models may be misused and distributed without authorization. This project will take a holistic approach to understanding and addressing risks and concerns regarding generative AI, including model memorization, data provenance, and data poisoning.

Accepting applications for: Either 5 hours or 10 hours per week are acceptable

2 positions available

Anticipated Student Learning Outcomes: Students will gain deep understanding of generative AI models; obtain hands-on experience with recent approaches to inference and data poisoning attacks toward machine learning models; learn about state-of-the-art solutions for data protection and provenance; write research manuscript and report.

Required training of 0 hours with Description: Not applicable

Mentoring plan: Dr. Fan believes in adapting her mentoring to each student to maximize their research experience and outcomes. Dr. Fan's research group consists of undergraduate students, graduate students, and staff members that conduct active research. We have a weekly group meeting and 1-on-1/small-team meetings are also available. We give feedback frequently and provide support to each other when challenges arise.

Applicant Requirements: Programming, e.g., PytorchAlgorithmsProbabilities and statistics

Applicant Preferences: Experience or coursework with machine learning and artificial intelligence

Specific Time considerations/conflicts: Individual preferences will be taken into consideration when scheduling group meetings and 1-on-1/small-team meetings

App ID #: 3053

Mentor: Jacob Machado, Denis Email: dmachado@charlotte.edu

Title: Assistant Professor

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

Co-mentor: Yes

Anastasiia Duchenko, aduchenk@charlotte.edu, Department of Bioinformatics and Genomics, College of Computing and Informatics

Community engaged research: No

Title: Evaluation of an automated bioinformatics workflow performance for pathogen analysis to guide treatment development

Description: This project offers hands-on research experience in cutting-edge bioinformatics as it is applied to health. Its focus is on testing and validating an original automated bioinformatics pipeline. This pipeline is designed to analyze pathogen's receptor-ligand protein interactions, which are crucial for developing new antibody-based treatments or understanding how viruses may escape current treatments or become more infectious.In addition to the P.I., the Ph.D. student who wrote the pipeline will offer mentoring and training to the undergraduate researcher during all essential steps of a data science project, including data collection, selection, cleaning, processing, analysis, visualization, and the presentation of results.The undergraduate trainee will use the automated pipeline to analyze target interactions with antibodies on a High-Performance Computing (HPC) cluster. The ultimate goal is to test and validate the pipeline.

Accepting applications for: Either 5 hours or 10 hours per week are acceptable

-6 positions available

Anticipated Student Learning Outcomes: Scientific Research Skills: synthesize scientific information, learn how to report research findings.Bioinformatics and Computational Biology: Practical application of an automated bioinformatics pipeline to analyze protein-to-small-molecule interactions.High-Performance Computing (HPC): Hands-on experience running analyses on a powerful computing cluster, a critical skill in modern research.Pathogen Biology: A deeper understanding of pathogen-receptor interactions and their role in developing antibody-based therapies.Data Analysis and Interpretation: How to process, analyze, and interpret complex biological data.Scientific Communication: The process of preparing and presenting a scientific poster for an academic symposium.Collaborative Science: How to work effectively as part of a research team, contributing to a larger scientific goal.

Required training of 4 hours with Description: Other than the HPC training module, I am not aware of any other training needed.

Mentoring plan: Our mentoring approach is centered on creating a supportive, encouraging, and empowering learning environment. We believe that the best way to learn science is by doing

science, and our goal is to foster the students' curiosity, critical thinking, and resilience. We are committed to sharing our passion for research and maintaining a positive attitude, where challenges are viewed as learning opportunities and mistakes are simply part of the scientific process. This project is designed as a collaborative partnership, and we are dedicated to ensuring the student has a successful and rewarding research experience. Direct Mentorship and Engagement:The student will be mentored directly by a second-year Ph.D. student (Anastasiia Duchenko), who will provide daily guidance, support, and hands-on training. Her role is to pass on my experience and ensure the student feels integrated into our research team. Weekly Meetings: We will have scheduled one-hour-long one-on-one meetings at least once a week to set clear goals, review progress, discuss challenges, and plan upcoming tasks. Ph.D. students will be available for informal check-ins, to answer questions, and to provide immediate assistance as needed.Lab Integration: The student will be encouraged to participate in our regular weekly group meetings to gain exposure to the broader research being conducted and to see how their project fits into the larger scientific picture. Professional Development and Project Outcomes: We are committed to the student's professional growth and have designed the project to provide valuable skills. Skill Development: The student will receive structured training in all aspects of the research project, from conducting a literature review and designing experiments to running analyses on a High-Performance Computing (HPC) cluster.Scientific Communication: A key goal of this mentorship is to help the student develop their scientific communication skills. We will work together to prepare a research poster summarizing their work.Conference Presentation: The student will be supported and encouraged to present their poster at an UNC Charlotte Undergraduate Research conference at the end of the semester. This is a fantastic opportunity to share their work, network with peers, and build their academic profile. Our Commitment to the Student:We commit to providing a structured yet flexible research experience where the student can thrive. We will offer consistent guidance, celebrate successes, and provide constructive feedback to help them grow. Our goal is to not only help the student successfully complete their project but also to inspire their interest in a scientific career and equip them with the skills and confidence to pursue future opportunities.

Applicant Requirements: Technical skills:Basic proficiency in Shell, Python, and R.Gain familiarity with fundamental bioinformatics algorithms and data pipelines.Experience creating charts, graphs, or other visual representations of data.

Applicant Preferences: Technical skills:A foundational understanding of biological concepts (proteins, viruses, antibody), is a plus, but not required.Basic understanding of central dogma, protein structures, and protein-antibody interactions.General knowledge of artificial intelligence technologiesBasic exposure to cloud platforms (e.g., AWS, Google Cloud) is a plus, but not required.Basic knowledge of database design. Soft Skills:Curiosity: A strong desire to learn and ask thoughtful questions.Attention to Detail: Meticulous and thorough in completing tasks.Resilience: A positive attitude toward challenges and viewing mistakes as learning opportunities.Coachability: Open to feedback and able to follow guidance effectively.

Specific Time considerations/conflicts: Does not apply.

App ID #: 3055

Mentor: Jacob Machado, Denis Email: dmachado@charlotte.edu

Title: Assistant Professor

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

Co-mentor: Yes

Giovanna Yumi Scorsim Omura, gyumisco@charlotte.edu, Department of Bioinformatics and Genomics, College of Computing and Informatics

Community engaged research: No

Title: Biogeography of snails from the Triodopsis genus

Description: Land snails represent a wonderful example of terrestrial adaptation where nearly half a million described species exist. Triodopsis (Polygyridae) is a genus containing some of these many species of snails that are distributed across the eastern United States. While we encounter them often in North Carolina the species identifications still rely on descriptions from the 1800's. Therefore their diversity and history remains poorly resolved. Currently there is no available evidence of Triodopsis distribution and information about their evolutionary history across scientific papers. To address this problem, this research proposal aims to focus on studying the biogeography data and distribution of Triodopsis to gather information about the species within the genus. This project focuses on gathering all possible information from scientific papers (google scholar), Biodiversity Heritage Library (BHL) to create a large dataset to be populated into image generation to display the distribution and biogeography information about Triodopsis. This project also integrates into the mentor Giovanna's work on her third chapter. This chapter collects the biogeographic data collected in this project for clade predictions along with phylogenetic data. This project also aims to influence the Maryland's State Wildlife Action Plan (SWAP) document to help designate "Species of Greatest Conservation Need" by using these displayed biogeographic data. Ultimately the final goal is for the undergrad to develop skills in databases and image generation while developing skills in programming and organization. The undergraduate student will serve as the lead developer under the direct supervision of the PhD student mentor.

Accepting applications for: Either 5 hours or 10 hours per week are acceptable

1 positions available

Anticipated Student Learning Outcomes: Anticipated Student Learning Outcomes:The student will gain experience in the following NACE Career Readiness Competencies:Technology: Learn about data visualization libraries as transferable technological skills beyond this project. Critical Thinking: By analyzing complex biogeographical data to identify ecological signals, the mentee will have to extract meaning from the data to develop clear images.Communication: The research will translate scientific conservation data (G1–G5 statuses) into visuals.

Required training of 0 hours with Description: None that I am aware of.

Mentoring plan: Mentoring plan or philosophy for engagement of students:Philosophy: My own personal mentorship philosophy has been built on my diverse research experience. I aim to provide a structured yet flexible environment where the student takes ownership of the dashboard's design. I believe the role of a mentor is to strive to be supportive, equitable, accessible, encouraging, and respectful. Another important factor is being mindful that each mentee comes from a different background and has different professional goals. Making the mentee feel secure with the methodology that the mentor is working with is very important. Interaction: The student will work directly with me (Giovanna Yumi Scorsim Omura, Ph.D. student) and have monthly progress reviews with the PI (Dr. Jacob Machado). The student will have weekly meetings with myself and have an active line of communication open for any in between updates/questions. Engagement: The student will present their progress at lab group meetings to practice communicating technical updates. The student will also present progress on goals to me during one on one meetings so we can continue their progress and adjust goals as needed. Technical & Bioinformatic On-boarding:Museum Metadata Standards: The student will be trained on how to curate and pre-process historical metadata from Natural History Museums (NHMs), ensuring data integrity for coordinates, habitat types, and collection dates. The student will be learning this process from the mentor (Giovanna Yumi Scorsim Omura, Ph.D. candidate) who has extensive experience in museum data curation. Data Visualization Pipeline: Training on the lab's standardized protocol for morphological and biogeographical data. Training Hours Breakdown:The 150 hours of training are necessary to bridge the student's technical skills with the specific scientific standards of your research:Museum Metadata Standards: Training on how to curate, trim, and pre-process historical records (type localities, habitat, and collection dates) from repositories like the Schiele Museum and the Academy of Natural Sciences.Bioinformatic Data Context: An orientation on how genomic data (mtDNA and rDNA) from genome skimming informs the species boundaries they will be mapping.Dashboard Framework & UI/UX Standards: Establishing pipeline for the specific "Species at Risk" visualization needs.Compliance & Ethics: Completion of ORPI/CITI training for Responsible Conduct of Research and specific protocols for handling sensitive conservation data for critically imperiled species.

Applicant Requirements: Compliance & Research Ethics:No previous training is required. However, we will ask the student to:Complete the Mentor-Mentee agreement from Phyloinformatics Lab (P.I. Dr. Denis Jacob Machado).Study and Comply with Museum Ethics: Instruction on the ethical handling of data derived from museum specimens, emphasizing conservation priorities and the "Species of Greatest Conservation Need" designation.

Applicant Preferences: The ideal candidate has some familiarity with the skills/tools/abilities listed below, under "Laboratory Integration." Laboratory Integration:Tool Orientation: Introduction to lab-developed tools and other bioinformatic software (e.g., MAFFT, TNT) used to generate the phylogenetic trees that the images will eventually show..Communication Standards: Training on the lab's internal reporting structure and how to present technical updates during weekly research team meetings. Moreover, the ideal candidate will be aware of the key duties, logistics, and commitments outlined below and feel comfortable working to learn and execute the responsibilities listed.Key duties include:Data Integration: Curating and pre-processing museum metadata (type localities, habitat types, and status) using Python.Mapping: Using coordinates from museum records to plot historical vs. contemporary distributions across the southeastern U.S

using AI and other tools.Image visualization: Creation of maps that will visualize the distribution of Triodopsis, while also maintaining a good design and structure. Logistics and Commitments:Interdisciplinary: Yes (Bioinformatics, Computer Science, and Conservation Biology).Time Commitment: Full-time (150 hours) for Fall 2026 academic semester. Students: This project is optimized for 1 student.Training: Approximately 10 hours per week.

Specific Time considerations/conflicts: Does not apply.

App ID #: 3090

Mentor: White III, Richard Allen Email: rwhit101@charlotte.edu

Title: Associate Professor

Department: BINF College of Computing and Informatics

Co-mentor: No

Community engaged research: Yes

Title: BITE (Bat Immunology Training and Education) computational immunoverse

Description: Bats represent 25% of all the mammals on Earth, and are elite suppressors of highly pathogenic viruses, rarely develop cancer, and have very long lifespans relative to body size. T cells are essential in the long-term suppression of viruses and cancer via the adaptive immune system leading to limited disease and long lifespan. Fundamentally, T cells arise from the bone marrow, they then migrate to thymus where they develop into naïve T cells, that circulate in peripheral tissues and blood – where they act as 'sentinels cells' (e.g., CD4 + helper, CD8+ cytotoxic) that suppress viral infection. However, after 100 years of anatomical study in bats, the role of the thymus in T cell development has not been described, nor has how T cell development occurs in the thymus or other lymphoid organ, which is the fundamental tenet of T cell immunology. This is the computational (dry-lab only) side of this grant. No wet-lab work or field work with live bats or tissues.

Accepting applications for: Only 150 hours over an academic semester (~10h/wk)

5 positions available

Anticipated Student Learning Outcomes: Bioinformatics relating to immunology and virology

Required training of 2 hours with Description: This would be the dry lab part of the project. No active research with wet-lab or viewing bats in the field. This is for computational design of antibodies, phylogenetics, and primer design only.

Mentoring plan: Honesty, critical thinking, and problem solving are helpful in success. This is key to successful outcomes. All knowledge is possible but you must first take that first step forward. We will help you the rest of the way.

Applicant Requirements: Honesty, critical thinking, and problem solving are helpful in success. This is key to successful outcomes. All knowledge is possible but you must first take that first step forward. We will help you the rest of the way.

Applicant Preferences: biological background preferredpython, R, rust, unix, machine learning very helpful.

Specific Time considerations/conflicts: Monday lab meetings and every other week journal club are required unless during class time.

App ID #: 3091

Mentor: White III, Richard Allen Email: rwhit101@charlotte.edu

Title: Associate Professor

Department: BINF College of Computing and Informatics

Co-mentor: No

Community engaged research: No

Title: Synthetic Virology - phage therapy development

Description: Drug-resistant microbial infection (DRMI) presents a clear and present danger to humanity. The World Health Organization predicts that 10 million people globally will die in 2050 due to DRMI (Strathedee et al. 2020; White III, 2021). Worldwide at least 700,000 people die each year from DRMI (Strathedee et al. 2020; White III, 2021). Beyond its global issue, American hospitals suffer from greater than 2.8 million antibiotic resistant infections per year that results in at least 35,000 deaths (Duin and Paterson, 2020). Antibiotic resistant bacterial pathogens (ARB) that are commonly studied include Streptococcus pneumoniae, Methicillin-resistant S. aureus, Vancomycin-resistant enterococci (VRE), Clostridioides difficile, Pseudomonas aeruginosa, Acinetobacter baumannii and a variety of other sexually transmitted infections (e.g., Neisseria gonorrhoeae) which are on the CDC pathogen watch list. We are currently losing the arms race against ARB pathogens, which a few have limited treatment options, that need novel combinatorial frameworks to tackle a fundamental threat to public health. The Burkholderia cepacia complex (Bcc) contains opportunistic pathogens that pose a deadly health risk to immunocompromised patients with cystic fibrosis (CF). Large-scale use of broad-range antibiotics prescribed for lung infections has led to the evolution of antibiotic resistant strains of Burkholderia that cannot be easily treated. It is essential that we develop alternative methods to delay or circumvent the use of antibiotics to treat bacterial pathogens. Bacterial pathogens that are resistant to nearly all forms of antibiotic treatment have become a major threat to society and health. Developing alternative methods that can delay or avoid the use of antibiotics are essential to combat antibiotic resistant strains and prevent major outbreaks. The objective of this project is to significantly advance our ability to combat antibiotic resistant pathogenic strains through phage therapy. Our team has strong expertise in molecular, theoretical, and computational tools that can be used in this study involving pathogenicity, collateral resistance, and phage therapy. In this study, we will focus on opportunistic pathogens within the Burkholderia species complex including B. multivorans species that can be lethal to individuals with Cystic Fibrosis. The significance of this approach is that our developed methods and technological approaches provide an alternative method of combating antibiotic resistant pathogens that can evade traditional methods of treatment.

Accepting applications for: Only 150 hours over an academic semester (~10h/wk)

5 positions available

Anticipated Student Learning Outcomes: Want a career in synthetic biology or engineering? Interested in designing approaches for vaccines and detection of viruses. Skills learned include molecular biology, synthetic biology techniques, and engineering of complex microbiomes.The lab

is looking for motivated individuals that are team players, willing to learn, have a interest in viruses or microbes that want to join our team. This includes any skill level for both wet-lab (microbiology, virology, at the bench) or dry-lab (data science, code building) etc.We will work with you to learn strengths and interests to find the best fit for your role on the project. Wet-lab or dry-lab open slots for both to find novel viruses in the lab or on your computer from biological data. Duties include the ability to assist, develop, design experiments and analyze results in the elucidation of viruses of microbes

Required training of 5 hours with Description: Coding, machine and deep learning

Wet-lab would require chemical and biological safety training in person

Mentoring plan: Dr. White is the primary mentor for all projects. We have a weekly lab meeting, a bimonthly journal club, and meet one on one as needed.

Applicant Requirements: We will work with you to learn strengths and interests to find the best fit for your role on the project. Wet-lab or dry-lab open slots for both to find novel viruses in the lab or on your computer from biological data. Duties include the ability to assist, develop, design experiments and analyze results in the elucidation of viruses of microbes

Applicant Preferences: Honesty, critical thinking, and problem solving are helpful in success. This is key to successful outcomes. All knowledge is possible but you must first take that first step forward. We will help you the rest of the way.Biological background is helpful. Culturing microbes and PCR helpful

Specific Time considerations/conflicts: Lab meetings on Monday and Journal club every other Friday.

App ID #: 3063

Mentor: Xue, Hongfei Email: hongfei.xue@charlotte.edu

Title: Assistant Professor

Department: Computer Science College of Computing and Informatics

Co-mentor: No

Community engaged research: No

Title: Human Motion Sensing and Understanding using Wireless Signals

Description: Our project aims to develop cutting-edge systems capable of sensing and recognizing human activities through the analysis of the physical properties of wireless signals. These systems repurpose the wireless signals typically used for communication, such as WiFi and millimeter-wave (mmWave), to enable activity sensing. Unlike traditional human sensing methods that rely on cameras and wearable sensors, our research leverages the ubiquity and non-invasiveness of wireless signals. These signals offer unique advantages, including the ability to work in environments where visual methods fail due to poor lighting or occlusions and preserve privacy more effectively. Undergraduate students participating in this project will have the opportunity to engage in various aspects of research and development, including:- Data Collection and Preprocessing: Assist in setting up experimental environments for data collection using WiFi and mmWave technologies. Learn to preprocess the collected signal data to prepare it for analysis.- Model Training and Evaluation: Participate in training machine learning and deep learning models on processed datasets. Gain hands-on experience in evaluating model performance and making iterative improvements.- Software Development: Contribute to developing the software tools and interfaces needed for data collection, model training, and activity recognition testing.- Research Documentation: Assist in the documentation process by compiling results, conducting literature reviews, and contributing to the writing of research papers or reports.

Accepting applications for: Only 150 hours over an academic semester (~10h/wk)

2 positions available

Anticipated Student Learning Outcomes: Participating in the research project on human activity recognition using wireless signals offers undergraduate students a multifaceted learning experience, rich in both theoretical knowledge and practical skills. Here are the anticipated learning outcomes categorized into skills, content knowledge, and experience:Skills:- Technical Proficiency in Deep Learning: Students will learn to implement and optimize deep neural networks, gaining hands-on experience with PyTorch. This includes data preprocessing, model architecture design, training, and evaluation.- Signal Processing and Analysis: Participants will develop skills in processing and analyzing wireless signals, such as WiFi and mmWave, understanding how human activities alter these signals and can be inferred from them.- Research Methodology: Students will acquire a rigorous approach to scientific research, including hypothesis formulation, experimental design, data collection, statistical analysis, and result interpretation.- Collaborative Software Development: Working on a project of this scale provides practical experience in collaborative software development practices, including version control with Git, code review, and continuous

integration tools.- Problem-Solving and Critical Thinking: The challenges faced during the project will hone students' problem-solving skills, requiring them to apply critical thinking to overcome obstacles and achieve project goals.Content Knowledge:- Human Activity Recognition (HAR) Fundamentals: Students will gain a deep understanding of the principles and state-of-the-art techniques in HAR, focusing on device-free methods using wireless signals.- Data Privacy and Ethics: Students will learn about the ethical considerations and privacy concerns inherent in human activity recognition research, especially regarding device-free monitoring methods.- Machine Learning and Deep Learning Theory: Participants will deepen their knowledge of machine learning and deep learning theories, understanding how these models can be applied to interpret complex signal data.Experience:- Real-World Application of Theoretical Knowledge: Students will apply their classroom learning in computer science and engineering to address real-world problems, bridging the gap between theory and practice.- Interdisciplinary Collaboration: The project offers the chance to work in an interdisciplinary team, fostering collaboration skills and exposing students to different perspectives and expertise areas.- Research Innovation: By contributing to cutting-edge research in HAR, students will experience the innovation process firsthand, including the excitement of discovery and the potential for real-world impact.- Professional Development: Participation in this research project can significantly enhance students' resumes, providing them with a competitive edge for future academic or industry opportunities in high-tech fields.- Publication and Presentation Skills: Students will have the opportunity to contribute to research reports and presentations, gaining valuable experience in scientific communication and the publication process.

Required training of 0 hours with Description: N/A

Mentoring plan: - The student will directly work with me and one of my PhD students on the project.- We will have weekly meetings with the students.- Yes, the student is expected to present at the group meetings and conferences.- I will work closely with the student to provide guidance and materials. And my PhD student will be open to the questions of the student. My Mentoring Philosophy: My mentoring approach is built on the foundation of support, growth, and collaboration. I believe in creating an inclusive, encouraging environment that promotes curiosity, critical thinking, and innovation. My goal is to guide students through their research journey, helping them to apply theoretical knowledge to practical problems, develop new skills, and grow both personally and academically.Success Plan- Goal Setting: At the beginning of the program, goals will be set collaboratively with the student, aligning their interests with the project objectives.- Skill Assessment and Development Plan: An initial assessment of the student's skills will be conducted to identify areas for development. A personalized plan will be created to address these gaps throughout the course of the project.- Feedback and Evaluation: Constructive feedback will be provided regularly, focusing on achievements and areas for improvement. Mid-term and end-of-term evaluations will assess progress toward the set goals.- Encouragement of Independence: While providing the necessary support, students will be encouraged to take initiative, make decisions, and lead parts of the project, fostering independence and confidence.- Recognition of Contributions: Student contributions will be acknowledged in presentations, publications, and reports. They will also be encouraged to present their work in academic forums.What Students Can Expect- Regular Check-Ins: Students can expect regular meetings to discuss progress, challenges, and next steps. These sessions provide an opportunity for feedback, reflection, and adjustment of

goals and strategies.- Clear Communication: Open lines of communication are vital. Students will receive clear instructions on tasks, expectations, and timelines and are encouraged to express their thoughts, concerns, and ideas freely.- Access to Resources: Students will be provided with the necessary resources and tools to successfully engage in the research project. This includes access to literature, software, databases, and any required hardware.- Skill Development: Apart from project-specific skills, students will be guided in developing soft skills such as teamwork, time management, problem-solving, and scientific communication.- Intellectual Challenge: The mentoring experience is designed to push students out of their comfort zones in a supportive way, encouraging them to tackle difficult problems, think critically, and engage deeply with the research content.- Professional Networking: Students will be introduced to professionals in the field, including guest speakers, faculty members, and industry experts, to expand their professional network and understand the broader implications of their work.- Ethical Guidance: Students will learn about the ethical considerations in research, ensuring they understand the importance of privacy, consent, and ethical data handling.

Applicant Requirements: - Basic Programming Knowledge: Proficiency in at least one programming language (e.g., Python, C++) is essential for coding, data analysis, and model development.- Fundamental Mathematics: A grasp of basic mathematics, including calculus and linear algebra, to understand the algorithms and models used in the project.- Introduction to Machine Learning: Having a basic knowledge of machine learning concepts and techniques.- Data Analysis Skills: Experience with data processing and analysis, understanding how to clean, interpret, and derive insights from data.- Problem-Solving Ability: Demonstrated ability to approach and solve problems systematically and creatively.- Communication Skills: Effective written and verbal communication skills for documenting research findings and collaborating with the team.

Applicant Preferences: - Advanced Programming Skills: Proficiency in Python with libraries such as PyTorch for deep learning model development is highly desirable.- Signal Processing Coursework: Courses or experience in signal processing, especially related to wireless signals, would be advantageous.- Experience with Deep Learning: Prior experience or coursework involving deep learning, particularly in the context of activity recognition or related fields.- Project Management Skills: Ability to manage time effectively and contribute to multiple aspects of the project, showing initiative and independence.- Collaborative Experience: Experience working in teams, especially in multidisciplinary settings, demonstrating the ability to collaborate and communicate effectively with peers from different backgrounds.- Research Methodology: Familiarity with research methods, including experimental design, literature review, and statistical analysis.- Curiosity and Enthusiasm for Learning: A strong desire to learn new concepts, explore innovative solutions, and engage deeply with the research topic.- Critical Thinking: The ability to critically evaluate information, challenge assumptions, and contribute original ideas to the research.- Presentation Skills: Experience with or willingness to learn how to present research findings to both technical and non-technical audiences.

Specific Time considerations/conflicts: Weekly Lab Meetings: It's standard for research groups to have weekly lab meetings where all members discuss their progress, challenges, and next steps. Once a week, 1-2 hours, preferably scheduled during a common free period for all team members.

Research Team Meetings: Smaller team meetings focusing on specific aspects of the project might occur more frequently than full lab meetings. 1 hour per week, timing to be determined based on the specific subgroup members' schedules within the larger project team.

Data Collection Sessions: For projects involving wireless signal processing, data collection is a critical component that might require all hands on deck. Variable, depending on the phase of the project.

App ID #: 3068

Mentor: Yarmand, Matin Email: myarmand@uncc.edu

Title: Assistant Professor

Department: Software and Information Systems College of Computing and Informatics

Co-mentor: No

Community engaged research: No

Title: From Voices to Visuals: A Research-Driven Website Redesign

Description: Have you ever decided whether to apply to a school or company (at least in part) on how their website made you feel? Did it seem welcoming, exciting, confusing, outdated, or inspiring? In this undergraduate research project, you will help reimagine and redesign the public-facing website of the Human-Centered Computing (HCC) Lab at the College of Computing and Informatics (CCI) to better communicate its mission, people, and impact. This is not just a technical redesign; it is an opportunity to shape how one of our most recognized research labs presents itself to students, collaborators, and partners worldwide. As a student researcher, you will play a central role in crafting an engaging, informative, and forward-looking digital presence that reflects the lab's identity and values.Rather than jumping straight into coding or visual design, this project follows a human-centered computing and research-driven approach. You will begin by conducting a competitive analysis of websites from peer labs and institutions to understand current best practices and design trends. You will then carry out structured interviews with faculty members and graduate students in the lab to capture their perspectives, needs, and goals. Based on these insights, you will prototype early design concepts, test them, iterate, and refine them before moving into full system development. Throughout the process, you will document methods, analyze data, and reflect on design decisions.By participating in this project, you will gain a rare combination of behavioral, design, and technical skills that are highly valuable in both academic and industry careers. You will learn how to conduct user research, synthesize qualitative data, translate insights into design decisions, and build real-world systems with impact. Beyond technical growth, you will expand your professional network by working closely with faculty, graduate students, and collaborators who are connected across academia and industry. This project is designed to be intellectually fulfilling, creatively rewarding, and professionally transformative, an opportunity to grow as a researcher, designer, and future leader in computing.

Accepting applications for: Only 150 hours over an academic semester (~10h/wk)

1 positions available

Anticipated Student Learning Outcomes: If you are considering graduate school, this project will give you hands-on experience with core research methods such as qualitative interviewing, competitive analysis, prototyping, and iterative evaluation. You will learn how to frame research questions, analyze data, and document design decisions, skills that are essential for success in master's and PhD programs. You will also have the opportunity to earn strong reference letters from internationally recognized faculty you will work closely with throughout the project. If you are considering industry, this project closely mirrors real-world UX and product development

workflows. You will conduct user research, translate insights into prototypes, and develop a polished system grounded in stakeholder needs. You will gain portfolio-ready work, practical collaboration experience, and concrete examples you can confidently discuss in interviews.If you are open to both paths, this experience bridges research and practice. You will learn to move fluidly between inquiry, design, and implementation while developing adaptable, interdisciplinary skills. You will emerge with both research credibility and applied experience, well positioned for graduate study, internships, or full-time roles.

Required training of 0 hours with Description: There is no on-boarding process needed for this project.

Mentoring plan: We will collaboratively establish a mentoring plan that aligns with your academic schedule and the goals of this research project. I follow a structured, phased approach that provides strong early support and increasing independence over time. You can expect regular meetings, clear expectations, timely feedback, and close collaboration throughout the semester.Phase 1: Research & Discovery (Weeks 1-4; 2× per week) — You will conduct a competitive analysis of peer labs and institutions, and carry out structured interviews with faculty and students to understand stakeholder needs. I will work closely with you to refine research questions, analyze findings, and translate insights into design requirements.Phase 2: Prototyping & Evaluation (Weeks 5–9; 1-2× per week) — You will create and iterate on prototypes and conduct lightweight evaluations to test design ideas. I will provide targeted feedback on your design decisions and support you in interpreting results and refining your approach.Phase 3: Development & Implementation (Weeks 10–14; 1× per week) — You will lead the development of the redesigned website, transforming validated prototypes into a polished, functional system (preferably using Jekyll). I will guide prioritization, quality, and alignment with research insights.Mentorship & Support — You will work directly with me and engage with the HCC research group. I am committed to providing consistent mentorship, constructive feedback, and professional guidance. My goal is to help you build confidence, independence, and a strong research-informed portfolio piece that supports your future academic and career goals.

Applicant Requirements: The following skills are crucial for success in this project:Communication & People Skills – Comfortable engaging with diverse stakeholders (faculty and graduate students) and learning from structured interviews and conversationsWeb Development Proficiency – Strong programming skills, particularly in web development (e.g., front-end frameworks, responsive design, basic back-end integration)Independence & Initiative – Highly self-motivated, proactive in making progress, seeking feedback, and communicating challenges

Applicant Preferences: The following skills can put you on a path to success:Qualitative Analysis & Synthesis – Experience with qualitative research methods and analyzing interview data to generate actionable design insightsPrototyping & Design Tools – Familiarity with prototyping tools (e.g., Figma or similar platforms); prior experience is helpful but can also be developed during the project

Specific Time considerations/conflicts: There is no specific day or hour for engagement in this research. We will collaboratively find times that work for both of us.

App ID #: 3080

Mentor: Yarmand, Matin Email: myarmand@uncc.edu

Title: Assistant Professor

Department: Software and Information Systems College of Computing and Informatics

Co-mentor: No

Community engaged research: No

Title: Same Words, Different Worlds: Designing for Cross-Disciplinary Collaboration

Description: What happens when two experts use the same word, but mean entirely different things? Consider the term "model." In computer science, a model might refer to a machine learning architecture trained on data. In the social sciences, a model might represent a conceptual framework for explaining human behavior. In design, it could refer to a prototype or representation of a system. These subtle but meaningful differences reveal a deeper challenge: disciplines operate with distinct norms, values, and communication styles. As complex societal problems demand interdisciplinary collaboration, misalignment in terminology and expectations can slow progress or even derail collaboration. This project investigates how scholars from different disciplines negotiate meaning, align norms, and build shared understanding when working together. By studying interdisciplinary communication, we aim to design tools and practices that support clearer collaboration across boundaries.In this project, you will play a central role in conducting design studies with scholars from different disciplinary backgrounds. You will design and conduct interviews, facilitate focus groups, and help organize interactive workshops to explore how researchers communicate, where misunderstandings arise, and how shared language is constructed. You will analyze qualitative data to identify patterns, tensions, and opportunities for intervention. This is a research-intensive project grounded in Human-Computer Interaction (HCI), with a strong emphasis on participatory methods and design-driven inquiry.By participating, you will gain valuable HCI skills including qualitative research design, interviewing, thematic analysis, workshop facilitation, and research synthesis. You will learn how to study complex social dynamics and translate findings into actionable design implications. This experience prepares you for both graduate study and industry roles that require cross-functional collaboration. There is also the possibility of submitting to top-tier HCI conferences, offering you exposure to the broader research community and the opportunity to author high-impact work.

Accepting applications for: Only 150 hours over an academic semester (~10h/wk)

1 positions available

Anticipated Student Learning Outcomes: If you are considering graduate school, this project will give you hands-on experience with qualitative research methods such as interviewing, focus groups, and participatory workshops. You will learn how to analyze qualitative data and synthesize findings into design implications, skills that are essential for success in master's and PhD programs. You will also have the opportunity to work closely with faculty and scholars across disciplines, positioning you to receive strong reference letters and build an academic network.

If you are considering industry, this project closely mirrors real-world cross-functional collaboration environments. You will study how teams from different backgrounds communicate, identify breakdowns in shared understanding, and propose design-driven interventions to improve collaboration. These experiences prepare you for roles in UX research, product strategy, and organizational design, where interdisciplinary coordination is critical. If you are open to both paths, this experience bridges theory and practice. You will learn to navigate disciplinary differences, facilitate structured conversations, and translate complex insights into actionable design recommendations. You will emerge with strong HCI research skills, interdisciplinary communication expertise, and experience contributing to work with potential for submission to leading HCI conferences.

Required training of 0 hours with Description: There is no on-boarding process needed for this project.

Mentoring plan: We will collaboratively establish a mentoring plan that aligns with your academic schedule and the goals of this interdisciplinary research project. I follow a structured, phased approach that provides strong early guidance and increasing independence over time. You can expect regular meetings, clear milestones, timely feedback, and close intellectual collaboration throughout the semester.Phase 1: Literature Review & Methodological Foundations (Weeks 1-4; 2x per week) — In this phase, you will conduct a focused literature review on interdisciplinary collaboration, communication breakdowns, and relevant HCI methodologies. You will also learn best practices in qualitative research methods, including interviewing, focus groups, workshop facilitation, and research ethics. I will work closely with you to identify gaps in existing work, and design a rigorous study plan. Phase 2: Running the Studies (Weeks 5–9; 1-2x per week) — You will design and conduct interviews, facilitate focus groups, and help organize workshops with scholars from different disciplinary backgrounds. I will provide targeted feedback on your interview protocols, facilitation techniques, and data collection practices. We will reflect after each session to refine our approach and ensure high-quality data collection. Phase 3: Qualitative Analysis & Synthesis (Weeks 10–14; 1x per week) — In the final phase, you will analyze collected data using qualitative methods such as thematic analysis. I will guide you through coding strategies, pattern identification, and synthesis of findings into design implications. We will work together to articulate contributions clearly and explore opportunities for conference submissions or research dissemination.Mentorship & Support — You will work directly with me and engage with the HCC research group in CCI, including presenting your progress at least once during a lab meeting. I am committed to providing consistent mentorship, constructive feedback, and professional development guidance. My goal is to help you grow into an independent researcher with strong qualitative skills, interdisciplinary awareness, and confidence in contributing to high-impact HCI research.

