2025 EUREKA! Project List

The table below contains the projects available for the 2025 EUREKA! Program. Project details are available on the pages following the table. The "Project Title" in this table will hyperlink you to the project information. The "Project Title" on the later pages will hyperlink you to the project or mentor website. The "Department" on the later pages will hyperlink you to the department's website. If you do not see a project or department that interests you, you will have the option to suggest one through your application. Please email us at eureka@clemson.edu with any questions.

*Indicates the project has **Required** Skills / Prerequisites. Please pay special attention to these as you will be responsible for ensuring you meet those requirements.

Department	Project Title
Agricultural Sciences	Exploring the Adoption of Climate-Smart Agricultural Practices Among Peanut Producers
Agricultural Sciences / SC Water Resources Center	Patterns and Trends in Hydro-climatological Data in South Carolina*
Automotive Engineering	Driving Safety with Intelligent Vehicles
Automotive Engineering	Simulation to Reality Transfer from Simulators Using VEX-AI Robotic Systems*
Biological Sciences	Bugs as Drugs
Biological Sciences	Cloning of Potential Antigens from Histomonas meleagridis for Vaccine Development Against Histomonosis in the Poultry Industry*
Chemical and Biomolecular Engineering	Breast Cancer (multiple projects)
Chemistry	X Marks the Spot: Finding Treasure in Halogen-bonded Cocrystals and Deep Eutectic Solvents
Civil Engineering	Learning from Images – Unveiling Lunar Regolith Properties from Rover Tracks*
Computing	Adversarial Scenario Extraction and Reproduction for Autonomous Vehicle Security Evaluation*
Computing	Security and Defense in Automatic Speech Recognition Systems*
Computing	Generative Artificial Intelligence (AI) for Harmful Content Moderation*
Computing	How to Train and Finetune a Deep Learning Model Efficiently*
Computing	Bring Clemson to Life in 3D*
Electrical and Computer Engineering	AI-Driven, Hands-on, Wireless Communications
Electrical and Computer Engineering	Trustworthy AI for Autonomous Driving*

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Department	Project Title
Environmental Engineering & Earth Sciences	From Blue-Gray to Blue-Green: Facilitating the Transition to Non-Plastic Natural Material Use Within the Coastal Zone Economy
Environmental Engineering and Earth Sciences	Electrochemical Process for Recovering Nitrogen and Phosphorus from Source-Separated Urine to Reduce Nutrient Loads to Domestic Wastewater Treatment Plants
Food, Nutrition and Packaging Sciences	Design and Development of Biopolymer-Based Films and Coatings for Sustainable Applications
Food, Nutrition, and Packaging Sciences	Monitoring and Analyzing Quality Changes During Postharvest Storage of Fresh Fruits and Vegetables*
Genetics and Biochemistry	AI in Biomedicine: Prediction of Novel Human Disease Genes by Genomic Data Mining*
Genetics and Biochemistry	Role of Metabolism in the Pathogenesis of the Fungus Cryptococcus neoformans*
Genetics and Biochemistry	Genetic Engineering for Crop Improvement
Genetics and Biochemistry	Gene Regulation during Encystation in the Human Parasite Entamoeba histolytica
Genetics and Biochemistry	Homologous Recombination and DNA Repair
Materials Science and Engineering	Influence of Microplastics on Cell Shape and Movement
Materials Science and Engineering	Synthesis and Characterization of Magnetic Nanoparticles for Biomedical Applications*
Materials Science and Engineering	Data Science in Materials Science and Engineering*
Mechanical Engineering	Using Computer Simulations to Design Better Biodegradable Packaging Materials
Mechanical Engineering	Innovative Approaches to MXene Nanofiber Fabrication and Mechanical Characterization*
Mechanical Engineering	Collective Hydrodynamics of Robotic Swimmers and Surfers
Mechanical Engineering	Experimental Studies on Spherical Flames: Applications in Aerospace Propulsion*
Mechanical Engineering / Bioengineering	Machine Learning-Enhanced Cardiovascular Biomedical Research*
Nursing	The Effects of Cholesterol Lowering Drugs on Human Colorectal Cancer Cells
Physics and Astronomy	DNA Paint - Superresolution Microscopy For Visualizing Cellular Structures
Plant and Environmental Sciences	Deciphering the Role of Plant-Microbe Interactions in Enhancing Plant Stress Tolerance and Soil Carbon Sequestration
Psychology	Midlife in the US (MIDUS): National Study of Daily Experiences (NSDE)

Project Title: Exploring the Adoption of Climate-Smart Agricultural Practices Among Peanut Producers

Mentor: Anastasia Thayer, Assistant Professor

Department: Agricultural Sciences

Delivery Option: Either In-Person and/or Online

Project Description:

The Climate-Smart Grown in SC program is an interdisciplinary project that incentivizes farmers to implement selected climate-smart (CS) production practices on leafy green, peanut, and beef cattle farms across South Carolina. In addition to incentivizing adoption, the project's implementation, research, and outreach components mean that team members are also involved with measuring carbon and greenhouse gas (GHG) benefits associated with the CS practices and understanding the potential markets for the resulting climate-smart commodities.

The intern(s) will work with the market development team to understand the current adoption and the challenges of adopting climate-smart practices on peanut operations across the Southeast. Using data from a survey collected in winter/spring 2025, the intern(s) will summarize survey results and work with researchers to present the findings of the survey. Through this internship, students will have an opportunity to learn about climate-smart agriculture, the relevant practices, and the benefits and challenges of adoption in peanut production systems.

Student Involvement:

The intern(s) will analyze survey data collected from 300 peanut producers to understand the current adoption of climate-smart/conservation practices as well as barriers to adoption. The intern(s) will work with the researchers to summarize the data and form a relevant, specific research question to be explored during the internship. Through this process, the intern(s) will learn how to 1) clean, code and summarize survey data, 2) generate research questions, and 3) use survey data to answer research questions. By the end of the internship, the intern(s) should have a working understanding of relevant climate smart/conservation practices adopted in peanut production systems, the benefits of adoption for ecosystem health, as well as some of the challenges with adoption.

Required Skills / Prerequisites:

No specific skills are required to participate in this project.

Expected Outcomes:

The intern(s) will: 1) analyze results of peanut producer survey to answer questions related to conservation practice adoption, 2) synthesize findings to understand current adoption and barriers to adoption 3) create relevant output to communicate findings such as poster, blog post, or other written material.

We are finishing year 2 of the Climate Smart Grown in SC program. In the remaining 3 years, there are additional opportunities for engagement with students for research and continuing the project.

Research Location:

Main Clemson University Campus

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Project Title: Patterns and Trends in Hydro-climatological Data in South Carolina
Mentor: C. Prakash Khedun, Assistant Professor
Department: Agricultural Sciences / SC Water Resources Center
Delivery Option: Either In-Person and/or Online

Project Description:

Hydro-climatological extremes (floods and droughts) are an integral part of the hydrological cycle. They are, however, not easy to predict. When they occur, they can have devastating effects on crops, infrastructure, local and state economy, and may in certain cases threaten lives. They are becoming more frequent and their impacts more catastrophic because of a changing climate. South Carolina, due to its location, is periodically subjected to both extremes.

In this project, students will learn how to (i) find and download hydro-climatological data, (ii) frame a hypothesis, and (iii) employ statistical tools and techniques to determine patterns and trends in the data.

Students may also have the opportunity to attend a one-day short course on climate impacts (still under preparation by the PI).

Interns may work on campus or, if they choose, work in the computer lab at the SC Water Resources Center in Pendleton, SC. The center is on the CatBus Pendleton route and is easily accessible from campus.

Student Involvement:

Each student will analyze one hydro-meteorological variable (precipitation, minimum and maximum daily temperature, evapotranspiration, wind, streamflow, etc.) depending on their interest. In the first week, they will be introduced to programming in R (a common statistical programming language) and will be taught a few relevant statistical techniques. They will also be introduced to data repositories at USGS, NOAA, and NASA. In week 2 they will download, clean, and organize their data. They will spend weeks 3 and 4 conducting the analysis and will prepare and present their poster in week 5.

Required Skills / Prerequisites:

Interns should have a basic mathematics and statistics background and be willing to learn computer programming. The PI and his postdoc and graduate students will introduce interns to programming in R. The programming course will be in the newly renovated computer lab at the SC Water Resources Center.

Expected Outcomes:

The PI encourages student to continue to develop their work after the completion of this internship for presentation at the South Carolina Water Resources Conference which will be held in October at the Metropolitan Convention Center in Columbia, SC. This is a two-day conference where students will have the opportunity to listen to a wide range of presentations and interact with researchers across the state.

Should the students wish to continue work the work they started during this internship, the PI will work with them to publish it in the Journal of South Carolina Water Resources.

Research Location:

SC Water Resources Center in Pendleton, SC (11 min drive from Sikes Hall)

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Project Title: Driving Safety with Intelligent Vehicles
Mentor: Bing Li, Assistant Professor
Department: Automotive Engineering
Delivery Option: Either In-Person and/or Online

Project Description:

The interns will explore and learn artificial intelligence and sensing technologies for driving safety with intelligent vehicles, especially for teenage drivers and other individuals learning to operate intelligent vehicles.

Student Involvement:

The interns will conduct surveys, write/test software/AI programs, and write reports.

Required Skills / Prerequisites:

Python or alternative-language programming skills are preferred, although not required. Students should have good passion with driving safety and new technologies.

Expected Outcomes:

Students will have the opportunity to publish their research results after EUREKA!

