



COLLEGE OF  
**CHARLESTON**

# ***2026 Research Matchmaking Session***

**Tuesday, October 20, 4:00 – 6:00 pm  
SNES Courtyard (202 Calhoun St.)**

## **Fields of Interest:**

***Biology***

***Chemistry & Biochemistry***

***Geology & Environmental Sciences***

***Engineering***

***Marine Sciences***

***Mathematics***

***Physics***

***Public Health***

***Psychology & Neuroscience***

***Biomedical Sciences***

*\* Asterisks indicate the researcher will not be attending, but you may contact them directly*

*\* Names in **maroon** indicate CofC faculty*

# Biology

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**Moshe Rhodes ([rhodesme@cofc.edu](mailto:rhodesme@cofc.edu))**

**Research Topic: Extremophiles in the aerobiome**

We're looking at the air and rain around us and finding all sorts of microorganisms that have no business being there. We're finding halophiles that require water 3x saltier than the oceans. We're finding thermophiles that need temperatures >60C. Some we identify by DNA, others we are able to culture. We're asking questions regarding their diversity, distribution, and how they get around etc.

**Fulei Tang ([fulei@musc.edu](mailto:fulei@musc.edu)) \***

**Research Topic: CRISPR gene editing**

The Transgenic & Genome Editing (TGE) Core provides centralized, affordable, and quality-controlled services for generating genetically engineered mouse models (GEMMs). The Core offers a full range of services, including CRISPR/Cas9-based genome editing (point mutations, conditional knockouts, knock-ins, and large-fragment insertions with AAV-assisted electroporation), pronuclear microinjection for transgenic model generation, and Assisted Reproductive Technology Services (ARTS) including sperm and embryo cryopreservation, IVF-based strain rescue, and rederivation. The Core is equipped with dedicated molecular biology laboratories and animal surgery rooms for embryo microinjection, electroporation, and embryo transfer. The Core is directed by Fu-Lei Tang, MD/PhD, who has more than 20 years of experience in transgenic and reproductive technologies. Since joining MUSC in 2022, the TGE Core has completed over 100 genome editing projects, generated more than 68 new genetically modified mouse strains, and served over 46 principal investigators. The Core also provides expert consultation on project design, genotyping strategy, and support for grant applications and manuscript preparation related to genome editing.

**Sara Setayesh ([setayeshs@cofc.edu](mailto:setayeshs@cofc.edu))**

**Research Topic: Cancer and nanoparticles**

Our research explores how liver cancer develops, why tumors resist treatment, and how nanoparticles can improve therapeutic delivery. Students will gain hands-on experience in molecular and cellular biology. This opportunity is intended for students completing a bachelor's thesis or committing to a long-term research project.

**Allison Welch ([welcha@cofc.edu](mailto:welcha@cofc.edu)) \***

**Research Topic: Amphibian ecology**

Effects of anthropogenic stressors on amphibians and their communities.

# Chemistry & Biochemistry

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**Peggi Angel** ([angelp@musc.edu](mailto:angelp@musc.edu))

**Research Topic: Imaging proteomics cellular to extracellular microenvironment**

- Mass spectrometry imaging of normal, fibrotic, and cancer tissues
- Proteomics by LC- MS/MS for post-translational modifications
- Biofluid to tissue experimental and bioinformatics for noninvasive markers of health and disease

**Tim Barker** ([barkertj@cofc.edu](mailto:barkertj@cofc.edu))

**Research Topic: Organic synthesis**

Students will develop and optimize reactions of organoboron reagents in reactions with electrophiles.

**Marcello Forconi** ([forconim@cofc.edu](mailto:forconim@cofc.edu))

**Research Topic: Chemical catalysis: From decoding reactions to designing new enzymes**

My lab explores how chemical reactions work, with the goal of applying that knowledge to enzyme design. We combine laboratory experiments with computational tools to understand what makes a catalyst effective. A central focus is the Kemp elimination, a model reaction for investigating catalytic mechanisms and exploring computational enzyme design. Undergraduate projects can involve measuring reaction rates, testing small-molecule and protein catalysts, or modeling molecules and proteins. Students gain practical experience at the intersection of chemistry, biochemistry, and computation.

**Meredith Frazier** ([fraziermn@cofc.edu](mailto:fraziermn@cofc.edu))

**Research Topic: Biochemistry and structural biology**

The Frazier lab studies the structure and function of oligomeric nucleases involved in pathogenic bacteria and viruses. Students use E. coli to express the nucleases of interest, purify them, and perform biochemical assays and cryo-electron microscopy.