Applicant Requirements: The following skills are crucial for success in this project:Strong Communication Skills – Comfortable engaging in thoughtful conversations with scholars from different disciplines, asking probing questions, and facilitating discussions in interviews or workshops.Independence & Initiative – Self-motivated, proactive in making progress, preparing for meetings, seeking feedback, and taking ownership of assigned tasks.

Applicant Preferences: The following skills can put you on a path to success:Familiarity with HCI Methods – Prior exposure to human-centered computing methods such as qualitative interviewing, thematic analysis, focus groups, or participatory design is beneficial, though not required.

Specific Time considerations/conflicts: There is no specific day or hour for engagement in this research. We will collaboratively find times that work for both of us.

App ID #: 3081

Mentor: Yarmand, Matin Email: myarmand@uncc.edu

Title: Assistant Professor

Department: Software and Information Systems College of Computing and Informatics

Co-mentor: No

Community engaged research: No

Title: Making Metaphors Work: A Usability Study of AI-Assisted Learning Tools

Description: As long as humans have existed, metaphors have been instrumental in bridging and sharing knowledge. Metaphor theories describe how humans communicate conceptual knowledge by mapping a known concept from other life experiences onto a target concept we want to convey. For example, we might find reading interdisciplinary papers to be an uphill battle. Of course, no such battle takes place; the metaphor is abstract to the target concept. But, this common idiomatic metaphor allows us to imagine the difficulty in our own experience and ascribe qualities to it (e.g., the metaphor implies the task gets more difficult over time, like going uphill). In this project, you will take an active role in advancing our existing AI-driven metaphor generation system and evaluating its usability. Your responsibilities will include preparing and refining the current system for study deployment, including implementing logging and tracking mechanisms to capture meaningful interaction data. You will help design the usability studies by developing study protocols, defining evaluation metrics, and preparing materials for participants. You will then recruit and run study sessions, guiding participants through tasks and ensuring high-quality data collection. Finally, you will analyze both system logs and participant feedback to identify usability patterns, strengths, and areas for improvement, contributing directly to research findings and system refinement. Through this project, you will develop core HCI skills spanning system preparation, usability evaluation, data analysis, and research communication. You will gain hands-on experience readying a research prototype for real-world deployment. Importantly, your contributions will extend beyond implementation: you will have the opportunity to participate in writing and refining research papers, with the potential to co-author submissions to top-tier HCI conferences. This experience positions you not only as a developer, but as a researcher capable of contributing to impactful, publishable work.

Accepting applications for: Only 150 hours over an academic semester (~10h/wk)

1 positions available

Anticipated Student Learning Outcomes: If you are considering graduate school, this project will give you hands-on experience in preparing and evaluating interactive systems through rigorous usability research. You will design and run user studies, implement logging mechanisms, analyze both quantitative interaction data and qualitative feedback, and translate findings into system improvements. These skills are essential for success in master's and PhD programs, especially in Human-Computer Interaction (HCI). You will also work closely with faculty and research collaborators, positioning you to earn strong reference letters and build an academic network.

If you are considering industry, this project closely mirrors real-world UX research and product evaluation workflows. You will gain experience instrumenting systems for data collection, designing usability protocols, running participant sessions, and synthesizing insights to inform iterative development. These experiences prepare you for roles in UX research and product development, where evaluating and refining systems based on user data is critical.If you are open to both paths, this experience bridges research and applied system development. You will learn to move from prototype to deployment-ready system, collect and interpret rich user data, and contribute to improving AI-driven tools through evidence-based design. You will emerge with strong HCI research skills, practical evaluation experience, and the opportunity to contribute to work that may be submitted to leading HCI conferences.

Required training of 0 hours with Description: There is no on-boarding process needed for this project.

Mentoring plan: We will collaboratively work on a mentoring plan that works for your schedule and mine. Having worked with many undergraduate students in the past, here is what I have found to be helpful: Phase 1: Project Setup and Early GuidanceMeetings: 3x per week (two short check-ins + one long co-working session)Duration: Weeks 1-3Mentor Role: Offer close guidance on project goals, co-work to model research and design processes, help with problem scoping and solution planningPhase 2: Independent Design and DevelopmentMeetings: 1x per week (one long check-in)Duration: Weeks 4-12Mentor Role: Provide targeted feedback on the usability design process, offer clues for technical obstacles, and track alignment with project goalsPhase 3: Consolidation and PresentationMeetings: 2x per week (one long and one short check-ins)Duration: Weeks 13-15Mentor Role: Advise on clear presentation strategies and provide support for integrating the work into a cohesive final outcome Besides our 1-on-1 engagement, I would also encourage you to talk to other students and faculty, and at least once, present to the HCC research group. These interactions can help you build a broader network, and especially, learn how to communicate your progress to a wider audience.

Applicant Requirements: The following skills are crucial for success in this project:Programming — You must have prior coding experience in full-stack development, either as part of previous classes or personal projects. You should have strong familiarity with front-end development, including HTML, CSS, JS. Strong familiarity with back-end workflows (e.g., Python Flask) is also necessary. It is also important that you are fairly familiar with project management on Github.Independence — You must be able to think and work independently, always aspiring to discuss your new ideas and explorations. I will be helping you along the way, but you will be the one driving the work according to your interest and expertise.Motivation and Curiosity — You must be motivated and curious to pursue this line of work. This interest can especially stem from your past experience when you might have shared challenges when reading interdisciplinary papers.

Applicant Preferences: The following skills can put you on a path to success:Design — Prior design skills for usability studies is a strong plus (recommended courses: ITIS 3130, ITIS 3140).Writing — Strong writing skills can help you transform your work into a manuscript that will publicize your work to a broad audience.

Specific Time considerations/conflicts: There is no specific day or hour for engagement in this research. We will collaboratively find times that work for both of us.

App ID #: 3084

Mentor: Arthur, Susan Email: sarthur8@charlotte.edu

Title: Associate Professor

Department: APHCS College of Health & Human Services

Co-mentor: No

Community engaged research: No

Title: Pancreatic Cancer Cachexia and Muscle Repair

Description: Description: The purpose of this project is to test if muscle repair is affected in pancreatic cancer cachexia. Mice inflicted with pancreatic cancer and diagnosed with cachexia will have protein markers of muscle repair measured. Students will learn theoretical foundations of skeletal muscle biology as well as extensive hands on experience in cellular techniques of handling muscle tissue, western blot technique and immunofluorescence. Students will also have exposure to professional development workshop series with Dr. Arthur – topics including designing life and career goals, time management, and skills in leadership and communication are incorporated. Student Qualifications: Basic laboratory skills including pipettingWhat the student will learnWill learn skills related to cellular biology.- Will have opportunity to present data.- Will gain laboratory experience.- Will have opportunity to practice independence.Engagement in Professional Development Series with Dr. ArthurThe on-boarding process will consist of:1. Online CITI training associated with laboratory skills and animal care.2. Online EHS training3. Theoretical lecture on the project.4. Video and in person basic laboratory training program.5. Specific project-related training.How I will help the scholarHave regular laboratory meetings and individual meetings to connect with the scholar and have mini-research and professional development discussions. Will make sure that the scholar has appropriate guidance and direction. Will have daily contact.Personal training the scholar in the skills required to be successful in his/her research project. Have a contract of the expectations of the scholar with deadlines. I will expect them to present at laboratory meetings and the departmental conference. I will expect to scholar to attend all laboratory meetings, and Dr. Arthur's professional development workshops which are scheduled based off of their schedule.

Accepting applications for: Only 150 hours over an academic semester (~10h/wk)

1 positions available

Anticipated Student Learning Outcomes: Student Learning Outcomes. The benefits of students participating in research. At the end of the fall semester, the students will be exposed and acquire skills in:Explaining the skeletal muscle repair process and how cancer affects skeletal muscle quality.Perform experiments that measure skeletal muscle quality (western blotting and immunofluorescence)Solve technique problems associated with their data. Appraise their results and determine the next course of action.Think about and develop career goals and skills in communication, time management, and leadership.Meet with Dr. Arthur to discuss professional development series.

Required training of 7 hours with Description: The on-boarding process will consist of:

1. Online CITI training associated with laboratory skills and animal care.

2. Online EHS training

3. Theoretical lecture on the project.

4. Video and in person basic laboratory training program.

Mentoring plan: I will help the student be successful by:Have regular laboratory meetings and individual meetings to connect with the scholar and have mini-research and professional development discussions. Will make sure that the scholar has appropriate guidance and direction. Will have daily contact.Personal training the scholar in the skills required to be successful in his/her research project. The projects are also team-based so they will be working with other lab members.Have a contract of the expectations of the scholar with deadlines. I will expect them to present at laboratory meetings, department conference, and OUR conference.I will expect to scholar to attend all laboratory meetings, and Dr. Arthur's professional development workshops which are scheduled based off of their schedule.

Applicant Requirements: Basic laboratory skills including pipetting. Either Biology, Chemistry, or Exercise Science Junior or Senior level. Students who are interested in working in a team-environment, willing to work in the laboratory for 10h/week, willing to write scientific literature, interested in cellular science techniques.

Applicant Preferences: Basic laboratory skills including pipetting. Either Biology, Chemistry, or Exercise Science Junior or Senior level. Students who are interested in working in a team-environment, willing to work in the laboratory for 10h/week, willing to write scientific literature, interested in cellular science techniques.

Specific Time considerations/conflicts: Must attend all lab meetings but the days and times are determined by corresponding schedules.

App ID #: 3029

Mentor: Da Costa Vieira, Rafael Felipe Email: rvieira@charlotte.edu

Title: Associate Professor

Department: Epidemiology and Community Health College of Health & Human Services

Co-mentor: Yes

Thallitha Samih Wischral Jayme Vieira, t.vieira@charlotte.edu, Department of Chemistry

Community engaged research: Yes

Title: Evaluating tick ecology in Mecklenburg County parks and recreation centers

Description: Tickborne diseases (TBDs) have been on the rise in recent decades, threatening public health. In the Northern Hemisphere, TBDs are well-known threats and represented >75% of all vector-borne disease cases reported in the USA from 2004 to 2016, with Lyme disease representing the majority of the cases (Rosenberg et al., 2018). In North Carolina, data on TBDs have been historically limited to Lyme disease and Spotted Fever Rickettsiosis, and only recently ehrlichiosis (Iyamu et al., 2024; Mokashi et al., 2024). However, other tick-borne pathogens (TBPs) and the growing number of emerging tick-borne viruses are overall understudied and rarely considered by physicians and public health professionals in differential diagnoses when evaluating tick-related febrile illnesses in humans. Habitat degradation is a major threat to animals, promoting cascading effects on species composition and influencing vector-host-pathogen interactions (Laurance et al., 2009). On this pattern, the Charlotte metropolitan area has shown rapid urban growth and tree canopy loss, directly impacting animal and vector species composition, which may lead to an increase human exposure risk to tick bites. Our long-term goal is to determine how the tick ecology, microbiome and TBPs shift in degraded areas and how this impacts human exposure risk. Our overall objective herein is to provide fundamental knowledge on how the ecology of ticks of public health importance respond to degradation comparing temperate and tropical climates. We also aim to detect and characterize other TBPs potentially transmitted by tick species in the Charlotte metropolitan area. Our central hypothesis is that degradation affects the distribution of animals and consequently tick species that serves as a vector for various TBPs.

Accepting applications for: Either 5 hours or 10 hours per week are acceptable

3 positions available

Anticipated Student Learning Outcomes: Local capacity building and technical and scientific support to prepare future qualified acarologists with interdisciplinary expertise that are able to minimize tick-borne diseases (TBDs) in a sustainable manner by assisting with the prevention, diagnosis, and control TBDs and arthropod vectors is critically lacking (Vieira et al., 2024). For instance, most public health organizations have inadequate training or capacity to conduct tick surveillance and identification. The limited access of acarologists to research facilities for more effective public health surveillance of ticks and the pathogens they transmit (e.g., molecular screening of field-collected ticks for pathogens), associated with the lack of multisectoral collaboration among professionals in entomology, acarology, public health, molecular methods,

veterinary medicine, ecology, and zoonotic infectious disease at regional, national, and global scales, represents an important gap in our capacity to reduce vector-borne diseases (Vieira et al., 2024). Herein, students will:Receive training in methods for field collection and identification of ticks occurring in the Charlotte metropolitan area;Receive training in the identification of ticks from different parts of the world;Receive training on how to store and maintain ticks in the scientific collection at the Zoonotic and Vector-Borne Diseases Laboratory at the Center for Computational Intelligence to Predict Health and Environment Risks (CIPHER);Receive training on how to send and receive tick specimens overseas.Develop skills in DNA and RNA extraction of different tick stages and tissues;Receive training on molecular methods to characterize the microbiome of ticks.Receive training on molecular methods for the diagnosis and characterization of zoonotic pathogens transmitted by ticks; In general, many vector-borne pathogens are extremely under-surveilled. Ticks, fleas, lice, and mites are typically prioritized below mosquitoes by vector control programs, due to the real or perceived expectations of lower public health burden and often limited resources. Upon the successful completion of this program, students will have the necessary skills to work on surveillance and control programs for tick-borne diseases.

Required training of 4 hours with Description: I expect students to perform the following CITI training:

OSHA Bloodborne Pathogens

Shipping and Transport of Regulated Biological Materials

USDA Permits

Mentoring plan: I have a documented history of mentoring a very engaged and successful group of students from multiple backgrounds, ethnicities, and nationalities. I have already directly supervised two postdoctoral, seven Ph.D., 14 Masters, five Veterinary Residents, and several undergraduates. In this project, I will directly lead theoretical and practical training and expeditions to the collection of ticks in the Charlotte metropolitan area. I will also provide theoretical and practical training on the identification of tick specimens. Postdoctoral and graduate students at the Zoonotic and Vector-Borne Diseases Laboratory (ZVBD Lab) will help with theoretical and practical training on DNA/RNA extraction, PCR and real-time PCR protocols for the detection of tick-borne pathogens, as well as sampling preparation for the characterization of the tick's microbiome.Herein, students are expected to discuss and present at the ZVBD Lab weekly meetings, and at Conferences when funds are available.I am committed to supporting students in their professional development and international experience, as the ZVBD Lab team includes graduate students from Brazil and Sub-Saharan Africa conducting One Health research. At the ZVBD Lab, students receive state-of-the-art training in One Health, as well as zoonotic and vector-borne disease studies.

Applicant Requirements: We are seeking motivated students who are eager to perform field activities and learn about ticks and the diseases they transmit, with the goal of advancing public health surveillance. Students with interests aligned with Public Health, Environment and Biological Sciences, Epidemiology and Bioinformatics are highly encouraged to apply.

Applicant Preferences: We are seeking motivated students who are eager to perform field activities and learn about ticks and the diseases they transmit, with the goal of advancing public health surveillance. Students with interests aligned with Public Health, Environment and Biological Sciences, Epidemiology and Bioinformatics are highly encouraged to apply.

Specific Time considerations/conflicts: Field collections are expected to occur on Tuesdays and Fridays in the morning. The Zoonotic and Vector-Borne Diseases Laboratory weekly meetings are either Monday OR Friday mornings.

App ID #: 3086

Mentor: Gibbons, Julie Email: jgibbon1@charlotte.edu

Title: Assistant Professor, Tenure Track

Department: School of Nursing College of Health & Human Services

Co-mentor: Yes

Apryl Alexander and Braveheart Gillani, apryl.alexander@charlotte.edu, braveheart@charlotte.edu, Department of Health Management & Policy - College of Health and Human Services/Department of Social Work - College of Health and Human Services

Community engaged research: No

Title: Assessing Early Life Adversity and Well-being among Healthcare Professional Students at The University of North Carolina Charlotte A Long-Term Strategy for Building a Sustainable Health Care System

Description: For the umbrella study, the principal investigator and team will use a mixed methods design to gather information about current well-being, early life adversity experiences and positive childhood experiences from students in undergraduate and graduate programs at UNC Charlotte. Participants will be recruited from counseling, health policy, nursing, physiology, public health and social work. The expected total number of participants is 500 with approximately 10 participants expected from each recruited department (including counseling, nursing, physiology, public health and social work). In the first phase, study participants will be asked to complete a researcher-designed survey of sociodemographic variables, the World Health Organization (WHO-5) Survey, the Adverse Childhood Experiences (ACEs) Questionnaire, and the Positive Childhood Experiences (PCEs) Questionnaire. Incorporating these surveys offers a comprehensive understanding of the developmental context influencing healthcare professional (HCP) students' well-being, empathy, and stress reactivity*. Once participants complete the survey/quantitative portion of the study, they will be asked if they are willing to participate in future research. If they are interested and agree, they will be taken to a separate Google Form where they can provide their email address for correspondence and scheduling of the interview/qualitative portion of the study. The participant-provided email address will be stored separately from survey responses and will not be linked in any way to specific study participants. Only participants who previously completed the approved survey and indicated that they were willing to be contacted for future research will be invited to participate in a follow-up interview. These individuals will receive a recruitment email containing a brief description of the qualitative interview, including the purpose, estimated time commitment (approximately 30-60 minutes via Zoom), and assurance of confidentiality. The next phase - the qualitative component - will involve a 30–60-minute, semi-structured Zoom interview with participants who have completed the original survey and agreed to be contacted for follow-up interviews. These interviews will explore participants' perceptions of the ACEs and PCEs questionnaires, the relevance of ACEs (and the impact of PCEs) in healthcare training, and how this topic relates to student well-being, resilience, and professional identity. In addition, the interviews aim to explore how students perceive the connection between childhood adversity and current well-being, including aspects of stress, burnout, emotional regulation, and coping in the context of

healthcare education. The study also seeks to understand how past adversity may influence students' approach to their future roles as healthcare providers—shaping values such as empathy, patient care, professional boundaries, and career decision-making. This qualitative addition will provide deeper context to the quantitative findings, inform trauma-informed educational practices, and support the development of student-centered interventions in healthcare training programs. Students entering healthcare professions are an important population to study because they represent the future of healthcare, and their experiences shape the quality and sustainability of healthcare delivery. Understanding the unique needs of people entering this challenging profession will provide insight into factors that may address well-being and burnout in a workforce that is experiencing significant shortages. Data from both parts of the study will be analyzed using thematic and constant comparative methods to identify patterns across and within participants. In addition, information gathered from this study can inform future interventions aimed at promoting resilience, self-care, and well-being, reducing future risks of burnout and attrition in the healthcare workforce. Early life adversity measured through the concept of Adverse Childhood Experiences (ACEs), has demonstrated to have a profound impact on long-term health and well-being, influencing mental health, chronic diseases, and professional functioning. Such potentially traumatic experiences early in life can predispose individuals to chronic health conditions, mental health challenges, and reduced life expectancy. Students entering healthcare professions are particularly vulnerable to stress and burnout due to the rigorous demands of their training. There is limited knowledge about the effects of early life adversity on HCP students, especially concerning how such experiences may influence their resilience and susceptibility to burnout. Additionally, current research shows that those with multiple PCEs form strong social attachments and are more resilient. Understanding the ACE and PCE profiles of HCP students is essential, as it can inform the development of targeted interventions aimed at enhancing well-being in future HCPs which may foster a more resilient and well-prepared healthcare workforce, ultimately improving patient care and patient outcomes. The research results from this study will be used to identify key patterns and relationships between early life adversity and the well-being of HCP students. Although trauma informed care (TIC) has gained significant traction across education, health, and human services sectors, the literature reveals a notable gap in understanding how institutions systematically assess the trauma-informed learning opportunities they already offer. Existing studies primarily evaluate discrete TIC trainings or professional development initiatives, rather than conducting comprehensive program evaluations of trauma-informed curricula within higher-education settings. Likewise, emerging trauma-informed evaluation frameworks provide guidance for assessing programs, yet few have been applied to mapping or analyzing academic course offerings. This gap underscores the need for an institutional-level curriculum review. It is at this point that students from the Scholars Mentored Project will serve as vital members of the research team. Before using the student-level data to shape a more responsive trauma-informed curriculum, it is essential to map the existing landscape of trauma-informed education within the institution. This involves gathering information about current courses, certificates, training initiatives that address trauma, adversity, resilience, or related competencies. Understanding what is already in place - and how it aligns with evidence-based trauma informed frameworks provide a foundation for identifying curricular strengths, redundancies, and areas needing further development. This role would provide the student with hands-on experience with research methods, trauma-informed educational frameworks, and program evaluation processes. Before engaging in any institutional-

level data collection, student research assistants could support the team by helping in the review of existing research on trauma-informed pedagogy and curriculum design. This preparatory work would ensure that the research group is grounded in the relevant frameworks, terminology and evidence base prior to reviewing institutional materials. With a specific focus on counseling, health policy, nursing, physiology, public health and social work, a student research assistant could help this research by supporting systematic review of curriculum materials, helping to organize and analyze data, and participating in the development of a comprehensive map of trauma-informed educational offerings. Supporting the review of a systematic review of curriculum materials could include searching institutional catalogs, websites and repositories for courses or programs related to trauma, adversity, resilience, or related constructs. Additionally, the student could help to compile course descriptions, learning outcomes, and other relevant data into a structured database. Organizing and analyzing data could include syllabi and course materials review using a researcher-developed coding framework. Results of this analysis would support the teams' understanding of gaps, redundancies and areas needing clarification. The student research assistant could support the research team by entering and organizing data into chosen software and maintaining accurate documentation of decisions and processes. Finally, the student research assistant could support the research teams' mapping of trauma-informed educational offerings in healthcare professional student programs at UNC Charlotte. *References available upon request.

Accepting applications for: Either 5 hours or 10 hours per week are acceptable

2 positions available

Anticipated Student Learning Outcomes: By participating in this project, student research assistants would be able to:demonstrate foundational knowledge of trauma-informed educational principles,apply program evaluation methods to an institutional context,develop skills in qualitative and document-based analysis,strengthen research literacy and evidence-based reasoning,build professional communication and collaboration skills, andgain experience with research tools and data management.

Required training of 10 hours with Description: IRB Citi Training, NVivo training, Library-based systematic review training

Mentoring plan: Research faculty will play an active, intentional role in preparing student assistants to contribute meaningfully and confidently to the trauma-informed curriculum review. Faculty will begin by providing structured training on trauma-informed educational principles, program evaluation methods, and ethical considerations relevant to working with sensitive content. Before students engage in any institutional-level data collection, faculty will guide them through a scaffolded literature review process, offering mentorship in search strategies, synthesis, and critical appraisal. Throughout the project, faculty will hold regular check-ins to clarify expectations, model analytic reasoning, and ensure students feel supported as they develop new skills. Faculty will also provide detailed coding frameworks, exemplars, and opportunities for practice to build students' confidence in reviewing syllabi and course materials. Students will work directly with three faculty mentors - Julie Gibbons, Apryl Alexander and Braveheart Gillani throughout the project. Weekly email correspondence with me, the principal investigator will ensure inclusion and provide a space for status updates and next steps. Students will be invited to attend research team meetings. Student researchers will have the opportunity to be acknowledged or listed as co-

authors on publications, presentations, or other dissemination materials that emerge from this project, consistent with their level of contribution and established authorship guidelines.Finally, students will be encouraged and supported to apply to present their work and share their research experiences at campus-based research dissemination events, such as undergraduate research symposia or student scholarship showcases.

Applicant Requirements: Our research team is seeking student applicants who bring curiosity, reliability, and genuine interest in trauma-informed education and research. Successful applicants will demonstrate strong attention to detail, the ability to follow structured research procedures, and a commitment to ethical and respectful engagement. Students should have solid academic skills, including clear written communication, basic literature search abilities, and comfort working with documents such as syllabi, course descriptions, or research articles. Prior coursework in education, public health, psychology, nursing, social work, or related fields is helpful but not required. Student applicants must be open to training in coding, data organization and literature review.

Applicant Preferences: Our research team is seeking student applicants who bring curiosity, reliability, and genuine interest in trauma-informed education and research. Successful applicants will demonstrate strong attention to detail, the ability to follow structured research procedures, and a commitment to ethical and respectful engagement. Students should have solid academic skills, including clear written communication, basic literature search abilities, and comfort working with documents such as syllabi, course descriptions, or research articles. Prior coursework in education, public health, psychology, nursing, social work, or related fields is helpful but not required. Student applicants must be open to training in coding, data organization and literature review.

Specific Time considerations/conflicts: N/A

App ID #: 3057

Mentor: Gillani, Braveheart Email: braveheart@charlotte.edu

Title: Assistant Professor

Department: CHHS- Social Work College of Health & Human Services

Co-mentor: No

Community engaged research: Yes

Title: Belonging in Action: Building Connection and Purpose Among Men in Charlotte

Description: This project is a community-based research initiative focused on belonging, connection, and well-being among men in Charlotte. Across the country, fewer men are entering and remaining in helping professions such as education, social work, and counseling. This project seeks to better understand why that is happening and to test creative, community-centered ways to strengthen connection, meaning, and purpose.Undergraduate research assistants will play an active, hands-on role in both the research and the experience-based components of the project. Responsibilities may include assisting with participant recruitment, managing survey data (N=120), helping coordinate five structured cohort sessions, supporting interviews, organizing materials, and contributing to literature reviews. Students will also help with logistics for community-based activities such as group gatherings, service projects, and outdoor experiences.This position is ideal for students interested in psychology, sociology, public health, education, or community leadership. You will gain experience in human subjects research, qualitative and quantitative methods, and applied community engagement. More importantly, you will contribute to a project designed to make a real difference in Charlotte.

Accepting applications for: Only 150 hours over an academic semester (~10h/wk)

2 positions available

Anticipated Student Learning Outcomes: Students who participate in the Gambrell Project will gain substantive experience in applied social science research and community-engaged scholarship. Specifically, students will develop:Research Design & Methods Skills: Experience with survey development and administration (N=120), participant recruitment, data management, and exposure to qualitative interviewing and phenomenological methods.Human Subjects Research Competency: Training in research ethics, confidentiality, and IRB-informed procedures.Data Literacy: Foundational skills in organizing, cleaning, and interpreting both quantitative and qualitative data.Project Management Skills: Coordinating events, managing timelines, communicating with participants, and problem-solving in real-world settings.Professional Communication: Writing summaries, assisting with reports, and contributing to presentations or publications.Beyond technical skills, students will gain exposure to issues related to gender, belonging, workforce participation, and community well-being. They will see how research can inform practical intervention.

Required training of 0 hours with Description: Students will participate in a structured onboarding process designed to ensure both competence and confidence in their role.

1. Project Orientation (Week 1)

Students will receive an overview of the Gambrell Project's goals, research design (survey + cohort model), and its broader community impact. We will review expectations, timelines, communication norms, and professional standards.

2. Human Subjects & Ethics Training

All students will complete required human subjects research training (e.g., CITI or equivalent). We will review confidentiality protocols, informed consent procedures, data protection standards, and appropriate participant interaction.

3. Methods Training

Students will receive hands-on instruction in:

-Survey administration and participant recruitment procedures

-Data entry, organization, and secure file management

-Interview support and qualitative research fundamentals

-Professional communication with community partners

4. Applied Practice

Before engaging participants, students will participate in mock scenarios (e.g., recruitment conversations, session setup, data handling simulations). This ensures clarity of role and procedural consistency.

5. Ongoing Mentorship

Weekly research meetings will provide continued training, troubleshooting, and professional development. Students will receive feedback, increasing responsibility over time, and opportunities to take leadership roles as appropriate.

Mentoring plan: Students on the Gambrell Project will not function as peripheral assistants; they will be developed intentionally as emerging professionals.I will meet with the research team weekly for structured project meetings that include training, progress updates, and skill development. Students can expect consistent access to me for mentorship, feedback, and career guidance. I maintain an open-door policy and respond promptly to questions so that students are never uncertain about expectations or next steps.Undergraduates will work directly with me as Principal Investigator, as well as with a graduate assistant who will provide day-to-day coordination support. This layered mentorship model ensures both high-level guidance and practical supervision.I expect students to be active contributors. As they gain confidence, they will present brief updates during research meetings and may assist in presenting findings to campus groups or community partners. Strong performers will have the opportunity to co-author conference submissions or present at regional academic meetings.My commitments are clear: I will provide structured training, increasing responsibility over time, meaningful feedback on performance, and tangible professional development opportunities. Students who invest in the project can expect to leave

with concrete skills, strong recommendation letters, and the ability to articulate their experience as substantive, impact-driven research engagement.

Applicant Requirements: I'm looking for students who are curious, dependable, and genuinely interested in people and community-based research. The strongest applicants tend to be the ones who show up consistently, communicate clearly, and take initiative when they see something that needs doing.Characteristics that matter mostStrong follow-through (you do what you say you'll do, on time)Warm, professional communication with participants and team membersComfort working with people from different backgroundsDiscretion and good judgment (confidentiality is non-negotiable)A learning mindset: you don't need to know everything, but you need to be coachableSkills and experiences that helpBasic organization skills (calendars, email, file management, checklists)Attention to detail for data entry and documentationComfort with Google Drive/Sheets/Docs (or willingness to learn quickly)Any experience in teamwork, leadership, mentoring, volunteering, or customer service

Applicant Preferences: Characteristics that matter mostDependable and consistent (shows up, meets deadlines, communicates early if issues arise)Coachable and proactive (asks good questions, takes initiative, learns from feedback)Respectful and people-centered (comfortable interacting with participants and community partners)Trustworthy with confidential information and sensitive topicsTeam-oriented and positive—someone who adds energy and steadiness to the groupSkills and experiences that are helpfulStrong organization skills (keeping track of tasks, details, schedules, and files)Clear written and verbal communicationComfort with basic tech tools (Google Drive, Sheets, email, calendars)Any experience with service, mentoring, student leadership, or community engagementInterest in psychology, sociology, public health, education, social work, or related fieldsCoursework that's a plus (but not required)Intro Psychology/Sociology or related coursesResearch methods, statistics, or qualitative research (helpful, not necessary)

Specific Time considerations/conflicts: None

App ID #: 3024

Mentor: Scheadler, Travis Email: tscheadl@uncc.edu

Title: Assistant Professor

Department: School of Social Work College of Health & Human Services

Co-mentor: No

Community engaged research: No

Title: Mental Health, Identity Development, & Activism Among LGBTQ+ People and Drag Performers

Description: This study involved interview data with LGBTQ+ activists and drag performers throughout the United States. The aim of the study was to develop a stronger understanding of the experiences of LGBTQ+ activists and drag performers. The study will have implications for empowering more LGBTQ+ people to become involved in their communities and for providing mental health support for LGBTQ+ people and drag performers. Duties may involve transcribing interviews, analyzing interview data, and/or writing research papers to be published in peer-reviewed journals.

Accepting applications for: Either 5 hours or 10 hours per week are acceptable

2 positions available

Anticipated Student Learning Outcomes: Students will develop stronger research writing skills. Students will develop a greater understanding of the needs and experiences of LGBTQ+ adults and drag performers. Students will develop a stronger understanding of mental health interventions and suicide prevention efforts targeting LGBTQ+ people. Students will be able to use these experiences to advance in careers related to research, mental health, activism, and/or LGBTQ+ communities.

Required training of -3 hours with Description: Students will need to complete CITI training.

Mentoring plan: The student(s) and I will meet weekly for supervision. During supervision, we will discuss the student's progress and the directions of the research. The student will have opportunities to submit peer-reviewed research papers and abstracts to professional conferences. We will communicate via e-mail. The student will work directly with me. As a mentor, I will adapt to the needs of the student. I want this to be a mutually beneficial experience!

Applicant Requirements: Students should have a demonstrated interest in working with LGBTQ+ populations.

Applicant Preferences: Ideally, students should have completed at least one research methods course.

Specific Time considerations/conflicts: Our weekly meetings are flexible based on the availability of the student. However, supervision must be between 9am and 5 pm during the week. Students are NOT expected to work outside of normal business hours.

App ID #: 3083

Mentor: Stearns, Elizabeth Email: mestearn@charlotte.edu

Title: Professor

Department: Sociology College of Health & Human Services

Co-mentor: No

Community engaged research: No

Title: Cultivating civic empathy in college

Description: Our project examines the causes and consequences of civic empathy among college students. We conceptualize civic empathy as a virtue that involves the awareness of and ability to understand and engage with different worldviews in order to actively participate in community. This definition emphasizes the complementary role that civic literacy, community engagement, and social empathy play in promoting active citizenship and openness to diverse viewpoints. By fostering civic empathy, we see the potential to foster agency and increase hope and optimism about the future of democracy. Cultivating civic empathy is a way to simultaneously address concerns related to declining political participation, increasing political polarization, and a growing "empathy gap" in society. Our study asks: 1. What is civic empathy and how do we measure it? 2. What are the causes of civic empathy and how can it be cultivated?3. What are the effects of civic empathy on acceptance of political or viewpoint diversity? Researchers often treat concerns about youth political disengagement, civic illiteracy, and political polarization as separate issues; we see civic empathy as a holistic, multi-dimensional virtue that can address such concerns. Amid efforts to promote civic engagement and viewpoint diversity in higher education, our study focuses on factors that cultivate civic empathy during the transition to college and the extent to which those efforts promote acceptance of viewpoint diversity on campus as well as agency and optimism about civic engagement. In one paper on this topic, a survey experiment and focus groups showed how and why students are apprehensive about interacting and working with people who hold political views that diverge from their own. At the same time, a pre-post survey showed that first-year students encountered situations that introduced them to new perspectives and even inspired empathy. This study uses mixed-method and longitudinal design to measure civic empathy among college students. We employ surveys, focus groups, and interviews with students during their transition to college and through their first two years. Incoming students will complete a survey about their opinions and experiences with social and political issues, their level of civic knowledge, the extent of their community and civic engagement, and empathetic feelings. They will again complete the survey after their first semester, after their first year, and at the start and end of year two. We use focus groups with first-year students in general education classes to explore their attitudes, experiences, and feelings related to empathy and viewpoint diversity. 40 students in each cohort will participate in interviews at the start of their first year and to interview them at regular intervals during their first two years about their college experiences related to the components of civic empathy. Sampling from different types of courses and recruiting students involved in different types of extracurricular activities, including some that emphasize community engagement, will help us understand the perceived benefits and potential barriers to engaging with diverse political

viewpoints on campus as well as factors that enable or constrain the cultivation of civic empathy. Our research design benefits from a general education curriculum that emphasizes exposure to multiple perspectives and a new requirement in North Carolina public universities to teach texts foundational to American democracy. During the first year, nearly all students will take a course that emphasizes multiple perspectives on local or global issues, a course that emphasizes civic knowledge, or both. This provides a natural experiment of sorts that will allow us to examine how the type and timing of these courses as well as other curricular interventions and extracurricular activities shape the development of civic empathy during this formative transition to college. Students working with this project will be involved in data analysis and presentation or with various aspects of data collection, depending on their interests. The research team, which includes faculty from Communication Studies, Middle, Secondary, and K-12 Education, Political Science and Public Administration, and Sociology, meets monthly, although students working on this project will meet weekly with mentors.