Research Location:

CU-ICAR in Greenville, SC (46 min drive from Sikes Hall)

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Project Title: Simulation to Reality Transfer from Simulators Using VEX-AI Robotic Systems
Mentor: Venkat Krovi, Professor
Department: Automotive Engineering
Delivery Option: In-Person Only

Project Description:

VEX Robotics offers kits with parts like motors, sensors, controllers (similar to LEGO), and software packages that introduce computer science concepts and lets users from beginners to experts rapidly build projects from simple prototypes to competition-ready designs. Prebuilt modules with plug and play capability give it the grace of simplicity. Nvidia Isaac Sim is a physics enabled simulation environment software, where 3D shapes can be created with real word likeness. The physics then interacts with these objects to make them behave in ways similar to the real world.

The question is, do simulated objects really behave like they do in the real world? Tuning object definition parameters in the software and matching the real world with the simulation is called Real-to-Simulation transfer and the opposite is called Simulation-to-Real (Sim2Real and Real2Sim in short). Both processes involve a deeper understanding of how real objects behave and what the software allows one to do.

By introducing Real2Sim and Sim2Real methods, and providing a quick prototyping platform like the VEX AI, students with varying levels of programming capabilities get a broad exposure and overview of the processes followed by the robotics industry along with the common challenges it faces.

Student Involvement:

Students will contribute both at individual and team levels in gaining an overview of tasks involved in the project, distribute tasks based on their strengths and interests, and finally integrate individual portions into a cohesive product.

Required Skills / Prerequisites:

Students should have a familiarity with basic programming / coding.

Expected Outcomes:

Students will gain a greater exposure to robotics and opportunities to deepen participation beyond the initial 5 weeks to result in publications and presentations.

Research Location:

CU-ICAR in Greenville, SC (46 min drive from Sikes Hall)

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Project Title: Bugs as Drugs
Mentor: Jeremy Tzeng, Professor
Department: Biological Sciences
Delivery Option: In-Person Only

Project Description:

Bacteria can make excellent vectors for tumor therapy as they can preferentially migrate towards the area surrounding the tumor, known as the tumor microenvironment (TME). This area undergoes changes as a tumor develops that includes hypoxia, acidification, angiogenesis, and increased nutrient density. Obligate anaerobes and facultative anaerobes can travel towards the hypoxic TME and can use chemoreceptors to sense local changes in nutrients. Because bacteria can be motile, they can facilitate deeper penetration into the tumor site and can invade the tumor cells. In this research project, we utilize modified strains of Listeria monocytogenes to deliver a suicidal gene specifically into tumor cells to induce programmed cell death.

Student Involvement:

Interns will work closely with a graduate student in validating the genotypes and phenotypes of the Listeria bi-vector system for delivery of mazF gene construct into tumor cells expressing the Human Epidermal Growth Receptor-2 (HER2). The efficacy of such system for arresting protein synthesis and induction of programmed cell death, i.e., apoptosis, will be determined. The potential off-target effect of the Listeria bi-vector system will also be assessed.

Required Skills / Prerequisites:

No specific skills are required to participate in this project.

Expected Outcomes:

At the completion of the program, interns would have the opportunity to continue undergraduate research moving the project forward and develop tumor therapy in a mouse model and collect data for manuscript publication.

Research Location:

Main Clemson University Campus

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Project Title: Cloning of Potential Antigens from Histomonas meleagridis for Vaccine Development Against Histomonosis in the Poultry Industry

Mentor: Zhicheng Dou, Associate Professor

Department: Biological Sciences

Delivery Option: In-Person Only

Project Description:

Histomoniasis (blackhead disease), caused by the protozoan Histomonas meleagridis, poses a significant threat to the poultry industry, leading to high morbidity and mortality rates in both chickens and turkeys and resulting in substantial economic losses. Currently, there are no vaccines or antibiotics available to prevent or treat Histomonas infections. One promising strategy involves developing peptide vaccines based on specific H. meleagridis antigens, particularly surface antigens, which are often immunogenic and easily recognized by the host's immune system. This project aims to clone, express, and purify candidate surface antigens from H. meleagridis using an E. coli expression system, then evaluate the resulting recombinant proteins for their potential as vaccine components against histomonosis in turkeys.

Student Involvement:

Each EUREKA! student will be assigned a gene encoding a potential surface antigen for their individual project. They will perform PCR amplification, molecular cloning, and transform E. coli with the resulting recombinant DNA for antigen expression and purification. Students will then conduct biochemical assays to determine the concentration and purity of their purified proteins. In addition to their bench work, participants are expected to present their progress at weekly lab meetings and deliver a final presentation at the conclusion of the EUREKA! program.

Required Skills / Prerequisites:

Students are expected to have a solid understanding of a high school–level biology curriculum. Prior laboratory experience from a high school biology course is preferred but not required.

Expected Outcomes:

Participants will gain hands-on experience with cutting-edge molecular biology techniques, which will equip them for future biomedical research endeavors. They are also encouraged to continue their research in my lab to further develop their skills and expertise. Furthermore, if participants work in the lab for multiple semesters, they will have the

opportunity to present their findings at local and regional conferences and will be considered for authorship on upcoming research articles.

Research Location:

Main Clemson University Campus

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Project Title: Breast Cancer (multiple projects listed below)
Mentor: Adam Melvin, Associate Professor
Department: Chemical and Biomolecular Engineering
Delivery Option: In-Person Only

Project Description:

Research in my lab focuses on the development of novel pre-clinical models to study various aspects of cancer with a focus on drug resistance and metastasis. We use microscale technologies to create new technologies to allow for new types of studies looking at cell-to-cell communication, 3D cell culture, and the diversity associated with single cell behavior. The idea is to provide new insight into mechanisms driving drug resistance at the primary and secondary site in addition to understanding how cancer cells interact with their environment (including other healthy cells) and how biophysical cues can influence cancer cell behavior. Students will be able to choose between the following projects:
(1) Single cell measurement of enzyme activity in a microfluidic device to identify drug resistant subpopulations,
(2) Development of a preclinical microfluidic model to study how biophysical stress impacts metastatic breast cancer,
(3) Development of a novel co-culture approach to study paracrine signaling in breast cancer.

Student Involvement:

Students will work in teams with current graduate and undergraduate students; however, they will be responsible for designing and running their own experiments. The majority of work will be experimental in a wet lab using established techniques like fluorescence microscopy and fluorometry coupled with using the microfluidic technology our lab develops. Some students, if interested, will gain experience working with mammalian cell culture. All projects require some degree of data analysis and interpretation to present the findings from the experiments.

Required Skills / Prerequisites:

No specific skills are needed. While we are a chemical engineering lab, we have students from a range of majors currently performing undergraduate research including biomedical engineering, biochemistry, biology, and microbiology.

Expected Outcomes:

Ideally the students will continue working on the project into the academic year as part of the CI program. Last year all three students elected to continue working in the lab. Depending on the project, the students may do enough over the

summer to earn authorship on a publication, but most other outcomes stem from the student's continuing to work in the lab during the academic year.

Research Location:

Main Clemson University Campus

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Project Title: X Marks the Spot: Finding Treasure in Halogen-bonded Cocrystals and Deep Eutectic Solvents

Mentor: William Pennington, Department Chair and Alumni Professor

Department: Chemistry

Delivery Option: In-Person Only

Project Description:

We are interested in combining molecules together, typically through mechanical grinding, which have the potential for forming halogen bonds (very similar to hydrogen bonding, but with the hydrogen replaced by a halogen such as iodine or bromine). Our expected outcome is formation of a cocrystalline solid product (containing two or more different molecules) or a liquid deep eutectic solvent. Cocrystals are important due to the ability to tweak the properties of one molecule by combing it with another. For example a pharmaceutical compound might have excellent potential for treating an illness or condition, but if it is not soluble in the body it is worthless. Whereas a cocrystal of this compound with a different molecule might have excellent solubility in the body and so be able to deliver that compound of interest so that it can react to treat the condition. Deep eutectic solvents are designer liquids formed from two or more different compounds. This newly emerging class of nontoxic environmentally friendly solvents have great potential to replace toxic, volatile organic solvents in many industrial and medicinal applications. If grinding results in formation of a solid powder, it is analyzed to determine whether it is a new cocrystalline product (containing two or more molecules in the solid phase). If so, the new compound is structurally characterized and its solid state properties and potential for application are studied. If grinding results in a liquid, its solubility characteristics and thermal properties are studied to determine its potential as a deep eutectic solvent.

Student Involvement:

EUREKA! students in our lab work under the guidance of a senior graduate student. They will learn many new skills and gain experience in valuable techniques. Students will experiment with a variety of chemical systems and will evaluate preferred crystal growth techniques in those systems forming crystalline phases. Upon the formation of crystals, students will participate in advanced structural analysis techniques such as single crystal X-ray diffraction, and engage with software to visualize the crystal structures and evaluate the intermolecular interactions. If a system produces a deep eutectic solvent, students will characterize samples using thermal analysis and rheology instrumentation.

Required Skills / Prerequisites:

Basic math skills and enthusiasm for learning are all that is needed.

Expected Outcomes:

Our EUREKA! students serve as coauthors on journal articles and present their results at professional conferences. Previous students have presented at professional chemistry conferences in Puerto Rico and Atlanta. Our students typically stay on with us to continue their research after EUREKA! ends, some for their entire academic career at Clemson.

Research Location:

Main Clemson University Campus

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Project Title: Learning from Images – Unveiling Lunar Regolith Properties from Rover Tracks
Mentor: Qiushi Chen, Associate Professor
Department: Civil Engineering
Delivery Option: In-Person Only

Project Description:

NASA's Artemis program necessitates the continuous innovation and development of efficient tools for in situ characterization and utilization of lunar regolith. In this project, the team will explore the use of track images from a Lunar Terrain Vehicle to infer important properties of lunar regolith. Students will learn and develop machine learning-based image processing methods and will also have hands-on experience setting up a rover-regolith system.

