



COLLEGE OF
CHARLESTON

2025 Research Matchmaking Session

Tuesday, October 21, 4:00 – 6:00 pm

Located in the SNES (formerly SSMB) Courtyard

Fields of Interest

Biology

Chemistry and Biochemistry

Computer Science

Engineering

Geology and Environmental Geosciences

Human Health

Marine Biology

Mathematics

Psychology/Neuroscience

Research Development

Biology

Lu Han (hanl@musc.edu)

Research Topic: Pancreatic cancer

Molecular and cellular biology of pancreatic cancer.

Jiaxing Li (lijiax@musc.edu)

Research Topic: Neuroscience

The Li Lab is a neuro(glia)biology research lab at the Medical University of South Carolina. We study oligodendrocytes and the critical roles they play in central nervous system (CNS) health and diseases. Currently, the intricacies of their regulation and interactions with neurons remain elusive. Our objective is to uncover the molecular and cellular mechanisms governing these processes, which will enhance our comprehension of how the CNS is constructed, functions, and malfunctions.

Moshe Rhodes (rhodesme@cofc.edu)

Research Topic: The Aerobiome

What microbes are in the air around us? We use genetic, molecular, and computational techniques to investigate unexpected microbes in the environment and their potential impacts.

Matt Rutter (rutterm@cofc.edu)

Research Topic: Raindrop microbiome

As part of a collaboration with Moshe Rhodes (Biology) and Mike Larsen (Physics) we are working to describe the species that are found in precipitation, to understand how the air and rain contribute to dispersal, and to understand whether the aerosolized biological entities contribute to the physical processes that start precipitation events. At this point, we are focused on using genetic techniques to characterize the microbiome of air, rain, and local water sources and are looking for students interested in participating in this project.

I also am the Academic Director of Stono Preserve and am happy to talk about opportunities for visiting or research at Stono Preserve, part of the College of Charleston.

Natalie Saini (sainina@musc.edu)

Research Topic: DNA damage in cancer initiation

We study how environmental carcinogens result in DNA damage, genome instability and cancer.

NOTE: Dr. Saini will not be present at the event, but feel free to email for more information.

Allison Welch (welcha@cofc.edu)

Research Topic: Amphibian ecology

Our lab investigates effects of environmental change on amphibians (and the species they interact with). Current and upcoming projects include examining effects of salinization on amphibian food webs and studying juvenile dispersal in endangered gopher frogs.

NOTE: Dr. Welch will not be present at the event, but feel free to email for more information.

Brent Wilkerson (wilkersb@musc.edu)

Research Topic: Hearing loss and inner ear development

We are seeking motivated students interested in conducting mechanistic research on hearing loss in the Wilkerson Lab at the Medical University of South Carolina. Our lab investigates pathological processes and developmental defects that contribute to hearing loss. Our research leverages the strengths of mouse models to evaluate new risk factors for hearing loss and to answer etiological questions. We study pathophysiological and neurobehavioral correlations of hearing loss to understand the functional consequences. We use single-cell genomics analysis to identify new cell subtypes and markers as well as the underlying gene networks.

If you're interested in participating, please fill out this form. Your responses will help us to understand your interest, availability, and background: <https://tinyurl.com/wilkersonlab>.

Chemistry & Biochemistry

Marcello Forconi (forconim@cofc.edu)

Research Topic: The Logic of catalysis: From small molecules to natural and designed enzymes

Our research group investigates the molecular logic of chemical and biochemical transformations, focusing on reaction mechanisms and structure–function relationships. We study both small-molecule systems, such as heterocyclic substrates undergoing Kemp elimination, and biological macromolecules, including the bacterial endonuclease YloC. By combining kinetic analysis, mechanistic reasoning, and structural insights, we aim to uncover how molecular architecture governs reactivity and specificity in both synthetic and biological contexts.

Mechanistic Studies in Heterocyclic Chemistry and in Designed Enzymes

Students will explore the kinetics and mechanisms of Kemp elimination reactions in

heterocyclic systems, focusing on benzisothiazoles and indazoles. This project offers hands-on experience in kinetic analysis, mechanistic reasoning, and structure–reactivity relationships, intersecting with medicinal chemistry and drug development. It also has implications for the computational design of new enzymes, in collaboration with Drs. Bill DeGrado (UCSF) and Dan Herschlag (Stanford).