Accepting applications for: Either 5 hours or 10 hours per week are acceptable

2 positions available

Anticipated Student Learning Outcomes: Students will gain experience with data collection and analysis. Depending on their interest, data may be quantitative, qualitative, or both. They will also gain skills in presentation of research findings, including poster presentations. Students may contribute to peer-reviewed journal submissions as well.

Required training of 5 hours with Description: IRB CITI training on social and behavioral research

Mentoring plan: Mentor and Advise: The project team will involve students in all facets of the ongoing research, per their interest. PI Stearns will be the designated advisor and mentor. The rest of the team would participate in the mentoring process based on the project phase and their expertise including scholars' activities in research, academic support, etc. The team will have biweekly meetings where the PIs and the student will discuss the specific research objectives for each phase and follow up on the progress, outcomes, evaluation, and dissemination activities. The meetings will have specific agendas based on the project plan and the student can report progress, share insights, ask questions, and seek feedback in these meetings. The PIs will offer an open-door policy whereby the student can reach out whenever they think the PI's insights would be helpful. The PIs will not only provide feedback and suggestions on the issues related to this project but also on issues such as career counseling and job applications. Provide opportunities for Interdisciplinary Collaborations: In this project, the student will conduct interdisciplinary research under supervision of the PIs. They will assist in data collection efforts, coding and analyzing data, developing dissemination products to include manuscripts and conference presentations, and disseminating the findings. Through these activities, the student will gain valuable experiences on how to collaborate toward achieving short-term and long-term goals with researchers and end-users from diverse backgrounds and disciplinary areas. Expect authorship of both publications and presentations: The students will receive guidance and training in the preparation of their research achievements into manuscripts for peer-reviewed journals and presentations at scholarly conferences. Provide opportunities for Grant Proposals. We will involve students in any future proposals stemming from this project so that they can learn best practices in proposal preparation,

including identification of key research questions, definition of objectives, description of approach and rationale, and construction of a work plan, timeline, and budget.

Applicant Requirements: major in a social science field or in data sciencestudent has taken at least one introductory social science courseattention to detailexperience working in diverse teams, either in-class or out-of-class

Applicant Preferences: experience with quantitative data analysis, including software like Excel and PowerBIexperience with data visualization techniques

Specific Time considerations/conflicts: Research team meeting schedules will be set in accordance with faculty and student schedules.

App ID #: 3045

Mentor: Blekking, Jordan Email: jblekkin@charlotte.edu

Title: Assistant Professor

Department: Earth, Environmental, and Geographical Sciences College of Humanities & Earth and Social Sciences

Co-mentor: No

Community engaged research: Yes

Title: Characterizing and evaluating food environments and food access across the United States

Description: Most people buy their food, rather than grow it, which means that changes to food prices, income, or the availability of different food stores that they can travel to and shop at can hinder access to the healthy and nutritious food. As a result, it is important to characterize and evaluate food environments – where people interact with the wider food system to acquire and consume food – to understand how food access varies across the country. That is to say, by understanding food environments, we can understand where people face challenges in getting healthy, nutritious food. In the US, we typically evaluate food access based on how much money people have and how far they are from a supermarket or grocery store, but this method does not consider the real-world conditions that Americans navigate to access food, like recent and on-going challenges related to high food prices, uncertainty around federal and state food assistance programs, and greater pressure on food banks and pantries to fill gaps. I am seeking one or two undergraduate student researchers to participate in important research that will characterize and evaluate food environments across the United States, with a specific focus on the State of North Carolina. The ideal undergraduate researcher needs enthusiasm, attention to detail, patience, and interest in learning new skills and applying those skills in an effort to understand food access. This research will involve collecting and organizing data from the United States Department of Agriculture's Food Environment Atlas and Supplemental Nutrition Assistant Program data tables and other publicly available data sets. We will use this data to characterize and evaluate food environments from across the United States, with a specific focus on North Carolina. To do this, the student researchers will use geographic information systems to create easy-to-interpret maps, basic statistical analysis to understand changes in what types of stores are operating at the county-level across the US, and read through policy-relevant documents to understand how changes relate to national- and state-level policy efforts. If you are interested in geography, urban studies, food systems, or American livelihoods, this research opportunity may be a great fit for you.

Accepting applications for: Either 5 hours or 10 hours per week are acceptable

2 positions available

Anticipated Student Learning Outcomes: The student will gain practical, real-world data organizing and analysis skills; a greater understanding of food access and how food access is evaluated; and, quantitative research experience, which is applicable across numerous employment sectors. Notably, the student will gain considerable experience related to the acquisition, organizing, and cleaning of food policy-relevant data, as well as the opportunity to develop an array of industry-

relevant skills (e.g., mapping, statistical and spatial analysis, literature review). For professional development, as detailed in my mentorship plan below, the student will have the opportunity to engage with me weekly in one-on-one opportunities and for peer-to-peer engagement through regular weekly research group meetings and collaboration with other undergraduates and my current graduate student(s). There will also be external collaborators from Cornell University, Indiana University, and UNC Charlotte that the students will have the opportunity to learn from and connect with.

Required training of 10 hours with Description: I plan to provide peer-to-peer engagement opportunities for the student by having them engage with another undergraduate researcher that I am currently working with and will continue to work with through the academic year. This other students has extensive experience with geographic information systems and statistics. I plan to hold research team meetings in which all undergraduate researchers attend together in an effort for them to share and ideas and learn from one another, in addition to learning from me. I have previous experience using this same approach with undergraduate and graduate students alike. Finally, in terms of on-boarding and ongoing training, I am very dedicated to engaging with students throughout the week, not only during weekly team meetings. My approach to mentorship involves frequent check-ins, posing questions that can prompt discussions, and creating a research environment in which student researchers are encouraged to engage through asking questions, trial and error, and regular constructive feedback.

Mentoring plan: I really enjoy working with students, and I think that this comes across as a mentor. I like hearing what students think, how they've come up with solutions, and working with them to continue making progress. My approach to mentoring is built upon three pillars: regular engagement, active support, and meaningful inclusion within a broader research team and research agenda. One way I do this is by ensuring that students engage and participate with my broader research team, which will consist of one graduate student and at least one other undergraduate researcher. I do this through hosting weekly one-on-one meetings with students and by holding weekly research team meetings. The one-on-one meetings enable more direct and clear avenues for communication, which students can use to seek specific feedback from me and I can use to facilitate further discussion and skill development. The group meetings are particularly helpful as I find that these meetings provide students with the opportunity to contribute to a larger research team (including undergraduate and graduate students and, potentially, outside collaborators), engage in peer-to-peer learning, learn about what other students are working on and share their own work (including progress and challenges), and also serve as important opportunities for developing professional skills. Specifically, during these meetings, students will provide brief updates on their work, have the opportunity to provide and receive constructive feedback, and engage in group discussions about methods, results, and next steps. This structure helps students develop communication skills, accountability, and an understanding of how collaborative research functions.

Applicant Requirements: The five primary requirements that I am interested in is a student(s) researcher that has enthusiasm, attention to detail, well-organized, patient, and an interest in developing skills. I seek a student(s) that is enthusiastic because this mentored research opportunity is about learning, and I fully believe that learning should be enjoyable and fun. I seek a student(s) that has strong attention to detail and is well-organized because working with large data

sets can be messy and complicated. Trying to run before learning to walk when it comes to quantitative work can be challenging. Therefore, I'm also seeking someone that is patient and willing to learn the process of research by slowing working through the steps that research requires. Finally, I seek someone that is interested in developing existing skills. I'm specifically interested in someone that has GIS, statistical analysis, and data science skills.

Applicant Preferences: In terms of preferences, it would be great if the student(s) researcher has existing skills and experience with GIS software (ArcGIS, QGIS, or similar), R or Python, and / or data organization, management and analysis. I welcome the opportunity to work with the student directly to further develop any or all of these skills. I fully understand that the Fall 2026 OUR Scholars Mentored Project program is intended on providing a space for students to develop skills over time and through real-world experiences. I'd also be very excited for a student(s) that is a sophomore or junior at UNC Charlotte, so that they can continue to work with me through the Spring and into the Summer, if they wish.

Specific Time considerations/conflicts: Research team meetings will be held in-person on Monday, Tuesday, Thursday, or Friday on UNC Charlotte's campus.

App ID #: 3032

Mentor: Buchenau, Jurgen Email: jbuchena@charlotte.edu

Title: Dowd Term Chair of Capitalism Studies

Department: History and Capitalism Studies College of Humanities & Earth and Social Sciences

Co-mentor: No

Community engaged research: No

Title: Why Economies Fail: Mexico's Road to the 1982 Debt Crisis

Description: This project analyzes the foreign and energy policy of Mexico's ambitious leadership in the period 1976-1982: a quest for autonomy that tragically ended in crisis and ignominy. Mexico's president, José López Portillo, postured as an exponent of the Global South, as unexpected petro-dollars following the discovery of vast oil deposits created an illusion of wealth. Examples of this posturing included support for the socialist Sandinista government in Nicaragua and more generally, leadership of the Global South. The act of parlaying oil exports into a position of international leadership lasted until the 1982 debt crisis put the Mexican government at the mercy of the International Monetary Fund, undermined this quest for autonomy, and ushered in an era of neoliberal restructuring and austerity. In this project, students will analyze original Mexican, U.S., and British archival sources on Mexico's road to the debt crisis, learning research, critical thinking, intercultural, and writing skills.

Accepting applications for: Either 5 hours or 10 hours per week are acceptable

2 positions available

Anticipated Student Learning Outcomes: --research skills: how to find new information in the historical record, including both published sources and digitized archival sources (no travel will be necessary).--critical thinking: how to assess, evaluate, analyze, and interpret historical documents and other data--writing skills: how to present these student findings on the data to the public and fellow researchers--interpersonal skills: how to work within a team of researchers and achieve mutual benefit.

Required training of 0 hours with Description: Training will be provided by the instructor as the initial part of the OUR experience. As part of their work, students will also read appropriate historical sources that acquaint them with Mexican history and economics more generally.

Mentoring plan:

--research skills: how to find new information in the historical record, including both published sources and digitized archival sources (no travel will be necessary).Mentorship consists of weekly feedback on the quality of the student's research on the documents and other data, helping students to become more effective researchers

--critical thinking: how to assess, evaluate, analyze, and interpret historical documents and other dataMentorship consists of weekly feedback on the quality of the student's notetaking on the

documents and other data they have found, aiming to help students become well-organized in their record keeping and thinking about their research products.

--writing skills: how to present these student findings on the data to the public and fellow researchersMentorship consists of active and frequent input on the deliverable for the undergrauate research symposium

--interpersonal skills: how to work within a team of researchers and achieve mutual benefit.Mentorship consists of weekly meetings and interactions with the team.

Applicant Requirements: Ideally, the applicant would come from a major in CHESS or the Belk College and have at least sophomore status in the current semester so they would concurrently be taking some upper-level classes in their major and have completed most if not all of their general education requirements. Students should demonstrate a keen interest in the subject matter.

Applicant Preferences: Knowledge of Spanish is a plus, as is previous experience with independent research in their coursework.

Specific Time considerations/conflicts: none

App ID #: 3109

Mentor: Clinton, Sandra Email: sclinto1@uncc.edu

Title: Associate Research Professor

Department: Earth, Environmental, and Geographical Sciences College of Humanities & Earth and Social Sciences

Co-mentor: No

Community engaged research: No

Title: Dragonfly genetic connectivity in urban freshwater systems

Description: Urbanization leads to an increase in impervious cover which results in increased flow, increased contaminants, and decreased biodiversity. Stream invertebrates, such as dragonflies and other insects, are monitored to determine ecosystem health. To better understand the impacts of urbanization on stream communities, we are mapping stream invertebrates across an urban gradient in Mecklenburg County and identifying them using both traditional (taxonomy) and molecular (DNA, PCR) methods. We are using these data to better understand urban impacts on biodiversity and genetic connectivity for better management and conservation of freshwater resources.

Accepting applications for: Only 150 hours over an academic semester (~10h/wk)

2 positions available

Anticipated Student Learning Outcomes: The Student Learning Outcomes include:Gaining field experience in urban freshwater ecosystems.Skills using a dichotomous key and microscope.Exposure to DNA methodologies and bioinformatics skills.Training in using excel, GIS, and potentially R.Training in data management and good data practices.

Required training of 3 hours with Description: Students will be required to complete the University EHS laboratory safety training (online).

Mentoring plan: The scholar will complete a mentor-mentee contract at the beginning of the semester that outlines the goals of everyone participating in the project. The OUR scholar(s) will be directly advised by graduate students (PhD, MS) in the Clinton research group and will work with these students to collect and analyze data. The graduate students and Dr. Clinton will help the student gain the needed skills for data analysis and presentation. The scholar(s) and the graduate student(s) will meet weekly to set goals for the week and review tasks from the previous week. The student will also meet ~1x/week with Dr. Clinton to discuss any questions related to the research or deliverables. The student(s), if time allows, will also join the Clinton lab meeting (2x/month).At the beginning of the semester the scholar(s) will be assigned 5 journal articles to read for background information. These articles will be discussed with the mentors to make sure the scholar understood the key concepts. The OUR scholar(s) are expected to present their research at the 2026 Undergraduate Research Conference at the end of the semester. Depending on progress and interest, Dr. Clinton will help support the scholar(s) to attend a state or national research conference.

Applicant Requirements: Students should be interested in learning traditional taxonomy and willing to work several hours on a microscope. This project will also involve a field component, and students should be comfortable working in urban streams and ponds. The research program will provide transportation and boots. The department also maintains a field closet for students who may need field clothes (these are free to students).

Applicant Preferences: Students should have completed introductory Earth Science (ESCI 1101) or introductory biology. While students who have completed an introductory environmental science or ecology course are preferred, this is not required. An enthusiasm for freshwater science and field work is encouraged. Both lab-based taxonomy and field work can be challenging and students should be willing to work through difficulties.

Specific Time considerations/conflicts: Students must be able to work 1 day per week (a morning or afternoon) in the field per week.

App ID #: 2765

Mentor: Eppes, Missy Email: meppes@charlott.edu

Title: Professor of Earth Sciences

Department: Earth, Environmental and Geographical Sciences College of Humanities & Earth and Social Sciences

Co-mentor: Yes

Yao Li, yao.li@charlotte.edu, Earth, Environmental and Geographical Sciences; CHESS

Community engaged research: No

Title: Why are those leaves so red!?! Investigating Leaf Anthocyanin Synthesis Using Remote Sensing and Geospatial Analysis

Description: Background. Tourism around Fall Leaf colors produces $30 billion in annual revenue for local economies across 24 eastern states!! While it is well-understood how the yellow and orange colors come about - as leaves die off - the occurrence of Anthocyanins that are responsible for the vivid reds in fall leaves is widely debated in Biology. Anthocyanins are energetically expensive pigments produced during senescence (autumn die-off). It has long been a mystery as to why a tree would expend energy to make them! Past work has focused on the physiology of the plants themselves, with very little investigation between the production of those red colors and the landscapes that the trees are growing in. This project will begin to make crucially needed links between Anthocyanins and landscapes! Our past preliminary work remarkably suggests that the landscape is very important, and that anthocyanin presence may correlate with nutrient stress. It therefore may be modulated by environmental variables such as soil chemistry and geomorphic position (on a floodplain, on a hillslope, etc). Previous field-based research has demonstrated links between anthocyanin content and geomorphic features such as slope, soil development (rubification), and landform stability. However, no large-scale study has leveraged the amazing modern geospatial tools we now have to quantify these patterns across entire landscapes. This project builds on past work by Eppes to explore the relationship between landscape topography and anthocyanin production (the pigment that makes leaves red) in deciduous trees during autumn, using remote sensing technology to map and analyze patterns of red coloration across varied terrain. The student(s) will use remote sensing imagery (e.g., multispectral drone, aerial, or satellite data) to index anthocyanin-rich foliage by isolating red spectral signatures during peak autumn coloration. These color indices will be spatially analyzed against topographic variables such as slope, aspect, elevation, and surficial geology using GIS software (ArcGIS/QGIS). Depending on student interest, lab work and field work could be acquired to validate the measurements, and/or statistical modeling could be employed to evaluate the strength of these correlations and determine whether landscape stability or nutrient availability inferred from topography plays a significant role in foliar anthocyanin expression.

Accepting applications for: Either 5 hours or 10 hours per week are acceptable

1 positions available

Anticipated Student Learning Outcomes: Research and Analytical Skills Hands-on experience with remote sensing image processing, including classification and spectral analysis (e.g., isolating anthocyanin-associated red spectral signatures). - Deepened understanding of landscape ecology, geomorphology, and their intersection with plant physiological responses - or if you are purely an IT person, experience in applying your skills to these fields. - - Experience applying statistical and spatial modeling to real-world environmental datasets. Geospatial and Technical Expertise Advanced training in GIS software (ArcGIS, QGIS) and digital elevation model (DEM) analysis for extracting topographic features (slope, aspect, curvature). - Exposure to multispectral satellite or drone imagery, including data acquisition, pre-processing, and analysis. - - Opportunities to develop scripts or workflows in Python or R to automate and analyze spatial data. Academic and Professional Development - Close mentorship on research design, data interpretation, and scientific communication. - Potential for co-authorship on a peer-reviewed publication and/or conference presentation. Real-World Impact Contribute to an emerging body of research on climate-resilient landscape ecology and forest response to environmental stressors. - Help uncover novel patterns linking vegetation physiology to landform evolution, with potential implications for conservation and land management. -Potential for Student Publication/Presentation: High. This project builds upon novel hypotheses linking landscape processes with plant physiological expression and offers potential for co-authorship on a peer-reviewed journal article and presentation at conferences such as AGU or the Southeastern Division of the AAG.

Required training of 4 hours with Description: No formal training required. Student will be instructed and given background on

the project overall. There will be some reading to catch up on different concepts

Mentoring plan: This is truly a multidisciplinary project - biology, Earth sciences, GIS and Remote sensing.The student will be closely mentored by both Dr. Eppes and Dr. Li (for GIS) as well as by Dr. Jiaming Lu - who has her PhD in remote sensing. We all maintain an 'open door' policy, where we are always available to help and answer questions. We will start off with regular meetings to develop a research plan. Then, in addition to open door, students can also meet with Dr. Yang and/or Dr. Eppes as required or preferred by the student. Ex: weekly meetings, bi-monthly, etc. We want the student(s) to feel confident to work independently, but also to know their limitations and to reach out for help when needed, rather than struggling and not making any progress.

Applicant Requirements: - Experience in Geographic Information Systems (GIS) - Familiarity with Remote Sensing techniques (e.g., NDVI, image classification, spectral indices) - Interest and curiosity about plant ecology, biogeography, soils and/or landscapes!

Applicant Preferences: Experience with Remote Sensing, spatial statistics, LiDAR, and/or Python scripting in GIS (through coursework or other opportunities) Experience or ability to work independently (through coursework or other opportunities) Experience or ability to troubleshoot Computer Science applications (through coursework or other opportunities)

Specific Time considerations/conflicts: none

App ID #: 3085

Mentor: Gagné, Sara Email: sgagne@charlotte.edu

Title: Associate Professor and Chair

Department: Earth, Environmental and Geographical Sciences College of Humanities & Earth and Social Sciences

Co-mentor: No

Community engaged research: No

Title: Wildlife Camera Trapping at an Urban Forest

Description: I seek 1-2 students to help with a wildlife camera trapping project in a nearby patch of urban Piedmont oak hickory forest. The site is registered with the national monitoring program Snapshot USA, which is a network of universities and other organizations that use camera trap images and metadata to track the relative abundance and distribution of significant wildlife species. As the only coordinated and standardized camera trap survey across all 50 states, Snapshot USA is innovative, highly cooperative, and a valuable contribution to conservation and research. This is an unprecedented opportunity for a motivated student to install and maintain infrared wildlife cameras at the site and to classify and otherwise manage the image data using AI. Species we might capture using cameras include coyote, deer, otter, fox, bobcat, skunk and more!

Accepting applications for: Only 150 hours over an academic semester (~10h/wk)

2 positions available

Anticipated Student Learning Outcomes: Students will gain experience in 1) ecological field methods, specifically wildlife camera trapping but also including best practices related to safety and orienteering; 2) the adherence to a standard experimental field protocol, including sampling design, data management, and data submission criteria; and 3) the identification of target species and their image classification using AI.Other skill development emphasized includes 1) the elaboration of testable and informative research questions, hyptheses, and predictions; 2) peer reviewed literature synthesis assisted by AI; 3) clear written and oral communication of research objectives, methods, results, interpretation, and conclusions; 4) teamwork in the field and in the office; and 5) time and project management.

Required training of 1 hours with Description: Training will be provided by the faculty member in the field and during weekly meetings.

Mentoring plan: Successful applicants will work directly with Dr. Gagné in the field and in the office to collect, analyze, and interpret data. Dr. Gagné will meet with studnets once weekly and will also be available by email. Dr. Gagné has successfully mentored many OUR scholars and loves doing so! Students will be guided through the research process from research question to conclusions in a constructive way that provides students with the resources they need to succeed, e.g., how to most effectively search for and synthesize peer-reviewed literature, while at the same time challenging students to think critically and problem solve along the way.

Applicant Requirements: Passion for wildlife/conservation/forests and an interest in working outdoors. Good time management and organizational skills. Willing to work in a team.

Applicant Preferences: Computer science skills are a plus.

Specific Time considerations/conflicts: None.

App ID #: 3075

Mentor: Heberlig, Eric Email: esheberl@charlotte.edu

Title: Professor

Department: POLS College of Humanities & Earth and Social Sciences

Co-mentor: No

Community engaged research: No

Title: The Financial Rewards of Effective Legislating in State Legislatures

Description: This project analyzes the relationship between legislative success and campaign fundraising using a data base of 20 years of state legislative activities from across all 50 states. The main research question explores how interest groups gain access to and build relationships with the most effective lawmakers. Using all 50 states allows us to explore how variations in the rules and power of legislatures, the campaign finance rules, and the size of the interest group systems in each state affect the flows of campaign money. Likewise, we can examine how differences in the characteristics of individual legislators such as their demographics (gender, race), status in the legislature (seniority, committee assignment, committee chairs or party leadership posts) affect their legislative success and their fundraising.Students would choose particular research questions to analyze using the data set and develop and test hypotheses to do so. Ideally, the ideas can be developed into conference papers and publishable articles.

Accepting applications for: Either 5 hours or 10 hours per week are acceptable

2 positions available

Anticipated Student Learning Outcomes: Experience in writing academic literature reviews. Using statistical packages (such as SPSS, STAT) to do data management and analysis. Interpretation and presentation of results. Good opportunity for students planning to go to graduate school to engage in similar activities grad schools will ask them to do (and to show on their applications that they have already done these activities and thus are qualified for top grad schools and are highly likely to succeed.)

Required training of 0 hours with Description: Students should have completed POLS 2220 (Research methods) or a similar course involving hypothesis testing and data analysis in social sciences. Experience working with SPSS, STATA or similar statistical package. I will provide additional training to help them complete the specific tasks relevant to their hypotheses.

Mentoring plan: I typically meet with the students once per week to develop ideas and schedules, brainstorm plan B's, advice/train on the statistics packages, and so on. We meet more often as needed to work through snafus. If the project develops into a project appropriate to present at an academic conference, we will do so. I've done that with multiple undergraduate students in the past. I will be working on analyzing this data independently, so we will be looking for areas of collaboration.

Applicant Requirements: Students should have completed POLS 2220 (Research methods) or a similar course involving hypothesis testing and data analysis in social sciences. Experience working with SPSS, STATA or similar statistical package. I will provide additional training to help them complete the specific tasks relevant to their hypotheses.Students will be working independently so the ability to manage time effectively, organize projects into doable increments, and motivation to complete tasks is critical.

Applicant Preferences: Some background knowledge or interest in legislative politics or state politics would help them develop a literature review, research questions and hypothesis.

Specific Time considerations/conflicts: no

App ID #: 3089

Mentor: Levens, Sara Email: slevens@charlotte.edu

Title: Associate Professor

Department: Psychological Science College of Humanities & Earth and Social Sciences

Co-mentor: No

Community engaged research: No

Title: Finding Joy in Physical Activity: Research and Intervention Development to Increase Physical Activity Enjoyment for Promoting Health and Longevity

Description: Physical activity offers substantial mind-body health benefits and reduced mortality, while insufficient physical activity is associated with chronic disease, physical disability and mobility issues, stress, and reduced mental well-being. Despite the known benefits of physical activity and risks of inactivity, many individuals are chronically underactive. Physical activity engagement is frequently characterized by an intention-behavior gap, and many current physical activity interventions are not tailorable or scalable, necessitating novel physical activity engagement intervention approaches. Broadly research in my lab seeks to design interventions and advance research in physical activity promotion. My lab uses an integrative interdisciplinary approach that brings together the fields of exercise science, affective science, behavioral science, neuroscience, behavioral medicine, and health psychology, and methodologies such as mindfulness, guided imagery, participatory intervention development, and qualitative and quantitative research techniques. We explore avenues of physical activity engagement to promote health across the lifespan, with current efforts aimed at promoting physical activity in midlife for healthy aging and in women undergoing menopausal transition. Our goal is to develop effective, tailorable, scalable, and accessible interventions that increase physical activity engagement by increasing physical activity enjoyment.We are currently recruiting students interested in being a part of this effort to help with one or more projects underway in the lab. Current areas in which an OUR scholar can assist include 1) setting up and testing a new recumbent exercise bike for conducting physical activity experiments in the lab, 2) assisting with data collection testing a novel physical activity intervention, 3) assisting with intervention development and refinement, 4) scheduling and tracking participants, 5) assisting with focused literature reviews on physical activity interventions, physical activity engagement, physical activity across the lifespan, and behavior change techniques, and 6) assisting with preparing conference abstracts and manuscripts. OUR scholars will have the opportunity to select one or more of the developmental opportunities above to comprise their individual research project. OUR scholars will also have the opportunity to identify personal interests that they would like to explore in the lab and potentially incorporate those into their research project. OUR scholars will also have the opportunity to join Dr. Levens and her lab to attend either the Society of Behavioral Medicine or the Society of Affective Science national conference in April 2027 (should they wish to). Hands-on mentorship and training for all opportunities will be provided by Dr. Levens and advanced doctoral students in her lab.

Accepting applications for: Only 150 hours over an academic semester (~10h/wk)

2 positions available

Anticipated Student Learning Outcomes: Students will gain a wide variety of career enhancing skills during their training in the Levens Lab. Students will be a part of a thriving research lab with other undergraduate students, and masters and doctoral students. Through participation at lab meetings, working with peers and graduate students, and one-on-one professional development meetings with Dr. Levens, students will gain career and self-development experience working in a team to move lab initiatives and advance health behavior research. Dr. Levens will work with OUR scholars to develop an individualized development plan (IDP) to guide their training and professional development. The IDP plan process will allow students to identify areas of strengths and growth opportunities, and help students identify professional development and networking opportunities inside and outside the lab. Students will develop strong communication skills through lab discussions, idea exchanges, and presentations. Students will also have the opportunity to develop their written communication skills by contributing to literature reviews and assisting with manuscript preparation. Dr. Levens and her graduate students will also train OUR scholars in cutting-edge research methods to provide OUR scholars with methodological and technological expertise in the field of health psychology and experimental medicine. Dr. Levens engages in interdisciplinary Team Science practices by integrating diverse perspectives and dividing responsibilities to advance common goals, providing OUR scholars with extensive opportunities to strengthen teamwork skills. Through personalized training in research methods, assisting with data collection, advancing a research project, professional development exercises, and engaging in team science, students will also strengthen their leadership skills and refine their professionalism. By assisting with intervention development and refinement, synthesizing literature, and conducting literature reviews in research databases, OUR scholars will have the opportunity to engage in critical thinking and knowledge application. Students will also be guided in how to conduct research and design interventions that ensure all people have an equal opportunity to achieve positive health outcomes. Finally, Dr. Levens will assist OUR scholars in developing and sustaining a growth orientation mindset that confers value on the process of growth and learning, and endeavor to instill a love of inquiry and research that will be beneficial in whatever career and future endeavors OUR scholars aspire to.

Required training of 3 hours with Description: All OUR scholars will be required to obtain Human Subjects CITI certification . This certification is provided by the CITI website and should take approximately 2 to 3 hours.

Mentoring plan: Dr. Levens is extremely passionate about mentorship and undergraduate research. Dr. Levens is a certified CIMER mentor (https://cimerproject.org/) and will develop an individualized development plan (IDP) with all OUR scholars in her lab. Dr. Levens will also provide professional development guidance incorporating CIMER materials into her mentorship practice. OUR scholars will be considered full members of Dr. Levens lab and receive weekly hands-on mentorship and training from Dr. Levens and advanced doctoral students in her lab. OUR scholars will be required to attend and participate in weekly lab meetings (the timing of which is set each semester at time that lab members are available to attend), and additional scheduled meetings (at a mutually agreed upon time) with Dr. Levens and/or her graduate students for OUR scholars to receive individualized skill based training in lab tasks and projects, such as training in how to operate the exercise bike, scheduling and tracking participants, conduct literature reviews, etc… OUR scholars will also be

expected to read assigned relevant articles, participate in lab discussions and share ideas, complete training tasks in a timely manner, and occasionally present their progress and contributions at lab meetings. Dr. Levens will oversee all mentorship and training of OUR scholars and commit time and resources to their training and professional development. Dr. Levens has been training undergraduates in research for over 20 years; it is something that she deeply enjoys. At the onset of the semester Dr. Levens will meet with OUR scholars in her lab to guide them through their Individualized Development Plan (IDP). Once a month thereafter Dr. Levens will meet individually with OUR scholars to review their IDP, update their goals and growth areas, and identify additional areas of training of interest to the student. At the end of the semester Dr. Levens will meet with OUR scholars to review and update their IDP in preparation for their future endeavors.

Applicant Requirements: Requirements:We are interested in students with an intrinsic interest in research and healthful living and behavior change. Students should be committed, reliable, punctual, and have good attention for detail and a good work ethic. Strong written communication skills. A sense of professionalism and ability to work directly with participants for in-person data collectionFamiliarity using Microsoft Word and Excel and Google Workspace (google docs and sheets)

Applicant Preferences: Preferences:Some familiarity/interest in psychology and health literature.Ability to conduct a literature review searchAbility to follow detailed instructions and protocolsCoursework in research methods and/or data analysis. Ideally students would be interested in working in the lab for an additional semester or more after their participation in the OUR program so that they have time to more fully develop their skills and interests, and benefit from their training. Interest in careers that overlap with Lab interests, training and expertise (e.g. advanced graduate training, careers in medicine or nursing, physical therapy, mental health, etc...) is desirable in terms of match between interest and training. Prior research experience would enable an OUR scholar to be involved in more advanced lab projects and opportunities.

Specific Time considerations/conflicts: There are no currently set meeting times.

At the end of the Spring semester OUR scholars and other lab members will identify a Fall Semester lab meeting time that fits the schedule of lab members. OUR scholars will be required to attend this weekly lab meeting.

All other required meetings will be determined in the Fall Semester at mutually available times.

App ID #: 3025

Mentor: Li, Yao Email: yao.li@charlotte.edu

Title: Assistant Professor

Department: Earth, Environmental, and Geographical Sciences College of Humanities & Earth and Social Sciences

Co-mentor: Yes

Xuyang Li, xuyang.li@charlotte.edu, Civil Engineering Technology & Construction Management

Community engaged research: No

Title: Digital Twins for Public Health: Pioneering AI-Driven 3D Simulations of Indoor Environments

Description: In an era defined by global public health challenges, understanding how infectious diseases spread within the built environment is a critical "multiscale" problem that demands innovative engineering solutions. While traditional models often rely on simplified "well-mixed air" assumptions or simple distance cutoffs, our research focuses on the mesoscale, the sweet spot where complex human behavior meets advanced flow physics. We are seeking 2 highly motivated undergraduate researchers to join an interdisciplinary team at the intersection of Civil Engineering, Computer Science, Geography, and Public Health. Our mission is to develop high-fidelity Digital Twins—virtual replicas of real-world buildings—to predict and prevent the spread of airborne pathogens. By integrating Reality Capture (LiDAR/360° imaging), Agent-Based Modeling (ABM), and Physics-Informed Deep Learning, we aim to transform how indoor spaces are designed and managed for public safety.

Accepting applications for: Only 150 hours over an academic semester (~10h/wk)

2 positions available

Anticipated Student Learning Outcomes: Students will have the opportunity to work on distinct, high-impact research tracks. Depending on your interest, you will contribute to one or more of the following phases:Phase 1: Architectural Digital Twinning & Reality CaptureGoal: Transform physical spaces into "Intelligent Environments."The Task: You will lead the "Reality Capture" phase, using LiDAR scanners and 360° cameras to create precise point clouds of complex building interiors.The Innovation: You will develop workflows to convert raw scan data into high-fidelity 3D meshes compatible with industry-leading simulation engines like Unity3D.Key Skills: LiDAR processing, photogrammetry, BIM (Building Information Modeling), and 3D spatial optimization.Phase 2: High-Performance Human Mobility SimulationGoal: Model the "living" component of the Digital Twin.The Task: Using the scanned 3D models, you will simulate human movement using Social Force Models—algorithms that mimic how people naturally navigate obstacles and avoid crowds.The Innovation: To ensure real-time performance with thousands of agents, you will utilize Unity's Data-Oriented Technology Stack (DOTS) and Entity Component Systems (ECS) to achieve unprecedented simulation speed.Key Skills: Unity3D development, DOTS/ECS, and Social Force Modeling.

Required training of 3 hours with Description:

1. Hardware Operation & Field Scanning

• LiDAR Scanning: Students will be trained to use LiDAR scanners to generate "point clouds"—vast sets of data points representing the X, Y, and Z coordinates of every surface in the building.

• 360° Imaging: In tandem with LiDAR, students will use 360° cameras to capture high-resolution visual data. This is essential for creating photorealistic, textured geometries within the simulation environment.

• Zonal Identification: Following the "field study" methodology, students will learn to categorize captured areas into clean, potentially contaminated, and contaminated zones (e.g., waiting areas vs. consultation rooms) to align the model with biosafety standards.

2. Data Processing: Point Cloud to 3D Mesh

The raw data must be converted into a format compatible with simulation engines.