Student Involvement:

The research interns will work with a team of graduate and undergraduate students and the faculty mentor. In this research, students will aim to answer the following key research questions:
(1) What are the basic principles of regolith and wheel interactions?
(2) What features, in particular geometric features, do track images possess, and how can they be extracted with image processing methods?
(3) How do track features correlate with regolith properties?
Revolving around these research questions, the following activities are planned for the interns:
(1) Survey the literature on the Lunar Terrain Vehicle, analysis of rover tracks, and image processing methods.
(2) Analyze and extract geometric features of wheel track images using machine learning methods and image processing software.
(3) Assist graduate students in setting up a lab-scale wheel-regolith system and a computer model to generate image data.
(4) Complete the required final poster presentation.

Required Skills / Prerequisites:

Students should have strong motivation and interest in NASA research, be able to critically analyze and process technical information from a variety of resources (technical papers, reports, websites, databases, etc.), be familiar with Microsoft Office, and be willing to learn and use new computer and image processing software.

Expected Outcomes:

The interns can present their research outcomes at Clemson's Annual Summer Undergraduate Research Poster Symposium.

After the interns complete their research experience, there are multiple opportunities to continue getting involved:
(1) Creative Inquiry: students may choose to join Dr. Chen's Creative Inquiry project (#1016 Lunar Regolith for In Situ Resource Utilization; course number: CE1990/2990/3990-123) in the Fall, Spring, or Summer semesters.
(2) NASA SC Space Grant Consortium (SCSGC) projects: Dr. Chen has multiple ongoing SCSGC projects that hire and support undergraduate students to conduct NASA-related research.

Research Location:

Main Clemson University Campus

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Project Title: Adversarial Scenario Extraction and Reproduction for Autonomous Vehicle Security Evaluation

Mentor: Mert Pesé, Assistant Professor

Department: Computing

Delivery Option: In-Person Only

Project Description:

This project focuses on extracting adversarial scenarios from original attack papers on autonomous vehicles and converting them into a domain-specific language (DSL) such as Scenic. These scenarios will then be implemented in CARLA, a high-fidelity simulator for autonomous driving research. The goal is to reproduce attack-specific scenarios to facilitate further investigation into the vulnerabilities and robustness of autonomous vehicle systems. By systematically recreating these attack conditions, we aim to analyze and improve defensive mechanisms in autonomous driving environments.

Student Involvement:

- Review and analyze existing research papers on adversarial attacks targeting autonomous vehicles.
- Extract key adversarial scenarios and threats described in these papers.
- Convert the extracted attack scenarios into Scenic or another DSL suitable for simulation.
- Implement and execute the scenarios within the CARLA simulator.
- Assist in documenting results and preparing findings for a research presentation.

Required Skills / Prerequisites:

Basic Python knowledge is required for this project.

While prior experience in the following areas is not required, interns should have a strong interest in autonomous systems security and be willing to learn new concepts.

- Simulation tools: Familiarity with CARLA or similar autonomous driving simulators is a plus.
- Machine learning and AI concepts: Basic understanding of adversarial attacks in autonomous systems.
- Research skills: Ability to read, summarize, and extract relevant information from academic papers.

Expected Outcomes:

- A collection of adversarial attack scenarios formally written in Scenic or another DSL.
- Reproduced attack scenarios successfully running in the CARLA simulator.
- A research report detailing findings and potential countermeasures.
- Possible contribution to a research paper submission.

Research Location:

Main Clemson University Campus

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Project Title: Security and Defense in Automatic Speech Recognition Systems
Mentor: Long Cheng, Associate Professor
Department: Computing
Delivery Option: Either In-Person and/or Online

Project Description:

Automatic Speech Recognition (ASR) is the use of Machine Learning technology to process human speech into readable text. ASR systems are increasingly used in applications such as virtual assistants (e.g., Amazon Alexa), transcription services, and voice authentication. However, these systems are vulnerable to various security threats, such as adversarial perturbation attacks. This project explores the security risks associated with ASR systems and investigates effective defense mechanisms to enhance their robustness.

Student Involvement:

Students will learn the Basics of Automatic Speech Recognition (ASR), such as how ASR systems convert speech into text, and the recent transformer-based end-to-end speech recognition system. Students will learn different types of attacks on ASR and understand the potential risks of ASR vulnerabilities in real-world applications.

Required Skills / Prerequisites:

Students must have basic Python programing experience.

Expected Outcomes:

Students may continue working with PhD students on this project after the EUREKA! program.

Research Location:

Main Clemson University Campus

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Project Title: Generative Artificial Intelligence (AI) for Harmful Content Moderation
Mentor: Long Cheng, Associate Professor
Department: Computing
Delivery Option: Either In-Person and/or Online

Project Description:

Online social media platforms revolutionized communication at an unprecedented scale but also face the growing challenge of harmful content, including misinformation, hate speech, and toxic interactions. To address this, platforms use content moderation systems that combine rule-based filters and human moderators, but these methods struggle to keep up with the sheer volume and complexity of online discussions. Also, human moderators face severe psychological strain due to constant exposure to harmful content, which has been reported to impact their mental health. Large language model (LLMs) are becoming powerful tools to detect, filter, and moderate harmful content, such as misinformation, toxic language, and hate speech at a large scale.

Student Involvement:

Students will explore how large language models (LLMs) such as ChatGPT can detect, filter, and moderate misinformation and toxic language. Students learn how to fine-tune these open-source LLMs using techniques such as few-shot learning and reinforcement learning with human feedback to enhance their ability to recognize context-dependent hateful content.

Required Skills / Prerequisites:

Students must have basic Python programing experience.

Expected Outcomes:

Students are encouraged to publish their research work (if it yields meaningful findings/results), and to continue doing research with our PhD students after the EUREKA! program.

Research Location:

Main Clemson University Campus

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Project Title: How to Train and Finetune a Deep Learning Model Efficiently
Mentor: Kai Liu, Assistant Professor
Department: Computing
Delivery Option: In-Person Only

Project Description:

Training deep learning models such as Large Language Models (LLM) usually need huge computing sources, such as thousands of GPUs which is very expensive and time consuming, therefore impractical to most users. In this project, we will work on efficient training and fine-tuning techniques to overcome the computing issue and make deep learning accessible to most customers.

Student Involvement:

Students will work individually or as a team. The intern(s) will follow specific instructions from Dr. Liu and the PhD. students on how to implement training and finetuning a deep learning model, such as large language model, and demonstrate the project in a live interactive style.

Required Skills / Prerequisites:

Students must have basic Python programming experience.

Expected Outcomes:

The students will present a functioning demo to others at the completion of the project.

Research Location:

Main Clemson University Campus

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Project Title: Bring Clemson to Life in 3D
Mentor: Siyu Huang, Assistant Professor
Department: Computing
Delivery Option: Either In-Person and/or Online

Project Description:

Have you ever wondered how movies and video games create lifelike 3D worlds? In this project, you'll dive into Novel View Synthesis (NVS), an exciting field of 3D computer vision that turns regular photos or videos—like the ones you take with your smartphone—into photorealistic 3D models.

Student Involvement:

Students will start by learning the basics of how computers "see" the world in 3D and get hands-on experience with cutting-edge NVS codes and softwares. Then, they will capture photos of landmarks and objects within Clemson campus, and use learned skills to transform those images into 3D models and bring them to life in a virtual world through interactive simulation tools like Unreal Engine — just like a game designer or a Hollywood VFX artist.

Required Skills / Prerequisites:

Basic Python programming experience is required. Having experience with linear algebra and probability theory is recommended.

Expected Outcomes:

Throughout EUREKA!, students will use 3D assets and toolkits of Clemson campus. After EUREKA!, there is the potential for paper submissions to top AI conferences such as NeurIPS and CVPR as well as the opportunity to keep working with Dr. Huang's lab for research on machine learning and 2D/3D vision.

Research Location:

Main Clemson University Campus

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Project Title: AI-Driven, Hands-on, Wireless Communications
Mentor: Lan Zhang, Assistant Professor
Department: Electrical and Computer Engineering
Delivery Option: In-Person Only

Project Description:

In today's world, artificial intelligence (AI) is everywhere—from self-driving cars to smart home devices. But have you ever wondered how AI data moves from one place to another? This project dives into the fascinating world of wireless communication by building a system that can transmit AI-generated data using specialized hardware. Using Software-Defined Radios (USRP) and Jetson Nano, students will explore how to send and receive AI-powered information in real time. Imagine a system where AI can "talk" wirelessly, enabling smarter and faster communication between devices. Throughout the project, students will gain hands-on experience in experimenting with signals, troubleshooting real-world problems and designing innovative solutions.

Student Involvement:

Research interns will engage in hands-on learning and structured research to develop an AI transceiver using USRP and Jetson Nano. They will begin by setting up hardware and software, conducting basic wireless communication experiments, and learning how AI-generated data is transmitted over radio signals. As the project progresses, they will troubleshoot real-world challenges, analyze transmission data, and optimize system performance, all while collaborating one-on-one or as part of a team. Weekly faculty mentorship will guide their research, ensuring they build critical skills in problem-solving, data analysis, and technical communication. The experience will culminate in a poster presentation, with opportunities to showcase findings at professional conferences. Through this immersive research experience, interns will gain an early and impactful start in cutting-edge AI and wireless technology, setting them on a path toward their next great discovery.