**George Hanna** ([hannag@musc.edu](mailto:hannag@musc.edu))

**Research Topic: Natural product drug discovery and environmental chemistry**

My research is focused on the discovery of natural products with interesting and useful biological activities. These skills and techniques are also applied to study pathogens and pollutants in the environment.

**Kate Mullaugh ([mullaughkm@cofc.edu](mailto:mullaughkm@cofc.edu))**

***Research Topic: Environmental chemistry***

The Mullaugh lab uses analytical tools to better understand the process of adsorption of various chemical contaminants to particles in water. This work can be used to design materials for water treatment (e.g., magnetic nanoparticles used to clean water) or to study how pollutants can interact with microplastics, affecting their cycling in the environment and bioavailability.

## Engineering

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**Sean Bruna ([bruna@musc.edu](mailto:bruna@musc.edu)) \***

***Research Topic: Healthcare systems engineering and patient safety***

We improve the delivery of care and the wellbeing of patients and healthcare workers through the development and application of anthropological, and human factors and systems engineering principles in clinical environments. Our research focuses on health services research, frequently in perioperative settings.

**Christopher Gross ([grossc@musc.edu](mailto:grossc@musc.edu)) \***

***Research Topic: AI applications in orthopedics***

Studying the use of AI in Orthopaedics, biomechanical research and clinical outcomes.

**George Wesley Hitt ([hittw@cofc.edu](mailto:hittw@cofc.edu))**

***Research Topic: CubeSat small satellite mission design***

There are three projects starting in Spring 2027 and extending into Summer 2027, for students interested in space science and systems engineering with CubeSat small satellites with the Hitt CubeSat Lab. Project (1) is to assist with building and testing an RAG-model AI-based mission design training system, to assist with training new students for joining CubeSat teams, (2) a physical build of a portable cleanroom facility at Harbor Walk, for eventual small satellite fabrication, assembly, and testing, and (3) learning mission simulation software (like ANSYS STK and FreeFlyer) to support mission design activities for current and future CubeSat missions at the College. The Hitt CubeSat Lab is currently designing two payloads for CubeSat missions, one for a new radiation dosimeter technology for satellites and one for a radiation test bed

payload for the University of Alabama-Huntsville and the Missile Defense Agency. All three of these projects will support the development of the two current missions and others.

## Geology & Environmental Geosciences

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**Michael DeLucia** ([deluciams@cofc.edu](mailto:deluciams@cofc.edu))

**Research Topic: Mapping and tectonics**

Sampling of specific rocks requires a knowledge of where that rock type might be, and what is the quality of the outcrop. This information can be helpful in mineralogic/petrologic analysis, geochemistry, natural resources, structural geology and tectonics, and geo/thermochronology which requires specific, but high quality rocks. Often this information is stuck in unpublished work from state geologic surveys, or other types of "gray literature". I'm interested in making a geologic map of the southern Appalachian Mountain region that is of higher resolution than those available, and adds rock/outcrop quality to the maps of that area. This will involve a significant compilation of published and unpublished data (and potentially outcrop visits) which will hopefully yield an ArcGIS dataset that can be shared with interested parties.

**Steven Jaume** ([jaumes@cofc.edu](mailto:jaumes@cofc.edu))

**Research Topic: Earthquakes in South Carolina**

Using modern analysis techniques to find and locate "missing" earthquakes, especially in upstate South Carolina. Comparing historical damage from the 1886 Charleston earthquake to modern ground motion estimates. Open to students in SNES (geosciences, physics), SECM (compsci, math, engineering) and even SHSS (history).

**Vijay Vulava** ([vulavav@cofc.edu](mailto:vulavav@cofc.edu))

**Research Topic: Environmental pollution**

My group investigates environmental pollution in water and soil environments.

## Marine Sciences

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**Haley Cabaniss** ([cabanisshe@cofc.edu](mailto:cabanisshe@cofc.edu))

**Research Topic: Benthic Acoustic Mapping & Survey (BEAMS) research**

The Benthic Acoustic Mapping & Survey, or BEAMS Program, is a 20-year strong Program at the College that teaches students the fundamentals of seafloor mapping. All BEAMers take a guided research course, Seafloor Research (GEOL-339), during which they process raw sonar data that are used to both ask and address a research question. The class culminates with the

production and presentation of a research poster at either our BEAMS Symposium on campus (even numbered years) or a national meeting, US Hydro (odd numbered years). Through experiences like these, students find opportunities to gain at-sea experience, internships, and jobs. Notably, the majority of our students have sea-going research experience before graduating, and graduates have a near-100% job placement rating in the hydrography sector. Visit our table to learn more about BEAMS research at the College of Charleston!