Structure and Mechanism of a Bacterial Endonuclease

In collaboration with Dr. Meredith Frazier (CofC) and Dr. Mike Harris (U. of Florida), students will investigate the structure and function of YloC, a bacterial endonuclease. This project involves protein expression and purification, enzymatic assays, and kinetic analysis, contributing to bioorganic and mechanistic enzymology.

Mohit Kwatra (kwatra@musc.edu)

Research Topic: Molecular and cellular mechanisms of neurodegeneration: Drug discovery and translational therapeutics

I am a neuropharmacologist and translational neuroscientist dedicated to understanding and targeting the molecular mechanisms that underlie neurodegeneration in Parkinson's disease (PD), Frontotemporal Dementia (FTD), and Amyotrophic Lateral Sclerosis (ALS). My work integrates drug discovery, cellular neuroscience, molecular pharmacology, and AI-assisted therapeutic modeling to design mechanism-based interventions that promote neuronal repair and survival.

I earned my Ph.D. in Pharmacology and Toxicology from the National Institute of Pharmaceutical Education and Research (NIPER), India, where I investigated behavioral and biochemical mechanisms in models of neuropsychiatric and neurodegenerative disorders.

During my first postdoctoral fellowship at the Van Andel Institute (Grand Rapids, MI), I studied how environmental toxins and airborne pollutants accelerate Parkinson's disease pathology through behavioral and neuropathological assays. As a recipient of the competitive Maryland Stem Cell Research Fund (MSCRF) Postdoctoral Fellowship at Johns Hopkins University (Baltimore, MD), I investigated the USP13–Parkin axis in mitophagy regulation and developed iPSC-based models of Parkinson's disease. This work involved differentiating human iPSCs into dopaminergic neurons, microglia, and astrocytes to study cell-type–specific vulnerability and neuron–glia interactions under α -synuclein–driven mitochondrial stress.

Currently, as a Postdoctoral Scholar at the Storm Eye Institute, Medical University of South Carolina (MUSC), my research focuses on stress-granule dynamics, FTD/ALS cellular modeling, and the retina–brain axis in neurodegeneration. I study how FUS (Fused in Sarcoma) and TDP-43 mislocalization, RNA–protein aggregation, and cytoplasmic stress signaling contribute to neuronal vulnerability, using primary neuronal and glial cultures, co-

culture systems, and iPSC-derived motor and cortical neurons. My ongoing studies also explore how retinal stress reflects and influences brain pathology in neurodegenerative disease.

I have first-authored and co-authored multiple high-impact publications, including a paper in ACS Nano on polymeric nanocarriers for CNS-targeted delivery and a first-author article in Drug Delivery and Translational Research (2025) demonstrating that PEG-PBAE/pGBA1 gene therapy restores glucocerebrosidase (GCase) activity and reduces α -synuclein pathology in PD models. I also employ Focused Ultrasound (FUS) to enhance blood–brain barrier permeability for non-viral gene and nanoparticle delivery of neuroprotective and trophic factors.

In collaboration with Boltzmann Labs, an AI-driven molecular design company, I am advancing computational drug discovery pipelines that integrate deep learning–based target prediction, molecular docking, quantum chemistry, and molecular dynamics simulations to design and optimize small molecules that restore mitochondrial and lysosomal function. This collaboration bridges computational chemistry with experimental pharmacology, enabling data-guided compound prioritization for translational testing.

My long-term goal is to link retinal and brain neurodegeneration through integrated computational and experimental frameworks, advancing precision drug discovery for neurodegenerative diseases. Students collaborating with me can gain training in iPSC differentiation, primary culture systems, fluorescence imaging, molecular assays, and AI-based drug design, participating in interdisciplinary projects that unite pharmacology, neuroscience, and data science.

Daniel Sprague (spragued@musc.edu)

Research Topic: Drug discovery and chemistry – antiparasitics, anticancer, neuropharmacology

We are a drug discovery lab in the Department of Biochemistry and Molecular Biology at the Medical University of South Carolina. Broadly, we are interested in discovering new druggable targets across a wide range of diseases. To do so, we dig into novel, or understudied, signaling and biosynthesis pathways. We perform molecule screening combined with genetic tools to learn about these pathways. We then design, synthesize, and optimize new small molecules that target key points within these pathways. These molecules can then be used as tools and preclinical candidates, allowing us to learn more about different diseases. At the moment, our interests span neglected tropical diseases, cancer, and neurotransmitter signaling -- and sometimes the combination of all three! Ultimately, the goal is to develop translational science -- from bench, to bedside, and then back to the bench for further optimization.