Required Skills / Prerequisites:

No specific skills are required to participate in this project.

Expected Outcomes:

Hands-on Technical Skills – Interns will gain practical experience with USRP and Jetson Nano, learning how to configure hardware, transmit AI-generated data wirelessly, and troubleshoot communication issues.

Research Experience & Data Analysis – They will understand how to design experiments, analyze signal transmission data, and optimize system performance, developing valuable research methodology skills.

Software Development & AI Integration – Interns may contribute to custom software scripts for data processing, transmission, and AI model deployment, potentially leading to new tools or open-source contributions.

Formal Research Documentation – Students will practice technical writing and documentation, ensuring their research is well-documented for future projects or publications.

Continued Research & Publications – Interns may have the opportunity to extend their research into a journal or conference publication, collaborating with faculty on further advancements.

Honors Theses & Independent Studies – This project could serve as a foundation for an Honors thesis, independent research project, or capstone experience in later years.

Graduate & Fellowship Opportunities – Exceptional students may be encouraged to pursue graduate research assistantships, fellowships, or NSF REU (Research Experiences for Undergraduates) programs.

Research Location:

Main Clemson University Campus

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Project Title: Trustworthy AI for Autonomous Driving
Mentor: Xiaoyong (Brian) Yuan, Assistant Professor
Department: Electrical and Computer Engineering
Delivery Option: Either In-Person and/or Online

Project Description:

This project focuses on building a trustworthy simulation platform to test and improve the safety of autonomous driving vehicles. Interns will help create virtual driving environments where different driving situations can be tested. The goal is to identify potential weaknesses and risks in autonomous vehicle systems and find solutions to enhance artificial intelligence (AI) trustworthiness.

Student Involvement:

Interns will develop and evaluate a trustworthy autonomous driving simulation platform. The platform will leverage the AI trustworthy techniques to identify the vulnerabilities of existing autonomous driving techniques. The students will work as a team to 1) build various scenarios on an autonomous driving simulation platform named CARLA and 2) collect data from the simulation platforms and perform a trustworthiness assessment.

Required Skills / Prerequisites:

Basic Linux skills are required. Any programming language experience (e.g., Python, C, C++) would be a plus.

Expected Outcomes:

They may contribute to conference papers, technical reports, or open-source simulation tools.

Research Location:

Main Clemson University Campus

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Project Title: From Blue-Gray to Blue-Green: Facilitating the Transition to Non-Plastic Natural Material Use Within the Coastal Zone Economy

Mentor: Michael Carbajales-Dale, Associate Professor

Department: Environmental Engineering & Earth Sciences

Delivery Option: Either In-Person and/or Online

Project Description:

This project looks to evaluate the use of non-plastic alternatives for different use applications in the coastal zone economy, e.g. water quality protection, aquaculture, and remediation. Our task is to undertake an economic and environmental assessment of the different systems being used.

Student Involvement:

The research intern will work with a graduate student on the project to collect data and build economic and life cycle assessment models of the non-plastic technologies.

Required Skills / Prerequisites:

No specific skills are required but a science or engineering background would be helpful.

Expected Outcomes:

There will be an opportunity to participate in project meetings and in the preparation of publications.

Research Location:

Main Clemson University Campus

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Project Title: Electrochemical Process for Recovering Nitrogen and Phosphorus from Source-Separated Urine to Reduce Nutrient Loads to Domestic Wastewater Treatment Plants

Mentor: Sudeep Popat, Associate Professor

Department: Environmental Engineering and Earth Sciences

Delivery Option: In-Person Only

Project Description:

Human urine contains most of the nitrogen (N) and phosphorus (P) that is received by centralized wastewater treatment plants (WWTPs), both of which, if released into receiving water bodies, rapidly degrade water quality through algal blooms and eutrophication. Conventional approaches to removing these compounds from municipal wastewater rely on biological processes and are energy-intensive and operationally sensitive. Undiluted source-separated urine could provide an opportunity to remove N and P in more efficient ways, but source-separated urine is an ephemeral medium; through the activity of the urease enzyme released by several microorganisms, urea is rapidly degraded to a putrid liquid that deposits hard-to-remove scaling on plumbing fixtures. We are developing and designing an electrochemical process: to 1) prevent the transformation of fresh source-separated urine to the putrid liquid that results from urea hydrolysis and microbial growth, 2) stabilize and precipitate the recoverable nutrients, N and P, from urine in a form that may be recovered for recycling in agriculture, and 3) reduce N and P released to the environment degrading quality of natural water bodies. Our electrochemical process can precipitate most of the P in source-separated urine as struvite and prevent microbial growth and hydrolysis of urea through the electrosynthesis of hydrogen peroxide in situ in source-separated urine. The remaining N in source-separated urine, urea, may be processed further and recovered as an N-rich fertilizer.

Student Involvement:

For this EUREKA! project, the assigned students will work with a team of undergraduate students and a graduate student to develop a novel approach of concomitant stabilization of fresh source-separated urine with preferential struvite precipitation using a sacrificial Mg anode and carbon-based gas-diffusion cathode. The proposed research for this project will be divided into four tasks, one of which will be performed by the EUREKA! students. Two tasks for this project are related to experimental work, performed by undergraduate students, which the EUREKA! students will participate in. The experimental work will focus on the proof-of-concept, followed by pilot-scale design and operation.

Required Skills / Prerequisites:

No specific skills are required to participate in this project.

Expected Outcomes:

The project will be ongoing for at least two summers, and thus if students want to come back and do research next summer, there will be an opportunity available (with funding).

Research Location:

L. G. Rich Lab in Anderson, SC (16 min drive from Sikes Hall)

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Project Title: Design and Development of Biopolymer-Based Films and Coatings for Sustainable Applications

Mentor: Sneh Bangar, Post-doctoral Fellow

Department: Food, Nutrition and Packaging Sciences

Delivery Option: In-Person Only

Project Description:

This project focuses on developing eco-friendly films and coatings derived from natural biopolymers to address sustainability challenges in packaging and coatings. Biopolymers such as starch, cellulose, and chitosan are utilized to create materials with enhanced properties like superior barrier performance, mechanical strength, and biodegradability. The goal is to replace conventional petroleum-based plastics with renewable, biodegradable alternatives that reduce environmental impact. Applications span food packaging, agricultural films, and coatings for industrial and medical purposes. By optimizing formulation and processing techniques, this research aims to produce high-performance materials that meet industry standards while supporting global sustainability goals.

Student Involvement:

Their involvement will be hands-on, structured around specific tasks that align closely with the project's objectives. Interns will work both individually and collaboratively to carry out experiments, collect data, and contribute to various stages of product development. Individually, interns will be responsible for tasks such as biopolymer extraction, film formulation, and the characterization of material properties (mechanical strength, biodegradability, barrier performance). They will also analyze and interpret data using statistical methods and report findings through written reports and presentations.

Team meetings will be held regularly to discuss progress and adjustments to the experimental plan. Interns will also contribute to the creation of final reports or scientific publications based on the findings. This collaborative approach fosters peer-to-peer learning and ensures a dynamic research environment.

Required Skills / Prerequisites:

No specific skills are required for the students to be involved in this project. Knowledge learned from high school sciences courses will be enough to participate in the project.

Expected Outcomes:

The project will enable interns to gain hands-on experience in the design, formulation, and testing of biopolymer-based films and coatings. They will develop a deeper understanding of material science, sustainability, and the challenges in creating eco-friendly packaging solutions. Interns will also improve their skills in laboratory techniques, data analysis, and problem-solving. Additionally, they will be trained to read and analyze scientific literature, prepare technical reports, and present findings effectively.

This experience will provide a strong foundation for pursuing graduate studies or careers in material science, sustainable packaging, or environmental research. Interns may also explore potential collaborations with industry partners focused on biodegradable packaging solutions.

Research Location:

Main Clemson University Campus

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Project Title: Monitoring and Analyzing Quality Changes During Postharvest Storage of Fresh Fruits and Vegetables

Mentor: Karin Albornoz, Assistant Professor

Department: Food, Nutrition, and Packaging Sciences

Delivery Option: Online Only

Project Description:

Fresh fruits and vegetables are highly perishable but living structures where metabolic reactions occur. In the Postharvest Laboratory at Clemson University, we work to understand the mechanisms determining fruit and vegetable quality and shelf-life. We aim to improve produce quality and reduce postharvest losses and waste.

We are currently working with tomato, leafy greens, watermelon and blackberry, where we generate data from subjective quality parameters, as well as compositional analysis. Data must be organized, curated and analyzed to extract information that could be valuable to growers and consumers.

Student Involvement:

The intern's job will be to organize, curate and analyze the data on tomato, leafy greens, watermelon, and blackberry through the use of basic statistical tools. The intern will also contrast that information with pictures we take of the products during storage.

Required Skills / Prerequisites:

Basic use of Microsoft Word, Excel, PowerPoint and statistical software is required.

Expected Outcomes:

The student will generate a presentation by the end of the internship summarizing relevant findings, challenges and opportunities for future research. The intern will also have the opportunity to participate in the preparation of scientific manuscripts.

Research Location:

Online

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Project Title: AI in Biomedicine: Prediction of Novel Human Disease Genes by Genomic Data Mining

Mentor: LiangJiang (LJ) Wang, Associate Professor

Department: Genetics and Biochemistry

Delivery Option: Either In-Person and/or Online

Project Description:

In the human genome, most genes actually do not encode proteins; they are non-coding RNA genes. The largest class of non-coding genes is known as long non-coding RNAs (lncRNAs), which are transcripts greater in length than 200 nucleotides, but with no protein-coding capacity. While some lncRNAs have been demonstrated to be key regulators of gene expression and 3D genome organization, most lncRNAs are still uncharacterized. We have thus been developing artificial intelligence (AI) and machine learning approaches for the functional annotation of human lncRNAs through mining the vast amount of genetic and genomic data ("biological big data"). Our recent studies demonstrate that genomic data mining can give insights into RNA functions and provide valuable information for experimental studies of candidate lncRNAs.