**Tanya Darden ([dardent@dnr.sc.gov](mailto:dardent@dnr.sc.gov))**

***Research Topic: SCDNR Marine Resources Research Institute***

The MRRI has been monitoring the health of and conducting research on South Carolina's marine species and ecosystems since 1973. Our teams spend their days aboard offshore vessels, navigating tidal creeks, and traversing pluff mud to study these resources in the field to inform management and conservation practices in the state and beyond.

**Leah Davis ([leah.n.davis@noaa.gov](mailto:leah.n.davis@noaa.gov))**

***Research Topic: Marine biotechnology, bioengineering, biotoxin detection, synthetic biology, public health, biosensors, HAB biotoxins***

Marine science has developed powerful approaches for observing, sampling, characterizing, and modeling ocean systems, yet accelerating environmental challenges increasingly require not only understanding biological change, but also developing new tools to detect and respond to it. My research combines marine science, synthetic biology, and bioengineering to apply engineering principles to biological systems for ocean applications. Harmful algal blooms (HABs) provide an important example of this need: blooms threaten marine ecosystems, seafood safety, coastal economies, and human health, while hundreds of marine biotoxins and diverse environmental conditions make rapid and adaptable detection challenging. My research focuses on developing novel tools, including programmable sensors and diagnostic technologies, to address current marine environmental challenges. For example, developing a modular, cell-based biosensing platform for environmental monitoring of HAB-related biotoxins that use engineered biological components to recognize marine toxins and directly generate a measurable signal. The platform is designed so that sensing components can be exchanged or redesigned to detect additional toxins and environmental targets, providing a foundation for broader marine biosensing applications. More broadly, this research explores the potential of Blue Synthetic Biology to complement existing marine science by building an engineering toolkit for the ocean—one capable of supporting environmental monitoring and diagnosis, targeted intervention, restoration, and long-term ecosystem resilience.

**Tony Harold ([harolda@cofc.edu](mailto:harolda@cofc.edu))**

***Research Topic: Ecology of larval and juvenile stages of inshore marine fishes***

The research aims to answer the question do larval and juvenile fishes, and of which species, that occur at low tide shift to the upper intertidal zone during high tide? Projects will involve collecting larval and juvenile marine fish from shallow-water habitats in the Charleston Harbor estuary and vicinity. Identification and measuring of specimens will be done in the laboratory

with the aid of a dissection microscope and a digital caliper. The diversity, relative abundance and body size of fishes captured in the focal habitats will be subjected to statistical analysis.

**Craig Plante ([plantec@cofc.edu](mailto:plantec@cofc.edu))**

***Research Topic: Microbial ecology***

My research focuses on marine microbial ecology. Current projects include: 1) benthic microalgal and fungal community structure along saltmarsh elevation gradient (sea-level rise effect), 2) eDNA, and 3) Mycoplasma and other bacteria in invertebrate guts.

**Bob Podolsky ([podolskyr@cofc.edu](mailto: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!

## Mathematics & Data Science

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**Rachel Ahumada ([ahumada@musc.edu](mailto:ahumada@musc.edu))**

***Research Topic: AI, machine learning, translational research***

We are trying to identify patterns of hearing loss through clinician-patient conversations. Ambient AI records the audio, assigns speaker roles, and produces transcripts of the entire visit. We then use various Natural Language Processing (NLP) and machine learning methods to parse through millions of patient turns that might contain these patterns of hearing loss.

**Aaron Barrett ([barretta1@cofc.edu](mailto:barretta1@cofc.edu))**

***Research Topic: Computational fluid dynamics, mathematical biology***

From microorganism motility to blood clot formation on moving valves, my research focuses on how structures interact with biological fluids. These fluids, such as mucus and blood clots, contain complex polymer networks that stretch and bend, giving them elastic "sticky" behaviors. My research aims to develop models that describe motion through these networks. I develop

computational tools that can efficiently and accurately approximate these models and then use these tools to answer biological and medical questions.

**Stacie Baumann ([baumannsm@cofc.edu](mailto:baumannsm@cofc.edu))**

***Research Topic: Mathematics: Graph theory***

Graphs are discrete mathematical structures containing dots called vertices and lines between them called edges. Graphs are used to model connections. There are many applications of graph theory including scheduling problems, modeling traffic networks, modeling the spread of disease, and the study of algorithms. If you enjoyed MATH 207, MATH 307, and/or MATH 295 and you are looking for a research project, please reach out!