• Mesh Generation: Training involves using processing software to turn point clouds into 3D mesh geometries.

• Spatial Optimization: Students will learn to simplify complex meshes to ensure they are computationally efficient while maintaining the "formulaic symmetry" or precise architectural layout required for accurate Agent-Based Modeling (ABM).

3. Unity Integration and ABMU Setup

Once the 3D model is captured, it must be imported into the project's core framework.

• Environment Setup: Students will use Unity's native tools to store and manipulate the building's scale and rotation natively using 3-dimensional vectors.

• ABMU Framework: Training will cover how to register the captured 3D environment within the Agent-Based Modelling Framework for Unity3D (ABMU). This ensures that the simulated agents interact realistically with the scanned obstacles and walls.

Mentoring plan: We will have weekly meetings to check the needs of the students and offer the next steps

Applicant Requirements: We are looking for students who fit into one of three specialized tracks, allowing us to select for specific interests while remaining inclusive to different majors:1. The "Reality Capture" Track (Inclusive to Design & Architecture)We need students with strong spatial awareness and an eye for detail. This track focuses on the "Living Digital Twin" foundation.• What you'll do: Operate LiDAR scanners and 360° cameras to "capture" the physical world and convert it into 3D meshes.• What we look for: Interest in Building Information Modeling (BIM) or digital photography. No programming is required for this phase; success depends on your ability to transform raw point-cloud data into clean, optimized 3D environments.2. The "Behavior Architect" Track (Inclusive to CS & Social Science)This track uses Agent-Based Modeling (ABM) to simulate how people move and interact in the scanned building.• What you'll do: Use the ABMU framework to define how "agents" (virtual people) navigate through the space, avoiding obstacles and forming social groups.• The Inclusive Approach: You do not need to know full C# to start. ABMU streamlines

the process by providing "Steppers" and "Schedulers" that handle the heavy lifting of the simulation. If you understand logical flowcharts and basic algorithms, you can succeed here.While we do not require a specific GPA or deep prior coding experience, we are selective regarding the following characteristics:• Interdisciplinary Curiosity: You must be excited to bridge the gap between Engineering, Computer Science, Geography, and Public Health.• Problem-Solving Mindset: You should enjoy "breaking down" a complex real-world problem—like how a virus travels in a hallway—into a set of simple logical rules.• Willingness to Learn: We provide extensive teaching materials and tutorials for Unity and ABMU. We are looking for students who are self-starters and can utilize these resources to grow their technical toolkit.

Applicant Preferences: Familar with Unity3D engine,Unity3D ML-Agents,Familiar with C# programming languagesFamiliar with deep learning

Specific Time considerations/conflicts: no

App ID #: 3066

Mentor: Newton, Jason Email: jnewto40@uncc.edu

Title: Assistant Teaching Professor

Department: History College of Humanities & Earth and Social Sciences

Co-mentor: No

Community engaged research: No

Title: Forest School Alumni Map: A Digital and Public History Project

Description: Description and Objectives:As part of a new monograph, I am creating a digital history project on early American forestry schools and the practice of forestry. I am applying for funding to go entirely to hire undergraduate students to help me with the project. This project has three objectives: 1) Further my own research on forest history. 2) Serve as a public and digital history project and a resource for other researchers and students. 3) Serve as a learning opportunity for graduate History students in the areas of forest, digital, and public history. Methods:This project began when I devised a way to use AI to scan Yale Forest School alumni records and create a spreadsheet with information on where graduates from 1900-1930 were born and where they worked. I used Claude and Gemini to "vibe code" a map representing this information. The early results are live on my website: https://jnewto40.github.io/map/. I plan to begin mapping Yale alumni but will also apply this method to other early forestry and ranger schools. I would like to teach to students to improve their digital and public history skills. I would teach them the method of using AI to scan the appropriate sources and how to map the results via GIS or AI coding. Research alignment:This project is meant to provide evidence for my next solo-authored book, tentatively titled "Lumberjack or Technocrat?: A New History of American Conservation Work." The work proposes the following hypothesis: much of what early conservationist knew about conserving American forests was learned from uncredentialed working people. In other words, I ask the reader to consider if a Forest Service Ranger in the period from 1900-1920 was simply a lumberjack with a different set of incentives. If this is true, the forestry credentialing process of professional forestry schools deskilled and disempowered rural workers. The mapping project described above is meant to show that professional college trained foresters were often working in places that they were not familiar with, while rangers often had a firmer grasp on local conditions because they worked closer to where they were born and raised.I have received about $6,000 of funding for this book from the Forest History Society and the Adirondack Experience Museum and have just completed a research fellowship at the latter institution. As the project develops it is growing into a broad criticism of forestry science, professionalism, and the centralizing trajectory of American conservation. The Society of American Foresters asked me to speak about this project during a plenary session at their annual meeting in Hartford, CT in October 2025.

Accepting applications for: Either 5 hours or 10 hours per week are acceptable

3 positions available

Anticipated Student Learning Outcomes: The SLOs for this project include:-Learning to decipher primary sources on United States history and environmental history, specifically the history of

American forestry and the US Forest Service.- Learning the basics of short form biography writing-Learning AI assisted coding for digital history.-Learning GIS for digital history.-Learning group problem solving.-Possibly presenting research at a professional academic conference (the American Society for Environmental History) in either presentation or poster form.

Required training of 5 hours with Description: According to ORPI compliance there will be no formal on-boarding.

Mentoring plan: The students will work directly with me likely from the history lab in Garinger. I will be available to help in person and by email. My plan is to have them present at the American Society for Environmental History conference with me and perhaps other scholars.

Applicant Requirements: My only requirement is for a student interested in the humanities or social sciences. I will teach them the digital history skills required.

Applicant Preferences: I would prefer a history major with GIS experience. My next preference would be a junior or senor history major with good basic computer skills.

Specific Time considerations/conflicts: no

App ID #: 3047

Mentor: Perry, Heather Email: hrperry@charlotte.edu

Title: Associate Professor

Department: History College of Humanities & Earth and Social Sciences

Co-mentor: No

Community engaged research: Yes

Title: Resurrecting Camp Greene: Digital History of WWI Charlotte

Description: I am working on a project that uses digital tools to re-create the lost history of Camp Greene – the U.S. ArmyTraining Camp that was located in Charlotte from 1917-1919.Camp Greene was an army training camp located in Charlotte's west end during the First World War. Like mostTraining Camps during this war, the camp was meant to be temporary and was demobilized after the war. Overthe past 100 years, Charlotte has changed so much through urban development and expansion, and today youcan barely find any trace of this once vibrant episode in local history. However, I am working with the CharlotteMecklenburg Parks & Rec Department to create a digital – or virtual – version of Camp Greene. Usingphotographs, maps, and other artefacts, we are creating first a 2D and then a 3D virtual reality version of CampGreene. And we are looking for an undergraduate students who wants to help us do that.The student research intern would help with researching historical data and digitizing material in the CarolinaRoom of the Char-Meck Public Library. They might also do some research in the Johnson C Smith UniversityLibrary. And, they would help us to collect the data that we need in order to use ArcGIS and StoryMap GIS to recreatea virtual Camp Greene.

Accepting applications for: Either 5 hours or 10 hours per week are acceptable

2 positions available

Anticipated Student Learning Outcomes: 1) develop and refine archival research skills2) develop their data organizational skills using Bibliography software3) develop their professional communication skills via ongoing interaction with the Historian andCommunications/Graphic Designer at the Meck Co. Parks and Rec Office as well as the CML Carolina Room4) create website content via digital story-telling programs5) learn more about Public History and how historians work with museums and public facing projects6) develop their ArcGIS data-mapping skills7) learn more about historical preservation.

Required training of 5 hours with Description: Students who are not already familiar with Camp Greene will likely need to spend some learning the basic history of the camp.

Mentoring plan: I will meet weekly with the OUR intern -- alternating between in person meetings one week followed by either email check-ins or Zoommeetings the next week. Depending on where we are in the research process, these meetings might be oncampus in the Public History Lab, or the Special Collections in Atkins Library, or in the Char-Meck Library's Carolina Room. During these meetings I work with the student to outlinethe data we are seeking and demonstrate how to find these via the archival materials. I will instruct the studentin how to digitize archival materials in a

usable format and how to organize and record these. I will also set upmeetings with Brandon Lunsford (the Historian at Meck Co Parks & Rec) and the intern will likely need to attenda couple of these.

Applicant Requirements: Students should have:1) experience using Zotero (or some other bibliography software);2) excellent communication skills in person, in writing, and via email;3) the flexibility to meet on campus in the Public History Lab and/or Area49 for in-person project work;4) the flexibility to meet off campus with our project partners and/or in off-campus research archive locations – if we need to do this;5) genuine curiosity and interest in how digging into the local past that history has forgotten;Students do not have to be expert users in ArcGIS to participate in the project; but they should be willing to learn and develop some technological research and digital communication skills.

Applicant Preferences: Students should be reliable communicators who can work independently towards a collaborative goal. Thestudent in this position must be willing to work with off campus professionals and communicate with them asneeded.Data-driven projects require students who can pay close attention to spelling, numbers, and other writtendetails.Students should have a genuine curiosity about history and be genuinely interested --and willing – to devoteseveral hours per week focused using specific tools and archives to find the kind of information that is notavailable in basic web searches or google searches or AI programs.

Specific Time considerations/conflicts: Because this research position entails doing research work in local archives and

computer work in the Public History Lab, the student must be able to meet and

work in-person at these locations during regular business hours. The research

archives are not open in evenings or weekends, so the archival and digitization

work would have to be conducted during regular business hours (10 a.m. to 5 p.m.).

Some of the data and visual programming can be conducted in the PH Lab

(History Dept) or Area49 -- which has slightly more flexible hours.

App ID #: 3094

Mentor: Peterson, Nicole Email: npeters8@charlotte.edu

Title: Professor

Department: Anthropology College of Humanities & Earth and Social Sciences

Co-mentor: No

Community engaged research: Yes

Title: "How do we activate that power when we're sitting with the provider ": The value of community discussions for self-advocacy in healthcare settings

Description: Project title:"How do we activate that power when we're sitting with the provider":The value ofcommunity discussions for self-advocacy in healthcare settingsProject title:"How do we activate that power when we're sitting with the provider":The value ofcommunity discussions for self-advocacy in healthcare settingsProject description: The main objective of this project is to assess how social interaction might improve how Black women in Charlotte understand and use self-advocacy to improve their access to healthcare. To do this, we will work with a community partner to analyze results from an intervention that includes in-person education and trainings with group discussions and/or group interactions around training, and compare women who engage in this intervention to those who only attend education and training sessions. Our hypothesis is that social interaction will improve perception of the value of self-advocacy and skills of self-advocacy, as well as the use of these skills in future healthcare encounters (as documented through self-report). Outcomes include improved self-advocacy, as well as public and academic publications documenting this impact.Self-advocacy encompasses a variety of behaviors that improve patient engagement in their own healthcare understanding and decision-making, including information-seeking, interactions with the healthcare providers, assertiveness (speaking up and speaking out), and even non-adherence (Kleman and Ross 2023, Axelrod et al 2025, Bell et al 2023, Hutchens et al 2023). Our previous research suggests that Black women may also see self-care and collecting family medical histories as a form of self-advocacy (Cole 2023). There is some suggestion that digital engagement (Schermuly et al 2021) and educational materials like in discharge instructions (Shen et al 2025, Thwe 2025) might improve both self-advocacy frequency and effectiveness, including among Black women (Thwe 2025). There is also a sense that culturally relevant materials and expectations could improve self-advocacy (Kaiser et al 2022). Our previous work suggests that bringing questions, other people, and family histories are important strategies for self-advocacy, and that sharing resources and personal stories, and practicing provider encounters are important tools for education and training (Cole 2023, Gillard 2025),We are providing a self-advocacy intervention (the "Summer Self-Advocacy Institute" in August 2026) for 100 Black women in Charlotte and will assess its short- and long-term effects on self-advocacy in healthcare settings. Drawing on our previous research, the studies mentioned above, and existing self-advocacy trainings, we will examine the importance of group discussions for the impact of education around the value of self-advocacy and trainings around communication strategies and gathering family histories. In partnering with the Women's Health Equity Institute (WHEI, https://ncwomenshealthequityinstitute.org/), UNC Charlotte students and faculty have conducted

research with Black women to document unmet needs around understanding and accessing available healthcare resources, and problems communicating with medical professionals due to racism and cultural norms. WHEI has asked us to understand how women learn strategies for self-advocacy, given the importance of this in our conversations with research participants and WHEI leadership. The WHEI Summer Self-Advocacy Institute, in providing training around self-advocacy, can contribute to a community need that builds on existing community assets, further document the role of social interactions and social networks on self-advocacy, and share this information with community members, providers, and academic through various means of dissemination, like websites, reports, presentations, and publications.We will bring together trained advocates in structured discussions and smaller breakout sessions focused on self-advocacy experiences, facilitators, barriers, and strategies (similar to our earlier and broader focus group discussions) and group-oriented trainings (e.g. simulated activities) that allow participants the opportunity to practice preparation for and skills around self-advocacy. We will assess self-advocacy with surveys that will include items around demographic information (ethnicity, gender, age, specialty, years in healthcare), a self-advocacy scale (modified from Hagen et al 2018), any previous experience with trainings, learner confidence assessments using Miller's scale of "knows" and "knows how" (1990), perceptions of barriers to quality healthcare (e.g. stigma, time with clients), general feedback about the intervention, and questions about applicability and use of strategies or network connections. We'll compare the survey data for the following groups:1. No social interactions (those who do not engage in discussions and/or training exercises as a group) (N=50)2. Attendees who attend sessions with speakers, discussions, and training (N=50)In addition, we will record group discussions for later analysis around themes of sharing resources, shared experiences, barriers (like stigma, stereotypes, Superwoman complex, racism), community assets (like strategies, spirituality, support), and other themes that emerge from the analysis.In Fall 2026, we will analyze data from the August 2026 surveys and discussions. Students will help with the data processing, analysis, and results writing. Student researchers will observe and participate in biweekly team meetings, collecting feedback from our broader WHEI team through interviews and conversations.
References Axelrod, Natalie A., Nicole C. Hammer, Abigail L. Berk, et al. 2025. "The Influence of Mistrust, Communication, and Advocacy on Black Women's Pregnancy-Related Healthcare Decisions." Journal of Racial and Ethnic Health Disparities, ahead of print, October 20. https://doi.org/10.1007/s40615-025-02705-1.Bell, Sarah, Rachel Bergeron, Patricia Jo Murray, Shena Gazaway, and Teresa Hagan Thomas. 2023. "Describing Self-Advocacy in Underrepresented Women With Advanced Cancer." Oncology Nursing Forum 50 (6): 725–34. https://doi.org/10.1188/23.ONF.725-734.Cole, Jaylan, 2023. Knowing, Learning, and Sharing: Understanding how Black women define, understand, and share healthcare knowledge in Charlotte, NC. MA Thesis, Department of Anthropology, UNC Charlotte.Gillard, Sharon, 2025. Mental Health Stigma Disparities: Cultural Identities and Cultural Values with Black Women. MA Thesis, Department of Anthropology, UNC Charlotte.Hutchens, Jane, Jane Frawley, and Elizabeth A. Sullivan. 2023. "Is Self-Advocacy Universally Achievable for Patients? The Experiences of Australian Women with Cardiac Disease in Pregnancy and Postpartum." International Journal of Qualitative Studies on Health and Well-Being 18 (1): 2182953. https://doi.org/10.1080/17482631.2023.2182953. Kaiser, Kim, Michele E Villalobos, Jill Locke, Iheoma U Iruka, Camille Proctor, and Brian Boyd. 2022. "A Culturally Grounded Autism Parent Training Program with Black Parents." Autism 26 (3): 716–26.

https://doi.org/10.1177/13623613211073373.Kleman, Carolyn, and Ratchneewan Ross. 2023. “Predictors of Patient Self-Advocacy among Patients with Chronic Heart Failure.” Applied Nursing Research 72 (August): 151694. Schermuly, Allegra Clare, Alan Petersen, and Alison Anderson. 2021. “‘I’m Not an Activist!’: Digital Self-Advocacy in Online Patient Communities.” Critical Public Health 31 (2): 204–13. Shen, Yanlin, Yashi Zou, Juan Du, et al. 2025. “Hear My Voice! The Experience of Self-Advocacy Among Patients with Enterostomy: A Qualitative Study.” Nursing Reports 15 (9). https://doi.org/10.3390/nursrep15090341.Thwe, Yimon. 2025. Empowering Your Healthcare Journey: A Guide to Support Your Development of Self-Advocacy Skills. July 1. https://escholarship.org/uc/item/82n7g2gn.

Accepting applications for: Either 5 hours or 10 hours per week are acceptable

2 positions available

Anticipated Student Learning Outcomes: Students will gain expertise in qualitative research, including analyzing surveys and focus group discussions. Students will also learn about research ethics and confidentiality.Students will have an opportunity to improve their skills in writing about research for the general public and policymakers. The student may also be involved in writing an academic paper, depending on their interests, including annotated bibliographies.Working in a team with community members and other students will also mean students will learn strategies for working collaboratively and with community members.Students will learn how to manage elements of complex research projects, while fully supported by the faculty mentor and community partners.Finally, students will gain knowledge about health disparities and how these are experienced by Black women in Mecklenburg County, as well as some of the efforts intended to reduce these disparities

Required training of 10 hours with Description: Before working with research data, students will complete the CITI draining for human subjects research, as well as methodological training in interviews, data analysis, and other relevant techniques. Students will also be supported in writing some literature reviews, in the form of annotated bibliographies.

Mentoring plan: Students in my projects learn how to engage with community members to design and implement research projects that not only prepare them to be good practitioners of anthropology and social science more broadly, but also ask them to grapple with important ethical and intellectual questions around applying social science with integrity and respect. Helping students gain expertise in research and community engagement is also reinforced through my mentorship efforts, which aim to help students learn through experiences while recognizing the unique backgrounds, skills, and challenges that each student brings to class or research. For me, this often means meeting students where they are, and helping them develop new skills where needed. I provide flexibility for assignments and support as needed, and provide support or opportunities for leadership, where appropriate. I mentor students in a way that helps them both to address personal challenges and to plan for a future with meaningful and fulfilling careers.I do this by setting up weekly meetings, though students can ask to meet whenever this would be useful, in person or via zoom. I prefer emails, but know some field issues require more immediate contact through texts or calls. Students, if comfortable, can present to the team or general public. I have worked with several students who needed to gain confidence to do this, but also respect students who are not ready to do this. Students will be asked to work relatively independently aside from the

regular meetings, where we will review progress and challenges since the last meeting. I expect students will need some additional support with new tasks, and help them work on communicating concerns or issues. Working in a group with other students helps with this, and provides opportunities for leadership and project management and problem-solving skill building.

Applicant Requirements: Applicants should have some coursework in social sciences (sociology, geography, anthropology, etc), and an interest in working with community partners. They should have the ability to talk with someone they do not know, about topics that may be uncomfortable or emotional. Applicants should have the ability to travel around the Charlotte area in a car or on public transit to attend events.

Applicant Preferences: Experience with interviews or similar data collection is a benefit, as is experience working on community engaged research projects.

Specific Time considerations/conflicts: We find a schedule that works for all members of the team.

App ID #: 3070

Mentor: Potochnick, Stephanie Email: spotochn@charlotte.edu

Title: Associate Professor

Department: Sociology College of Humanities & Earth and Social Sciences

Co-mentor: No

Community engaged research: Yes

Title: Advancing the Labor Force Participation of Charlotte's Latino Mothers and Fathers: Examining Intersecting Employment & Child Care Sector Opportunities and Barriers

Description: Project Importance. Charlotte's economic mobility depends on its fast-growing Latino immigrant population, which represents 14% of Mecklenburg's total population and 21% of its young (age 0-8) children. The labor force participation of Latina mothers (62.8%) lags behind that of other mothers (71.2%). Addressing Latina mothers' low labor force participation is important because it can lead to upward mobility and better health for Latina mothers,' their families and communities.Additionally, despite Latino father's high employment rates, many Latino fathers, particularly immigrant fathers, work long hours in low-wage jobs, leading to financial instability, limited investment in child development, and mental health stress. Accessing early care and education (ECE) services is also complicated by low wages and non-standard work hours, further hindering upward mobility prospects for Latino immigrant families. Our overall goal is to enhance the economic well-being of Latino immigrant families by examining the intersecting challenges in the employment and ECE sectors, with a focus on Latino immigrant mothers and fathers—an under-researched group. Building on a prior Gambrell project and collaboration with Camino Research Institute (CRI), we seek to (1) identify and (2) understand how employment and ECE sector barriers and opportunities influence Latino fathers' family relationships and mental healthProject Team. This is an interdisciplinary, community-engaged research project in collaboration with Camino Health Center, which provides health, employment, and education services to Latino immigrant families in the Charlotte Region. The OUR researcher will be joining the UNCC Child & Family Development Lab, which is an interdisciplinary research lab with graduate, post-graduate, and undergraduate research assistants. Project Objectives and & Methodology. Using a mixed-methods, community-driven research approach, this project will: (1) Identify Charlotte Latina mothers' and Latino fathers' overall employment experiences, opportunities, and barriers, and (2) Examine how childcare services shape Latina mothers' and Latino fathers' employment and identify their suggestions for improvement. To address these objectives, we will use secondary survey data and focus group and interviews with Latina mothers and fathers.To provide a broad picture of Charlotte's Latina mothers' and Latino fathers' employment, we will use multiple Camino data sources and different statistical techniques and software (Excel, STATA) to examine their employment experiences. To provide a more in-depth assessment of Latina mothers' and Latino fathers' employment experiences and how childcare services shape their employment prospects, we will conduct 4 focus groups (6-8 participants each) with Latina mothers with different employment backgrounds. For fathers we will conduct one-on-one interviews with ~20 fathers. We will record, transcribe, and translate these focus groups and interviews and use

qualitative software (NVIVO) to analyze common trends and patterns.Based on these data, we will create informative fact sheets with dynamic graphics to disseminate to Camino and key employment and childcare stakeholders to improve services and programs for Latina mothers and families.OUR Intern Contributions & Duties. The OUR researcher will become a part of the research lab team and attend regular (weekly or bi-weekly) meetings. In the meetings they will receive the necessary training (e.g., how to use the statistical software, code qualitative data, etc) and will work on an assigned task through the week. The Lab provides extensive mentoring and growth opportunities and flexibility (when possible) for students to work on aspects of the project of most interest to them. By the summer, we will likely be working on transcribing and coding the qualitative focus groups of Latina mothers and interviews with Latino fathers. Potential Duties: Transcribe interviews, code interviews using qualitative software, help co-create fact-sheets, attend lab meetings.

Accepting applications for: Either 5 hours or 10 hours per week are acceptable

2 positions available

Anticipated Student Learning Outcomes: -Learn about research ethics-Learn to work as part of a larger, collaborative research team-Cultural competency and how to work in a diverse, bilingual environment-Learn how to collaborate with community partners-Learn how to transcribe and code qualitative data; how to conduct focus groups-Learn how disseminate research findings in a dynamic, informative way-Learn how to create databases (from administrative data and surveys) in Excel and clean and analyze data with STATA

Required training of 5 hours with Description: -All students complete research ethics training (CITI) before on-boarding

-Attend weekly lab meetings where training and mentorship are provided for the different research tasks students will be assigned.

-Meet with mentor to ensure project aligns with student preferences/skills and broader OUR program goals/requirements

Mentoring plan: The UNCC Child & Family Development Lab is an interdisciplinary research lab with graduate, post-graduate, and undergraduate research assistants. There are approximately 5-8 student participants and 2-3 faculty any given semester.The main goal of the lab is to foster student growth and development. We do that by having collaborative meetings that connect faculty and students from different backgrounds and stages of career development. The meetings are a collaborative environment where in addition to discussing the specific research project we also discuss different topics of interest to the students (e.g., how to apply to grad school, etc.), and each person on the lab contributes their unique knowledge, skills and viewpoints.

Applicant Requirements: Required: A strong work-ethic, desire to learn new research skills, and the ability to collaborate with a larger research team.

Applicant Preferences: Preferred but not required: Spanish-English bilingual

Specific Time considerations/conflicts: No. We set-up a When2Meet to find a time that fits best for all lab members since everyone's schedule changes each semester.

App ID #: 3071

Mentor: Potochnick, Stephanie Email: spotochn@charlotte.edu

Title: Associate Professor

Department: Sociology College of Humanities & Earth and Social Sciences

Co-mentor: Yes

Andrew Gadaire, agadaire@charlotte.edu, Psychological Sciences

Community engaged research: Yes

Title: Advancing Immigrant Inclusion and Economic Mobility in Charlotte's Early Childhood Workforce

Description: Project Importance. Like other U.S. Southeast cities, Charlotte has invested in more equitable Early Care and Education (ECE) systems, including county-funded free Pre-K, to reduce disparities and promote child well-being. Yet, mirroring national trends, Latinx ECE enrollment in Charlotte (31%) continues to lag behind that of non-Hispanic Black (47%) and White (66%). ECE scholars indicate that the developmental consequences of the enrollment gap are severe: Latinx children—60% of whom have an immigrant parent and 25% an unauthorized parent—face heightened risks of developmental delays and long-term academic struggles. In response, community partners in Charlotte have developed multilingual, multicultural ECE workforce traineeships that train and license immigrant newcomers—primarily mothers—to become ECE professionals. These programs aim to leverage immigrant women's linguistic and cultural expertise to better engage immigrant families while also creating employment opportunities for women who often experience post-migration occupational downgrading due to licensing barriers, language constraints, discrimination, or legal status. Although nearly 400 Spanish-speaking immigrants have completed these traineeships, little is known about their effectiveness.To address these gaps, our community–university research team will examine (1) how multilingual ECE workforce programs in Charlotte prepare trainees for employment and economic stability, and (2) whether these programs increase immigrant family engagement and enrollment in ECE.Project Team. This interdisciplinary, community-engaged research project is conducted in collaboration with Charlotte Bilingual Preschool, a comprehensive dual-language preschool; Central Piedmont Community College (CPCC); and Smart Start, the countywide coordinator of Mecklenburg County's Meck Pre-K (Public Pre-K). The academic team includes faculty from Sociology, Psychology, Geography, and Anthropology. The OUR researcher will join a larger interdisciplinary research lab that includes graduate, postdoctoral, and undergraduate research assistants.Project Objectives & Methodology. Using a mixed-methods, community-driven research approach, this project addresses three core aims:Aim 1: Profile Charlotte's Multilingual ECE Workforce Programs and Trainees.We will collect and analyze program documents and survey data from trainees across three local ECE workforce programs to understand who participates, their backgrounds, and their employment outcomes. Surveys will capture trainees' experiences before, during, and after training, including education, work history, and job outcomes.Aim 2: Examine How Program Participation Shapes Employment Outcomes.We will combine survey analysis with in-depth interviews of program graduates and administrators to understand how training experiences and program features influence job

opportunities and barriers. This aim focuses on connecting trainees' experiences to employment pathways in the ECE workforce.Aim 3: Share Findings to Support Stronger ECE Workforce Programs.We will translate findings into a best-practice guide highlighting strategies that support successful employment for multilingual ECE workers. Results will be shared with community partners and local ECE networks to inform future program development.OUR Intern Contributions & Duties. The OUR researcher will be fully integrated into the research lab and participate in regular (weekly or bi-weekly) meetings. Interns will receive training in research methods (e.g., survey administration, qualitative coding, and statistical software) and work on assigned tasks throughout the semester.The lab emphasizes mentoring, skill development, and flexibility, allowing students to engage in project components that align with their interests when possible. During the summer, interns will likely assist with survey and interview data collection, as well as interview transcription. Potential OUR Intern Duties: Assisting with survey data collectionCollect and organize administrative and survey data in Excel Transcribing interviewsCoding qualitative interviews using research softwareAttending and participating in lab meetings

Accepting applications for: Either 5 hours or 10 hours per week are acceptable

2 positions available

Anticipated Student Learning Outcomes: -Learn about research ethics-Learn to work as part of a larger, collaborative research team-Cultural competency and how to work in a diverse, bilingual environment-Learn how to collaborate with community partners-Learn how to transcribe and code qualitative data-Learn how to create databases (from administrative data and surveys) in Excel and clean and analyze data with STATA

Required training of 5 hours with Description: -All students complete research ethics training (CITI) before on-boarding

-Attend weekly lab meetings where training and mentorship are provided for the different research tasks students will be assigned.

-Meet with mentor to ensure project aligns with student preferences/skills and broader OUR program goals/requirements

Mentoring plan: The main goal of the lab is to foster student growth and development. We do that by having collaborative meetings that connect faculty and students from different backgrounds and stages of career development. The meetings are a collaborative environment where in addition to discussing the specific research project we also discuss different topics of interest to the students (e.g., how to apply to grad school, etc.), and each person on the lab contributes their unique knowledge, skills and viewpoints.

Applicant Requirements: Required: A strong work-ethic, desire to learn new research skills, and the ability to collaborate with a larger research team.

Applicant Preferences: Preferred but not required: Spanish-English bilingual

Specific Time considerations/conflicts: No. We set-up a When2Meet to find a time that fits best for all lab members since everyone's schedule changes each semester.

App ID #: 2751

Mentor: Quinlan, Margaret Email: mquinla1@uncc.edu

Title: Professor

Department: COMM/ IDST/HHUM College of Humanities & Earth and Social Sciences

Co-mentor: No

Community engaged research: No

Title: Communicating Women's Reproductive Health

Description: OUR research experience serves as a research practicum for interested undergraduate students. You will work on a research project and/or research projects and complete specific tasks to get “hands-on experience” through the design and conduct of actual communication studies research. Your project will be structured and include:Assisting me with my research; depending on the research project, you may be assigned to conduct/write/perform literature reviews, interviews or surveys, coding, data entry, statistical analysis, interview or focus group scheduling, focus group/interview transcription, transcribing of one-on-one interviews, sourcing articles or other related research tasks. Before the semester you will take, we will meet and agree on your tasks and expectations.Background: Women's reproductive health is an essential aspect of women's overall health and well-being. Women's reproductive health needs to be given the attention it deserves in communication studies. There is a need to explore the communication aspects of women's reproductive health to understand women's challenges and opportunities in this area.Research Questions: The proposed research will address the following questions (specific health issues will be revealed when OUR student begins):RQ1: What are women's communication challenges and opportunities for their reproductive health?RQ2: How do women communicate about their reproductive health with their partners, family members, friends, and healthcare providers?RQ3: How do media and technology shape women's perceptions and attitudes towards their reproductive health?RQ4: What are the implications of communication practices for women's reproductive health outcomes?Methodology: The proposed research will employ a qualitative research design. Data will be collected through in-depth interviews or rhetorical analysis with women who have experienced reproductive health issues, healthcare providers, and women's reproductive health experts to gain their perspectives on communication and reproductive health. The data will be analyzed using qualitative thematic analysis.Significance: The proposed research will contribute to understanding women's reproductive health in communication studies. The findings will inform the development of communication strategies and interventions to improve women's access to reproductive health services and information. The research will also contribute to developing policies to improve women's reproductive health outcomes.

Accepting applications for: Either 5 hours or 10 hours per week are acceptable

2 positions available

Anticipated Student Learning Outcomes: Undergraduate Research Assistant: I will work with Dr. Margaret M. Quinlan, Professor, Department of Communication Studies, Interdisciplinary Studies,

Health & Medical Humanities at UNC Charlotte. I will help the professor collate, execute and design research. It is competitive. Dr. Quinlan will guide you to: gathering information;analyzing, compiling, and interpreting data;multitasking ability;clerical work;administrative functions

Core Skills: we will work on developingExcellent written and oral communicationExcellent administrationGood presentation and organizationExpert in analyzing qualitative/rhetorical dataExcellent technical writing

Required training of 3 hours with Description: I will train the student when the project begins

Mentoring plan: The mentoring plan for the OUR Research Scholar Program involves Dr. Quinlan, who will work closely with students during the internship period. Dr. Quinlan is expected to be committed to the program, provide guidance and direction on the research project, and ensure that the scholar completes all required deliverables promptly. Regular contact with the student is necessary, and daily contact is encouraged. The mentor will also assist the scholar in writing an abstract, a research report, and a poster based on their summer research project, and will provide constructive criticism. Finally, Dr. Quinlan will inform the OUR Research Scholar Program Director of the scholar's progress and complete the program evaluation at the program's conclusion.

Applicant Requirements: Interest in gaining:Experience working with a senior researcher.Excellent knowledge of gathering information.Expertise in various fields like correcting, analyzing, compiling, and interpreting data.Multitasking ability and knowledge of clerical work.Expertise in administrative functions.Excellent written and oral communication skills.Excellent administration and organization skills.Good presentation skills.Interest in gaining expertise in analyzing data.Excellent technical writing skills. Additionally, an interest in qualitative methods, feminist methods, and rhetorical analysis is desirable

Applicant Preferences: Preference to Communication Studies students and Interdisciplinary Studies with a concentration in Health &Medical Humanities or other health-related field. Background in Research Methods Interest in qualitative methods, feminist methods, rhetorical analysisMedical Humanities or other health-related fieldBackground in Research MethodsInterest in qualitative methods, feminist methods, rhetorical analysisSome recommended or preferred characteristics, skills, courses, or experiences for the research assistantposition include:Strong attention to detail and accuracy, focusedInterested in graduate schoolHealth focus in your research interestsAbility to work independently and take initiative.Strong critical thinking and analytical skills.Interest in learning software and tools (e.g., Google Docs, Google Sheets).Interest in experience with data collection and analysis.Knowledge of research ethics and protocols. Interest in experience with academic writing and formatting.Interest in experience with qualitative research methods.Familiarity with feminist methods and rhetorical analysis.Interest in experience with interdisciplinary research.Strong work ethic, good time management skills, and a willingness to learn and take on new challenges.

Specific Time considerations/conflicts: We will schedule a weekly meeting via Zoom or in person. Dr. Quinlan is available for meetings between 8-1:30. We need to find a time that works for Dr. Quinlan and your team (if you are on a team), based on class schedules. By 5 PM EST on Sunday, students are expected to submit their timesheets, an updated to-do list, and a research journal.

App ID #: 3073

Mentor: Shuster, Martin Email: mshuste2@uncc.edu

Title: Professor of Philosophy and Isaac Swift Distinguished Professor of Jewish Studies

Department: Philosophy College of Humanities & Earth and Social Sciences

Co-mentor: No

Community engaged research: No

Title: The Political Economy of Policing

Description: This project is one of the inaugural projects in the Philosophy and Critical Theory Lab (https://pages.charlotte.edu/pact/) at UNC-Charlotte. The project will involve an inquiry into the political and economic basis of policing, especially around police misconduct settlements, police militarization, and police administration. This project will revolve around compiling data on police misconduct settlements in preparation for theoretical/philosophical analysis. Students will be involved in the first phase of data compilation. Students are expected to have (1) superior organizational skills, (2) excellent communication skills, whether via phone, in person, or in writing (e-mail and/or print), (3) facility with computers, including the GoogleDocs, GoogleDrive, and entering data into spreadsheets, and (4) tenacity (they are liable to deal with a range of bureaucratic structures).