This research project will focus on the identification and functional analysis of novel candidate lncRNAs associated with human diseases, including autism spectrum disorders (ASD) and intellectual disability (ID). ASD and ID are clinically and genetically heterogeneous complex disorders, affecting up to 1% and 3% of the human population, respectively. ASD is characterized by impaired social communications and restrictive or repetitive behavior, whereas ID is recognized by diminished intellectual capacity and adaptive reasoning. Both disorders originate in early childhood, and involve a large number of genes essential for normal brain development and function. However, in most cases of ASD or ID, the specific genetic factors of the disorders are still unable to be determined. Until recently, only protein-coding genes were studied for their involvement in ASD and ID. It is thus likely that many of these disease-causing genetic factors may reside in lncRNAs, which are enriched in the brain. The research interns will learn how to build machine learning models for candidate disease gene prediction, and then utilize publicly available genetic and genomic data to further characterize and prioritize the candidate lncRNAs. The high-priority candidates identified in this project can not only provide new insight into the roles of lncRNAs in genetic brain disorders, but may also be further developed as biomarkers.

Student Involvement:

Research interns will be directly involved in the project. Each intern will learn how to build an AI/machine learning model for candidate disease gene prediction and prioritization. They will also contribute to the further evaluation and curation of novel candidate lncRNAs associated with genetic brain disorders.

Required Skills / Prerequisites:

Research interns are expected to have good computer skills and understand the basic concepts of genetics. Although prior experience with computational research is not required, the interns are expected to be willing to learn basic AI/machine learning concepts and computer programming skills for genomic data mining.

Expected Outcomes:

The project will generate a prioritized list of candidate lncRNAs associated with genetic brain disorders. The findings can be used for presentations and publications. The interns will also learn large-scale genomic data analysis and use of AI/machine learning techniques in biomedical research. The data analysis skills learned through this project can be useful for future careers in biomedical data science, bioinformatics, genomics, human genetics, and precision medicine.

Research Location:

Main Clemson University Campus

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Project Title: Role of Metabolism in the Pathogenesis of the Fungus Cryptococcus neoformans

Mentor: Kerry Smith, Professor

Department: Genetics and Biochemistry

Delivery Option: Either In-Person and/or Online

Project Description:

Invasive fungal infections cause nearly one and a half million deaths annually, accounting for nearly 50% of all AIDS-related deaths. Cryptococcus neoformans, an invasive opportunistic pathogen of the central nervous system, is the most frequent cause of fungal meningitis. The CDC estimates the yearly burden of cryptococcal meningitis to be nearly one million cases with greater than 190,000 deaths. AIDS is a major risk factor and mortality rates in AIDS patients range from 55-70% in Latin America and sub-Saharan Africa. Exposure to Cryptococcus is common, as it is an environmental fungus found in the soil that can enter the lungs through inhalation and disseminate to the central nervous system in susceptible individuals. An increased rate of infection occurs in individuals with impaired immunity, particularly those with AIDS and recipients of immunosuppressive therapy. The widespread availability of antiretroviral therapy in developed countries has helped improve the immune systems of many HIV patients to decrease their susceptibility to infection. However, cryptococcal meningitis is still a major problem in resource-limited regions of the world such as sub-Saharan Africa where HIV prevalence is high and access to healthcare is limited. Despite the global significance of cryptococcal meningitis, current treatments are inadequate as the gold standard therapy is based on half century old drugs that have a wide range of liabilities and shortcomings.

Metabolic adaptability and flexibility are important attributes for fungal pathogens to successfully infect and cause disease. Although carbon metabolism is critical for virulence in Cryptococcus very little is known about which carbon sources are utilized during infection. Our long-term goal is to provide a better understanding of how Cryptococcus can adapt its metabolism to survive in the changing environments encountered during infection.

Student Involvement:

If online, the student intern will utilize computational approaches to analyze data from genomics, transcriptomics, proteomics, and metabolomics experiments to make new discoveries in Cryptococcus biology and carbon metabolism. Possible projects could include computational approaches in: (1) the identification of novel virulence factors, (2) the

characterization of the interplay between metabolic pathways during virulence, (3) the identification and characterization of genes necessary for acetate utilization, (4) the identification of important protein modifications, etc.

If in person, the student intern will be provided with mutants of a particular metabolic pathway. Possible projects would include: (1) identification of what growth conditions does the pathway function, (2) the effect on known virulence parameters, (3) the role of the pathway in responding to cellular stresses that pathogen encounters during infection, etc.

At the beginning of the project, the mentor will discuss possible projects and the student intern will have the opportunity to choose their favorite. Throughout the internship, the intern will be able to not only interact directly with the mentor but also work with PhD students who may have a related dissertation project.

Required Skills / Prerequisites:

Students should have enthusiasm for research, basic biology and chemistry knowledge, and general computer knowledge.

Expected Outcomes:

The goal of the EUREKA! internship in the Smith laboratory is to result in an increased interest for research. The expected outcome is that the intern will present their research to the scientific community. First, the intern will have the opportunity to present (talk or poster) their research at national scientific conferences such as the annual Cellular Biology of Eukaryotic Pathogens held at Clemson in October. Second, the expectation is that the intern's research will be published on its own or as part of a greater study. These opportunities will help the student as s/he pursues a career in research and/or medicine. Finally, the student's research will also assist my laboratory in gaining and/or sustaining federal research funds.

Following the EUREKA! internship, the student will have the opportunity to continue research in the lab. This wet lab opportunity would provide the student with experience in a variety of genetic, biochemical, and molecular and cellular techniques that can be utilized to study the discoveries that were made during the EUREKA! internship. Hopefully, the student will enjoy their summer experience and will want to perform their Departmental Honors research in the lab.

Research Location:

Main Clemson University Campus

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Project Title: Genetic Engineering for Crop Improvement
Mentor: Hong Luo, Professor
Department: Genetics and Biochemistry
Delivery Option: Either In-Person and/or Online

Project Description:

Environmental stress is one of the most important factors impacting agriculture production. Plant genetic engineering using molecular cloning and transgenic approaches has been playing an increasingly important role in modern agriculture. Development of novel molecular strategies to genetically engineer important crops will lead to new cultivars with beneficial new traits, enhancing crop yield. This project focuses on manipulation of expression of several stress-related candidate genes in transgenic rice and turfgrass plants to achieve enhanced plant performance under adverse environmental conditions such as drought and salt stress, improving agriculture production and economy.

Student Involvement:

The students participating in the project online will read and discuss related research papers on plant molecular biology, plant genetic engineering and molecular mechanisms of plant-environment interaction. They will participate in all the online presentations and discussions, and actively interact with myself, graduate students and post-doc researcher to become familiar with the basics about scientific research, gene cloning, gene functional characterization and chimeric gene construction as well as plant genetic transformation and transgenic analysis. The students participating in the proposed project in-person will work with graduate students to learn and gain hands-on experience in gene cloning, chimeric gene construction, plant genetic transformation and transgenic analysis.

Required Skills / Prerequisites:

No specific skills are required for the students to be involved in this project. Knowledge learnt from a high school biology course will be good enough to participate in the project. The students will be trained to learn basic molecular and cell biology techniques including DNA and RNA extraction, DNA cloning, plasmid construction, PCR, plant tissue culture, and plant genetic transformation.

Expected Outcomes:

The project would allow students to become familiar with the basics about scientific research, and learn techniques in molecular biology, genetics, and biochemistry including gene cloning, gene functional characterization, chimeric gene construction, preparation of plasmid and plant DNA and RNA extraction, polymerase chain reaction (PCR) as well as plant genetic transformation and transgenic analysis. They will also be trained to read scientific literature, to prepare, present, communicate and discuss scientific data to their peers and the public. The students could continue their research in the lab and gain more hands-on research experience and have opportunities to present research data in professional meetings and publish their discoveries. This experience has been very helpful for many students in their application for graduate school, medical school, and other professional opportunities.

Research Location:

Main Clemson University Campus

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Project Title: Gene Regulation during Encystation in the Human Parasite Entamoeba histolytica

Mentor: Cheryl Ingram-Smith, Associate Professor

Department: Genetics and Biochemistry

Delivery Option: Either In-Person and/or Online

Project Description:

Entamoeba histolytica is a human parasite that causes amoebic dysentery, which is characterized by severe bloody diarrhea that lasts for several weeks. E. histolytica has two life forms, the amoeba form that grows in the large intestine, and the cyst, which infects people through contaminated food and water. We are studying how Entamoeba can convert from the amoebic to the cyst form, a process called encystation. We are working to identify how the parasite senses and responds to environmental signals to begin this process and what genes are involved in the early stages.

Student Involvement:

In-person students will learn how to grow Entamoeba and will examine expression of certain genes of interest to determine whether they are turned up or down in response to certain signals that cause cyst formation to begin. They will isolate DNA and RNA from cells and use reverse transcriptase PCR to determine the changes in RNA level for the genes of interest. They will use PCR, gel electrophoresis, and other common molecular biology techniques.

Online students will work with RNAseq data we recently obtained. This is data that shows the level of expression of all the genes in the cell under a given condition. We will examine this data to identify sets of genes that are turned up or down on different conditions at certain time points. We will use online programs to identify sequences upstream of those genes that may regulate those gene sets. We can also compare the sets of genes that are unregulated early during encystation to genes that are turned up in response to other stresses.