**Shixuan Wang ([wangs1@cofc.edu](mailto:wangs1@cofc.edu))**

***Research Topic: Bayesian information borrowing in clinical trials, causal inference, synthetic control in policy evaluation, Bayesian optimization, imaging analysis***

My research focuses on developing methods for Bayesian information borrowing and synthetic control causal inference to make better use of historical and real-world evidence when randomized studies are limited or infeasible. In Bayesian information borrowing, I develop methods that incorporate external evidence into current studies while accounting for potential differences between historical and current populations. These methods are particularly relevant to pediatric rare disease and small-population clinical trials, where sufficiently large concurrent control groups may be difficult to obtain. In parallel, I study synthetic control methods for constructing credible counterfactuals in observational settings to evaluate whether public interventions—such as health policies or community programs—have a meaningful causal effect on outcomes such as infant mortality rates.

## Physics

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**Alex Brummer ([brummerab@cofc.edu](mailto:brummerab@cofc.edu); [setayeshs@cofc.edu](mailto:setayeshs@cofc.edu))**

***Research Topic: Multi-omics modeling of liver cancer***

Dr. Alex Brummer and Dr. Sara Setayesh are recruiting for an interdisciplinary project investigating how gene expression, immune responses, and cellular signaling change during liver cancer treatment. The project is organized in two phases.

Phase 1 – Data discovery: Search public biomedical data repositories for datasets containing multi-timepoint transcriptomic or multi-omic measurements of liver cancer and immune system response to therapy. Training will include scientific literature review, interpretation of experimental metadata, and summarizing datasets.

Phase 2 – Dynamical modeling: Prepare and analyze molecular and immune measurements using newly developed mathematical methods for identifying coordinated immune system

changes during treatment. Training will include data preparation, data science methods and interpretation of computational results.

Helpful background, though not required, includes genetics, cell biology, cancer biology, immunology, data science, linear algebra, or programming. Students are not expected to enter with experience in all of these areas, nor to complete both phases; students with strengths in either biological or quantitative sciences are encouraged to apply.

**Ana Oprisan ([oprisana@cofc.edu](mailto:oprisana@cofc.edu))**

***Research Topic: Soft matter fluids and image processing***

I am interested in experimental and computational models of soft matter systems. Recent applications include characterizing the dynamic properties of supercritical fluids from microgravity and Earth-based cryogenic levitation images recorded near the phase transition. My research also applies to the characterization of thermal- and concentration-driven fluctuations in nanocolloids.

## Public Health

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**Paul Baker ([bakerp@cofc.edu](mailto:bakerp@cofc.edu))**

***Research Topic: Women's health***

My research focuses on identifying the determinants and modulators of energy balance in women during the menopause transition and beyond, including factors influencing energy expenditure, exercise metabolism, appetite, and dietary preferences, with particular emphasis on the role of female sex hormone fluctuations. I investigate targeted interventions, including resistance and endurance training, dietary strategies, and novel approaches such as normobaric hypoxia, to optimize energy regulation, body composition, metabolic health, and menopause-related symptom burden. The overarching goal of this work is to develop actionable, evidence-based strategies that improve quality of life, reduce disease risk, and inform personalized frameworks for women's health across the lifespan.

**Sundar Balasubramanian ([balasubr@musc.edu](mailto:balasubr@musc.edu))**

***Research Topic: Breathing exercises for health & wellness***

Our lab studies the biological mechanisms of various regulated breathing practices (e.g. pranayama), their applications in clinical conditions, and the practice dissemination. Students can participate in a variety of hands on research projects.

**Mariel Bello ([belloma@musc.edu](mailto:belloma@musc.edu))**

***Research Topic: Addiction, tobacco use, and health disparities***

My research focuses on understanding why some individuals and communities are more vulnerable to developing and maintaining addictive behaviors, particularly nicotine and tobacco

use. Specifically, I study how social, environmental, and psychological factors (e.g., stress, financial hardship, interpersonal relationships, mental health, and living in rural vs. urban communities) shape substance use, quitting behaviors, and risk of relapse. Much of my work focuses on young adults and populations disproportionately affected by tobacco-related health disparities (e.g., individuals from low-income, rural, and racial/ethnic minority backgrounds), with the ultimate goal of developing more effective and equitable approaches to addiction prevention and treatment.