Computer Science

Tony Morelli (oladimejioo@cofc.edu)

Research Topic: Developing a real-time PLC-based digital twin prototype

This research builds a hands-on Digital Twin (DT) learning platform to prepare undergraduate students for the state's advanced manufacturing sector. Using low-cost Programmable Logic Controller (PLC) trainer kits, it enables students to interact with the same control hardware used in industrial automation, bridging classroom learning with real-world applications. The research investigates whether educational PLC trainers can function as valid, real-time DT therefore addressing a key feasibility gap in current literature that largely focuses on large-scale enterprise systems. Through the design, implementation, and validation of a PLC-based DT prototype, the project measures system latency, jitter, and fidelity to establish empirical performance benchmarks.

Engineering

Noor Ahmad Hazari (hazarin@cofc.edu)

Research Topic: Field Programmable Gate Array (FPGA)

Hardware oriented security of integrated circuits.

Funke Oladimeji (oladimejioo@cofc.edu)

Research Topic: Developing a real-time PLC-based digital twin prototype

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Qian Zhang (zhangq@cofc.edu)

Research Topic: Adaptive Automation in drone operation

The growing reliance on drones in civilian and military operations highlights the need to address the question of how operators can be better supported under stressful operating conditions. High-pressure operating conditions increase mental workload for operators and often lead to elevated stress levels. High stress then contributes to a decline in performance and rise in human error rates. The proposed research aims to explore an avenue for reducing this effect by studying the effects of adaptive automation on human performance and stress during high-pressure drone operation in response to monitored biometric indicators of stress. It specifically focuses on stress reduction and error minimization to boost operator performance and wellbeing, overall providing evidence to progress understanding of human-centered drone systems.

By adjusting levels of automated support in real time according to biometric data, adaptive automation is capable of providing aid to drone operators, reducing their stress levels and preventing performance decline. Previously, other studies have investigated the potential of adaptive automation to achieve these goals in different settings, and autonomous drone systems have been researched as ways to increase efficiency and success in drone missions. However, limited study has focused on the intersection between adaptive automation and drone technology, so there is little evidence of how adaptive automation can improve drone operation. This proposed study aims to explore the research gap in the function of adaptive systems in drones in order to optimize drone use for the growing number of operators in need. The results will show whether biometric-based adaptive automation can improve operator performance and lower stress or not.

Geology & Environmental Geosciences

Erin Beutel (beutele@cofc.edu)

Research Topic: Fracture orientation and ground water contamination

Two areas of research:

- 1) Reconciling fracture orientations in the Appalachians with tectonic stresses (why are the fractures orientated like they are?).
- 2) Arsenic contamination of groundwater related to tectonic features.

Haley Cabaniss (cabanisshe@cofc.edu)

Research Topic: Benthic Acoustic Mapping & Survey (BEAMS) Program

The Benthic Acoustic Mapping & Survey (BEAMS) Program at the College of Charleston is a unique undergraduate program at the College of Charleston that trains students in the art of

mapping the ocean floor. Students enrolled in this Program take a research course, Seafloor Research, where they turn timed pulses of sound into beautiful maps that they then use to address a research question regarding the science of the seafloor. Students create posters and have the opportunity to present them at our BEAMS Symposium on campus each April and during the US Hydro meeting every other year (next, Spring 27'). The BEAMS Program is a sequence of three courses, Marine Geology (GEOL-257), Introduction to Seafloor Mapping (GEOL-239), and Seafloor Research (GEOL-339), and the Program traditionally attracts students from Geology and Environmental Geosciences, Marine Biology, Archaeology, and Geoinformatics. However, we welcome any student interested in exploring the ocean floor! With the creation of the new Marine Geology minor, students can easily earn a minor for their participation in the BEAMS Program by adding a few additional courses. Come chat with me to learn more about it!

Michael DeLucia (deluciams@cofc.edu)

Research Topic: Surface and subsurface structure (fault) mapping in South Carolina and Missouri. Preliminary evaluation into thermochronology (ups and downs) potential in the southern Appalachian Mountains.

I have two general themes I'm interested in pursuing. The first is looking at the geometry of structures in both South Carolina and Missouri. Often, faults are hard to describe (or even find) at the surface, and subsurface mapping with well data can display a more accurate geometry. The second theme is a much bigger, multi-year project looking at the potential for using thermochronology to assess ups and downs of the Appalachian Mountains. This would be very preliminary and would start with mapping out all previous work and potential sample locations for analysis before a grant can be written.