Required Skills / Prerequisites:

No special skills, experience, or knowledge are needed for in-person or online students.

Expected Outcomes:

In-person students will learn basic molecular biology techniques and online students will gain exposure to online bioinformatics tools. Students will also have the opportunity to present their work to our lab group, and potentially at the Eukaryotic Pathogens Innovation Center's summer research presentations.

I encourage my EUREKA! students to consider my lab for undergrad research (they can start right away or come back to the lab when they are ready).

Research Location:

Main Clemson University Campus

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Project Title: Homologous Recombination and DNA Repair
Mentor: Michael Sehorn, Associate Professor
Department: Genetics and Biochemistry
Delivery Option: In-Person Only

Project Description:

The focus of the research in the Sehorn lab involves the DNA repair proteins that promote genome stability. We have a number of DNA repair proteins in the lab that we are interested in understanding how they contribute to the maintenance of the genome. We introduce mutations into the genes that encode the DNA repair proteins, we express and purify the variant proteins and determine the effect of the mutation on the activity of the DNA repair protein. To do this, we use experiments using multiple assays that test different activities that DNA repair proteins have.

Student Involvement:

The overall plan of a project in the Sehorn lab starts with the student doing polymerase chain reaction (PCR) to amply a DNA repair gene. The student will use PCR to introduce a specific mutation into the DNA repair gene. After sequencing the mutated gene to ensure the mutation is present, the student will optimize expression of the DNA repair protein encoded by the mutated gene. If time permits, the student will purify the variant DNA repair protein and perform biochemical assays on this protein. The results of these experiments will be compared to the results of the unmutated DNA repair protein. This will allow the student to determine if the mutation they introduced into the gene resulted in a protein that has altered activity. The student will work with a teammate but each person will do the experiments individually.

Required Skills / Prerequisites:

The student does not need to have any specific skills. We will teach and train the student with the skills they need to be successful.

Expected Outcomes:

After the EUREKA! program is over, the student will have the opportunity to continue conducting research in the lab until they graduate from Clemson University. The short term goal for the EUREKA! student is for them to get acquainted with the lab and learn some lab techniques. The long term goal for the student after EUREKA! program is over, is to have the

student work on a project, completing a significant amount of research that could be a part of a manuscript that is submitted for peer review and publication.

Research Location:

Main Clemson University Campus

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Project Title: Influence of Microplastics on Cell Shape and Movement
Mentor: Kimberly Weirich, Assistant Professor
Department: Materials Science and Engineering
Delivery Option: In-Person Only

Project Description:

Microplastics are ubiquitous in the environment, pervasive in substances such as water and air. Consequently, there has been a lot of interest in how microplastics accumulate in biological organisms and the implications to human health. Microplastics have been detected in plants and animals; and are widespread in humans such as in the brain, milk, and blood. Little is known, however, about how microplastics affect cells. The cytoskeleton is responsible for regulating functions such as cell shape and movement. In this project, Research Interns will investigate how microplastics change the cytoskeletal architecture and forces and shapes the cytoskeleton is able to produce. Research Interns will perform experiments to build cytoskeleton assemblies outside of the cell using purified proteins. Using fluorescence microscopy and image analysis, they will characterize the architecture and dynamic shape changes of the assemblies with and without microplastics. This project will contribute to our understanding of how cell movement and shape regulation, which abnormalities are critical in cancer and some diseases, are influenced by environmental contaminates.

Student Involvement:

Research Interns will have the opportunity to learn a lot of research skills, while working in our research lab, which is an interdisciplinary, collaborative group of graduate and undergraduate students. The Research Intern will work directly with a graduate student on the project, and the professor, as well as potentially with other summer undergraduate students. The Research Intern will perform experiments and analysis. They will learn techniques ranging from engineering and biophysics to biochemistry and molecular biology. They will learn how to make model cytoskeleton samples using purified proteins. They will learn to use a state-of-the-art confocal fluorescence microscope and image samples and microplastics. They will learn fundamentals of image analysis to quantitatively characterize microscopy data along with other techniques to characterize samples.

Required Skills / Prerequisites:

Curiosity required!

Expected Outcomes:

The Research Intern will learn fundamental laboratory skills, various microscopy techniques and image analysis. The Research Intern will learn how to make figures, and develop scientific communication skills. This is an active research project in the lab, so the Research Intern has the potential to contribute to the data collection or analysis in a way that earns authorship in future publications, which some of our lab's undergraduate researchers have accomplished. We have an active group of undergraduate researchers during the academic year, so Research Interns would have the opportunity to continue as researchers in our group after the summer internship.

Research Location:

Main Clemson University Campus

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Project Title: Synthesis and Characterization of Magnetic Nanoparticles for Biomedical Applications

Mentor: Thompson Mefford, Associate Professor

Department: Materials Science and Engineering

Delivery Option: In-Person Only

Project Description:

We are focused on using magnetic particles for biomedical applications. Specifically, we are synthesizing particles for medical imaging (e.g., magnetic resonance imaging, MRI), targeted drug delivery, and removal of diseased tissue. Students will be producing particles with the correct physical attributes, biocompatible surface chemistry, and suitable surface functionality. Students characterize their materials with electron microscopy and magnetometry.

Student Involvement:

Our laboratory works on a team effort approach. The students involved in this project will be integrated into existing work. For example, the student will be trained on the proper synthesis and characterization of nanoparticles. Following training the participants will be given a unique challenge within the project for them to solve. In the past this has been developing new techniques for non-destructive characterization of materials.

Required Skills / Prerequisites:

A successful student will have a strong background in chemistry and an eagerness to learn. In addition, the student must be willing to work individually as well as in a team. Good communication skills (both speaking and writing) are also important.

Expected Outcomes:

The results of this summer will be included in several developing publications focused on the dimensionality of materials and their respective heating rates. This new information will also be presented at several national and international meetings.

Research Location:

Advanced Material Research Laboratory (AMRL) in Anderson, SC (16 min drive from Sikes Hall)

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Project Title: Data Science in Materials Science and Engineering
Mentor: Dilpuneet Aidhy, Associate Professor
Department: Materials Science and Engineering
Delivery Option: In-Person Only

Project Description:

Advanced materials are the backbone of an industrialized economy, and materials science and engineers play a crucial role in developing new materials for future applications such as electronic gadgets, space vehicles, new drugs, and clean and sustainable environment. As we look for newer materials, data science methods are needed to handle large data. The course will teach data-science methods to be applied to the field of materials science and engineering to develop next-generation materials. The engineering students will learn data science skills and vice-versa whereas the computer science students will learn to apply coding to engineering problems. The project will focus on new types of materials called high entropy materials (HEMs) that are game-changers in the materials industry such as space, nuclear, and defense. The course will teach fundamentals of bonding, the guiding principles of alloy formation, and underlying reasons for high strength and better mechanical properties of HEMs compared to traditional materials. The students will work with the advisor and graduate student for peer-to-peer learning in an informal atmosphere.

Student Involvement:

The students will learn to (1) perform research, (2) perform literature search from the scientific journals, (3) analyze data, (4) perform calculations to predict materials properties, and (5) apply data science methods to predict materials properties. The students will work on live, state-of-the-art projects that would make direct impact on the current science and knowledge.

Learning outcomes include a literature review of materials science and engineering research, understanding materials at atomic levels, data mining and curation, coding in Python and usage of Jupyter notebooks, performing simulations to understand materials properties, and developing machine learning models to predict materials properties.

Required Skills / Prerequisites:

Basic understanding of chemistry and mathematics is needed to start the project. Some knowledge of coding will be helpful but not required.

Expected Outcomes:

Curious and hardworking students will enjoy success in the form of conference presentations and/or peer-reviewed journal publications in prestigious journals.

Research Location:

Main Clemson University Campus

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Project Title: Using Computer Simulations to Design Better Biodegradable Packaging Materials

Mentor: Zhaoxu Meng, Assistant Professor

Department: Mechanical Engineering

Delivery Option: Either In-Person and/or Online

Project Description:

Plastic waste is a big problem for the environment, and scientists are looking for better materials to replace traditional plastics in food packaging. One promising option is biodegradable materials, more specifically biopolymers—natural substances that break down over time instead of polluting landfills and oceans. However, to be useful for packaging, these materials need to be strong, flexible, and protective against moisture and air.

This project will introduce students to computer simulations as a tool to help design better biodegradable packaging materials. Instead of mixing materials in a lab, students will use virtual experiments to predict how different biopolymers behave when mixed together or combined with tiny particles called nanoparticles. By running computer models, students will explore questions such as: Which material combinations make the packaging stronger? What role does crystallinity (how organized the molecules are) play in making the material more durable? How do different nanoparticle sizes and surface conditions affect the material's structure and properties?

By the end of the project, students will run simulations, analyze results, and make recommendations for how to improve biodegradable packaging materials. Students will learn how scientists use computer simulations to test ideas before performing real-world experiments. They will gain hands-on experience with:

- Designing an experiment by choosing different material combinations.
- Running simulations on a computer instead of in a lab.
- Interpreting data by looking at patterns in the results.
- Communicating findings through a poster presentation at the end of the summer.

Student Involvement:

Research interns in this project will work both individually and as a team to explore how biodegradable materials can be improved for sustainable packaging using computer simulations. The project will be structured in a step-by-step learning

process, ensuring that students gradually develop confidence and independence in conducting research. No prior experience in programming or computer modeling is required. Students will receive guidance and hands-on training throughout the project.