Accepting applications for: Either 5 hours or 10 hours per week are acceptable

2 positions available

Anticipated Student Learning Outcomes: Students will: Learn how to navigate government agencies and bureaucraciesLearn to gather quantitative and qualitative data from public sourcesPractice dealing with unexpected obstacles and problem solving in response to themLearn how to safeguard and collate dataDevelop written and oral communication skillsDevelop organizational skillsDevelop theoretical and analytical skills related to complex issues around policing

Required training of 1 hours with Description: Students will receive training in how the lab approaches this project and will be socialized into lab culture while learning technical aspects of our work.

Mentoring plan: This is a position that has well defined goals but offers a motivated students a lot of possibility for innovation and creative thinking with regard to problems that arise when gathering data from government agencies that may be resistant to providing that data. This requires good social skills and an ability not to be flustered by recalcitrant bureaucratic agent. The student can expect to have a mentor available to answer questions but will also be performing a lot of independent work. You will work directly with Dr. Shuster. We will generally have regular meetings. We are happy to have students participate at conferences but it is not required.

Applicant Requirements: Students are expected to have (1) superior organizational skills, (2) excellent communication skills, whether via phone, in person, or in writing (e-mail and/or print), (3) facility with computers, including the GoogleDocs, GoogleDrive, and entering data into

spreadsheets, and (4) tenacity (they are liable to deal with a range of bureaucratic structures).Problem solving and ability to think outside of the box when possible are huge pluses.

Applicant Preferences: Problem solving and ability to think outside of the box when possible are huge pluses.

Specific Time considerations/conflicts: n/a

App ID #: 3074

Mentor: Shuster, Martin Email: mshuste2@uncc.edu

Title: Professor of Philosophy and Isaac Swift Distinguished Professor of Jewish Studies

Department: Philosophy College of Humanities & Earth and Social Sciences

Co-mentor: No

Community engaged research: No

Title: Mapping How US History is Taught

Description: This project is a recently launched project in the Philosophy and Critical Theory Lab (https://pages.charlotte.edu/pact/) at UNC-Charlotte. The project begins with the basic observation that there is great debate about how United States history ought to be taught, especially when it comes to the ills of United States society (slavery, destruction of indigenous peoples, etc.) The aim of this project is to see how US history is in fact taught across different secondary schools. The project will begin with gathering data about Charlotte, but will then move to other cities in North Carolina and eventually other states, depending on how quickly we acquire data.

Accepting applications for: Either 5 hours or 10 hours per week are acceptable

1 positions available

Anticipated Student Learning Outcomes: Students will be responsible for (1) researching curricula across public, private, and semi-private schools; (2) understanding features of this curricula and what it means about how such education is relating to the past; and creating and situating this data for public availability. Students will Learn how to navigate various education agenciesLearn to analyze a wide range of educational materialsLearn to extrapolate quantitative and qualitative data from mixed sourcesPractice dealing with unexpected obstacles and problem solving in response to themLearn how to safeguard and collate dataDevelop written and oral communication skillsDevelop organizational skillsDevelop theoretical and analytical skills related to complex issues around what it means to pursue history

Required training of 1 hours with Description: Students will receive training in how the lab approaches this project and will be socialized into lab culture while learning technical aspects of our work.

Mentoring plan: Students can expect to work directly with Dr. Shuster. He will train them in how to perform the desires functions and procedures related to this project, but it will be largely up to them to navigate the various bureaucratic and interpersonal issues that will arise when gathering this kind of data (Dr. Shuster will of course be available for consultation, but the ideal student will have initiative and the capacity to problem solve). The student can thereby expect to have a mentor available to answer questions but will also be performing a lot of independent work. We will generally have regular meetings. We are happy to have students participate at conferences but it is not required.

Applicant Requirements: Students are expected to have (1) superior organizational skills, (2) excellent communication skills, whether via phone, in person, or in writing (e-mail and/or print), (3) facility with computers, including the GoogleDocs, GoogleDrive, and entering data into spreadsheets, and (4) tenacity (they are liable to deal with a range of bureaucratic structures).

Applicant Preferences: Students who have facility with education or history are considered an asset, as are students who are capable of problem solving. Students who have facility with education or history are considered an asset, as are students who are capable of problem solving.

Specific Time considerations/conflicts: n/a

App ID #: 3044

Mentor: Vinson, David Email: dsvinson@charlotte.edu

Title: Associate Professor

Department: Department of Earth Environmental & Geographical Sciences College of Humanities & Earth and Social Sciences

Co-mentor: Yes

Sandra Clinton, sclinto1@uncc.edu, Department of Earth Environmental & Geographical Sciences, College of CHESS

Community engaged research: No

Title: Water Quality in Urban, Restored, and Beaver-Colonized Charlotte Streams

Description: The OUR-supported student will contribute to a multi-year project on water quality in urban streams of the Charlotte region. Sites will include a 5-year post-restoration check up of a large urban forest watershed that was restored and subsequently colonized by beavers. Both field work and lab work are expected within this project. The OUR-supported student will make water quality measurements, collect samples, analyze water quality in the lab, analyze data, and interpret results. The student will download sensors, will collect water quality samples, and will analyze water quality parameters in the lab. Water quality parameters in this study are mostly chemical in nature- for example, dissolved oxygen, nitrate, and organic carbon. However, for interested students with biology backgrounds there may be opportunities to examine the recovery of macroinvertebrates in the restored streams. The lab analyses in this project will help us understand groundwater-surface water interactions, the amount of time that water resides in the watershed, and how well the restored stream processes chemicals of interest to water quality, such as nitrate. Finally, the OUR-supported student will have the opportunity to cross-train with related water quality projects in the Piedmont region to gain additional experiences.

Accepting applications for: Only 150 hours over an academic semester (~10h/wk)

1 positions available

Anticipated Student Learning Outcomes: The OUR-supported student will work collaboratively and independently to gain experience with taking field measurements of natural water (pH, temperature, dissolved oxygen) and collecting water samples according to established procedures. The OUR-supported student will also participate in the lab analysis of water samples for water quality parameters such as ion concentrations, metal concentrations, nutrient concentrations, alkalinity, or dissolved organic carbon. The student will learn to follow established methods in the lab, will learn to work safely in the lab, and will learn to manage data collected during the project. The student will learn the basics of data management in a group-based, long-term project. Finally, the student will synthesize their findings and experiences. Interested students will be able to present findings at a conference or participate in publication of results.This project will provide excellent experience for students interested in employment or graduate school in fields such as hydrology, stormwater, water quality, soils, or related fields.

Required training of 0 hours with Description: As part of the project, the student will do general lab work. General lab safety training will be provided before the student will do the in-lab portions of the project. Procedure-specific lab training will be provided for analysis procedures. Specific training will be provided for field work procedures such as downloading sensors and collecting water samples.

Mentoring plan: The project faculty advisor, Dr. David Vinson and co-advisor, Dr. Sandra Clinton, will work with the student to define goals and tasks that fit the student's interests and that build on the prior skill set (within the needs of the overall project). Students will build upon their skill set to gain confidence and experience in lab work, field work, data collection, and interpreting results. Within the student's core block of time on the project, the OUR-supported student will have progress meetings with the project mentor. The student will work in a small lab group setting in which students work collaboratively toward shared goals while also developing the confidence and skills to work independently toward individual goals. At many times, the OUR-supported student will work independently or alongside other students. All students working in the group are expected to support and mentor their student peers. Other mentoring goals can be set according to the student's interests. For example, for students interested in applying to graduate school, the student's project can develop experiences to include in the student's graduate school application research statement.

Applicant Requirements: Interest in field work and/or in working a water quality analysis lab necessary. No specific experience is required; training will be provided. Applicants must be able to learn and follow established procedures and safety requirements. In addition, the student should have completed at least one semester of college-level chemistry before beginning the project. Students must also have the interest and ability to work within a team environment toward shared goals.

Applicant Preferences: Prior experience working in a laboratory setting; or previous coursework in hydrology, soils, water quality, geology, chemistry, or a related field; would be a plus.

Specific Time considerations/conflicts: The student will commit to a core block(s) of hours during weekdays to work on the project. Committing to a core block(s) of hours will be critical to the student's success. Additional flexible hours will be possible around the core committed time block(s).

App ID #: 2744

Mentor: Walker, Lisa Email: lisa.walker@charlotte.edu

Title: Professor

Department: Sociology College of Humanities & Earth and Social Sciences

Co-mentor: Yes

Jon Overton, jon.overton@charlotte.edu, Sociology, CHESS

Community engaged research: No

Title: Social Information Processing and Inequality

Description: Have you ever wondered how we decide who is competent and who isn't? In group settings—whether it's a workplace, a hospital team, or a classroom project—we constantly process information about the people around us. We look at things like education, gender, or job titles to form expectations about how smart or capable someone is. These expectations are powerful; they drive social inequality and determine who gets listened to and who gets ignored. This project explores the fascinating mechanics behind those judgments.We are basing our work on a well-established framework called the Theory of Status Characteristics. This theory is unique in the social sciences because it uses a precise mathematical formula to predict human behavior. It explains how people take different pieces of status information and combine them to decide who is "better" at a task. The theory assumes that we give weight to characteristics that make people different, that consistent traits add up (though with diminishing returns), and that contradictory traits have a huge impact on our confusion. This mathematical model has been backed up by decades of experiments, but we believe it is missing a crucial piece of the puzzle: emotion.This project investigates a bold new idea: that the "math" we use to calculate status changes depending on how we feel about a person. We suspect that the way we combine information depends heavily on the initial "vibe" of the interaction—specifically, the sentiment (liking or disliking) between group members. We are testing the hypothesis that this established model of status isn't just about ability; it's actually a special case of a broader principle of social cognition that includes our feelings.To explore this, we are looking at how social status (a "cold" cognitive cue about ability) interacts with sentiment (a "warm" emotional cue). This is significant work because it bridges the gap between precise mathematical sociology and broader theories about identity and relationships. If we can prove that our feelings change the math of how we judge competence, we can better understand how social hierarchies are maintained—or how they might be dismantled—in everyday life.Our primary goal is to test a mechanism we call Similarity Balancing. We believe that when people aren't under extreme pressure to perform perfectly, they simplify how they judge others based on whether they like them. If you like your partner, you might subconsciously "balance" your view by focusing only on their positive status traits (like their high education) while ignoring the negative ones. Conversely, if you dislike them, you might focus exclusively on their negative traits.To test this, we are running a controlled laboratory experiment. The design involves placing participants in pairs where we carefully manipulate two things: their status and their sentiment. We assign high or low status using scores on unfamiliar tasks (like matching abstract patterns), and we induce liking or disliking by telling participants they share (or don't share)

attitudes with their partner, supplemented by a small gift exchange.In the experiment, participants act as an "Advisor" to a partner who is the "Decision Maker." This setup is designed to slightly lower the pressure to "win" the task, allowing those emotional biases to surface. We then measure how often the participant sticks to their own opinion versus agreeing with their partner. This gives us a direct measurement of their performance expectations. By analyzing this data, we can see if people really do process status differently when they like or dislike someone.This research offers a unique opportunity to get involved in experimental sociology. It combines rigorous data analysis with deep theoretical questions about human nature. By helping us compare our results against competing models of behavior, you will contribute to understanding the hidden mechanisms that shape inequality and social interaction. As an RA on the "Status and Sentiment" project, you are the face of the study. You are the person who makes the theoretical concepts come to life in the lab. Your primary responsibilities will fall into three main categories:1. Running "Subjects" (The Core Task)You will be responsible for guiding participants through the 8-condition experiment. This is a live, interactive process.Lab Setup: Before participants arrive, you will prepare the station. This includes setting up the computer terminals and preparing the physical props used for the "Sentiment Manipulation," such as the small gifts and the attitude survey results that convince participants they are similar or dissimilar to their partner.Managing the Interaction: You will oversee the "Contrast Sensitivity" task. While the computer handles the math, you ensure the participants understand their roles (Advisor vs. Decision Maker) and that the "Status Manipulation" (the nonsense syllable task) is taken seriously.Troubleshooting: If the software glitches or a participant gets confused about the instructions, you are the first line of defense to keep the data valid.2. Conducting Post-Experiment InterviewsThe proposal mentions that we need to exclude participants who didn't believe the setup (e.g., they suspected their partner wasn't real).The Debrief: After the computer task is done, you will sit down with the participant for a structured interview.Detective Work: Your goal is to gently probe their experience to determine if they met the "scope conditions." Did they really feel the status difference? Did they genuinely like or dislike the partner?Coding: You will record their answers and help decide which participants stay in the final dataset and which fall into the "20% exclusion" rate.3. Data Management & Team CollaborationData Entry: You will assist in aggregating the $P(s)$ scores (the measure of how often they disagreed with their partner) and the questionnaire data.Weekly Lab Meetings: We function as a team. You will attend weekly meetings to discuss how data collection is going, read relevant literature on Status Characteristics Theory, and brainstorm why the results are looking the way they are.

Accepting applications for: Either 5 hours or 10 hours per week are acceptable

3 positions available

Anticipated Student Learning Outcomes: Anticipated Student Learning Outcomes:Methodological Proficiency: Students will gain hands-on mastery of experimental design, specifically in the administration of the "Contrast Sensitivity" paradigm and the management of human subjects.Data Analysis: Students will develop skills in qualitative data processing, learning to screen participants based on scope conditions and code interview transcripts for analysis.Theoretical Application: Students will demonstrate a deep understanding of social psychology theories regarding status and sentiment, connecting abstract mathematical models to observed behavioral

outcomes.Professional Development: Students will prepare and present research summaries, fostering the skills necessary for disseminating academic work in professional settings.

Required training of 10 hours with Description: (Based on 5 hours per week - would be accelerated if 10 hours per weeek)

Phase 1: Foundations & Ethics (Week 1)

Before entering the lab, RAs must understand the rules of the road.

Human Subjects Certification: All RAs will complete the standard CITI Program training (Institutional Review Board certification) to understand the ethical requirements of research, specifically focusing on the use of deception in psychology experiments.

Theoretical Bootcamp: RAs will participate in a seminar-style review of the core literature (e.g., Berger et al., Ridgeway) to understand why the experiment is designed this way. We will specifically cover the Principle of Organized Subsets so they understand the math behind the study.

Phase 2: Technical Protocol & The "Script" (Weeks 2-3)

This phase focuses on the mechanics of the "Contrast Sensitivity" task.

Script Memorization: The experiment relies on a precise script to ensure every participant has the exact same experience. RAs will drill this script until the delivery is natural and neutral.

Software Mastery: RAs will learn to operate the experimental software that displays the binary patterns. They will learn how to initialize the "Advisor/Decision Maker" roles, input the "Status Manipulation" scores (the nonsense syllable results), and troubleshoot common crashes or errors.

Prop Management: RAs will be trained on the physical logistics of the Sentiment Manipulation, specifically how to casually and believably manage the "gift exchange" and the delivery of the "attitude survey" results without raising suspicion.

Phase 3: Simulation & The "Detective" Role (Week 4)

The most critical training involves the post-experiment interview.

Mock Sessions: RAs will run full experimental sessions with each other and with the Principal Investigator. This "flight simulator" approach allows them to make mistakes in a safe environment.

Interview Techniques: RAs will be trained in non-directive interviewing. They will learn how to probe for suspicion (e.g., "Did you think the partner was real?") without "leading the witness" or giving the answer away.

Coding Calibration: RAs will practice coding sample interview transcripts to ensure they can accurately identify which participants meet the "scope conditions" (i.e., truly felt the status difference and sentiment) and which need to be excluded.

Phase 4: Shadowing & Launch (Week 5)

Shadowing: RAs will observe the Lead Researcher running the first few live participants to see the flow in real-time.

Supervised Runs: For their first 3-5 participants, RAs will be shadowed by a senior team member who will provide immediate feedback and support.

Ongoing: Weekly Calibration

Training does not end when data collection begins. Weekly lab meetings will serve as "calibration checks" where RAs discuss unusual participant behaviors and ensure everyone is still adhering strictly to the protocol.

Mentoring plan: We view this research experience as an apprenticeship designed to transition students from knowledge consumers to active producers of sociological insight.Supervision & Contact Students will work directly with us. During the initial training phase, we will have regular check-ins to ensure mastery of the protocol. Once data collection begins, we will transition to weekly lab meetings to review progress and discuss theory, supplemented by an "open channel" policy for immediate troubleshooting.Presentation Expectations We expect students to be vocal contributors, eventually leading a literature discussion during a team meeting. Our goal is for every student to co-author an abstract and present a poster at the university's Undergraduate Research Symposium.Our Commitments to SuccessContextual Learning: We will connect every task back to the "Status and Sentiment" theory so students understand the why behind their work.Scaffolded Training: We provide a phased regimen—observation, simulation, and supervision—ensuring students feel confident before running live sessions.Professional Development: We dedicate time to reviewing CVs and writing strong, specific letters of recommendation.Constructive Feedback: We commit to providing timely feedback in a safe environment where mistakes are treated as learning opportunities.

Applicant Requirements: For this position, our primary requirement is unwavering reliability and attention to detail. Because we are running a controlled laboratory experiment, the validity of our data depends entirely on your ability to memorize a script and execute a precise protocol exactly the same way for every participant. You must be comfortable and professional when interacting with strangers, as you will be the authority figure in the room guiding them through tasks and conducting detailed post-experiment interviews to check for suspicion. No prior laboratory experience is strictly necessary, but you must possess the maturity to maintain strict confidentiality regarding participant data and the discipline to arrive punctually for every scheduled session.

Applicant Preferences: While we welcome applicants from various academic backgrounds, we have a strong preference for students majoring in Sociology or Psychology who are genuinely curious about human behavior and social inequality. Applicants who have already completed coursework in Research Methods, Social Statistics, or Social Psychology will be particularly competitive, as they will have a foundational understanding of the concepts we are testing. Ideally, we are looking for students who are comfortable with technology—capable of basic computer troubleshooting if the software hiccups—and who view this position not just as a job, but as a potential stepping stone toward graduate study or a career in social science research.

Specific Time considerations/conflicts: None

App ID #: 3101

Mentor: Adnot, Mindy Email: madnot@charlotte.edu

Title: Assistant Teaching Professor

Department: Honors College Honors College

Co-mentor: No

Community engaged research: No

Title: Exploring Interdisciplinary Learning in the University Honors Capstone

Description: Honors education, according to the National Collegiate Honors Council, aims to provide students with intellectually rigorous and integrative experiences that transcend disciplinary boundaries. Central to the honors curriculum is the capstone project, which functions as the culmination of an honors student's academic journey. At UNC Charlotte, the University Honors Program (UHP) capstone project asks students to identify an interdisciplinary research question, complete an in-depth literature review, and design and lead a series of six seminars for incoming honors students under the mentorship of a faculty committee. Our research team is studying how this unique model uses interdisciplinarity to foster deeper learning and shape students' experiences and learning outcomes in the capstone sequence. In earlier work, we conducted a literature review and created a conceptual model that highlights the relationship between interdisciplinarity and deeper learning in the UHP capstone. Now, we are moving to the next phase of the project: gathering qualitative data to see, in practice, how students experience their capstone work. The OUR scholar will play an active role in the next stage of this project, helping to design effective interview questions, participating in interviews with UHP alumni, reviewing and synthesizing data, and contributing to the writing of an article intended for publication in an honors journal.

Accepting applications for: Only 75 hours over an academic semester (~5h per week)

1 positions available

Anticipated Student Learning Outcomes: Through participation in this research project, the OUR scholar will: Critical thinking: Develop interview questions, analyze qualitative data, connect findings to a conceptual model of capstone learning Communication: Strengthen oral communication through conducting interviews and potentially presenting findings at future honors conferences. Strengthen written communication through contribution to journal article draft Teamwork: Collaborate with the faculty mentor and members of the Honors College team in designing the research and interpreting findings for programmatic decision making Leadership: Take initiative on specific research tasks, contribute to project planning Professionalism: Meet deadlines, maintain confidentiality, learn and uphold ethical standards in human subjects research. Career and Self-Development: Reflect on strengths and areas for growth, build research skills relevant for future graduate study or career

Required training of 6 hours with Description: The scholar will need to complete CITI training to be able to complete human subjects research at UNC Charlotte. I anticipate this training will require

approximately 6 hours. Additional training in qualitative research methods will be embedded into in-person working sessions throughout the semester.

Mentoring plan: My mentoring philosophy emphasizes building strong relationships with students through regular in-person engagement and collaborative work. The student researcher will have a standing weekly meeting with me for guidance, feedback, and reflection. While the student researcher will work most directly with me, they will also have the opportunity to work with and learn from our small, tight-knit Honors College team. I expect that the student researcher and I will share the results of this work by submitting an article to the Journal of NCHC, and presenting at local and national honors conferences.

Applicant Requirements: Strong critical thinking, communication skills, professionalism, organizational skills, and time management are required for this role. No prior experience with qualitative research methods is necessary, just enthusiasm for learning!

Applicant Preferences: Prior experience with honors education and/or familiarity with interdisciplinary learning are preferred.

Specific Time considerations/conflicts: Availability for a weekly meeting during business hours Monday-Friday; will be scheduled to accommodate the students' class times.

App ID #: 2802

Mentor: Bossu, Sebastien Email: sbossu@uncc.edu

Title: Assistant Professor

Department: Mathematics and Statistics Klein College of Science

Co-mentor: No

Community engaged research: No

Title: New mathematical and numerical optimization methods for a class of inverse problems with applications to machine learning and engineering

Description: An important problem in mathematics is about approximating a potentially complicated function into a sum of simpler functions. For example, could be a complicated insurance contract payment formula that covers, say, 10 times the highest individual damage in a multi-car accident beyond a $5,000 deductible. If 3 cars were damaged for x_1 = $3,000, x_2 = $8,000, x_3 = $6,500, then the policy pays ; but if the car damages are x_1 = $1,000, x_2 = $3,000, x_3 = $2,000$, then the policy pays nothing.Calculating is easy, but figuring out the corresponding insurance premium is potentially difficult. Instead, we wish to approximate f as a weighted sum of single-damage contracts whose premiums are easier to calculate. Assuming at most 50 cars would be damaged, we may want to find the 50 optimal quantities of single-damage contracts that best approximate f.In this multi-semester project, we initially consider the function approximation problem in the simplest input dimension d=1, i.e. we wish to approximate a given target function f(x) of a single numeric variable x using a weighted sum of n basis functions , such as polynomials, Fourier cosines, Haar wavelets, step functions, or ReLU functions. The optimal quantities of basis functions are determined to minimize approximation errors according to some metric such as MSE (mean squared error) over a relevant range of x-values. The corresponding error-minimizing problem is known in mathematics as a least-squares problem.This project will use the linear algebra foundations of least-squares function approximation and how Gram matrices (similar to covariance matrices in statistics) play an important role in obtaining the solution. It turns out that the Gram matrix for step functions is a single-pair matrix whose inverse is tridiagonal in closed form. For ReLU basis functions, it is the sum of two single-pair matrices whose inverse can be calculated in semi-closed form.

Accepting applications for: Other (Externally funded opportunity with alternate time commitment)

2 positions available

Anticipated Student Learning Outcomes: Develop coding and mathematical skills, including critical thinking. Learn to work professionally under supervision. Learn to communicate results in writing and possibly verbally at a presentation.

Required training of 0 hours with Description: No compliance training is currently anticipated. Mentor will support student on learning technical skills throughout the project.

Mentoring plan: The student(s) will work directly under my supervision with weekly meetings.

Applicant Requirements: This is a special opportunity pending final approval of grant funding from the Department of Defense. Eligibility is limited to U.S. citizens or permanent residents. These positions would actually be 15hrs/week expected commitment.If funding is unavailable by Fall, positions would return to standard OUR appointments of 10 hours per week. Calculus II, Matrices & linear algebra, Coding in C++/Python.Knowledge of optimization algorithms is a plus.This is a multi-semester effort project. Returning students may be given priority consideration, including for full-time summer research positions.

Applicant Preferences: This project would typically be suitable for math majors at the junior/senior level, and could also earn credit as senior project or honors project. Exceptionally qualified candidates from other disciplines will be considered. In addition to excellent coding and mathematical skills, candidates must be diligent, disciplined, motivated, and available.

Specific Time considerations/conflicts: Weekly meeting, typically Tuesday or Wednesday afternoon depending on my schedule. Some meetings may take place over Zoom.

Again please note that pending funding approval, these positions would actually be 15hrs/week time commitment.

App ID #: 3103

Mentor: Etzkorn, Markus Email: metzkorn@charlotte.edu

Title: Associate Professor

Department: Chemistry Klein College of Science

Co-mentor: No

Community engaged research: No

Title: Synthesis and Characterization of Novel Hydrocarbon Cage Compounds

Description: Hydrocarbon cages represent a fundamentally important class of organic compounds that intertwine unusual organic structures with unusual bonding scenarios, unique chemical reactivities, and unprecedented properties. They continue to take center stage when investigating fundamental (novel) concepts in organic chemistry, developing innovative synthetic routes, and considering applications in material science or medicinal chemistry. The Etzkorn group has established a sparsely studied cage diene as a synthetic platform to target different scaffolds with defined fluorine substituent patterns, novel derivatives with tailored oxygenated subunits, or carbon-elongated frameworks.Undergraduate participants, who will need to have a solid background in organic chemistry, will synthesize known and novel intermediates, characterize the new molecular architectures, and document the experimental and analytical work.

Accepting applications for: Only 150 hours over an academic semester (~10h/wk)

2 positions available

Anticipated Student Learning Outcomes: improve / develop novel synthetic laboratory skills refine purification skillsacquire contemporary analytical skills, in particular NMR spectroscopic techniquesadvance oral / written communication skills

Required training of 3 hours with Description: 1) departmental safety training

2) laboratory specific safety training

3) literature review prior to laboratory work

4) development of personal mentoring plan with clearly defined expectations

Mentoring plan: Student participants will work with experienced (under)graduate students who have at least worked two semesters in the Etzkorn lab; Dr. Etzkorn will also spend some time with student participants in the laboratory to provide guidance with respect to safety and laboratory procedures.Students will develop a personalized mentoring plan with dr. Etzkorn to clearly define project expectations and anticipated outcomes along a well-defined timelineWeekly group meeting and monthly individual meetings will monitor student and project progressMonthly reports will be reviewed by Dr. Etzkorn and feedback is expected to be implemented into revised versionsDiscussion of dissemination of research in general and the student project in particular will be discussed; ideally student participants will present at a UNC Charlotte undergraduate research fair, and - if sufficient progress (intellectual ownership and novel chemistry) along the defined

research outcomes is achieved - dissemination to the broader chemical community (conference or manuscript for publication) will be desirableDr. Etzkorn will be committed to continue work with a successful student and provide guidance for the student's future career plans

Applicant Requirements: The applicant must have completed CHEM 2131 and ideally CHEM 2132 with a grade B or betterStudent should have completed CHEM 2131L and ideally CHEM 2132L with a grade B or betterAttention to detail, careful observation skills, and willingness to learn from failure are critical traits for success in synthetic organic chemistryAbility to look closely and learn from the unexpected outcome will define success in many cases; that said, the unexpected results have guided our work toward the most interesting branches of our recent cage hydrocarbon workWillingness to clearly and consistently communicate is importantAbility to ask (good) questions Curiosity and commitment to time-consuming lab work

Applicant Preferences: The successful student applicant will meet most of the requirements above. Motivation and drive, as well as commitment and deep interest in organic chemistry are, however, the most important factors to success in a synthetic organic laboratory.

Specific Time considerations/conflicts: Group meeting times will be mandatory. The group schedules those usually in the evening to ensure that every group member can attend.

Otherwise, a student participant should be able to spend two (ideally consecutive) afternoons for a minimum of 5 hours each in the laboratory. Furthermore, the successful applicant will participate in group meetings and spend some additional time reading literature.

App ID #: 3058

Mentor: Feng, Hongsong Email: hfeng2@uncc.edu

Title: Assistant Professor

Department: Mathematics and Statistics Klein College of Science

Co-mentor: No

Community engaged research: No

Title: Mathematical AI models for predicting protein-complex interactions

Description: Protein interactions underlie nearly all biological processes, from gene regulation to cellular signaling. Accurately predicting protein-complex interactions—such as protein–protein, protein–ligand, and protein–DNA binding affinities—is a fundamental challenge in computational biology with important implications for drug discovery and disease research. This project focuses on developing mathematically grounded AI models to predict these interaction types efficiently and accurately.The project leverages advanced mathematical theories, particularly Topological Data Analysis (TDA), to model molecular structures and interaction patterns. TDA provides robust descriptors that capture the intrinsic geometric and topological properties of proteins and molecular complexes. Using these descriptors, we will construct low-dimensional embeddings that preserve essential structural information while reducing computational complexity. These embeddings are then integrated with modern AI and machine-learning algorithms to build predictive models for protein–protein, protein–ligand, and protein–DNA binding affinities.

Accepting applications for: Only 150 hours over an academic semester (~10h/wk)

1 positions available

Anticipated Student Learning Outcomes: First, students will develop research skills and gain expertise in mathematical modeling for molecular biology, Python programming, and machine learning for biomolecular data analysis. This experience will prepare them for more advanced scientific research in the future.Second, through participation in the project, students will learn how to conduct research in applied mathematics and explore how mathematics can be applied to real-world challenges.Third, students will have the opportunity to write a scientific research paper, which will strengthen their graduate school applications.

Required training of 20 hours with Description: 1. Training on mathematical modeling of molecular data using available mathematical tools developed in my research group.

2. Learning how to program in python for data processing and analysis.

3. Learning how to build machine learning models using python packages.

Mentoring plan: I expect students to engage in the training and project and work hard. I encourage open communication and value timely feedback from students, whether they are making progress or encountering difficulties. I am always glad to receive emails or Teams messages and am committed to helping students resolve problems in a timely manner. I also encourage students to develop independent thinking and problem-solving skill by learning to utilize online resources like

google, Youtube, or ChatGPT. Students will learn research skill from me, such as python coding, machine learning modeling, research report writing, data analysis, figure drawing for high-quality journals. I am the one whom students will work directly with. I will meet student at least once a week and students only need to present their progress with me. I will provide students sufficient training and support to help them complete a project. A publication can be possible if students make good progresses.

Applicant Requirements: Skills: coding skills or experiences, good writing skills, good communication skills Courses: Calculus I, Calculus II.

Applicant Preferences: Good coding skills. Independent thinking, and good problem-solving ability

Specific Time considerations/conflicts: Weekly office meeting is expected.

App ID #: 3098

Mentor: Mathews, Jay Email: jmathe24@uncc.edu

Title: Associate Professor

Department: Physics and Optical Science Klein College of Science

Co-mentor: No

Community engaged research: No

Title: Ge and GeSn alloys for photonic devices

Description: Germanium (Ge) and germanium-tin (GeSn) alloys are materials that are of interest for use in photonic devices that are compatible and integrable with silicon (Si). These materials can be grown directly on Si, and they are compatible with complementary metal-oxide-semiconductor (CMOS) processing used for fabrication of Si microelectronics. Due to its optical properties, Si cannot be used for detection of light at wavelengths longer than 1200 nm, and it does not have the right band structure for making a laser. Ge and GeSn have been demonstrated to work at wavelengths of 2000 nm and beyond, and both materials have been used to demonstrate lasing on a Si chip. This project involves measuring the optical and structural properties of Ge and GeSn films grown on Si by our collaborators at institutions such as Air Force Research Laboratory, University of Arkansas, or Australia National University.Photoluminescence (PL) spectroscopy is a technique that involves shining laser light on the material and then looking at the spectrum of light that is produced by band edge luminescence in the material. The spectrum and intensity of the PL is dependent on many material properties, including the defects in the material. The student will perform PL measurements on samples that were grown by different growth techniques or have been subjected to different types of thermal processing. The student may also perform other types of optical measurements such as reflection/transmission or spectroscopic ellipsometry, as well as structural characterization techniques such as scanning electron microscopy or atomic force microscopy. The student will gain knowledge of crystalline semiconductor materials and their properties, and they will learn experimental techniques for materials characterization as well as soft skills like written and oral communication. These skills will be directly transferrable to other research or to industry, helping prepare them for their future career as a scientist or engineer. They will work directly with graduate students, one postdoctoral researcher, and the primary investigator Dr. Jay Mathews. This work may lead to publication in a peer-reviewed journal and/or a conference presentation.

Accepting applications for: Either 5 hours or 10 hours per week are acceptable

2 positions available

Anticipated Student Learning Outcomes: The student will gain knowledge of crystalline semiconductor materials and their properties, and they will learn experimental techniques for materials characterization as well as soft skills like written and oral communication. These skills will be directly transferrable to other research or to industry, helping prepare them for their future career as a scientist or engineer. They will work directly with graduate students, one postdoctoral

researcher, and the primary investigator Dr. Jay Mathews. This work may lead to publication in a peer-reviewed journal and/or a conference presentation.

Required training of 2 hours with Description: Students must complete online safety training for lab safety, lasers, and chemical storage. Students working in the cleanroom will undergo additional training from cleanroom staff.

Mentoring plan: The student will work directly with other undergraduate students, graduate students, one postdoctoral researcher, and the primary investigator Dr. Jay Mathews. The student will be expected to give presentations at weekly or biweekly group meetings, and Dr. Mathews will meet with them regularly one-on-one for additional mentoring. Dr. Mathews has had multiple trainings in mentoring students and has mentored 22 undergraduate students in the past. He is committed to helping students navigate the next steps of their career, and he is always available for advice after the student leaves the group.

Applicant Requirements: The most important characteristics are enthusiasm, work ethic, and a willingness to learn new things.

Applicant Preferences: A rising junior or senior Physics major or dual-degree with Physics as one major is preferred.

Specific Time considerations/conflicts: N/A

App ID #: 2733

Mentor: Reitzel, Adam Email: areitze2@charlotte.edu

Title: Professor

Department: Biological Sciences Klein College of Science

Co-mentor: No

Community engaged research: No

Title: Stress response pathways in a coastal invertebrates

Description: This undergraduate research project will investigate how a coastal sea anemone responds to environmental stress, contributing to ongoing work in the Reitzel Lab on the ecology, physiology, and molecular biology of cnidarians. The student will gain hands-on experience with a broad suite of laboratory techniques, beginning with culturing and maintaining healthy anemone populations under controlled conditions. Training in organismal biology will include monitoring behavior, growth, and visible stress indicators in response to changing environmental cues.Building on this foundation, the student will learn core molecular biology methods such as nucleic acid extraction, gene expression assays, and preparation of samples for downstream sequencing or imaging. These tools will be applied to examine how anemones detect and respond to both biotic signals (such as microbial interactions) and abiotic stressors (including temperature and salinity). By integrating organismal observations with molecular data, the student will help characterize the pathways and physiological mechanisms underlying stress responses in this emerging model system.Overall, the project provides comprehensive training in experimental design, data collection, and analysis while contributing new insights into how coastal cnidarians cope with dynamic environmental conditions. This experience will prepare the student for future research in marine biology, genomics, and environmental physiology.