**Jasmine Cash ([cashja@musc.edu](mailto:cashja@musc.edu))**

***Research Topic: Neuroscience, exercise science, rehabilitation***

My research explores how the brain, nervous system, and cardiovascular system work together to support walking, balance, and recovery after stroke. I use brain imaging, measures of heart rate and muscle activity, and movement assessments to understand why recovery differs across individuals. I also study how exercise and noninvasive nerve stimulation may improve recovery. This work connects neuroscience, exercise science, and rehabilitation to develop more personalized approaches to stroke recovery.

**Douglas Cassidy ([cassidyd@musc.edu](mailto:cassidyd@musc.edu)) \***

***Research Topic: Surgical simulation and medical education research***

Surgical education and simulation research. Research in robotic surgery skill development and interprofessional simulation in the OR.

**Kirsten Dunlap ([dunlapk1@cofc.edu](mailto:dunlapk1@cofc.edu))**

***Research Topic: Skeletal muscle physiology***

I study skeletal muscle physiology in extreme environments and disease. I have ongoing projects in each of these areas. The first of these projects is a NASA-funded study investigating the impacts of simulated lunar gravity and galactic cosmic radiation on skeletal muscle, both acutely and after a long-term recovery period. The samples for this study have been collected and are ready for Western Blot and microscopy analysis. The second study is looking at skeletal muscle in Alzheimer's disease (AD). AD is a complex disease that involves more than just the brain! Skeletal muscle weakness in AD patients is beyond what is associated with aging. Both brain and muscle are altered prior to AD-associated cognitive decline. Our study is trying to determine whether resistance exercise can improve skeletal muscle health and function, and whether healthier muscles can send signals to the brain that contribute to improved brain health. Preliminary samples for this project are ready for Western Blot analysis.

**Austin Hahn ([hahna@musc.edu](mailto:hahna@musc.edu)) \***

***Research Topic: Substance use prevention and mental health interventions***

Developing and evaluating interventions to prevent and treat substance use and co-occurring mental health conditions, particularly among adolescents and young adults. Students interested in clinical psychology, psychiatry, addiction research, or pursuing graduate or medical training are particularly encouraged to participate.

**Jessica Hartman ([hartmanj@musc.edu](mailto:hartmanj@musc.edu))**

***Research Topic: Liver/gut metabolism, toxicology, metabolic disease***

How do metabolism and environmental exposures change the body and contribute to disease? The Hartman Lab studies these questions using molecular, cellular, and animal models, with a particular focus on the metabolic enzyme CYP2E1. Undergraduate researchers can contribute to projects investigating liver and intestinal metabolism, alcohol and environmental exposures, and metabolic disease. Students will gain hands-on experience with molecular and biochemical techniques, microscopy, tissue and cell analysis, and interpreting real experimental data. No prior research experience is required. Enthusiasm, curiosity, and reliability are most important.

**Fernando Herrera ([herreraf@musc.edu](mailto:herreraf@musc.edu)) \***

***Research Topic: Plastic and reconstructive surgery***

Clinical outcomes research related to plastic reconstructive, hand and upper extremity surgery

**Brian Lally ([lallyb@musc.edu](mailto:lallyb@musc.edu)) \***

***Research Topic: Radiation oncology clinical trials***

Clinical trials and clinical research using radiation for cancer patients.

**Natalia Trehan ([trehan@musc.edu](mailto:trehan@musc.edu))**

***Research Topic: Therapeutic injectables***

Creating and publishing protocols for therapeutic injectables 1) modification of dystonia and migraine protocols with botulinum toxin injections 2) use of botulinum toxin injections for parotitis 3) polydioxanone threads for head and neck pain management 4) usage of hyaluronic acid fillers and hyaluronidase for scleroderma patients

**Ozlem Yilmaz ([yilmaz@musc.edu](mailto:yilmaz@musc.edu))**

***Research Topic: Host microbe interaction, microbial colonization, neurodegenerative disease and bacteria***

Our lab studies the cellular and molecular relationship between the oral opportunistic pathogens and their specific participations into various systemic diseases in humans, with particular emphasis on Oral and Brain Axis. Interested undergraduates would be studying these relationships mostly on ex vivo human samples through advanced microscopic imaging.