Introduction to Research & Background Learning (Week 1)

- Attend a research orientation on biodegradable materials, packaging challenges, and how computer simulations help solve real-world problems.
- Learn about nanoparticles and biodegradable materials (what they are and why they matter).
- Gain basic training in computational modeling, using user-friendly software to set up simple simulations.

Designing Virtual Experiments (Week 2)

- Select different material and nanoparticle combinations to test in simulations.
- Adjust variables like nanoparticle surface conditions and biopolymer blend ratios to see how they affect final properties.
- Run initial computer simulations and record observations.

Analyzing & Interpreting Data (Week 3-4)

- Compare results to see how material combinations influence mechanical properties and other properties.
- Learn how to visualize data using mathematical or computational software.
- Discuss real-world applications of their findings with the research team.

Final Research & Presentation (Week 5)

- Summarize key findings into a poster presentation.
- Practice communicating results in a way that is easy to understand.
- Present research at the end-of-summer forum and, if interested, at a professional meeting like the SC Academy of Science.

How Interns Will Work

- Team Collaboration: Interns will work together to discuss research questions, share findings, and help each other troubleshoot simulation challenges.
- Individual Research: Each student will explore a unique material combination, run their own simulations, and contribute individual insights to the final presentation.
- Mentorship & Guidance: Interns will have regular check-ins with the research mentor to ask questions, receive feedback, and refine their research approach.

Required Skills / Prerequisites:

While no prior experience is required, familiarity with MATLAB or Python coding would be beneficial for running simulations and analyzing data. However, students without programming experience will receive introductory training and can participate effectively by focusing on data interpretation and research design. The most important skills for this project are curiosity, problem-solving, and a willingness to learn new techniques.

Expected Outcomes:

By the end of the project, students will have gained hands-on experience in computational materials science, developed skills in data analysis and simulation, and contributed to ongoing sustainable packaging research. Students with good performance will be encouraged to co-author a research paper or continue with independent research in the academic year.

Research Location:

Main Clemson University Campus

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Project Title: Innovative Approaches to MXene Nanofiber Fabrication and Mechanical Characterization

Mentor: Lihua Lou, Assistant Professor

Department: Mechanical Engineering

Delivery Option: In-Person Only

Project Description:

MXenes, a rapidly emerging class of two-dimensional transition metal carbides and nitrides, have garnered significant attention due to their exceptional electrical, thermal, and mechanical properties. This project aims to explore innovative methodologies for fabricating MXene-based nanofibers and conducting a comprehensive nanoscale mechanical characterization to understand their potential for advanced applications. The first objective focuses on the fabrication technique of electrospinning to integrate MXene with polymer matrices. Tailoring nanofiber structures, optimizing MXene dispersion, and achieving uniform distribution within the fibers will be key challenges addressed through advanced processing strategies. The second phase involves in-depth mechanical characterization of the fabricated MXene nanofibers using state-of-the-art techniques of atomic force microscopy (AFM). These tests will evaluate properties such as modulus, elasticity, and adhesion, while understanding the influence of MXene concentration. The outcomes of this research will offer valuable insights into the structure-property relationship of MXene nanofibers, paving the way for their applications in flexible electronics, energy storage, and high-strength composites.

Student Involvement:

Two or three interns will collaborate as a team under the direct mentorship of a Ph.D. student, who will guide them through weekly research activities. The team will present their progress during weekly meetings with Dr. Lou, who will provide strategic guidance and feedback to ensure the research stays on track and achieves its objectives. The program will begin with a one-week training period, during which the interns will gain hands-on experience in essential techniques. These include solution preparation, the electrospinning process, imaging of nanofibers using advanced microscopy methods, and fiber diameter characterization using image analysis tools. Following the training phase, the next two weeks will focus on optimizing fiber diameter by systematically adjusting electrospinning parameters such as voltage, solution concentration, and needle-to-collector distance. With the support of the mentoring Ph.D. student, the team will subsequently conduct mechanical characterization of the MXene-based nanofibers. These tests will include evaluations of adhesion, elasticity, and modulus. In the final phase, the interns will receive training in scientific

communication, including research poster design and technical report preparation. If the research plan is successfully completed, the data generated will contribute to the submission of a peer-reviewed research paper.

Required Skills / Prerequisites:

This research project is designed for students with a basic understanding of organic solvents, polymers, the electrospinning technique, and nanofiber fabrication. Familiarity with these concepts is critical for successfully participating in the experimental and analytical components of the study. Students are encouraged to strengthen their understanding by consulting supplementary resources. For a more visual and practical introduction to these topics, educational videos available on platforms like YouTube are highly recommended. Here are related YouTube channel or videos: (1) Inovenso Ltd. Electrospinning Company; (2) https://www.youtube.com/watch?v=jXFqQYybXUI.

Expected Outcomes:

The expect outcomes of this project include the development of hands-on expertise in experimental techniques, such as solution preparation, electrospinning processes, and nanofiber imaging, providing students with practical experience in advanced material fabrication. The project aims to produce MXene-based nanofibers with optimized diameters and uniformity, achieved through systematic adjustment of fabrication parameters. Additionally, a comprehensive analysis of the nanoscale mechanical properties of these nanofibers will be conducted, yielding valuable insights into their structural and mechanical behavior. The data generated during the project is anticipated to form the basis for a potential peer-reviewed journal publication, contributing to the broader scientific understanding of MXene-based materials. Furthermore, students will receive training in the design of research posters and the preparation of technical reports, equipping them with essential scientific communication skills for presenting their findings effectively at academic and professional forums. These experiences will not only enhance their technical knowledge and communication abilities but also prepare them for future research roles in academic or industrial settings by fostering a deeper understanding of scientific methodology and its applications.

Research Location:

Main Clemson University Campus

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Project Title: Collective Hydrodynamics of Robotic Swimmers and Surfers
Mentor: Hassan Masoud, Associate Professor
Department: Mechanical Engineering
Delivery Option: In-Person Only

Project Description:

In this project, interns will delve into the fascinating world of fluid dynamics and bio-inspired robotics. They will design, build, and test simple fish-like robotic swimmers and Marangoni surfers that mimic natural species' movement. Interns will also gain hands-on experience in flow visualization techniques, and computer-aided design. Through this experience, interns will develop skills in scientific experimentation, data acquisition, and analysis, fostering creativity and a deeper understanding of mechanical engineering principles.

Student Involvement:

Research interns will actively participate in all aspects of the project, gaining hands-on experience in designing and building aquatic robots, such as fish-like swimmers and Marangoni surfers, using CAD software and fabrication tools. They will conduct experiments to test the performance of these robots, employing flow visualization techniques like particle tracking velocimetry to analyze fluid dynamics. Interns will acquire and interpret data, exploring the effects of modifications such as flexible fins and unconventional shapes on robotic performance. They will apply creativity to propose and test new designs, troubleshoot experimental challenges, and collaborate closely with the mentor.

Required Skills / Prerequisites:

No specific skills are required to participate in this project.

Expected Outcomes:

In addition to the poster presentation, interns will contribute to research reports or visual data outputs that may be used in publications or conferences. After completing the program, interns may continue collaborating on research, present at conferences, or use their experience to pursue advanced opportunities in STEM education, scholarships, or careers in robotics, mechanical engineering, or fluid dynamics.

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Project Title: Experimental Studies on Spherical Flames: Applications in Aerospace Propulsion

Mentor: Yuhao Xu, Assistant Professor

Department: Mechanical Engineering

Delivery Option: In-Person Only

Project Description:

This project allows students to engage in hands-on research in liquid fuel combustion, critical technologies for future aerospace propulsion and space exploration, aligning with challenges faced in missions like NASA's Lunar and Martian exploration efforts. As space missions become increasingly complex, understanding combustion processes and waste management in reduced-gravity environments is critical to advancing propulsion systems and ensuring sustainable space habitats. By studying the combustion of liquid fuels (e.g., Sustainable Aviation Fuels) in high pressure, they will explore ways to improve performance and reduce emissions in propulsion systems. Through innovative experiments, students will study how pressure, temperature, and gravity affect combustion and oxidation processes. They will gain valuable skills in experimental design, data analysis, and scientific communication while contributing to research with real-world applications. This project will prepare students for successful careers in engineering, research, and space technology.

Student Involvement:

1. Introduction and Literature Review: Learn the fundamentals of droplet combustion, supercritical oxidation, and their relevance to aerospace propulsion and waste reclamation for space exploration.
2. Lab Safety and Equipment Training: Gain hands-on experience with combustion experimental setup, safety protocols, and equipment handling.
3. Experimental Design: Work in teams to design initial experiments, including fuel selection and parameter identification (e.g., pressure, temperature, fuel compositions).
4. Calibration and Equipment Testing: Calibrate instruments like cameras, temperature sensors, and pressure gauges to ensure accurate data collection.
5. Preliminary Fuel Testing: Conduct small-scale tests on various liquid fuels, such as Sustainable Aviation Fuels (SAFs), to qualitatively observe combustion and oxidation dynamics.
6. Data Collection & Analysis: Begin analyzing initial results to obtain quantitative measurements.

7. Progress Review & Adjustments: Review initial results with the team and discuss potential modifications to improve the experiment design.

Required Skills / Prerequisites:

Students must have a solid understanding of high school physics as well as be passionate about scientific research and hands-on experiments.

Expected Outcomes:

We expect students to work on conference presentations and/or journal publications with doctoral students. After EUREKA!, students would be able to continue to do research in our lab as undergraduate researchers and potentially intern at NASA Glenn Research Center as an undergraduate student.