Accepting applications for: Only 150 hours over an academic semester (~10h/wk)

2 positions available

Anticipated Student Learning Outcomes: By the end of this research experience, the student will be able to:Laboratory & Technical SkillsCulture and maintain healthy populations of coastal sea anemones under controlled laboratory conditions.Perform core organismal biology techniques, including behavioral observations, stress-response assays, and organism condition.Execute molecular biology workflows, such as DNA/RNA extraction, PCR, gel electrophoresis, and gene expression analyses.Prepare biological samples for downstream sequencing, imaging, or other analytical platforms.Scientific Reasoning & Experimental DesignDesign and implement experiments to test how biotic (e.g., bacteria cues) and abiotic (e.g., temperature, salinity) factors influence anemone stress responses.Formulate hypotheses grounded in ecological and physiological principles of sea anemone biology.Interpret molecular and organismal data to identify patterns in stress-response pathways.Data Analysis & CommunicationAnalyze and visualize data using appropriate quantitative tools and software. Previous experience with computational biology or high performance computing would be useful but not required.Synthesize findings into written summaries, figures, and oral presentations suitable for lab meetings or the

annual undergraduate research symposia.Connect results to broader ecological and environmental contexts, demonstrating an understanding of how coastal species respond to changing conditions with opportunities to present at public events (Discovery Place, public library).

Required training of 10 hours with Description: The student will complete required biosafety training prior to engaging in research. The student will participate in weekly lab meetings to contribute to other research projects in the lab. Professional development training options will be provided by the Office of Undergraduate Research, the CIPHER Center, and/or the Career Center.

Mentoring plan: The mentoring plan for this undergraduate project emphasizes a team-focused approach as the student becomes an active member of the Reitzel Lab. At the start, the student will be introduced to the lab's research goals, safety expectations, and daily routines while shadowing a more experienced lab member (graduate student or postdoctoral scholar). During these early weeks, they will learn how to culture sea anemones, basic molecular biology techniques, and record observations. The student will be co-mentored by Dr. Reitzel and a current member of the Reitzel lab (graduate student or postdoctoral scholar). The student is expected to attend the weekly 1-hour lab meeting. As the student gains familiarity, mentoring will shift toward developing technical skills in molecular biology, including nucleic acid extraction, PCR, and gel electrophoresis. They will gradually take on independent tasks and meet weekly with their mentor to review progress, troubleshoot challenges, and set short-term goals.Midway through the experience, the student will begin designing a focused experiment on how biotic or abiotic cues influence stress responses for the sea anemone. Dr. Reitzel and the graduate student or postdoctoral scholar will guide them through forming hypotheses, selecting experimental approaches, and planning analyses, while encouraging increasing independence in data collection and interpretation.In the remaining time of the research experience, the student will learn to analyze and visualize data and will receive feedback as they prepare a written summary or presentation of their findings. Throughout the experience, Dr. Reitzel will also support the student's broader professional development by discussing career paths and encouraging participation in lab meetings and seminars.

Applicant Requirements: The main requirement is an interest in engaging with research and the dedication to commit the time. The lab group is very collaborative so a willingness to work in a team is important. Previous experience with either microbiology (through a class) or computational approaches (through a class or otherwise) would be beneficial but not required.

Applicant Preferences: Previous experience with either microbiology (through a class) or computational approaches like bioinformatics, computer science, or mathematical modeling (through a class or otherwise) would be preferred.

Specific Time considerations/conflicts: None

App ID #: 3040

Mentor: Trammell, Susan Email: srtramme@uncc.edu

Title: Professor

Department: Physics and Optical Science Klein College of Science

Co-mentor: No

Community engaged research: No

Title: Enhanced Thermal Imaging (ETI): A New Tool for Surgical Guidance

Description: Surgical procedures rely on imaging tools for pre-operative planning, intraoperative guidance, and post-surgical assessment of healing. Common techniques, such as CT, MRI, Doppler ultrasound, and angiography, are essential for surgical planning but face significant limitations during surgery. These methods often require intravenous dyes, specialized equipment, and skilled technicians to interpret the images, making them impractical for many intraoperative applications. Our lab is developing a new imaging tool to address these challenges: Enhanced Thermal Imaging (ETI). ETI is an infrared (IR) imaging technique (8-10 microns) that uses heat as a contrast agent to detect vascular structures within tissue. While the human body naturally emits thermal infrared radiation, tissues are generally at similar temperatures, making it difficult to distinguish between tissue types in standard thermal images. ETI overcomes this limitation by selectively heating blood vessels to make them visible in thermal images. Tissue is illuminated with a green LED (530 nm), and because blood absorbs green light more strongly than surrounding water-rich tissue at this wavelength, blood vessels heat up by approximately 0.5 °C relative to the surrounding tissue. This selective heating causes blood vessels to appear brighter in thermal images, enabling clearer visualization of vascular structures. We have successfully applied ETI to delineate the margins of solid tumors and assess the reperfusion of skin grafts after surgery. Our current work focuses on designing and testing tissue-mimicking phantoms to develop and validate new imaging protocols. These phantoms are synthetic models (gelatin + additives) engineered to replicate the specific optical and thermal properties of human tissue, providing a controlled environment for system testing. In parallel, we use MATLAB to develop computational models of the Enhanced Thermal Imaging (ETI) process. These simulations of light-tissue interactions are critical for determining the optimal LED parameters, such as intensity and pulse duration, required for successful vessel delineation. Ultimately, this project offers students a unique opportunity to bridge the gap between predictive modeling, physical hardware validation, and real-world clinical application.

Accepting applications for: Either 5 hours or 10 hours per week are acceptable

2 positions available

Anticipated Student Learning Outcomes: Students participating in this research project will gain valuable hands-on laboratory experience, including developing experimental design, data analysis, computational modeling, and technical writing skills. Specifically, students will gain hands-on experience in the design and fabrication of tissue-mimicking phantoms, learning to engineer synthetic models that accurately replicate the optical and thermal properties of human tissue. Through the physical testing of these phantoms, students will develop the skills necessary to

operate the ETI system, execute controlled experimental protocols, and evaluate the efficacy of new imaging methods for vascular visualization. Finally, students will achieve technical proficiency in MATLAB by developing computational models of the ETI process. These simulations of light-tissue interactions are essential for predictive modeling, allowing the student to determine the precise LED parameters, such as intensity and pulse duration, required for successful experimental outcomes. Beyond these technical skills, students will learn to communicate findings effectively and collaborate within a research team. This experience will provide a strong foundation for graduate studies or careers in research, healthcare, and industry.

Required training of 8 hours with Description: Laboratory Safety Training (online modules)

Mentoring plan: Students will work directly with a graduate student mentor who will provide day-to-day guidance and technical support in the laboratory. I will meet with the students as a group during our weekly lab meetings and will also hold individual meetings with each student at least once a week. During lab meetings, students will deliver a brief (5-10 minute) progress report, summarizing their work from the previous week and outlining goals for the upcoming week. These sessions will include reviewing data, troubleshooting experiments, and discussing strategies to achieve research objectives. Students will also be expected to present their findings at the Summer Undergraduate Research Symposium. Those who successfully complete the program are usually listed as co-authors on a conference proceedings paper. Additionally, there may be opportunities for students to continue working in the lab beyond the summer program to further develop their skills and contribute to ongoing projects.

Applicant Requirements: Applicants should have completed PHYS 2101 and 2102 with a grade of C or better to ensure they have a strong foundation in physics principles.

Applicant Preferences: While not required, completion of 3000-level coursework, such as PHYS 3141, would be beneficial, as it may provide additional background information relevant to the research. In addition to coursework, I value students who demonstrate curiosity, a strong work ethic, and the ability to think critically. Applicants should be reliable, motivated to learn, and able to collaborate as part of a research team. Prior laboratory experience is not required but is advantageous. Students should have an interest in developing hands-on skills and engaging in data analysis.

Specific Time considerations/conflicts: Students must be available during normal working hours 9 AM-5 PM to work with graduate students. They may not work in the lab alone after hours.

App ID #: 3043

Mentor: Trammell, Susan Email: srtramme@uncc.edu

Title: Professor

Department: Physics and Optical Science Klein College of Science

Co-mentor: No

Community engaged research: No

Title: Light-Assisted Drying to Enable Room Temperature Storage of Biological Products

Description: The development of biologics including vaccines and protein-based therapeutics is one of the most significant achievements of modern medicine. These products are essential for preventing infectious diseases, treating diseases ranging from cancer to autoimmune conditions, and advancing research through biobanking. However, nearly all biologics are highly temperature-sensitive. To maintain their stability and potency, they must be stored and transported within a strict "cold chain," typically between 2°C and 8°C. Temperature excursions outside this range can lead to degradation. These cold storage requirements are expensive, logistically complex, and particularly burdensome in low-resource settings where refrigeration infrastructure is limited. To address this global challenge, our lab is developing Light-Assisted Drying (LAD), an new processing technique that enables biologics to be stored at ambient temperatures. In the LAD process, a biologic is suspended in a sugar solution. The sample is then irradiated with a near-infrared laser, which selectively heats the water to accelerate drying. As moisture is removed, the sugar forms a solid matrix that "traps" and protects the biologic in a stable state. Once dried, these samples can be stored at room temperature and quickly rehydrated for use when needed. LAD is broadly applicable to a variety of biologics, and our current work focuses on demonstrating this versatility by expanding the types of products tested, including vaccines, large-molecule drugs, and biomanufacturing reagents. Students will learn to process these biologics by operating the near-infrared laser system. They will learn to characterize the resulting sugar matrix using techniques such as polarized light imaging. To evaluate the structure and function of the biologic after processing, students will utilize a suite of analytical tools, including ELISA assays, dynamic light scattering (DLS), and differential scanning calorimetry (DSC). This project provides a comprehensive introduction to biotechnology by bridging the gap between innovative engineering and real-world clinical application.

Accepting applications for: Either 5 hours or 10 hours per week are acceptable

2 positions available

Anticipated Student Learning Outcomes: Students participating in this research project will gain valuable hands-on laboratory experience, including developing experimental design, data analysis, computational modeling, and technical writing skills. Specifically, students will gain hands-on proficiency in operating the near-infrared laser system to LAD process samples. They will utilize polarized light imaging to characterize the formation and stability of the protective sugar matrix. Students will apply dynamic light scattering (DLS) and differential scanning calorimetry (DSC) to assess the structure and perform ELISA assays to determine the functional potency of processed

biologics. Beyond these technical skills, students will learn to communicate findings effectively and collaborate within a research team. This experience will provide a strong foundation for graduate studies or careers in research, healthcare, and industry.

Required training of 8 hours with Description: Laboratory Safety Training (online modules)

Mentoring plan: Students will work directly with a graduate student mentor who will provide day-to-day guidance and technical support in the laboratory. I will meet with the students as a group during our weekly lab meetings and will also hold individual meetings with each student at least once a week. During lab meetings, students will deliver a brief (5-10 minute) progress report, summarizing their work from the previous week and outlining goals for the upcoming week. These sessions will include reviewing data, troubleshooting experiments, and discussing strategies to achieve research objectives. Students will also be encouraged to present their findings at the Undergraduate Research Conference. Those who successfully complete the program are usually listed as co-authors on a conference proceedings paper. Additionally, there may be opportunities for students to continue working in the lab to further develop their skills and contribute to ongoing projects.

Applicant Requirements: Applicants should have completed PHYS 2101 and 2102 with a grade of C or better to ensure they have a strong foundation in physics principles.

Applicant Preferences: While not required, completion of 3000-level coursework, such as PHYS 3141, would be beneficial, as it may provide additional background information relevant to the research. In addition to coursework, I value students who demonstrate curiosity, a strong work ethic, and the ability to think critically. Applicants should be reliable, motivated to learn, and able to collaborate as part of a research team. Prior laboratory experience is not required but is advantageous. Students should have an interest in developing hands-on skills and engaging in data analysis.

Specific Time considerations/conflicts: Students must be available during normal working hours 9 AM-5 PM to work with graduate students. They may not work in the lab alone after hours.

App ID #: 3097

Mentor: Amburgey, James Email: jeamburg@charlotte.edu

Title: Associate Professor

Department: Civil & Environmental Engineering Wm States Lee College of Engineering

Co-mentor: No

Community engaged research: No

Title: Rapid Prototyping and Testing of Water Filters

Description: This project will encourage students to learn "maker skills" in the University's Super Fab Lab and put them to use in the research lab. Students will use equipment such as 3d printers, laser cutters, waterjets, and CNC milling machines to fabricate components and create new types of water filters. The filters will then be performance tested in the research lab for removal of different contaminants of interest. Based on the results, the filters will be redesigned and tested again until performance goals are met. The filters could be used for drinking water, swimming pools, or other water sources where purification is desirable. Students will learn to laboratory equipment like turbidimeters, pH meters, micropipettes, epifluorescent microscopes, pumps, pressure transducers, and digital flow meters.

Accepting applications for: Only 150 hours over an academic semester (~10h/wk)

2 positions available

Anticipated Student Learning Outcomes: Students will learn to use the latest prototyping equipment as well as to perform controlled scientific experiments in the laboratory with state-of-the-art lab equipment.

Required training of 4 hours with Description: Students will complete a basic laboratory safety course and receive individual training on various pieces of prototyping and lab equipment.

Mentoring plan: Students will have 1 on 1 meetings with the mentor to receive feedback on their designs and test results. We will work together to interpret the results and plan next steps.

Applicant Requirements: No prerequisite skills are required, but all students should have a desire to make things and conduct lab experiments.

Applicant Preferences: The abilities to 3d print, draw in CAD, or operate a CNC machine would be desirable.

Specific Time considerations/conflicts: None.

App ID #: 3096

Mentor: Amengonu, Yawo Email: yhameng1@uncc.edu

Title: Teaching Assistant Professor

Department: Electrical and Computer Engineering department Wm States Lee College of Engineering

Co-mentor: No

Community engaged research: No

Title: Design of an Audio-Digital Encoder System to Demonstrate the Effects of Sampling Rate, Quantization Resolution, and Dynamic Range in Audio Signal Conversion

Description: Analog-to-digital conversion is a fundamental process in modern communication, control, and multimedia systems. The quality of a digitally reproduced audio signal depends heavily on several important design parameters, including the sampling rate, quantization resolution, and dynamic range of the analog-to-digital conversion stage. If these parameters are not properly selected, the reconstructed audio signal can suffer from distortion, loss of fidelity, clipping, aliasing, and poor reproduction quality.This project proposes the design and implementation of an audio-digital encoder system that will allow students and users to observe and hear the effects of inadequate signal sampling and poor quantization conditions. The system will take an analog audio signal, condition it for conversion, digitize it using an ADC, reconstruct it using a DAC, and play it back through a speaker. By intentionally varying system parameters, the project will demonstrate how digital audio quality changes under non-ideal conditions. 3. Project GoalThe goal of this project is to design an audio-digital encoder system that demonstrates the effects of:Insufficient sampling of the input audio signalInsufficient resolution of the digital signalPoor dynamic range at the input of the A/D converterThe project is intended to serve as an educational platform for illustrating practical concepts in sampling theory, quantization, and signal conditioning. 4. Project ObjectivesThe main objectives of this project are to:Design a complete signal path for acquiring, digitizing, reconstructing, and reproducing an audio signal.Demonstrate the impact of undersampling on reconstructed audio quality.Demonstrate the effect of low ADC resolution on quantization noise and signal distortion.Demonstrate how poor input dynamic range affects ADC performance, including clipping and low signal utilization.Build a working prototype that allows users to compare audio quality under different conversion settings.Reinforce theoretical concepts from analog and digital signal processing through a hands-on implementation.Design a PCB board for the entire project 5. System DescriptionThe proposed system consists of the following major functional blocks:(a) Audio SourceThe audio source provides the analog input signal to the system. This may be generated from a microphone, mobile device, signal generator, or prerecorded audio source.(b) Signal Conditioning CircuitryThe signal conditioning circuitry acts as the interface between the audio source and the ADC. Its purpose is to prepare the analog audio signal for digitization by providing:amplitude scalingbiasing/level shiftingfilteringimpedance matchingThis stage ensures that the input signal is compatible with the ADC input range and helps avoid distortion or clipping.(c) Analog-to-Digital Converter (ADC)The ADC converts the conditioned analog audio signal into a digital signal. This stage will be used to demonstrate the consequences

of:low sampling frequencylow bit resolutionpoor input range utilization(d) Digital-to-Analog Converter (DAC)The DAC converts the digital signal back into an analog waveform so that the effects of the conversion process can be evaluated through playback.(e) Low-Pass Filter and Audio AmplifierThe low-pass filter smooths the reconstructed signal from the DAC and removes unwanted high-frequency components introduced during reconstruction. The audio amplifier increases the signal power to a level suitable for driving a speaker.(f) SpeakerThe speaker converts the reproduced analog signal into sound that can be heard by the end user, allowing direct comparison between the original and reconstructed audio. 6. Proposed MethodologyThe project will be carried out in several stages:Stage 1: System DesignDevelop the overall system architecture and block diagram.Select the audio source, ADC, DAC, amplifier, and speaker components.Determine operating voltage levels and interface requirements.Stage 2: Signal Conditioning DesignDesign the front-end signal conditioning circuit.Ensure proper scaling of the audio signal to match the ADC input range.Include filtering and biasing as needed.Stage 3: Digital Conversion and ReconstructionImplement ADC sampling of the conditioned audio signal.Store or process the resulting digital signal.Reconstruct the signal using a DAC.Stage 4: Demonstration of Key EffectsThe system will be configured to demonstrate the following cases:Insufficient sampling rate: show aliasing and reduced waveform fidelity.Insufficient bit resolution: show increased quantization noise and stair-step distortion.Poor dynamic range: show weak signal usage or clipping when the input amplitude is not properly matched to the ADC range.Stage 5: Testing and EvaluationCompare original and reconstructed signals using plots and listening tests.Evaluate time-domain waveforms and spectral effects where possible.Document the observed relationship between system settings and output audio quality. 7. Expected OutcomesAt the completion of this project, the following outcomes are expected:A working audio-digital encoder and reproduction system.Practical demonstration of sampling and quantization effects.Clear examples of aliasing due to undersampling.Audible and visible evidence of distortion caused by low bit resolution.Demonstration of how poor dynamic range reduces system performance.A useful educational platform for teaching audio signal conversion concepts.

Accepting applications for: Either 5 hours or 10 hours per week are acceptable

2 positions available

Anticipated Student Learning Outcomes: This project is valuable because it connects theoretical signal processing concepts to real-world implementation. Students will learn about the Nyquist sampling theorem, quantization, and dynamic range in a mathematical setting. This project provides a direct physical and audible demonstration of these principles. It therefore serves as an effective laboratory and teaching tool in courses related to:signals and systemsdigital signal processingembedded systemsanalog and digital electronicsinstrumentation and measurement

Required training of 0 hours with Description: There is no training necessary

Mentoring plan: I will work with the students in my lab weekly to first develop a conceptual design, the design of each subsystem and how to interconnect subsystems to make up the overall system. At the completion of this project, the following outcomes are expected:A working audio-digital encoder and reproduction system.Practical demonstration of sampling and quantization effects.Clear examples of aliasing due to undersampling.Audible and visible evidence of distortion

caused by low bit resolution.Demonstration of how poor dynamic range reduces system performance.A useful educational platform for teaching audio signal conversion concepts.

Applicant Requirements: Students must be an ECE major who has completed Circuit Analysis II (ECGR 2112) before Fall 2026 and may have some PCB design experience.

Applicant Preferences: Junior standing with a recorded grade in Signals and Systems at the time of the application.

Specific Time considerations/conflicts: No conflicts

App ID #: 3093

Mentor: Berez, Jaime Email: jberez@charlotte.edu

Title: Assistant Professor

Department: Mechanical Engineering and Engineering Science Wm States Lee College of Engineering

Co-mentor: No

Community engaged research: No

Title: Novel 3D printed instructional tools for geometric dimensioning and tolerancing

Description: Geometric dimensioning and tolerancing (GD&T) is a system of syntax (symbols, terminology) and semantics (rules, guidance, conditions) that is used to create rigorous engineering drawings that fully define the geometrical specifications for a component. GD&T requires strong spatial reasoning skills to comprehend the three-dimensional shapes, tolerance zones, and geometrical errors that make up the fundamentals of this complex topic. Typically, these skills are difficult to teach and learn. The objective of this research project is to develop physical demonstration tools that embody GD&T concepts and assist instructors in explaining those concepts to students. Rapid prototyping tools, such as 3D printing, will be utilized to make these demonstrators. Other objectives include the documentation of all teaching tools (CAD files, 3D printing files, accompanying explanations, etc.) in a manner that can support open-source deployment of them. Methods for assessing the effectiveness of teaching tools will also be designed. The student researcher will assist in developing these demonstrators using a variety of rapid prototyping tools in the lab. They will also be expected to help generate new ideas for related tools.

Accepting applications for: Only 150 hours over an academic semester (~10h/wk)

1 positions available

Anticipated Student Learning Outcomes: Students will gain experience working in a research lab setting. They will learn good project management and communication skills through weekly progress reports. They will gain experience working a variety of cutting-edge technologies including manufacturing systems, characterization instruments, and metrology equipment. They will develop skills in computer aided design, parametric modeling, mechanical design, and rapid prototyping.

Required training of 0 hours with Description: Students will receive training on an as-needed basis depending on the parameters of the project that they develop during the first stage of on-boarding. Training will include hands-on training for use of specialized equipment by the faculty member or another expert user as well as targeted instruction on the use of relevant software packages.

Mentoring plan: Students will have weekly in-person meetings with the faculty member. Further ad-hoc meetings to conduct training, assist in research tasks, etc. will also be conducted. Students will work with the faculty member to develop a "Research Expectations" plan at the beginning of the work period where milestones, deliverables, and a timeline are collaboratively developed and

required assistance from the faculty member is identified. The student will also be introduced to other students in the lab in order to facilitate a collaborative work environment.

Applicant Requirements: Interest in research-based inquiry into manufacturing and metrologyProfessional work ethic and good organizational/communication skillsSecond year status or higher standing (as of Fall 2025) at UNC Charlotte with a major in mechanical engineering, mechanical engineering technology, or a related area

Applicant Preferences: Experience with CAD, 3D printing, rapid prototyping, machining, and similar practicesExperience using GD&T in industrial settings

Specific Time considerations/conflicts: General availability for in-person work during standard weekday working hours, e.g., 9-5 M-F (not including class) is required so that the student may have a weekly meeting with the adviser, attend weekly lab meetings, and schedule independent research.

App ID #: 3041

Mentor: Chen, Gongfan Email: gchen12@charlotte.edu

Title: Assistant Professor

Department: Department of Engineering Technology and Construction Management
Wm States Lee College of Engineering

Co-mentor: No

Community engaged research: No

Title: Investigating Edge AI Applications to Support Informed Construction Jobsite Decision-Making

Description: Generative artificial intelligence (GenAI) has rapidly transformed the world over the past few years, and the construction industry is beginning to see significant opportunities as well. However, a major challenge lies in the practical use of GenAI tools, such as large language models (LLMs) and vision-language models (VLMs), which require substantial computing resources, cloud connectivity, and Internet access. These models are extremely large, energy-intensive, and not always compatible with field conditions. In construction projects, particularly in rural or remote areas, reliable Internet access and advanced computing infrastructure are often unavailable. As a result, applying GenAI tools in real time on jobsites remains far from reality. This project aims to address that challenge by developing an edge computing–powered framework capable of running construction-specific language models in real time without dependence on Internet services or external infrastructure. The aim is to provide jobsite construction workers with a personalized physical AI assistant that leverages construction-specific knowledge to collaboratively support their decision-making. Dr. Gongfan Chen is seeking to mentor a promising undergraduate researcher to help design and test a prototype of edge AI that can be deployed directly on construction sites to support real-time decision-making.

Accepting applications for: Either 5 hours or 10 hours per week are acceptable

1 positions available

Anticipated Student Learning Outcomes: The expected learning outcomes for the student on this project include the following: Critical Thinking development by gathering and analyzing information from a diverse set of sources to fully understand a problem. Communication development by asking questions, seeking feedback, providing feedback appropriately to seek guidance and informing others of your needs and progress during the research process. Professionalism development by prioritizing and completing tasks to accomplish goals within the broader research environment.

Required training of 5 hours with Description: The student will receive training on how to use Generative AI tools, and python as

part of the research process.

Mentoring plan: Dr. Chen will have regular weekly project update meetings that are scheduled based on the team's availability during the period of performance for the project. The specified

project tasks will be performed based on the project schedule. The student will get the opportunity to practice their professional communication skills with weekly, in-person presentations based on aforementioned aspects to report on task completion updates, action items, and discuss questions.

Applicant Requirements: The student should be familiar with general generative AI tools (e.g., ChatGPT), possess strong oral and written communication skills, and demonstrate a genuine passion for research.

Applicant Preferences: Students with proficiency in Python programming and embedded system are desired and would be strongly considered. Training can be provided to students who are willing to learn.

Specific Time considerations/conflicts: The student must be available to meet in person for up to 1 hour for research team meetings

App ID #: 3042

Mentor: Chen, Gongfan Email: gchen12@charlotte.edu

Title: Assistant Professor

Department: Department of Engineering Technology and Construction Management
Wm States Lee College of Engineering

Co-mentor: No

Community engaged research: No

Title: Investigating the Role of Multimodal AI in Supporting Engineering Plan Reading for Undergraduate Education

Description: Engineering plan reading is a fundamental skill for engineers because it serves as the primary means of communication between design and construction. Accurate interpretation of drawings ensures that projects are built as intended, reducing errors, delays, and safety risks. For undergraduate students, developing strong plan reading skills builds spatial reasoning, problem-solving ability, and professional readiness, making it a cornerstone of engineering education. Interpreting the different aspects of engineering plan readings often requires years of on-site experience. For senior professionals, this knowledge gradually becomes a form of "muscle memory," shaped by case-specific situations and accumulated practice. However, acquiring such expertise is costly and impractical to replicate for daily teaching in higher education settings. Recently, multimodal AI has advanced significantly, with the ability to process and understand multiple forms of input such as images, audio, and video. Preliminary findings from our pilot study indicate that multimodal AI is capable of interpreting certain aspects of engineering plan drawings. This research seeks to explore the potential of multimodal AI in supporting undergraduate students as they learn to interpret engineering drawings. Dr. Gongfan Chen is seeking to mentor a motivated undergraduate researcher to investigate students' learning experiences with multimodal AI in plan reading. The student's primary responsibilities will include conducting focus interviews, organizing and analyzing data, and contributing to reports or research papers.

Accepting applications for: Either 5 hours or 10 hours per week are acceptable

1 positions available

Anticipated Student Learning Outcomes: The expected learning outcomes for the student on this project include the following: Critical Thinking development by gathering and analyzing information from a diverse set of sources to fully understand a problem. Communication development by asking questions, seeking feedback, providing feedback appropriately to seek guidance and informing others of your needs and progress during the research process. Professionalism development by prioritizing and completing tasks to accomplish goals within the broader research environment.

Required training of 5 hours with Description: The student will receive training on how to use Generative AI tools, and python as part of the research process.

Mentoring plan: Dr. Chen will have regular weekly project update meetings that are scheduled based on the team's availability during the period of performance for the project. The specified project tasks will be performed based on the project schedule. The student will get the opportunity to practice their professional communication skills with weekly, in-person presentations based on aforementioned aspects to report on task completion updates, action items, and discuss questions.

Applicant Requirements: The student should be familiar with general generative AI tools (e.g., ChatGPT), possess strong oral and written communication skills, and demonstrate a genuine passion for research.

Applicant Preferences: Students with proficiency in generative AI tools and data analysis skills are desired and would be strongly considered. Training can be provided to students who are willing to learn.

Specific Time considerations/conflicts: The student must be available to meet in person for up to 1 hour for research team meetings.

App ID #: 3014

Mentor: Chen, Xiang Email: xchen50@charlotte.edu

Title: Assistant Professor

Department: MEES Wm States Lee College of Engineering

Co-mentor: No

Community engaged research: No

Title: Predicting cryogenic thermal boundary conductance using atomistic modeling

Description: Thermal management in next-generation quantum and superconducting devices is increasingly limited by heat dissipation across solid-solid interfaces at cryogenic temperatures. Traditional models fail to capture the interplay between internal electronic state transitions, lattice defects, and non-local ballistic transport. This project will deliver an atomistic study of thermal conduction across metal/dielectric interface at cryogenic temperature using atomistic simulations. The work will quantify spectrally resolved interfacial resistances, evaluate oxide thickness and chemistry, and assess how nanoscale features influence overall conductance. The participating undergraduate will be trained in high-performance computing and MD simulations to (i) evaluate heat transport across interfaces under varying conditions and (ii) analyze how electron–phonon coupling alters phonon transmission and thermal boundary conductance. These simulations and spectral post-processing are expected to contribute to a journal manuscript or conference presentation.

Accepting applications for: Either 5 hours or 10 hours per week are acceptable

2 positions available

Anticipated Student Learning Outcomes: Students will be able to learn the usage of high-performance computing and atomistic simulations. They will gain experience working in the cutting-edge interdisciplinary field of energy, material science, nanoscience, and mechanical engineering. They will develop skills in analyzing simulation results with tools such as MATLAB and OVITO. They will also have the chance to exercise their prior knowledge on heat transfer in materials and gain a new understanding of that from a microscopic perspective.

Required training of 6 hours with Description: Students will receive roughly three two-hour trainings conducted by the advisor and assisted by the graduate students, with an access to the UNCC high-performance computing center. After the initial training, the students will get continuous training while working on the project through group meetings and one- on-one meetings with the advisor and the graduate student mentor.

Mentoring plan: The student will receive hands-on trainings on accessing high-performance computing and conducting atomistic simulations. After the initial training, the student will meet with the advisor to develop weekly plan and major milestones to be accomplished, as well as the deliverables and research expectations. The student will have weekly in-person meetings with the advisor. The student will also participate in the regular lab group meeting to be exposed to a collaborative work environment and other cutting-edge research topics.

Applicant Requirements: Interest in nanoscience, physics, computer programing, and simulations.Interest in reading cutting-edge research papers.

Applicant Preferences: Proficiency in MATLAB, Python, or a similar programming language.Fundamental knowledge of material science such as crystal structures.

Specific Time considerations/conflicts: Weekly group meetings (Dates/times TBD)

App ID #: 3048

Mentor: Deeba, Farah Email: fdeeba@charlotte.edu

Title: Assistant Professor

Department: Electrical and Computer Engineering Wm States Lee College of Engineering

Co-mentor: No

Community engaged research: No

Title: From Pixels to Prognosis: Using Deep Learning to Explore Placenta Pathology

Description: The placenta plays a critical role in supporting a healthy pregnancy, yet many complications arise from subtle structural changes that are difficult to quantify using traditional pathology methods. This project aims to develop an artificial intelligence (AI) pipeline to analyze digitized placental histology slides and automatically identify patterns associated with healthy and abnormal tissue. Using deep learning and image analysis, we will detect and classify individual cells, segment tissue regions (such as healthy versus infarcted areas), and quantify structural organization across the entire slide. Undergraduate students will contribute directly to building and testing this computational pipeline. Their responsibilities may include annotating histology images, assisting with data preprocessing, implementing and evaluating machine learning models in Python, extracting quantitative features, and visualizing results. Students will gain hands-on experience in biomedical image analysis, machine learning, and research methodology while contributing to a project that advances our understanding of pregnancy health and AI-driven diagnostics.

Accepting applications for: Either 5 hours or 10 hours per week are acceptable

1 positions available

Anticipated Student Learning Outcomes: Understand the biological and clinical context.Students will develop foundational knowledge of placental structure and function, common pregnancy complications, and how tissue-level changes relate to clinical outcomes. They will learn how pathology slides are prepared and interpreted, and why quantitative analysis is important for improving reproducibility in medicine.Develop technical skills in biomedical image analysis.Students will learn how whole slide histology images are structured and how to preprocess large-scale image data. They will gain practical experience with image annotation, segmentation, nuclei detection, and cell classification using Python-based tools. Students will understand how deep learning models are trained, validated, and evaluated.Apply machine learning in a real-world research setting.Students will implement and test computational models for detecting and classifying tissue features. They will learn to evaluate model performance using appropriate metrics, interpret results, and identify sources of bias or error. This will strengthen their ability to move from classroom theory to applied research.

Required training of 5 hours with Description: Project Introduction Sessions: Students will attend initial meetings to learn the biological context of placental pathology, research goals, and the overall approach. They will review foundational literature with their mentor to understand the

scientific and clinical significance of the project. Students will receive step-by-step instruction in the tools and methods used in this project, including Python programming basics for image analysis, use of annotation software for histology slides, and introductory machine learning workflows.