# Psychology & Neuroscience

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**Stephanie Aghamoosa ([fountast@musc.edu](mailto:fountast@musc.edu)) \***

***Research Topic: Aging, Alzheimer's disease, cognition, and brain health***

Dr. Aghamoosa is a clinical neuropsychologist who directs the Aging, Resilience, and Cognition (ARC) Lab at MUSC, studying how aging and Alzheimer's disease affect the brain, cognition, and daily functioning, and we develop and test non-pharmacological interventions that may help individuals maintain cognitive health and independence. Our work combines cognitive testing, neuroimaging, cognitive training, brain stimulation, and digital health technologies.

**Haley Anderson ([andersonhr@cofc.edu](mailto:andersonhr@cofc.edu))**

***Research Topic: Cellular and molecular mechanisms of auditory aging***

Our research focuses on the aging auditory system and the biological mechanisms that contribute to age-related hearing loss. We investigate how changes in neurons, myelin, sensory hair cells, immune cells, and other cellular and molecular processes affect the structure and function of the cochlea and auditory nerve. Our work uses both mouse models and human temporal bone specimens to better understand how aging and environmental factors, such as noise exposure, contribute to degeneration of the auditory system.

**Howard Becker ([beckerh@musc.edu](mailto:beckerh@musc.edu))**

***Research Topic: Alcohol addiction***

Stress interactions with alcohol on drinking, relapse, and social behavior: brain mechanisms  
Exercise effects on stress-alcohol interactions: effects on stress hormones

**Meghan Flanigan ([flanigme@musc.edu](mailto:flanigme@musc.edu)) \***

***Research Topic: Neuroscience***

Our laboratory investigates the neurobiological mechanisms driving impaired social behaviors in mouse models of addiction, mood disorders, and Autism. We use a variety of cutting-edge circuit and systems neuroscience techniques to answer our experimental questions.

Undergraduates would have the opportunity to receive training in mouse behavior, histology, gene expression analyses, and intracranial surgeries to support multiple exciting projects in the lab.

**Sonal Gaur ([gaurs@musc.edu](mailto:gaurs@musc.edu)) \***

***Research Topic: Neurodegenerative disease mechanisms in ALS and FTD***

Explores how changes within cells contribute to neurodegenerative diseases such as ALS and FTD. We study FUS protein dysfunction and its role in cellular damage and neurodegeneration, using molecular, cellular, imaging, and disease models to identify mechanisms that could support the development of targeted treatments.

**Sam Gottlieb ([gottlies@musc.edu](mailto:gottlies@musc.edu))**

***Research Topic: Neuroscience of alcohol use***

I study alternative treatment options for alcohol use disorder medications and how these drugs effect the brain to change alcohol drinking behaviors in mice.

**Mohit Kwatra ([kwatra@musc.edu](mailto:kwatra@musc.edu))**

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

I am a neuropharmacologist and translational neuroscientist investigating the molecular and cellular mechanisms underlying neurodegenerative diseases, particularly Parkinson's disease (PD), frontotemporal dementia (FTD), and amyotrophic lateral sclerosis (ALS), with the goal of translating mechanistic discoveries into therapeutic strategies. My research examines how disease-associated proteins, including  $\alpha$ -synuclein, FUS, and TDP-43, contribute to protein mislocalization and aggregation, stress-granule dynamics, mitochondrial dysfunction, impaired cellular homeostasis, and neuronal vulnerability. Current work integrates cellular neuroscience, molecular pharmacology, neuronal disease models, advanced fluorescence and confocal imaging, and mechanism-based drug discovery to identify and evaluate potential therapeutic interventions. Students joining my research can gain hands-on experience in mammalian and neuronal cell culture, Western blotting, immunofluorescence, fluorescence/confocal microscopy, image and quantitative data analysis, molecular assays, experimental design, and scientific interpretation. Students will have opportunities to contribute to interdisciplinary projects connecting fundamental mechanisms of neurodegeneration with translational therapeutic development.

**Jiaxing Li ([lijiax@musc.edu](mailto:lijiax@musc.edu))**

***Research Topic: Neuroimmune responses to Traumatic Brain Injury***

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.

**Jennifer Longoria ([longoriaj@musc.edu](mailto:longoriaj@musc.edu)) \***

***Research Topic: Cognitive outcomes in children with sickle cell disease***

My research is focused on cognitive outcomes in children with sickle cell disease. I will be developing a clinical program that will be paired with a longitudinal protocol. This would be a nice opportunity for students with interest in psychology, cognition, and/or sickle cell disease.