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Project Title: Machine Learning-Enhanced Cardiovascular Biomedical Research
Mentor: Ethan Kung, Associate Professor
Department: Mechanical Engineering / Bioengineering
Delivery Option: Either In-Person and/or Online

Project Description:

In this project, students will apply machine learning techniques with cardiovascular biomedical engineering to analyze clinical data, predict patient outcomes, optimize treatment options, and devise engineering tools for studying the cardiovascular system. The project may extend to setting up software for simulating blood flow using supercomputing resources, thereby providing a virtual platform for testing clinical hypotheses and treatment strategies.

Student Involvement:

Research interns will work through tutorials to learn the necessary skills to perform preprocessing clinical or experimental data, developing and validating machine learning models, and performing analyses using Python. They will follow a defined workflow with regular testing, refinement, and progress reviews to ensure alignment with project goals. Depending on progress, interns may also contribute to setting up software for computational simulations of blood flow on high-performance systems.

Required Skills / Prerequisites:

Interns should have some general coding knowledge and ideally some basic concepts about machine learning. While prior exposure to related technical skills are advantageous, the ability to learn and adapt is most crucial.

Expected Outcomes:

Students are expected to gain proficiency in machine learning frameworks and engineering software, along with coding skills in Python. The project aims to equip participants with advanced skills at the intersection of machine learning and cardiovascular biomedical research, leading to tangible deliverables such as predictive models, simulation tools, novel clinical insights, and potential publications. There will be opportunities for continuation of related research in Creative Inquiry or future summer research.

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Project Title: The Effects of Cholesterol Lowering Drugs on Human Colorectal Cancer Cells
Mentor: Diana Ivankovic, Professor of Biology, Lab Manager of the Healthcare Genetics Lab
Department: Nursing
Delivery Option: In-Person Only

Project Description:

Colorectal cancer is the third most common cancer worldwide, affecting both men and women. While undergoing cancer treatments, many patients take medications at the same time for a variety of reasons. Statins are included to be one of these frequently prescribed drug groups that are taken during cancer treatment. These drugs are used to lower cholesterol levels in patients. Atorvastatin and simvastatin are specific statins prescribed to patients with multiple risk factors for cardiac disease due to abnormal lipid or cholesterol levels. In this study, Atorvastatin and Simvastatin will be utilized and tested on several human colorectal cancer cell lines, such as HCT116 and HSW480. The effects of exposure to low and high dosages of the two statins on cell growth will be observed and investigated to determine whether the statins could be potential chemotherapeutic agents in cancer treatment. DMSO and Doxorubicin (DOXO) will also be introduced to the cell lines, where cell growth will be observed. Each cell line will be treated with different diluted concentrations of 10 μM or 40 μM of each statin, 60 μL of DMSO, or 60 μL DOXO. Both HCT116 and HSW480 cell lines will individually be plated in 96-well plates, and a 48-hour incubation period will follow. MTS and trypan blue live/dead assays will be performed to observe the viability of each cell line, and then the MTS data will be collected and analyzed.

Student Involvement:

Interns will be trained in cell culturing and sterile techniques. They will learn how to grow, feed, and split cells, as well as treat them with cholesterol-lowering drugs. They will learn how to do live/dead trypan blue assays, as well as MTS assays. They will do statistical analysis and graph the data.

Required Skills / Prerequisites:

No specific skills are required to participate in this project.

Expected Outcomes:

We hope that the students will decide to stay in our laboratory during their undergraduate career. If so, their work will get published in scientific journals.

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Project Title: DNA Paint - Superresolution Microscopy For Visualizing Cellular Structures
Mentor: Hugo Sanabria, Associate Professor
Department: Physics and Astronomy
Delivery Option: In-Person Only

Project Description:

The compartmentalization of biological pathways into organelles is a fundamental characteristic of eukaryotic cells, playing a critical role in cellular function and organization. In this project, interns will actively contribute to uncovering the spatial organization of several key structural elements within cells using an advanced imaging technique known as DNA-PAINT (Points Accumulation for Imaging in Nanoscale Topography).

DNA-PAINT leverages the specificity of DNA hybridization to achieve nanometer-scale resolution, allowing researchers to visualize subcellular structures with exceptional clarity. Interns will gain hands-on experience in preparing biological samples, performing high-resolution fluorescence microscopy, and applying DNA-PAINT protocols to study both membrane-bound and membrane-less organelles. Through this work, interns will develop valuable skills in quantitative image analysis, microscopy data interpretation, and an understanding of cellular architecture at the nanoscale.

Additionally, interns will be exposed to critical aspects of experimental design, problem-solving, and troubleshooting in advanced imaging workflows. They will engage in collaborative discussions to interpret results, connect structural insights to biological functions, and explore how organelles are dynamically formed and remodeled in different cellular contexts. This experience will deepen their knowledge of cell biology and biophysics and provide them with a strong foundation in cutting-edge imaging technologies that are highly relevant to careers in biomedical research, biotechnology, and related fields.

Student Involvement:

Interns will be part of a highly interdisciplinary and collaborative environment using quantitative super-resolution microscopy in the Sanabria Lab via DNA-PAINT. Interns will familiarize themselves with the state of the art of single-molecule methodologies to quantify biomolecular machines. They will be involved in all stages of the research process, from sample preparation, which might include cell culture, labeling, and DNA-conjugation techniques, to data acquisition using high-resolution fluorescence microscopy systems. Interns will learn to operate advanced imaging

equipment, optimize imaging conditions, and apply DNA-PAINT protocols to visualize the spatial organization of organelles with nanometer precision. Additionally, they will engage in quantitative data analysis, using computational tools to process and interpret large datasets, extract meaningful biological information, and contribute to developing models that explain how subcellular structures are formed and remodeled. Through regular lab meetings, journal clubs, and collaborative discussions, interns will have opportunities to present their findings, receive constructive feedback, and develop strong scientific communication skills. This immersive experience will equip interns with a robust technical skill set, critical thinking abilities, and a comprehensive understanding of how interdisciplinary approaches can advance our knowledge of cellular structures.

Required Skills / Prerequisites:

No specific skills are required to participate in this project.

Expected Outcomes:

Interns will participate in lab activities and meetings and join a cohort of REU students.

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Project Title: Deciphering the Role of Plant-Microbe Interactions in Enhancing Plant Stress Tolerance and Soil Carbon Sequestration (multiple projects listed below)
Mentor: Vidya Suseela, Associate Professor
Department: Plant and Environmental Sciences
Delivery Option: In-Person Only

Project Description:

There are several research projects in the lab funded by the United States Department of Agriculture and the National Science Foundation. The students can choose from the three projects below. They can work in groups of two or individually.

Project 1: Imparting drought tolerance to crops via rhizosphere microbiome. The aim of this project is to understand the bacterial and fungal community (microbiome) of a drought-tolerant native plant species and the ability of this microbiome to impart drought tolerance to crop plants. We will assess the performance of plants with and without this microbiome when exposed to drought.

Project 2: Understanding the effect of arbuscular mycorrhizal fungi (AMF) in obtaining soil phosphorus.
The aim of this project is to understand the chemical communication between diverse crop genotypes and AMF species that vary in their functional traits. The project involves assessing the plant growth parameters and AMF fungal colonization that help in obtaining higher yield in crops.

Project 3: Understanding soil organic carbon (SOC) sequestration and persistence in agroecosystems.
The aim of this project is to understand how various plant species with different chemical composition of tissues facilitate the sequestration of SOC. We also seek to understand where this newly formed carbon is stored to predict the persistence and function of SOC under global changes. We utilize monocultures and diverse mixtures of cover crops belonging to various plant functional types as a model system, to predict the accrual and chemical composition of SOC.

Student Involvement:

The research in our lab involves plant and soil processing and chemical analysis. The research intern will be involved in all aspects of processing samples for different analysis (e.g., metabolomics, soil microbial enzyme analysis, analysis of root traits, analysis of soil for plant and microbial biomarkers to understand the soil organic matter composition).

Required Skills / Prerequisites:

None. All necessary training will be provided.

Expected Outcomes:

The expected outcomes will be gaining:

1. knowledge on plant-microbe-mineral interaction and how we can utilize these for ecosystem sustainability under global changes.
2. analytical chemistry skills, data collection, data analysis using statistical software, and interpretation.
3. effective oral and written communication skills (poster preparation and presentation).
4. skills to work effectively in a team.

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Project Title: Midlife in the US (MIDUS): National Study of Daily Experiences (NSDE)
Mentor: Jody Nicholson, Professor
Department: Psychology
Delivery Option: Either In-Person and/or Online

Project Description:

The National Study of Daily Experiences (NSDE) is one of the in-depth studies that are part of the MacAuthur Foundation National Survey of Midlife in the United States (MIDUS). The purpose of the NSDE is to examine the day-to-day lives, particularly the daily stressful experiences, of a subsample of MIDUS respondents. Students will have the opportunity to work directly with data collection tasks for NSDE as well as work with graduate students who are conducting their theses with MIDUS data. MIDUS allows for secondary-data collection for students and has extensive literature to also allow for a scoping review. Students would be encouraged to submit research to Southeastern Psychology Association, which is a regional conference.

Student Involvement:

The intern would work directly with the project manager in packaging packets we send to participants. Moreover, they would work directly with graduate students on tasks relevant to their theses. Weekly meetings with the professor would help students identify and complete their own independent project.

Required Skills / Prerequisites:

It is preferred that students have experiences in research methods and/or statistics, but not required.

Expected Outcomes:

As students complete their research experience they would have the opportunity to continue in the lab as a CI student. Students will leave with a greater grasp of tools that facilitate research, such as SPSS/R (statistical tools), Scite (AI tool), and Zotero (reference manager).

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