Mentoring plan: Mentoring structure and direct supervision.The student will work within my research group (QUEST: Quantitative Ultrasound: Enhancing Soft Tissue Imaging). I (the faculty PI) will provide overall direction, help the student connect daily tasks to the broader scientific goals, and monitor progress and learning. Day-to-day guidance will be provided by a designated graduate student or senior undergraduate mentor who is already familiar with the project's datasets, software tools, and workflow. This structure ensures the student has frequent support while also receiving faculty-level mentorship focused on research thinking, professional development, and long-term growth.The student can expect consistent contact throughout the semester:Weekly 1:1 check-in (30 minutes) with the graduate mentor (or me, depending on the project phase) to review progress, troubleshoot barriers, and plan the next week's tasks.Biweekly 1:1 meeting with me (20–30 minutes) to discuss learning goals, research direction, and how their work fits into the bigger picture (placenta pathology, pregnancy health, and AI-enabled diagnostics).Weekly group meeting attendance to build a sense of community, learn from peers, and develop scientific communication skills.Outside meetings, the student will have an established communication channel (e.g., Slack/email) for quick questions. Onboarding and early success plan.The first 2–3 weeks will focus on building confidence and momentum. The student will receive a structured onboarding plan that includes: (1) a project overview and biological background of placental tissue and why it matters; (2) a guided introduction to tools used in the project (Python environment, basic image handling, version control, and annotation software); and (3) small, achievable starter tasks with clearly defined deliverables. Defined responsibilities and progressive independence.The student's responsibilities will be matched to their preparation level and will increase in complexity over time. Typical duties may include:Assisting with data organization and preprocessing for whole slide histology images (WSIs).Supporting annotation and quality control, such as labeling regions of interest or reviewing nuclei detections with supervision.Implementing or refining analysis code (e.g., running pipelines, testing model settings, documenting results).Producing visualizations and summary statistics that help interpret tissue patterns.Maintaining careful documentation of methods, parameters, and results to support reproducible research.As skills grow, the student will take ownership of a small sub-project (for example, evaluating model performance on a subset of slides, developing a quality-control dashboard, or comparing two approaches for nuclei detection). The expectation is that the student will become increasingly independent while still receiving regular feedback and support.Feedback, accountability, and skill development.To help the student stay on track, we will use a simple and transparent progress system:At the start of each week, we will agree on 2–3 specific goals (deliverables).The student will maintain a short research log (what they tried, what worked, what didn't, questions for next time).In meetings, we will focus on both results and process: how to debug, how to interpret unexpected outcomes, and how to make decisions based on evidence.I will provide timely feedback on work products (code, figures, short summaries) and will explicitly teach "research habits" such as how to break down a large problem, run controlled experiments, evaluate results honestly, and document work for others to reproduce.Expectations for group meetings and presentations.The student is expected to attend group meetings and will be encouraged to participate actively. Presentations will be designed to be

supportive rather than intimidating:Early in the semester, the student may give a short informal update (2–3 slides) on what they learned and what they are working on.By the end of the semester, the student will give a final presentation to the group summarizing their contribution, results, and next steps. Conferences and dissemination.If the student's work reaches a strong milestone (e.g., a validated analysis, a clear dataset contribution, or a new method improvement), I will encourage dissemination. This may include presenting at an undergraduate research showcase, contributing to a poster, or being included in a future abstract/paper depending on the scope and quality of their contribution. I will discuss authorship and credit transparently, following clear expectations for contribution and documentation.Commitments I make to support student success.Students can expect the following from me during this research experience:A structured, welcoming onboarding with clear expectations and achievable early tasks.Regular, predictable mentoring contact.A supportive environment where questions are encouraged and mistakes are treated as part of learning.Professional development support, including guidance on research communication, next opportunities, and (when earned) support for presentations or recommendation letters.

Applicant Requirements: I am looking for an undergraduate student who is curious, reliable, and excited to learn research skills at the intersection of biomedical imaging and artificial intelligence. The most important qualifications are strong motivation, consistency, and willingness to work through challenging problems with guidance. Critical for success (must-have):Interest in biomedical research and health-related applications, especially women's health, imaging, or AI in medicine.Strong attention to detail and organization, since the project involves large images, annotations, and careful data handling.Willingness to learn and take feedback, including debugging code, revising analyses, and improving documentation.Dependability and time management, including the ability to meet weekly deadlines and communicate early if obstacles arise.

Applicant Preferences: Helpful background (preferred but not required):Prior exposure to Python programming (e.g., through coursework or self-learning).Coursework in intro programming, data science, machine learning, image processing, signals and systems, biomedical engineering, or related ECE/CS courses.Familiarity with tools such as Jupyter notebooks, basic Git/version control, or working with datasets (even from class projects).Comfort reading and interpreting basic technical material (tutorials, documentation, or short research papers).Who should apply (encouraged):Students from Electrical and Computer Engineering, Computer Science, Data Science, or related majors are encouraged.

Specific Time considerations/conflicts: Students must be available for the following weekly research group meeting (typically 1 hour; day/time determined at the start of the semester based on group availability).

Students should also be able to dedicate consistent weekly research hours (approximately 5–10 hours per week, depending on program expectations). While most work can be done remotely, occasional in-person meetings on campus may be required for onboarding and group meetings.

App ID #: 3056

Mentor: Gao, Zheming Email: zgao7@charlotte.edu

Title: Assistant Professor

Department: Department of Industrial and Systems Engineering; Center for Biomedical Engineering and Science Wm States Lee College of Engineering

Co-mentor: No

Community engaged research: No

Title: Interpretable Machine Learning for Progression Analysis: From Mild Cognitive Impairment to Alzheimer's Disease

Description: This research project seeks to develop novel machine learning models, specifically SVM for the early detection of prodromal dementia, an intermediate stage before full AD. The project will use data from the Alzheimer's Disease Neuroimaging Initiative (ADNI), which provides a large, curated collection related patient information for academic research.Introduction Alzheimer's disease is a progressive brain disorder that destroys memory, cognitive ability, and ultimately the capacity to perform basic daily tasks. First identified by Dr. Alois Alzheimer in 1906, the disease has become one of the most pressing public health challenges of our time. Despite decades of research, the exact causes remain unclear, and definitive diagnoses often occur late, after irreversible damage has already occurred. Since MCI is widely recognized as a prodromal stage of AD, accurate prediction of MCI progression is crucial. Research shows that 10% to 15% of MCI cases progress to Alzheimer's annually, underscoring the urgent need for early detection tools that can help guide treatment, improve patient outcomes, and reduce healthcare costs.Machine learning and artificial intelligence provide promising tools for modeling disease progression. Predictive models trained on neuropsychological assessments, demographic variables, and other clinical features have demonstrated potential in identifying individuals at high risk. However, several major challenges remain in the limited sample size, high-dimensional features, the data uncertainty such as measurement errors and missing values. Moreover, many high-performing models function as black boxes, which lack of interpretability and limits clinical trust and adoption. To address these challenges, this project proposes interpretable SVM models tailored for small-sample, high-dimensional clinical datasets. By integrating statistical learning theory with advanced optimization techniques, we will develop interpretable SVM variants that incorporate robustness against data uncertainty and identify significant predictive features and interaction effects. The research shifts the focus from purely biomarker-driven discovery to data-driven risk modeling grounded in statistical rigor. Ultimately, this work aims to provide reliable and interpretable predictive tools for MCI progression, supporting earlier interventions and improving quality of life for patients and their families. Research Plan and Student ContributionsThe project is organized into the following steps:Data Preparation and Exploration: Clean and preprocess the longitudinal MCI data from the ADNI database. Implement descriptive statistical analysis on the data.Model Development: Model the progression with SVM while considering the low data quality.Validate models using the ADNI data and perform statistical and computational analysis to evaluate accuracy, robustness, and efficiency.Undergraduate students will actively contribute to each of

these phases. Their tasks may include writing scripts for data preprocessing, running model training and testing, analyzing results with statistical tools, and helping to prepare visualizations and figures for research dissemination. This hands-on work will give students experience in AI programming, data science workflows, and biomedical applications of machine learning.Tentative Timeline (16 weeks)Weeks 1–2: Data retrieval, cleaning, and initial exploration.Weeks 3–10: Model construction, theoretical investigation, and initial computational experiments.Weeks 11–13: Comprehensive testing, validation, and statistical performance analysis.Weeks 14–16: Drafting research manuscripts and preparing materials for presentation. Nature of this projectThis project indeed integrates mathematics, engineering, computer science, and biomedical research. It combines methods from optimization, machine learning, and image analysis with applications in healthcare industry. Students will experience how engineering tools can be applied to solve pressing problems in healthcare. Although this project has no direct community engagement, it addresses a critical public health issue with societal impact, and results may eventually benefit patient communities and healthcare providers.

Accepting applications for: Either 5 hours or 10 hours per week are acceptable

2 positions available

Anticipated Student Learning Outcomes: Students participating in this project will gain a broad set of technical, analytical, and professional skills:Teamwork and Communication: By collaborating with graduate students and Dr. Gao, undergraduates will practice working in research teams, presenting ideas, and communicating results effectively.Mathematical and Analytical Skills: Students will engage with the theoretical foundations of machine learning and optimization, strengthening their mathematical background and problem-solving abilities for future engineering or data science challenges.Programming and Technical Competency: Through Python programming, students will implement machine learning models, handle multimodal datasets, and gain fluency in widely used tools for AI and data science.Domain-Specific Knowledge: Students will learn to process and analyze MRI brain images, providing them with valuable experience in biomedical data science, which is a skillset increasingly sought after in healthcare, AI, and research careers.Research and Professional Development: Students will contribute to the preparation of journal and conference publications, gaining academic writing and presentation experience that will strengthen graduate school and job applications.After completing the project, students will be able to describe their experience as one where they applied AI methods to real-world health problems, developed technical and teamwork skills, and contributed to advancing dementia research. These outcomes align well with NACE career readiness competencies such as critical thinking, digital technology, teamwork, and professional communication.

Required training of 8 hours with Description: Since this is a machine learning–related project, students are expected to have basic knowledge of machine learning concepts, particularly regression, LASSO and SVM models. Participants should also be familiar with basic knowledge in statistics and probability. The research data will be obtained from ADNI. Students will be responsible for clearning, processing and analyzing the MCI data during the study.

The training is structured in two main parts:

1) Data Preparation and Handling: Gain hands-on experience in cleaning and preprocessing the MCI data. This part of the training will be conducted under the guidance of graduate students supervised by Dr. Gao.

2) Modeling Knowledge and Applications: Acquire background knowledge of regression models and SVMs. Engage in directed readings, including selected recently published research papers, machine learning textbooks, and tutorials.

Through this onboarding process, students will build a strong foundation in both the technical skills (programming, data processing, algorithm implementation) and the conceptual understanding (machine learning theory, biomedical applications) needed to contribute meaningfully to the project.

Mentoring plan: This project will be supervised by Dr. Zheming Gao, faculty member in the Department of Industrial and Systems Engineering at UNC Charlotte. Dr. Gao specializes in machine learning and optimization, with ongoing research in applications in healthcare field. Undergraduate students will have the opportunity to work directly under Dr. Gao's guidance, gaining hands-on experience with machine learning methods while contributing to AI powered healthcare.Dr. Gao's research group fosters a collaborative and supportive environment where students are encouraged to take initiative while receiving consistent guidance. Research resources, including access to a high-performance computing environment, relevant literature, and dedicated workspace, will be available to all students.Supervision and SupportStudents will work directly under the supervision of Dr. Gao, with additional day-to-day support from Ph.D. students in the lab. Graduate mentors will be available to answer technical questions related to data processing, coding, and model implementation. Students are encouraged to work in the lab during scheduled hours to promote active engagement with peers and mentors.Meetings and CommunicationStudents will attend a weekly group meeting every Friday to present updates, share challenges, and receive feedback on their progress. Regular communication will also occur via email, and students are welcome to schedule additional one-on-one meetings as needed. Professional DevelopmentAs part of the research, students will have the chance to contribute to the preparation of a research manuscript and are expected to participate in at least one conference presentation, such as a poster session at the IISE or INFORMS annual meeting. This experience will expose students to professional research communities and provide opportunities for networking and career development.Evaluation and Future OpportunitiesStudent performance will be evaluated jointly by Dr. Gao and collaborating Ph.D. mentors, with attention to both research contributions and professional growth. Students who demonstrate strong performance will receive personalized recommendation letters to support graduate school or career applications. High-performing students will also be given priority consideration for future research opportunities within Dr. Gao's group.

Applicant Requirements: Ideal applicants are sophomore or junior students from the College of Engineering or the College of Science who demonstrate intellectual curiosity, reliability, and strong time management skills. Students should be eager to learn new methods and tools, willing to collaborate with graduate mentors and peers, and motivated to apply artificial intelligence techniques to meaningful real-world health challenges. The requirements on applicants are listed

as follows.Required Skills, Courses, or ExperiencesCompletion of Calculus (engineering level).Knowledge in matrix operations and linear algebra.Knowledge in probability and statistics.Experience in Python, R or MATLAB. 2. Availability and SchedulingStudents are expected to attend Dr. Gao's weekly research group meeting (time to be determined). They will also be provided with a workspace in Dr. Gao's lab to conduct independent research and collaborate with peers. To ensure smooth progress, students are required to respond promptly to emails and maintain consistent communication with Dr. Gao and graduate mentors.

Applicant Preferences: Recommended or Preferred Skills and Experiences:Prior coursework, knowledge or project-experience in machine learning.Familiarity with mathematical programming / optimization methods.Strong ability in mathematical and statistical derivations.

Specific Time considerations/conflicts: No conflicts. The group meeting time will be scheduled based on the availability of all team members.

App ID #: 3105

Mentor: Gonzalez-Calderon, Carlos Email: cgonza60@uncc.edu

Title: 801498310

Department: Civil and Environmental Engineering Wm States Lee College of Engineering

Co-mentor: No

Community engaged research: No

Title: Freight Safety Corridors in Charlotte: An Open-Data Atlas of Truck-Involved Severe Crashes

Description: Large trucks are essential for moving goods, but truck-involved crashes—especially severe and fatal crashes—can create disproportionate safety burdens on certain corridors and communities. Transportation agencies and local partners often need quick, practical ways to identify where truck-related severe crash risk concentrates, why it concentrates (e.g., interchange friction, complex merges/weaves, high-speed differentials, grades, access points to logistics clusters), and what countermeasures are most feasible to consider next. However, many safety analyses require specialized datasets, extensive manual processing, or tools that are hard to replicate.This undergraduate research project will build a screening-level, open-source, open-data workflow to create a Freight Safety Atlas for the Charlotte–Mecklenburg region. Instead of producing only "hotspot dots," the project will define and prioritize High-Risk Freight Safety Corridors (corridor segments where truck-involved severe crash burden is elevated), generate clear GIS-based maps and corridor rankings, and produce short "corridor fact sheets" that summarize patterns and plausible mechanism types (e.g., interchange/merge conflicts, stop-and-go shockwaves, ramp density, access to freight generators). The student will help assemble public datasets, create a reproducible corridor segmentation workflow, compute safety burden indicators, and support communication products (maps, figures, and a short technical summary) that can be updated and expanded in the future.This project is designed as a practical, hands-on introduction to research at the intersection of transportation safety, freight systems, and data-driven decision support. No prior research experience is required—training and support will be provided.

Accepting applications for: Either 5 hours or 10 hours per week are acceptable

2 positions available

Anticipated Student Learning Outcomes: Students participating in the project will have practical, resume-ready skills and a clear understanding of how transportation system design and operations relate to safety outcomes. By the end of the program, students will be able to:Translate a real-world safety problem into research tasks (define the question, identify needed data, choose appropriate methods, and specify deliverables).Work with messy, real-world datasets and turn them into research-ready files through cleaning, organization, and documentation.Build a reproducible GIS/data workflow (clear folder structures, metadata, version control or structured saving practices) so work can be shared and repeated.Create corridor-level safety measures relevant to truck-involved crashes (e.g., severe crash counts/rates by segment, proxy exposure measures, and simple uncertainty/confidence labels).Produce clear, publication-quality maps and figures with appropriate legends, captions, and narrative framing.Develop applied understanding of freight

safety concepts, such as why severe crash risk can concentrate near interchanges, bottlenecks, freight generators, and complex access environments.Strengthen communication skills by writing short methods summaries, explaining assumptions/limitations, and presenting results in a final poster or slides at the end-of-term symposium.

Required training of 2 hours with Description: Students will begin with a structured onboarding in the first week that covers project goals, expectations, responsible research practices, and data handling. The student will complete a compliance check through UNC Charlotte's Office of Research Protections and Integrity (ORPI) using the required questionnaire. Based on ORPI determination, the student will complete any required modules. Once compliance requirements are satisfied, the student will complete a short technical bootcamp (GIS basics, data cleaning, documentation, and reproducible workflow practices) and set up the project workspace (organized folders, a data dictionary, and a simple "how to run" README). Training continues throughout the summer through weekly mentoring meetings and short, targeted skill sessions as needed (e.g., map design, corridor segmentation, interpretation of safety metrics).

Mentoring plan: I will mentor the student through a structured, supportive research experience designed for novice researchers. At the beginning of the term, we will complete an onboarding that introduces the project goals, clarifies expectations, and provides initial training in the tools and workflows the student will use (GIS, basic data analysis, documentation, and responsible data handling). The student will receive a simple project roadmap with weekly milestones and examples of what strong deliverables look like (e.g., a cleaned dataset, a draft map, a short methods summary), so they always know what to work on and how success will be assessed.During the program, the student will work directly with me as the primary mentor and can expect consistent contact: a standing weekly mentoring meeting focused on progress, problem-solving, and skill-building, plus an additional weekly work session/office-hour block for hands-on troubleshooting and feedback. I will scaffold the work so the student builds confidence quickly—starting with clearly defined tasks and moving toward greater independence as skills develop. The student will submit brief weekly progress updates, and I will provide timely, specific feedback on maps, analysis outputs, and research communication. The student will also practice presenting their work in short updates during our meetings and will be coached to prepare a polished poster or slide presentation for the OUR symposium.

Applicant Requirements: I am looking for an undergraduate student who is genuinely interested in how transportation systems and freight movement affect safety in Charlotte, and who is excited to learn through a hands-on research experience. Prior research experience is not required; what matters most is reliability, strong organization, and a willingness to learn new tools and follow a structured workflow. The ideal student is comfortable working with data (even at a basic level), can communicate clearly through brief progress updates, and is open to feedback and teamwork. Familiarity with GIS (QGIS/ArcGIS), spreadsheets, introductory statistics, or basic Python/R is helpful but not necessary—training and support will be provided. Students from a wide range of majors are encouraged to apply, including engineering, data science, geography/GIS, public health, environmental studies, computer science, statistics, and related fields.

Applicant Preferences: While prior research experience is not necessary, I will give preference to students who show strong interest in transportation safety, freight systems, or cities, and who are

motivated to learn data-driven methods. Helpful preparation includes any exposure to GIS/mapping (QGIS or ArcGIS), working with spreadsheets for data cleaning (Excel/Google Sheets), or introductory statistics/data science. Coursework in areas such as transportation/urban planning, geography/GIS, public health, statistics, or computer science is a plus, but students from any major are welcome if they can demonstrate curiosity, organization, and follow-through. Preference will also be given to applicants who communicate clearly, are comfortable working independently between meetings, and can commit consistently to weekly check-ins and project milestones.

Specific Time considerations/conflicts: The student must be available for a weekly mentoring meeting (60 minutes) and a weekly check-in/work session (30–60 minutes) scheduled by mutual agreement during the workweek (Monday–Friday) between 9:00 a.m. and 5:00 p.m. Occasional additional availability may be requested near the end of the term for symposium preparation and practice presentations, but these will be scheduled in advance and coordinated around the student's availability.

App ID #: 3031

Mentor: Li, Xuyang Email: xli65@charlotte.edu

Title: Assistant Professor

Department: ETCM Wm States Lee College of Engineering

Co-mentor: Yes

Yao Li, yao.li@charlotte.edu, Department of Earth, Environmental, and Geographical Sciences, College of Humanities & Earth and Social Sciences

Community engaged research: No

Title: Physics-Informed AI: Real-Time Indoor Flow Modeling and Pathogen Tracing

Description: Understanding how air and airborne pathogens move through complex indoor environments is a critical challenge in modern public health and building engineering. Within our larger collaborative initiative to build high-fidelity Digital Twins of physical spaces, our specific research track focuses on the computational physics of airflow. Traditional fluid dynamics simulations are highly accurate but computationally expensive, often taking days to compute the airflow in a single building layout. This makes real-time prediction and rapid decision-making impossible.To overcome this computational bottleneck, our project leverages Physics-Informed Deep Learning and differentiable physics. In standard machine learning, models learn purely by finding patterns in static datasets. Instead, we are building neural networks that are mathematically constrained by the fundamental laws of physics. By utilizing differentiable physics frameworks, we integrate fluid dynamics equations directly into the deep learning training pipeline. This hybrid approach gives the model a unique capability: not only can we perform indoor flow modeling at unprecedented speeds to predict contamination zones in milliseconds, but the differentiable nature of the physics engine allows us to mathematically "trace back" the airflow to its origin, instantly locating the exact source of an infection. This bridges the gap between traditional fluid dynamics and modern AI without sacrificing scientific accuracy.Track 1: Physics-Informed Deep Learning for Real-Time PredictionGoal: Build high-speed AI emulators for indoor flow modeling.The Task: You will train neural networks that are mathematically constrained by the fundamental laws of physics to replace slow traditional numerical solvers.The Innovation: By embedding fluid dynamics equations into the deep learning pipeline, you will create a surrogate model capable of predicting airflow patterns and potential contamination zones in milliseconds without sacrificing scientific accuracy.Track 2: Differentiable Physics for Source TracingGoal: Solve the computational inverse problem to locate infection sources.The Task: You will utilize differentiable physics frameworks to integrate physical simulations directly into a differentiable computational pipeline.The Innovation: Instead of just predicting where the air will go, the differentiable nature of this physics engine allows us to mathematically "trace back" the airflow to its origin, instantly locating the exact source of an airborne pathogen outbreak.This role is designed for students with a strong quantitative foundation who want to work at the intersection of computer science and physical sciences. While a deep prior background in fluid mechanics is not expected, you should bring a solid understanding of calculus, a strong interest in deep learning architecture, and the programming capability to work

with complex scientific datasets. You will leave the project with hands-on experience in one of the most rapidly advancing areas of scientific artificial intelligence.

Accepting applications for: Only 150 hours over an academic semester (~10h/wk)

2 positions available

Anticipated Student Learning Outcomes: The student researcher will gain practical experience and highly transferable skills at the intersection of computer science and computational physics. Specifically, the expected learning outcomes include:1. The student will master advanced artificial intelligence techniques, specifically transitioning from standard machine learning to Physics-Informed Deep Learning. They will learn to implement differentiable physics frameworks in Python, gaining hands-on experience with how physical constraints are mathematically embedded into neural network training and backpropagation.2. By translating complex physical problems, such as indoor flow modeling, into computational graphs and custom loss functions, the student will develop strong critical thinking and problem-solving skills. They will learn how to design, debug, and optimize complex machine learning pipelines for scientific applications.3. Operating within a larger Digital Twin initiative, the student will gain experience in interdisciplinary teamwork. They will learn how to manage technical dependencies by integrating their computational backend models with the spatial data and 3D building meshes generated by the parallel Reality Capture team.4. The student will enhance their scientific communication skills by learning to analyze and visualize high-dimensional flow field predictions. Through weekly research meetings and a final symposium presentation, they will learn to explain complex AI and physics concepts clearly, building the professional research and development habits essential for a future career in software engineering, artificial intelligence, or scientific computing.

Required training of 4 hours with Description: The on-boarding process begins with required university compliance training, followed by project-specific technical training to prepare the student for their research tasks.

This project is fundamental research in open-source scientific data and AI, with the goal of producing results for public presentation and potential publication.

Mentoring plan: The mentor's philosophy is to guide the student's transition from a classroom learner to a capable researcher, equipping them with the technical, critical thinking, and professional skills essential for a career at the intersection of artificial intelligence and scientific discovery.This philosophy is put into practice through a structured and supportive mentoring plan. Students will work in a collaborative environment, simulating a professional research lab. They can expect a weekly meeting to set goals, review progress, and receive direct technical guidance. The mentor will support the student in mastering a computational research workflow: training physics-informed neural networks, utilizing differentiable physics frameworks, and evaluating the accuracy of indoor flow modeling predictions.A key outcome is a successful presentation at the end-of-term symposium, and the mentor will provide dedicated guidance on preparing the abstract, poster, and presentation. Should the project yield significant results, the mentor may also fully support the student in preparing a submission for a peer-reviewed conference or journal. Throughout the experience, the mentor will remain accessible and provide all necessary resources for the student to succeed.

Applicant Requirements: 1) Completion of foundational mathematics: Calculus and Linear Algebra (e.g., MATH 2241, 2164).2) Basic understanding of Probability and Statistics.3) Proficiency in Python programming.4) A willingness to read and learn from recent technical papers (with guidance).

Applicant Preferences: 1) Experience with PyTorch or similar Deep Learning libraries.2) Prior coursework or experience in Machine Learning or Artificial Intelligence.3) Interest in Science, Physics, or Engineering simulations.

Specific Time considerations/conflicts: The majority of the research work (e.g., designing algorithms, coding, running experiments, analyzing results) can be completed on a flexible schedule that accommodates the student's academic coursework.

The student must be available for one weekly 1-hour research team meeting. The specific day and time will be determined based on mutual availability.

App ID #: 3054

Mentor: Molavi-Zarandi, Marjan Email: marjan.molavi-zarandi@charlotte.edu

Title: Research Associate Professor

Department: MEES Wm States Lee College of Engineering

Co-mentor: Yes

Ali Bonakdar, ali.bonakdar@charlotte.edu, Associate Professor

Community engaged research: Yes

Title: Print-to-Sense: Additive Manufacturing of Tactile Sensor Tiles for Introductory Robotics

Description: Want a hands-on first research experience with a real, working demo at the end? In the Additive Manufacturing Technology Lab (AMTL), you'll help build small 3D-printed "touch tiles" made from a ceramic that generates a tiny electrical signal when tapped or pressed (piezoelectric effect). Your tile will produce a measurable voltage that can light an LED or appear as a live signal plot on a laptop. In introductory robotics, this works like a "touch button" or tactile input—your tile becomes a simple sensor that a robot/controller could read.No prior research experience required. We teach every step, work side-by-side, and keep safety at the center.What you'll do (beginner-friendly, supervised):Make: prepare and label small powder batches; assist with the 3D-printing workflow using checklists; keep a clean lab notebook.Process: help dry and heat-treat parts (supervised); measure size/mass; record times, temperatures, and settings.Wire & Test: apply simple silver electrodes, attach thin wires, and measure "tap-to-voltage" using a meter or basic data acquisition.Show & Tell: create one clear plot, a one-page poster, and a simple "tap-to-light" or live-signal demo.Safety first: PPE required (lab coat, gloves, safety glasses; mask for powders). No solo work. Follow posted SOPs and proper waste disposal.What you'll gain: real lab experience in additive manufacturing and sensors, strong data/plotting skills, and a tangible outcome (printed parts + demo + poster) you can showcase for internships or grad school.

Accepting applications for: Either 5 hours or 10 hours per week are acceptable

2 positions available

Anticipated Student Learning Outcomes: By the end of the semester, students will be able to:Explain how a piezoelectric ceramic converts a tap/press into a measurable voltage signal.Follow AMTL safety practices and SOPs (PPE, powder handling, cleanup, waste disposal) under supervision.Assist with an additive manufacturing workflow using checklists and maintain a clear lab notebook with traceable settings.Perform simple post-processing support and metrology (dry/heat-treat assistance, measure size/mass, record parameters).Create electrodes, attach wiring, and measure "tap-to-voltage" signals using a meter and/or basic data acquisition.Collect repeatable data, generate at least one clear plot, and communicate results via a one-page poster and a small working demo.These outcomes provide you with transferable skills in safe lab work, additive manufacturing, sensor testing, data visualization, and technical communication—suitable preparation for internships, capstone projects, and graduate research.

Required training of 8 hours with Description:

- AMTL in-person orientation (Week 1): PPE, powder-handling hygiene, cleanup/waste disposal, emergency procedures, and review of posted SOPs/checklists.

- Hands-on, task-based training (Weeks 1–2): supervised practice on the specific steps the student will perform (printing workflow support, drying/heat-treatment support, metrology, simple wiring/testing).

- Ongoing supervision: no solo work; new tasks are added only after the student demonstrates competency on the checklist.

Mentoring plan: We will support your success through a structured, beginner-friendly mentoring approach that prioritizes safety, steady progress, and clear deliverables in the Additive Manufacturing Technology Lab (AMTL).Who you'll work withYou'll work within the AMTL project team. Your day-to-day supervision during hands-on lab tasks will be provided by a designated graduate student.We will provide overall direction, approve weekly goals, and review your progress, results, and next steps.You will not work alone in the lab—tasks are supervised and aligned with AMTL SOPs.Onboarding and early success (Weeks 1–2)We begin with required compliance training, AMTL safety orientation, and task-based training using checklists.You'll start with low-risk, well-scoped tasks (labeling/traceability, notebook practice, basic measurements) and progress to printing support and testing only after you demonstrate readiness.Expected contact and weekly rhythmYou can expect consistent weekly contact:15–30 min check-in to set a realistic goal and confirm safety stepsOne supervised lab block (2–3 hours) for printing/process/testing tasks15–30 min wrap-up to save data, update your lab notebook, and define next stepsWe'll be available for questions between meetings (email/Teams) so you don't get stuck.Skill-building and feedbackWe will explicitly teach you lab notebook practices, data/file organization, repeatable measurement methods, and how to make a clear plot.We'll provide frequent, specific feedback on technique, documentation, and interpretation, and we'll adjust task scope as needed to help you succeed.Presentations and deliverablesYou'll attend brief AMTL check-ins as appropriate (e.g., biweekly) and give a short mid-semester progress update (2–3 slides or a quick demo).By the end of the term, you'll present a one-page poster and a simple working demo (tap-to-light LED or live signal display). Optional participation in an undergraduate research showcase is encouraged but not required.Our commitments to youWe commit to providing a safe, supportive environment; clear expectations and achievable weekly goals; hands-on training and supervision; and tangible outcomes (printed parts, dataset/plot, poster, and demo) you can showcase for internships or graduate school.

Applicant Requirements: You are an undergraduate student who can commit 5 or 10 hours/week during the semester.You are willing to complete required ORPI/EHS training and consistently follow all AMTL safety rules.You are comfortable with hands-on lab work and wearing required PPE (lab coat, gloves, safety glasses; mask when handling powders).You are reliable and detail-oriented: you can follow checklists, label samples correctly, keep a clear lab notebook, and organize files/data.You communicate well, work respectfully in a team, and ask questions when unsure.No prior research experience is required. Interest in manufacturing, materials, sensors, robotics, electronics, or basic data/plotting is a plus.

Applicant Preferences: Interest in hands-on engineering research (making, testing, troubleshooting) and curiosity about how sensors work.Coursework or exposure (formal or informal) in one or more

of these areas is helpful: materials, manufacturing/3D printing, circuits/electronics, instrumentation/measurements, or introductory programming/data analysis.Comfort with basic tools and careful manual work (measuring parts, labeling samples, simple wiring).Good organization habits (keeping notes, following procedures, managing files) and a willingness to learn lab best practices.Positive teamwork mindset: dependable, communicative, open to feedback, and respectful of shared lab spaces.Interest in robotics applications and building simple demos.

Specific Time considerations/conflicts: No specific days/times are mandatory. We can schedule lab blocks around your class schedule.

Preferred availability is one consistent 2–3 hour supervised lab block each week during normal weekday hours, plus a brief weekly check-in (15–30 minutes) that can be arranged flexibly.

App ID #: 3092

Mentor: Ogunro, Tobi Email: vogunro@charlotte.edu

Title: Associate Professor

Department: Civil & Environmental Engineering Wm States Lee College of Engineering

Co-mentor: No

Community engaged research: No

Title: Translating Engineered Water Repellency Research on Soil to Field Application: Accelerated In-Situ Drying

Description: Engineered water repellency (EWR) is a technique used to reduce the adverse effects of water on the properties of soils. This is important because as water infiltrate into soils increases, their strength and other mechanical properties decrease. EWR works by surface treatment or coating of soil particles so that water ingress into the soil is prevented, implying that the soil particles to render them non-wettable. This helps maintain the right or optimal moisture levels and improves the soil's performance. Our team has successfully has had good success testing EWR in the laboratory (bench-scale tests) using an organosilane (OS) treatment. However, field pilot tests have been less successful. The main challenges are (1) the treated soil takes too long to dry in the field and (2) there are no enough data to accurately simulate real field conditions in the lab.To overcome these challenges, we identified three research areas that will help move the EWR toward successful field applications: Optimizing the amount of drying agent in OS-treated silty and clayey soil. This study will:Measure basic soil properties (index properties)Mix different amounts of OS and drying agents into the soilsPerform compaction testsMeasure how water-repellent the soil becomes by measuring the contact angle of water droplets using an imaging system.Simulating field condition in the laboratory. This study will test a simple and practical method to accelerate drying in treated soils. The goal is to understand how quickly the treated soils under realistic field environments. In this study we will:Prepare OS-treated soil samples mixed with drying agents such as cement or super-absorbent polymer (SAPs)Place the samples in an environmental chamberExpose them to different temperature and humidity conditionsTesting long-term performance under wetting solutions of high ionic concentrations (Salty water conditions). Roads are often exposed to de-icing agents or salts in winter. These salts can weaken the bond between the OS treatment and soil particles. The tests under this study will show how well the treatment will holds up under harsh conditions. This study will:Expose Os-treated soils to water with ionic (salt) concentrationsMeasure changes in contact angle, breakthrough pressure and resistance to water ponding.The outcomes of these research studies will help us improve EWR technology so it can work reliably in real-world conditions. This will ensure that treated soils are strong, stable and hardened, even in wet environments.

Accepting applications for: Only 150 hours over an academic semester (~10h/wk)

2 positions available

Anticipated Student Learning Outcomes: Students will learn critical thinking and effective collaboration skills. The student education, training and careers advising will be led by me. Each

student will participate in the professional & career development training offered by the university during the project. The students will learn skills that are crucial for their academic and professional success, chart a well-defined professional development plan (including self-assessment, goalsetting, action plan, milestones, resources, evaluation and reflection), explore effective ways to foster teamwork, and improve communication.

Required training of 2 hours with Description: Since this research exclusively uses organosilane, a chemical that is environmentally benign and safe for handling, our team has trained several undergraduate to work with it. Consequently, student training will be limited to a one-hour online the online laboratory safety course. Additionally, students will be required to attend a one-hour in-person laboratory orientation with our environmental lab and geotechnical lab managers before gaining access to the labs.

Mentoring plan: My mentoring is developed in the context of regular meetings (weekly, standing meeting with research team every Friday) and an individual meeting prior to this group. During the team meeting students will describe their work to colleagues and assist each other with solutions to challenging research problems, explore issue- rather than discipline-based solutions, peer and faculty mentoring. Student will work directly with me but will be assist in laboratory activities by my graduate students. Students will develop multidisciplinary and leadership skills, and acquire teamwork skills.

Applicant Requirements: No specialized skills and courses or experiences required, however, students must be interested to work in a team and open to learn new skills.