**Khalil Mallah ([mallah@musc.edu](mailto:mallah@musc.edu))*****Research Topic: Neuroimmune responses to Traumatic Brain Injury***

The Mallah Lab studies neuroimmune interactions following injury to the central nervous system, with a primary focus on traumatic brain injury (TBI). Although the initial injury occurs within seconds, the neuroimmune response in the brain evolves over months to years and can profoundly influence long-term neurological outcomes. We investigate how these persistent neuroimmune responses alter neural function and behavior, with the goal of understanding the mechanisms that drive lasting changes after brain injury and identifying therapeutic windows and strategies to improve long-term outcomes.

**Sorinel Oprisan ([oprisans@cofc.edu](mailto:oprisans@cofc.edu))*****Research Topic: Computational neuroscience***

My research is broadly in computational neuroscience: I use the tools of physics, mathematics, and machine learning to understand how the brain processes information. A central theme of my work is how the brain tells time—how networks of neurons produce our sense of duration in the seconds-to-minutes range, something essential to speech, music, movement, and decision-making. To study this, I build biologically realistic computer models of neurons and neural circuits, and I apply deep-learning and signal-analysis methods to brain-activity recordings such as EEG to uncover the hidden dynamics behind behavior and disease. My broader goal is to connect mechanistic models of the brain with modern artificial intelligence, making each more interpretable—and to involve students directly in that work.

**Jen Rinker ([rinker@musc.edu](mailto:rinker@musc.edu)) \******Research Topic: Stress, alcohol use disorder, and brain circuitry***

A systems neuroscience lab investigating how stress and chronic alcohol exposure change the brain and influence behavior. We want to identify how these changes contribute to the development and persistence of alcohol use disorder (AUD) and stress-related psychiatric conditions, and to uncover more effective treatments. No prior research experience is required—just a willingness to learn, ask questions, and contribute to meaningful scientific research.

**Takashi Sato ([satot@musc.edu](mailto:satot@musc.edu))*****Research Topic: Neuroscience***

Our laboratory studies how the brain and body communicate to control behavior and maintain normal physiological function. We are particularly interested in how sensory information from internal organs is transmitted to the brain and how the brain, in turn, regulates the function of these organs. To address these questions, we use cutting-edge neuroscience approaches, including optogenetics, in vivo two-photon imaging, and genetic manipulation. Students working in our lab will have opportunities to gain hands-on experience with advanced imaging, neural circuit analysis, and modern molecular and genetic techniques. We welcome motivated undergraduate students who are curious about neuroscience and interested in learning how brain circuits interact with the body.

**Stephanie Slan ([slans@musc.edu](mailto:slans@musc.edu)) \***

***Research Topic: Gut-brain axis and gastrointestinal neuromodulation***

Conducts translational research focused on the gut-brain axis, gastrointestinal motility disorders, and non-pharmacologic neuromodulation with a goal of better understanding the biological and neurophysiological mechanisms underlying conditions like gastroparesis and Parkinson's disease-associated GI dysfunction.

**Karelys Vereen ([montanek@musc.edu](mailto:montanek@musc.edu)) \***

***Research Topic: Alcohol effects on brain function and behavior***

Studies how alcohol use can change the brain and influence behavior. Undergraduate researchers will have the opportunity to work alongside graduate students and post-docs exploring how different experiences affect brain activity and neural connections, gaining hands-on experience with cutting-edge neuroscience techniques, advanced brain imaging, and/or computational data analysis. No prior research experience is required-just curiosity and an interest in learning how the brain works.

**Gavin Wang ([wangy@musc.edu](mailto:wangy@musc.edu))**

***Research Topic: Alzheimer's disease***

The roles of environmental factors in modifying the development and progression of Alzheimer's disease, with a particular emphasis on the development of novel protective approaches and therapeutic strategies..

**Brent Wilkerson ([wilkersb@musc.edu](mailto:wilkersb@musc.edu))**

***Research Topic: Hearing loss, inner ear development***

Our laboratory uses experimental approaches to investigate the biological mechanisms underlying hearing loss, including developmental differences and pathological processes that affect hearing function. Students will have opportunities to develop practical skills in experimental design, laboratory methods, data analysis, and scientific problem-solving. Research also requires effective communication and teamwork. Projects may involve molecular biology, genetics, physiological testing, neurobehavioral testing, bioinformatics, and other quantitative approaches. The experience is best suited for students who enjoy working with technology and data, solving problems, and learning new skills. The skills and knowledge gained are most applicable to careers in laboratory research and biotechnology, as well as preparation for advanced scientific training. We currently have limited capacity for undergraduate mentorship and may not be able to accommodate all interested students. [Link to Research Interest Form](#).