Human Health

Haley Anderson (anderhal@musc.edu)

Research Topic: Auditory neuroscience

Our lab investigates the mechanisms underlying age-related hearing loss using both mouse models and human temporal bone specimens. Age-related hearing loss is the most common sensory disorder in older adults and is strongly linked to social isolation, depression, and cognitive decline. By studying diverse biological processes, including cellular degeneration, inflammation, and structural changes in the auditory system, we aim to uncover the pathways that drive auditory decline. Our goal is to inform strategies that can preserve hearing and improve quality of life in aging populations.

George Hanna (hannag@musc.edu)

Research Topic: Natural product drug discovery and environmental chemistry

I explore the chemistry found in nature to ask and answer questions about human and environmental health. This includes identifying new molecules with therapeutic potential as well as pollutants or toxins that may be harmful.

Casey Langdon (langdonc@musc.edu)

Research Topic: Cancer biology; targeted therapeutic development; pediatric cancer

My lab is interested in understanding the biology and the therapeutic vulnerabilities which underlie childhood cancers, specifically sarcomas. For many of these cancers, there has been no improvement in therapies for decades and these kids are still treated with very toxic chemotherapy cocktails. We want to find new ways to treat these patients and in a less toxic way. We focus on finding new "Achilles heels" which may lead to these new therapies and tell us more about how these cancers arise and function.

Kyu-Ho Lee (leekh@musc.edu)

Research Topic: Metabolism and liver disease

Our laboratory broadly studies human liver disease caused by dietary excess and/or alcohol consumption. We use both animal (genetically modified mice) and cell-based systems to understand biological mechanisms related to fatty liver disease, liver inflammation and liver cirrhosis.

NOTE: Dr. Lee will not be present at the event, but feel free to email for more information.

Jihad Obeid (jobeid@musc.edu)

Research Topic: Data science/AI applied to human health, clinical data

Using AI, large language models, with clinical data, including text, from electronic health records to characterize patients for research purposes and predictive modeling.

Sarah Porto (portosc@cofc.edu)

Research Topic: Translational spine project

We are investigating the effect of amyloid deposition on spine mechanics and tissue structure and integrity. Undergraduate students involved in this study will gain laboratory research experience with tissue dissection, cell and molecular biology techniques (i.e., immunohistochemistry with confocal microscopy, histology, proteomics), biochemical and biomechanical testing, and preparation of experimental results for presentation and publication.

NOTE: Dr. Porto will not be present at the event, but feel free to email for more information.

Ozlem Yilmaz (oyilmaz@yilmazlab.com)

Research Topic: Microbe and host interaction for oral and brain health

Studying oral microbes' invasion into oral tissues and distant locations in the body for disease formation through molecular confocal imaging.

Marine Biology

Tanya Darden (dardent@dnr.sc.gov)

Research Topic: SCDNR Marine Resources Research Institute

The MRRI is responsible for collecting the scientific data needed for science-based resource management. If it has anything to do with the estuarine or marine ecosystems, we are probably conducting research on it. Stop by our table to learn more about our work.

Bob Podolsky (podolskyr@cofc.edu)

Research Topic: Environmental and functional biology of marine invertebrates

In my lab we ask questions about marine invertebrates—their ecology, evolution, functional biology, and environmental biology. My students and I have done work on most life history stages—gametes, embryos, larvae, adults—with a special interest in how development unfolds in an environmental context. I am especially drawn to study life histories because early stages can experience such different environmental challenges and selection pressures than later stages. We have worked with a variety of organisms—echinoderms, molluscs, arthropods, sponges, bryozoans, cnidarians—and I am open to new organisms and interests. Many projects have focused on how environmental challenges like temperature stress, ocean acidification, salinity stress, pollutants, and microplastics influence early development. Other projects are concerned with reproductive investment by adults, behavior, and life-history patterns. I am happy to talk about your interests!

Note: Dr. Podolsky will be able to attend only part of the research mixer--free to contact him if you do not have a chance to meet.

Tracey Smart (smartt@dnr.sc.gov)

Research Topic: Fisheries science

Use video and still imagery and laboratory techniques to study the demography of economically important fisheries species and their habitats.