Applicant Preferences: Civil Engineering, Geology, Chemistry, Engineering disciplines, and Science disciplines

Specific Time considerations/conflicts: None

App ID #: 3095

Mentor: Rasanen, Ryan Email: rrasanen@uncc.edu

Title: Assistant Professor

Department: Civil and Environmental Engineering Wm States Lee College of Engineering

Co-mentor: No

Community engaged research: No

Title: Interpreting Cone Penetration Test (CPT) Data to Understand Soil Behavior During Earthquakes and Ground Improvement

Description: How do engineers determine whether soil beneath a building will perform safely during an earthquake? How do we verify that ground improvement methods actually make soil stronger and stiffer? This project focuses on interpreting Cone Penetration Test (CPT) data to better understand soil behavior in two important applications:(1) earthquake engineering and liquefaction assessment, and(2) performance evaluation of ground improvement methods such as rammed aggregate piers. CPT testing provides detailed measurements of soil resistance and friction with depth. These measurements are widely used to estimate soil stiffness, liquefaction resistance, and ground improvement effectiveness. However, interpreting CPT data can be complex because soil density, stress conditions, and stiffness all influence the readings. The undergraduate researcher will contribute to analyzing and expanding upon an existing CPT database that includes both natural and improved soils. Depending on student interest and project direction, responsibilities may include: Compiling and cleaning CPT datasets (pre- and post-ground improvement where available)Exploring relationships between CPT measurements and soil stiffness (including shear wave velocity)Investigating how soil properties change after densification or ground improvementExamining how in-situ stress conditions influence CPT measurementsCreating plots and visualizations to compare soil behavior before and after ground improvementAssisting with preliminary evaluation of liquefaction resistance and earthquake site responsePreparing figures and materials for presentation at the OUR SymposiumOpportunity to contribute to conference and/or journal publications This project connects to ongoing research in geotechnical engineering, including earthquake engineering and displacement-based ground improvement. The scope will be tailored to match the students' interests and background, and no prior research experience is required.

Accepting applications for: Only 150 hours over an academic semester (~10h/wk)

1 positions available

Anticipated Student Learning Outcomes: By participating in this research project, students will gain: Hands-On Engineering Research Experience: Students will work with real geotechnical datasets used in engineering practice and research, contributing meaningfully to ongoing projects. Data Analysis and Technical Skill Development: Students will learn how to organize, clean, and interpret large engineering datasets. They will develop experience using tools such as Excel and/or MATLAB/Python to analyze subsurface data and create professional-quality figures, skills highly valued by future employers. Improved Understanding of Soil Behavior: Students will strengthen

their understanding of soil mechanics concepts including stiffness, liquefaction resistance, and how ground improvement alters soil response. Critical Thinking and Problem Solving: Students will evaluate patterns in real data, compare engineering interpretations, and think critically about how measurements reflect physical soil behavior. Professional Communication Skills: Students will prepare and present their research at the OUR Symposium. They will practice explaining technical findings to both technical and non-technical audiences.After completing this experience, students will be able to describe their work as contributing to research in earthquake engineering and ground improvement while developing transferable skills in data analysis, engineering judgment, and technical communication. This research experience will strengthen the students' resume and position them for future research roles, internships, or careers in civil engineering.

Required training of 3 hours with Description: The student will work directly with the faculty mentor. Initial onboarding will include:

- Introduction to Cone Penetration Testing (CPT) and basic soil mechanics concepts
- Overview of liquefaction, soil stiffness, and ground improvement
- Introduction to the existing CPT database
- Training in data organization and analysis tools (Excel and/or MATLAB/Python)

Training will be integrated into the research process. I expect training to occur throughout the project as questions arise, but initially there will be a couple hours introducing the project and some data science tools. The student will gradually take on more independent tasks as their confidence and understanding increase. Weekly one-on-one meetings will provide ongoing guidance and support.

Mentoring plan: My goal is to provide students with a structured, supportive, and intellectually engaging research experience that promotes both technical growth and professional development. Students can expect: Regular Meetings and Guidance: Students will meet with me weekly to discuss progress, challenges, and next steps. These one-on-one meetings will aid in research productivity, goal setting, and offer personalized professional guidance. Clear Milestones and Feedback: The student will have defined research objectives and incremental milestones. Students will informally present their findings and/or progress during weekly meetings to improve communication skills and receive constructive feedback on results. Additionally, students interested in sharing their work at conferences or university symposiums will be encouraged and supported. Skill Development Through Active Participation: Rather than observing, the student will actively work with real datasets and contribute directly to analysis and interpretation. Commitment to Professional Growth: I will offer mentorship, discuss potential next steps in research or industry, and help students identify future opportunities that align with their interests.My mentoring philosophy emphasizes curiosity and careful analysis and interpretation of engineering data. I aim to create an environment where students feel comfortable asking questions while being challenged to think critically.

Applicant Requirements: Required skills, courses, or experiences:Major in Civil Engineering or a closely related fieldCompletion of (or current enrollment in) an introductory soil mechanics or

geotechnical engineering courseStrong attention to detail and willingness to work carefully with dataReliability and consistent weekly engagement

Applicant Preferences: Students with a genuine interest in natural hazards are encouraged to apply. Recommended skills are: Interest in geotechnical engineering, earthquake engineering, or ground improvementFamiliarity with Excel, MATLAB, or Python (can learn these during the project)Interest in data analysis and interpretationStrong organizational skillsMotivation to learn

Specific Time considerations/conflicts: Meeting times are flexible and will be scheduled around the student's course commitments. Weekly meetings (in person, with occasional Zoom if needed) will be required. Meetings can occur more frequently as needed/desired by the student.

App ID #: 3067

Mentor: Sun, Mei Email: msun8@charlotte.edu

Title: Associate Professor

Department: Civil and Environmental Engineering Wm States Lee College of Engineering

Co-mentor: No

Community engaged research: No

Title: "Forever chemicals" (PFAS) in groundwater samples from fire stations

Description: PFAS are a group of organic contaminants toxic to human beings and the ecosystem. Firefighting foam is a major PFAS source, and therefore, groundwater at fire stations may be contaminated by PFAS through firefighting training. We collected groupwater samples from fire stations across the state and will analyze them to determine whether any are contaminated with PFAS. The goal of this project is to reduce the potential risks for affected firefighters from drinking or showering with contaminated water.

Accepting applications for: Only 150 hours over an academic semester (~10h/wk)

1 positions available

Anticipated Student Learning Outcomes: • Hands-On Experience: Work closely with our experienced research team, gaining practical skills in research laboratories and environmental monitoring.• Cutting-Edge Research: Contribute to groundbreaking studies on emerging contaminants, addressing real-world environmental challenges, and shaping future solutions.• Methodology to explore new areas: learn how to get started with an unfamiliar territory by finding relevant information, reading literature, making testable hypotheses, implementing a realistic workplan, critically thinking about results, and effectively communicating ideas with others.• Professional Development: Brighten your resume with enhanced problem-solving, data analysis, and teamwork skills, preparing you for a successful career.

Required training of 10 hours with Description: The student will first receive lab safety training, followed by basic protocol training for conducting experiments, using instruments, and collecting data.

Mentoring plan: I and other members of my research team will teach the student the skills needed to conduct this project and, in general, how to do research in a wet lab. The students will also learn how to analyze the results, draw conclusions, and represent the research findings. I will meet with the student weekly to keep up with progress, answer questions, provide feedback, and finalize action plans.The student can expect timely communication, resources for help, and opportunities for authorship if they produce high-quality results that can be published in conference presentations or scientific papers.

Applicant Requirements: • Enthusiasm for environmental issues and curiosity about emerging contaminants.• Strong attention to detail and ability to quickly learn new techniques.• Ability to

work effectively both independently and as part of a team.• Prior coursework in environmental science/engineering and chemistry.

Applicant Preferences: Good at time management and communication, interest and background knowledge in chemistry.

Specific Time considerations/conflicts: N/A

App ID #: 3087

Mentor: Suresh Babu, Arun Vishnu Email: asures10@charlotte.edu

Title: Teaching Assistant Professor

Department: Mechanical Engineering and Engineering Science Wm States Lee College of Engineering

Co-mentor: No

Community engaged research: No

Title: Gust Mitigation on aircraft wings

Description: Airplane wings and helicopter blades encounter atmospheric gusts which can pose danger to the aircraft and its passengers. Can we adjust a flap or tab on a wing to negate the effect of a gust? If so how should we move them? This project will explore the effect of the gusts on the wing: how the air flow around the wing is affected due to the gust and how the sudden forces generated with the aim of developing strategies to counteracting the gust effects. The project will use a computational fluid dynamics (CFD) software like STARCCM /FLUENT/CONVERGE to simulate for a wing encountering various types of gusts. An undergraduate student with some background in introductory fluid mechanics shall be a able to, with the guidance of the mentor, develop an understanding of the basic aerodynamic theory of wings, and further study a wing or blade encountering a gust. The research will also involve the use of MATLAB for calculations and visualization.

Accepting applications for: Only 150 hours over an academic semester (~10h/wk)

2 positions available

Anticipated Student Learning Outcomes: Students will have an excellent opportunity to apply classroom knowledge to tackle an interesting and critical real-world engineering problem. The project will also further enhance their understanding of fluid mechanics and enable them to further explore the concepts of aerodynamics. Besides, the project will also be a great platform to enhance the students' problem solving and mathematical modeling skills. Finally, through the use of MATLAB and other CFD software, athe students will be able to develop good computer coding and simulation skills while applying it to study a research problem.

Required training of 0 hours with Description: NA

Mentoring plan: The students will be initially guided by the mentor to develop an understanding of the relevant aerodynamic theory and softwraee. The students will also be initially guided to operate some existing MATLAB programs /software setups for visualization and calculations. Through the course of the project, the student will develop theoretical models and add make small-scale modifications to the existing MATLAB programs to analyze the models. Mentoring meetings will be set up with the mentor weekly twice on a recurring basis during weekdays 9-5. The mentor will also be available to meet more often whenever needed. Smaller discussions will also be addressed through email communications.

Applicant Requirements: Basic understanding of Fluid Mechanics and Aerodynamics, Basic programming knowledge in MATLAB, Beginner level experience with any CFD software

Applicant Preferences: Interest in Aerodynamics and Mathematics, Proficiency in MATLAB, Experience with any CFD software

Specific Time considerations/conflicts: NO

App ID #: 3088

Mentor: Suresh Babu, Arun Vishnu Email: asures10@charlotte.edu

Title: Teaching Assistant Professor

Department: Mechanical Engineering and Engineering Science Wm States Lee College of Engineering

Co-mentor: No Community engaged research: No

Title: Modeling and Simulation of fluid-flow energy harvesting mechanisms

Description: This project will explore the idea of a fluid-flow energy harvesting mechanism. The project will use a computational fluid dynamics (CFD) software like STARCCM /FLUENT/CONVERGE to simulate the energy harvester under various incoming flow conditions. An undergraduate student with some background in introductory fluid mechanics and CFD shall be a able to, with the guidance of the mentor, develop an understanding of the basic fluid dynamics of the harvester, and further study the energy harvesting mechanism. The research will also involve the use of MATLAB for calculations and visualization.

Accepting applications for: Only 150 hours over an academic semester (~10h/wk)

2 positions available

Anticipated Student Learning Outcomes: Students will have an excellent opportunity to apply classroom knowledge to tackle an interesting and critical real-world engineering problem. The project will also further enhance their understanding of fluid mechanics and enable them to further explore the concepts of aerodynamics. Besides, the project will also be a great platform to enhance the students' problem solving and mathematical modeling skills. Finally, through the use of STARCCM, the students will be able to expand their skillsets for a successful career.

Required training of 0 hours with Description: NA

Mentoring plan: The students will be initially guided by the mentor to develop an understanding of the relevant theory and the software. The students will also be initially guided to operate some existing MATLAB programs/software setups for visualization and calculations. Through the course of the project, the student will develop simulation frameworks in the software and make small-scale modifications to the existing setups to simulate and various scenarios. Mentoring meetings will be set up with the mentor weekly on a recurring basis during weekdays 9-5. The mentor will also be available to meet more often whenever needed. Smaller discussions will also be addressed through email communications.

Applicant Requirements: Basic understanding of Fluid Mechanics and Aerodynamics, Basic programming knowledge in MATLAB, Beginner level experience with any CFD software

Applicant Preferences: Interest in Fluid Mechanics and Mathematics, Basic knowledge of Aerodynamics, Proficient in in MATLAB, experience with any CFD software

Specific Time considerations/conflicts: NO

App ID #: 3049

Mentor: Tipton, Roger Email: rtipton2@uncc.edu

Title: Research Associate Professor

Department: Mechanical Engineering and Engineering Science Wm States Lee College of Engineering

Co-mentor: No

Community engaged research: No

Title: Extracting Nanocellulose Fibers from Plant Matter and Supply Chain Development

Description: Join the cutting-edge research where you'll be part of a dynamic team developing innovative processes to extract nanocellulose fibers from plant matter. These fibers are a game-changer in the manufacturing of biocomposite materials, offering a sustainable and eco-friendly alternative to traditional composites. Additional focus on developing a local cellulose supply chain to get these materials into production.

Accepting applications for: Either 5 hours or 10 hours per week are acceptable

1 positions available

Anticipated Student Learning Outcomes: Educationally, students will gain a deep understanding of research methodology, including experimental design, data analysis, and comprehensive literature reviews. The interdisciplinary nature of the project will broaden their knowledge across materials science, chemistry, and environmental engineering, fostering a well-rounded understanding of these interconnected fields. This holistic approach will enhance their critical thinking and problem-solving abilities, which are highly valued in any career.From a career perspective, students will significantly enhance their professional profiles. The project offers opportunities for networking with faculty, graduate students, and industry professionals, which can open doors for future career opportunities. Additionally, the chance to co-author research papers and present findings at conferences will be a notable achievement on their resumes. The focus on sustainability and eco-friendly materials will also appeal to employers and academic programs dedicated to green technologies, positioning students as forward-thinking candidates in their future endeavors.

Required training of 2 hours with Description: Students will need to perform 2 hours of lab safety training before the student can work in the lab. All other training will be on the job training

Mentoring plan: To ensure students' success in developing a process for extracting nanocellulose fibers from plant matter for biocomposite materials, I am committed to providing comprehensive support and guidance throughout their research journey. Here's what students can expect from me during this experience:Direct Mentorship and Regular Contact: Students will work closely with me through regular one-on-one meetings where we will discuss their progress, address challenges, and set goals. These sessions will provide personalized feedback and guidance, ensuring that students feel supported and confident in their work.Collaborative Team Environment: Students will be part of

a collaborative research team, working directly with faculty members, graduate students, and industry professionals. This team-based approach will foster a supportive and dynamic learning environment, encouraging the exchange of ideas and collaborative problem-solving.

Applicant Requirements: The key qualifications and characteristics we seek in an applicant:Science or engineering background: completion of foundational courses in chemistry material science, environmental science related fields.Laboratory Experience: Prior coursework that includes lab components, providing basic lab skills and familiarity with scientific equipment.Critical thinking: strong analytical skills to interpret data, troubleshoot experiments, and draw me a conclusion.We believe that with the right attitude and foundational skills, any dedicated student can succeed and make meaningful contributions to our team.

Applicant Preferences: We are looking for enthusiastic and dedicated students who are eager to contribute to cutting-edge research in sustainable materials. Here are the key qualifications and characteristics we seek in an applicant:Genuine interest and sustainable materials and desire to make a positive environmental impactAn inquisitive mindset and ability to think creatively to solve complex problemsSelf motivated with strong work ethic and ability take initiative and driving the project forwardDetail oriented, ensuring accuracy and experiment and dataAbility work effectively in collaborative team environment, sharing insides, and supporting peersStrong, verbal and written communication skills

Specific Time considerations/conflicts: None

App ID #: 3050

Mentor: Tipton, Roger Email: rtipton2@uncc.edu

Title: Research Associate Professor

Department: Mechanical Engineering and Engineering Science Wm States Lee College of Engineering

Co-mentor: No

Community engaged research: No

Title: How Microplastic Shape Impacts Toxicity

Description: Current science on microplastics has a critical flaw: over 80% of studies use smooth, spherical beads to test toxicity11. However, real environmental plastics (specifically PET) degrade into jagged, sharp fragments2. We hypothesize that these jagged edges mechanically puncture immune cells (macrophages) from the inside, causing cell death without the usual warning signs of inflammation—a mechanism we call "Silent Cytotoxicity. We are looking for a student researcher to help us prove that shape is just as deadly as chemistry. You will move beyond standard testing by creating realistic "jagged" microplastics and analyzing their lethal potential. This is a great opportunity for Biomedical Engineering, Materials Science, Biology, and Chemistry students.

Accepting applications for: Either 5 hours or 10 hours per week are acceptable

1 positions available

Anticipated Student Learning Outcomes: Educationally, students will gain a deep understanding of research methodology, including experimental design, data analysis, and comprehensive literature reviews. The interdisciplinary nature of the project will broaden their knowledge across materials science, chemistry, and environmental engineering, fostering a well-rounded understanding of these interconnected fields. This holistic approach will enhance their critical thinking and problem-solving abilities, which are highly valued in any career.From a career perspective, students will significantly enhance their professional profiles. The project offers opportunities for networking with faculty, graduate students, and industry professionals, which can open doors for future career opportunities. Additionally, the chance to co-author research papers and present findings at conferences will be a notable achievement on their resumes. The focus on sustainability and eco-friendly materials will also appeal to employers and academic programs dedicated to green technologies, positioning students as forward-thinking candidates in their future endeavors.

Required training of 2 hours with Description: Students will need to perform 2 hours of lab safety training before the student can work in the lab. All other training will be on the job training

Mentoring plan: To ensure students' success in developing a process for extracting nanocellulose fibers from plant matter for biocomposite materials, I am committed to providing comprehensive support and guidance throughout their research journey. Here's what students can expect from me during this experience:Direct Mentorship and Regular Contact: Students will work closely with me through regular one-on-one meetings where we will discuss their progress, address challenges, and set goals. These sessions will provide personalized feedback and guidance, ensuring that students

feel supported and confident in their work.Collaborative Team Environment: Students will be part of a collaborative research team, working directly with faculty members, graduate students, and industry professionals. This team-based approach will foster a supportive and dynamic learning environment, encouraging the exchange of ideas and collaborative problem-solving.

Applicant Requirements: The key qualifications and characteristics we seek in an applicant:Science or engineering background: completion of foundational courses in chemistry material science, environmental science related fields.Laboratory Experience: Prior coursework that includes lab components, providing basic lab skills and familiarity with scientific equipment.Critical thinking: strong analytical skills to interpret data, troubleshoot experiments, and draw me a conclusion.We believe that with the right attitude and foundational skills, any dedicated student can succeed and make meaningful contributions to our team.

Applicant Preferences: We are looking for enthusiastic and dedicated students who are eager to contribute to cutting-edge research in sustainable materials. Here are the key qualifications and characteristics we seek in an applicant:Genuine interest and sustainable materials and desire to make a positive environmental impactAn inquisitive mindset and ability to think creatively to solve complex problemsSelf motivated with strong work ethic and ability take initiative and driving the project forwardDetail oriented, ensuring accuracy and experiment and dataAbility work effectively in collaborative team environment, sharing insides, and supporting peersStrong, verbal and written communication skills

Specific Time considerations/conflicts: None

App ID #: 3051

Mentor: Tipton, Roger Email: rtipton2@uncc.edu

Title: Research Associate Professor

Department: Mechanical Engineering and Engineering Science Wm States Lee College of Engineering

Co-mentor: No

Community engaged research: No

Title: Thin Films and Additive Manufacturing for Hypersonic and Spacecraft Applications

Description: This project offers an exciting opportunity for undergraduate engineering students to contribute to groundbreaking research in advanced materials for hypersonic and spacecraft applications. Students will gain hands-on experience in cutting-edge fabrication techniques, including thin-film deposition and additive manufacturing. The goal is to develop and test novel materials capable of withstanding the extreme temperatures and pressures of space and hypersonic travel, pushing the boundaries of what is possible in aerospace engineering. This work involves collaborative research with industry partners, providing a unique chance to apply classroom knowledge to real-world challenges.

Accepting applications for: Either 5 hours or 10 hours per week are acceptable

1 positions available

Anticipated Student Learning Outcomes: Educationally, students will gain a deep understanding of research methodology, including experimental design, data analysis, and comprehensive literature reviews. The interdisciplinary nature of the project will broaden their knowledge across materials science, chemistry, and environmental engineering, fostering a well-rounded understanding of these interconnected fields. This holistic approach will enhance their critical thinking and problem-solving abilities, which are highly valued in any career.From a career perspective, students will significantly enhance their professional profiles. The project offers opportunities for networking with faculty, graduate students, and industry professionals, which can open doors for future career opportunities. Additionally, the chance to co-author research papers and present findings at conferences will be a notable achievement on their resumes. The focus on sustainability and eco-friendly materials will also appeal to employers and academic programs dedicated to green technologies, positioning students as forward-thinking candidates in their future endeavors.

Required training of 2 hours with Description: Students will need to perform 2 hours of lab safety training before the student can work in the lab. All other training will be on the job training

Mentoring plan: To ensure students' success in developing a process for extracting nanocellulose fibers from plant matter for biocomposite materials, I am committed to providing comprehensive support and guidance throughout their research journey. Here's what students can expect from me during this experience:Direct Mentorship and Regular Contact: Students will work closely with me through regular one-on-one meetings where we will discuss their progress, address challenges, and set goals. These sessions will provide personalized feedback and guidance, ensuring that students

feel supported and confident in their work.Collaborative Team Environment: Students will be part of a collaborative research team, working directly with faculty members, graduate students, and industry professionals. This team-based approach will foster a supportive and dynamic learning environment, encouraging the exchange of ideas and collaborative problem-solving.

Applicant Requirements: The key qualifications and characteristics we seek in an applicant:Science or engineering background: completion of foundational courses in chemistry material science, environmental science related fields.Laboratory Experience: Prior coursework that includes lab components, providing basic lab skills and familiarity with scientific equipment.Critical thinking: strong analytical skills to interpret data, troubleshoot experiments, and draw me a conclusion.We believe that with the right attitude and foundational skills, any dedicated student can succeed and make meaningful contributions to our team.

Applicant Preferences: We are looking for enthusiastic and dedicated students who are eager to contribute to cutting-edge research in sustainable materials. Here are the key qualifications and characteristics we seek in an applicant:Genuine interest and sustainable materials and desire to make a positive environmental impactAn inquisitive mindset and ability to think creatively to solve complex problemsSelf motivated with strong work ethic and ability take initiative and driving the project forwardDetail oriented, ensuring accuracy and experiment and dataAbility work effectively in collaborative team environment, sharing insides, and supporting peersStrong, verbal and written communication skills

Specific Time considerations/conflicts: None

App ID #: 3052

Mentor: Tipton, Roger Email: rtipton2@uncc.edu

Title: Research Associate Professor

Department: Mechanical Engineering and Engineering Science Wm States Lee College of Engineering

Co-mentor: No

Community engaged research: No

Title: Using Data Science to Predict Microplastics and PFAS Transport in Oceans

Description: Despite being remote, the Arctic is accumulating toxic "forever chemicals" (PFAS) and microplastics at alarming rates. These pollutants ride ocean currents from industrial regions to the polar north, threatening fragile ecosystems. We are looking for an undergraduate researcher to serve as the computational engine of our team. You will bridge the gap between raw environmental data and actionable climate models. You will use data science tools to track how pollutants move through a changing Arctic.Data Integration: Merging chemical sampling datasets with ocean current and sea ice data.Visualization: Creating dynamic heat maps and spatial visualizations (using Python, R, or GIS) to highlight contamination pathways.Transport Modeling: assisting in building models that predict where pollutants will travel next based on current velocity and ice melt.

Accepting applications for: Either 5 hours or 10 hours per week are acceptable

1 positions available

Anticipated Student Learning Outcomes: Educationally, students will gain a deep understanding of research methodology, including experimental design, data analysis, and comprehensive literature reviews. The interdisciplinary nature of the project will broaden their knowledge across materials science, chemistry, and environmental engineering, fostering a well-rounded understanding of these interconnected fields. This holistic approach will enhance their critical thinking and problem-solving abilities, which are highly valued in any career.From a career perspective, students will significantly enhance their professional profiles. The project offers opportunities for networking with faculty, graduate students, and industry professionals, which can open doors for future career opportunities. Additionally, the chance to co-author research papers and present findings at conferences will be a notable achievement on their resumes. The focus on sustainability and eco-friendly materials will also appeal to employers and academic programs dedicated to green technologies, positioning students as forward-thinking candidates in their future endeavors.

Required training of 2 hours with Description: Students will need to perform 2 hours of lab safety training before the student can work in the lab. All other training will be on the job training

Mentoring plan: To ensure students' success in developing a process for extracting nanocellulose fibers from plant matter for biocomposite materials, I am committed to providing comprehensive support and guidance throughout their research journey. Here's what students can expect from me during this experience:Direct Mentorship and Regular Contact: Students will work closely with me through regular one-on-one meetings where we will discuss their progress, address challenges, and

set goals. These sessions will provide personalized feedback and guidance, ensuring that students feel supported and confident in their work.Collaborative Team Environment: Students will be part of a collaborative research team, working directly with faculty members, graduate students, and industry professionals. This team-based approach will foster a supportive and dynamic learning environment, encouraging the exchange of ideas and collaborative problem-solving.

Applicant Requirements: The key qualifications and characteristics we seek in an applicant:Science or engineering background: completion of foundational courses in chemistry material science, environmental science related fields.Laboratory Experience: Prior coursework that includes lab components, providing basic lab skills and familiarity with scientific equipment.Critical thinking: strong analytical skills to interpret data, troubleshoot experiments, and draw me a conclusion.We believe that with the right attitude and foundational skills, any dedicated student can succeed and make meaningful contributions to our team.

Applicant Preferences: We are looking for enthusiastic and dedicated students who are eager to contribute to cutting-edge research in sustainable materials. Here are the key qualifications and characteristics we seek in an applicant:Genuine interest and sustainable materials and desire to make a positive environmental impactAn inquisitive mindset and ability to think creatively to solve complex problemsSelf motivated with strong work ethic and ability take initiative and driving the project forwardDetail oriented, ensuring accuracy and experiment and dataAbility work effectively in collaborative team environment, sharing insides, and supporting peersStrong, verbal and written communication skills

Specific Time considerations/conflicts: None

App ID #: 3039

Mentor: Xie, Sheldon Email: yxie10@charlotte.edu

Title: Assistant Professor

Department: ETCM Wm States Lee College of Engineering

Co-mentor: No

Community engaged research: No

Title: Turning City Waste into Green Tech: Upcycling Wastewater Sludge into Graphene using Ultra-Fast Heating

Description: Charlotte is a rapidly growing city, and with that growth comes a massive environmental challenge: what do we do with all the wastewater sludge? Currently, wastewater treatment plants spend huge amounts of money to dispose of this sludge, which is often contaminated with heavy metals and "forever chemicals" (PFAS). But what if we stopped looking at sludge as garbage and started treating it as an untapped goldmine? Sludge is actually packed with carbon and useful metals, which are the exact building blocks needed to make advanced, high-value materials.In this project, we are tackling this challenge using a futuristic manufacturing technique called Flash Joule Heating (FJH). By passing a very quick, high-voltage electrical current through the dried sludge, we can heat it to over 3000 Kelvin in a matter of milliseconds. This intense, ultra-fast "lightning strike" vaporizes the bad stuff (like toxic metals) so we can trap it safely, and instantly rearranges the carbon into turbostratic graphene—a super-material used in everything from batteries to water filtration. We are currently building a brand-new, specialized FJH apparatus in our lab to process these complex environmental wastes, and we want you to be a part of this exciting development!In our lab, you will do far more than just wash beakers; you will step in as a core member of the research team, actively driving the entire manufacturing loop from start to finish. Your hands-on journey begins with sample preparation, where you will learn how to transform raw sludge—through drying, ball-milling, and mixing with conductive additives—into a highly engineered feedstock. With the material ready, you will work closely with the PI and graduate researchers to operate our brand-new FJH apparatus, testing various electrical parameters like voltage and pulse time to push the limits of graphene synthesis. After the "flash," you will take on the exciting role of a materials detective. Using advanced analytical tools such as Raman spectroscopy and electron microscopes, you will examine the microscopic structures you just created to determine if the waste was successfully upcycled. Finally, by recording these experimental conditions and plotting the resulting data, you will help the team uncover the ultimate "sweet spot" for this futuristic manufacturing process, proving that toxic city waste can indeed be turned into high-value graphene.

Accepting applications for: Only 150 hours over an academic semester (~10h/wk)

1 positions available

Anticipated Student Learning Outcomes: Students participating in this project will gain a unique, highly marketable skill set at the intersection of environmental sustainability and advanced manufacturing. On the technical front, they will build a strong, practical foundation in materials

science, carbon nanomaterials, and environmental chemistry. Through rigorous hands-on training, students will master advanced laboratory techniques, ranging from precise sample formulation to high-temperature thermal processing. Furthermore, they will gain invaluable experience operating state-of-the-art characterization equipment, such as Raman spectrometers and electron microscopes, allowing them to directly analyze and validate the nanomaterials they synthesize.Beyond bench skills, this research experience is deeply committed to cultivating essential professional competencies. By actively navigating the research process, students will sharpen their critical thinking—learning how to design robust experiments, troubleshoot unexpected process failures, and interpret complex datasets to guide their next steps. They will also hone their science communication skills, learning how to translate dense lab results into compelling narratives for both scientific peers and the general public. Ultimately, this comprehensive training culminates in exceptional career readiness. When interviewing for future jobs or graduate programs, students will be able to confidently state: “I helped build a new advanced manufacturing reactor and successfully converted toxic city waste into valuable graphene.” This specific, high-impact experience will ensure they stand out as highly competitive candidates in fields like green engineering, sustainable manufacturing, and environmental consulting.

Required training of 5 hours with Description: Because safety and proper technique are our absolute highest priorities, your onboarding process is designed to be thorough, structured, and highly supportive. Before you step up to the equipment, you will build a solid foundation by completing all required UNC Charlotte Environmental Health and Safety (EHS) modules—including General Lab Safety, Hazardous Waste Management, and Electrical Safety—while simultaneously reviewing a curated list of accessible papers to grasp the underlying science of graphene and waste upcycling. Once in the lab, your hands-on training begins with the FJH apparatus. Given that this system utilizes high voltage and generates extreme temperatures, you will undergo rigorous, step-by-step instruction directly with the PI. During the first several weeks, you will strictly observe and assist, transitioning to independent operation only after you have demonstrated a complete mastery of the standard operating procedures (SOPs) and safety protocols. This phased, "shadow-first" approach extends to your materials characterization training as well; you will be guided through the UNCC core facilities to learn sample preparation for Raman and TEM analysis, moving toward independent equipment use only when you are fully confident and prepared.

Mentoring plan: My mentoring philosophy is built on active engagement, clear expectations, and tailoring the research experience to the student's personal career goals.The student will work directly with me and closely collaborate with graduate researchers in the ETCM department. In the first month, contact will be highly frequent (multiple times a week in the lab) to ensure safe onboarding and technical confidence. As the student gains independence, we will transition to a structured weekly 1-on-1 meeting to discuss data, troubleshoot challenges, and plan the next steps. The student will also attend our bi-weekly group meetings.I expect the student to be curious, reliable, and unafraid to ask questions or make mistakes. Research is about exploring the unknown. The student will be expected to keep a detailed lab notebook and briefly present their weekly progress during our group meetings. By the end of the semester/year, I expect the student to present a poster summarizing their findings at the UNC Charlotte Undergraduate Research Conference.I commit to fostering an inclusive, supportive, and intellectually stimulating

environment. I will not just teach the student how to do an experiment, but why we are doing it. I will actively discuss their long-term goals, whether that is securing a job in the green energy sector, applying to graduate school, or exploring intelligent robotic automation in manufacturing, and tailor their project responsibilities to build the exact resume they need. I will also provide guidance on writing abstracts, designing scientific posters, and building professional networks.

Applicant Requirements: To thrive in this research role, applicants should begin with a basic scientific foundation, having completed at least introductory-level college courses in Chemistry, Physics, or Materials Science. Beyond your coursework, we are looking for students with a genuine hands-on disposition who are excited to work in a dynamic wet/dry chemistry lab. This means being completely comfortable wearing appropriate personal protective equipment (PPE) and handling physically messy materials, such as dried sludge and carbon powders. Because our specialized FJH apparatus utilizes high voltages and generates extreme temperatures, a strict safety mindset and an unwavering adherence to laboratory protocols are absolutely critical. In your day-to-day work, reliability and attention to detail will be your most valuable tools; you will be expected to carefully follow experimental procedures, accurately weigh chemical ratios, and maintain a meticulous laboratory notebook. Above all, we highly value proactive communication. We want researchers who are eager to learn and possess the confidence to ask questions immediately whenever they are unsure about a procedure, a safety rule, or a complex scientific concept.

Applicant Preferences: Prior coursework in engineering materials or introductory chemistry/physics.Familiar with data analysis tools like Excel or OriginPro.Proactive attitude, attention to detail, and willingness to try new things.Students are expected to maintain a consistent schedule to receive necessary training and conduct experiments, though specific hours can be arranged flexibly in coordination with me.

Specific Time considerations/conflicts: N/A

App ID #: 3028

Mentor: Zhang, Ran Email: rzhang8@charlotte.edu

Title: Assistant Professor

Department: Electrical and Computer Engineering Wm States Lee College of Engineering

Co-mentor: No

Community engaged research: No

Title: Artificial Intelligence Powered Autonomous and Distributed Multi-Drone Platform

Description: Most existing drone swarm management platforms feature either centralized control by a ground station or predefined synchronized action plans, e.g., the drone light show. A fully distributed yet coordinated multi-drone platform is still missing for realistic applications. Such applications need drones' own intelligence to make coordinated decisions in a real-time manner without centralized or remote control. This project is the continuation of a 3-year project to build an autonomous, distributed and coordinated multi-drone network. Students will learn and be devoted to programming drones both virtually in realistic simulations and practically in real drones with on-board intelligence and advanced sensors, design deep learning and reinforcement learning algorithms for distributed multi-drone management in concrete task scenarios, and document the achievements for possible research publications. A new project component is added which explores using wireless power transfer technique to power the drones on the ground or even in the air.

Accepting applications for: Only 150 hours over an academic semester (~10h/wk)

2 positions available

Anticipated Student Learning Outcomes: Learning about the wiring and connections inside a self-built droneLearn how to program in a realistic drone simulator integrating Gazebo, lower-level drone flight controller and RViz.Learn to design machine learning and reinforcement learning algorithms for concrete practical tasksLearn how to program the drones in ROS and Python and upload onto the real drones for reallife testing.

Required training of 20 hours with Description: 1. Tutorials on how to build drones from scratch

2. Training on how to operate the realistic drone simulator

Mentoring plan: The mentor will hold weekly meetings with the mentees to discuss the accomplishments and tasks to be done.The mentee will get trained on the project via working with existing undergraduate research assistants. The training includes how to wire different components in a self-built drone, how to program Intel NUC to interact with different sensors and control the drone flights, and how to use realistic drone simulator - Gazebo to simulate before actually flying.The mentees will design distributed algorithms under the guidance of the mentor.The students may present to the lab visitors to introduce the ongoing projects. They may also get involved in writing academic papers by providing simulation results from Gazebo.

Applicant Requirements: Required: Having Python programming experiences

Applicant Preferences: Preferred: have considerable amount of microcontroller (Arduino UNO, raspberry Pi, Intel NUC, or Nvidia Jetson) programming experiences

Specific Time considerations/conflicts: N/A