Erik Sotka (sotkae@cofc.edu)

Research Topic: Ecological and genetic restoration of salt marshes

The foundation species *Spartina alterniflora* is a cordgrass that creates ecologically important and economically valuable salt marshes, including shoreline protection from storm surge, rising seas, and other natural phenomena, filtration of nutrients and pollution, and provisioning habitat for a variety of economically valuable and ecologically important species. Historical and recent destruction and die-off of *Spartina* marshes is widespread, and the preservation and restoration of *Spartina* marshes remains a top priority for conservation practitioners. We are looking to create a team of scientists that will assess and improve restoration of salt marshes in two ways. (1) Do restored salt marshes have similar ecological functioning as that of natural marshes (i.e., soil properties, wave buffering capacity, stem density and height, and value as habitat for associated ecological communities)? To do this, we will pursue field surveys of 23 marshes throughout South Carolina. (2) Can we improve and widen the temporal window for recruitment success? In collaboration with the nationally recognized Seeds-to-Shoreline program, seeds are collected in the fall, seeds go into a required cold, wet storage during the school Winter break of K12 classes (late December - early January), seeds germinate and are reared in the spring, and outplanted by K12 students in May before school lets out. Can we improve germination success in the classrooms by using alternative strategies (e.g., bury seeds vs soaking seeds)? Can we extend the propagation of seeds all year long, perhaps by freezing seeds and germinating in summer? With this project, students will have opportunities to interact with K12 teachers and other non-profits (e.g., The Nature Conservancy).

Mathematics

Garrett Mitchener (mitchenerg@cofc.edu)

Research Topic: Interpretable Machine Learning

I'm developing a symbolic regression software package for solving problems in machine learning and yielding human-interpretable models.

Psychology/Neuroscience

Arjun Bharioke (bharioke@musc.edu)

Research Topic: Cortical circuits involved in cognitive state transitions

We study the cortical circuits involved in the formation, adaptation, and regulation of cognitive state transitions, mostly through 2p calcium imaging of neurons in mice.

Hailey Britt (dart@musc.edu)

Research Topic: Addiction research within the Department of Psychiatry and Behavioral Sciences at MUSC

The DART Program at the Medical University of South Carolina (MUSC) offers a 10-week summer research fellowship for students interested in learning more about addiction-related research. The goal of the DART Summer Research Fellowship program is to introduce students to research, both basic science and clinical research, and afford them the opportunity to work closely with a research mentor and their investigative team. Students can gain experience collecting data, running analyses, training through weekly didactic seminars, scientific writing, and presenting their work at the annual DART Summer Research Day meeting.

Christina Lebonville (lebonvil@musc.edu)

Research Topic: Alcohol drinking and stress interactions

Altered threat responsivity is seen in posttraumatic stress disorder (PTSD) and alcohol use disorder (AUD) which are often comorbid in Veterans. Chronic alcohol exposure, which engages stress systems, may predispose Veterans to develop PTSD and worsen their prognoses. The central amygdala (CeA) is a key brain region in stress/alcohol-interactions, particularly dynorphin-expressing cells (CeADyn). Aim 1: Examine effects of CeADyn inhibition on behavioral and physiological threat responses and changes following chronic alcohol. Aim 2: Examine activity of CeADyn-expressing neurons during threat responses after chronic alcohol and assess the therapeutic potential of currently available dynorphin system-targeting medications.

Tammy Nowling (nowling@musc.edu)

Research Topic: Glycolipids as biomarkers and modulators of pathological changes in the kidney in lupus nephritis

My lab measures glycolipids and glycopeptides in the urine, serum, and renal biopsies from patients with lupus with the goal of establishing a biomarker panel for monitoring disease and predicting therapeutic responses. We also perform cellular and molecular experiments

to define pathways and mechanisms by which glycolipids modulate pathological function of renal cells in response to inflammatory stimuli.

Anna Tsyrunikov (tsyruni@musc.edu)

Research Topic: Neurobiology of opioid use disorder

Our lab investigates potential novel therapeutic targets for treating opioid use disorder using preclinical animal models. We use unbiased approaches to investigate brain regions involved in drug seeking behaviors.

Kenny Vaden (vaden@musc.edu)

Research Topic: Age-related listening difficulties and hearing loss

Many older adults struggle to understand speech in noisy places like waiting rooms and restaurants. My research involves behavioral and MRI experiments to map the brain systems that support speech recognition in noise and how those are affected by age and hearing loss. The long-term goal of this research program is to develop approaches to target or rehabilitate brain systems for successful communication in older adults.

Research Development

Carla Stipe (stipecar@musc.edu)

Research Topic: Research development

Proposal development; research resources; grant writing education and training