**Paula Zamudio ([zamudiob@musc.edu](mailto:zamudiob@musc.edu))**

***Research Topic: Cerebellum and alcohol consumption***

Traditionally studied exclusively as a motor structure, the cerebellum is increasingly recognized for its role in cognitive and emotional processing relevant to alcohol dependence. Our research

focuses on exploring the role of the cerebellum on alcohol consumption escalation in the dependent brain and in characterizing chronic alcohol exposure effects on cell and synapse physiology within cerebellar synapses. Our experimental approaches include ex-vivo slice electrophysiology, chemogenetics, in-vivo calcium photometry, whole brain clearing, and light sheet microscopy.

**Hailong Zhang ([zhangha@musc.edu](mailto:zhangha@musc.edu); [cuim@musc.edu](mailto:cuim@musc.edu))**

***Research Topic: The role of enteric neurons in infection, inflammation, cancer, and social behaviors***

1. The Enteric Neurons-Immune Cell Axis: This project focuses on the interactions between enteric neurons and immune cells within the gut. We aim to uncover the mechanisms by which enteric neurons influence immune responses, regulate inflammation, and maintain intestinal homeostasis.
2. How enteric neurons sense infection: This project aims to explore how enteric neurons detect and respond to infections in the gut. We investigate the molecular mechanisms by which enteric neurons sense the presence of pathogens and initiate protective responses.
3. How enteric neurons influence social behaviors: In this project, we explore the connection between enteric neurons and social behaviors. We aim to uncover the mechanisms by which enteric neuronal activity influences emotional states like anxiety, happiness, and anger, and how these signals are communicated to the brain.

## Biomedical Sciences

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**Leidy Diana Caraballo Galva ([carabale@musc.edu](mailto:carabale@musc.edu)) \***

***Research Topic: CAR-T cell engineering for cancer immunotherapy***

We aim to develop next-generation synthetic switches and engineering tools that accelerate the clinical translation of CAR-T cell therapies and make them safer and more effective against solid tumors.

**Cassandra Clift ([cliftc@musc.edu](mailto:cliftc@musc.edu))**

***Research Topic: Cardiovascular biology, extracellular matrix, mass spectrometry, bioinformatics***

The Clift Lab uses advanced imaging and chromatographic mass spectrometry-based approaches to identify biomarkers and therapeutic targets in cardiovascular disease. Specifically, we use multi-omics integration to investigate the cross-talk between cells, extracellular matrix, and secreted factors such as extracellular vesicles. Housed in the Department of Vascular Surgery at MUSC, our research focuses on human clinical cohort specimens (tissue, plasma), as well as creating bioengineered disease models from primary human cells.

**Silvia Guglietta ([gugliett@musc.edu](mailto:gugliett@musc.edu))**

***Research Topic: Tumor immunology; neuroimmunology***

Our lab studies one of the most powerful and complex systems in the human body: the immune system. We are interested in understanding how immune responses protect us, how they can contribute to disease, and how we can harness them to develop better strategies for prevention and treatment. Our research spans several areas, including cancer, autoimmunity, neuroinflammation, and neurodegenerative disease. A common theme connects these projects: understanding how immune cells interact with their local tissue environment and how these interactions influence the development and progression of disease. Understanding this communication between the immune system and the brain may reveal new opportunities to limit tissue damage and promote recovery.

**Lu Han ([hanl@musc.edu](mailto:hanl@musc.edu))**

***Research Topic: Pancreatic cancer cellular and molecular biology***

We investigate the biology of pancreatic cancer at cellular and molecular levels. We aim to define how tumor cells interact with the host body and leverage this for novel therapeutics. Our research platforms include cell culture, genetically engineered mouse models, and human patient tissues.

**William Hill ([hillwi@musc.edu](mailto:hillwi@musc.edu))**

***Research Topic: Aging research (mechanisms of aging), both musculoskeletal and CNS***

My research is driven by a single goal: translating discoveries in the biology of aging into therapies and technologies that improve human health. As a Geroscientist my laboratory investigates the molecular mechanisms that drive aging across the musculoskeletal, immune, and central nervous systems. We study how metabolism, stem cell dysfunction, cellular senescence, autophagy, and immune interactions contribute to osteoporosis, Alzheimer's disease, frailty, cancer, and other chronic diseases of aging. Our research has helped establish the kynurenine pathway as a central regulator of aging biology, demonstrating its role in stem cell dysfunction, impaired bone regeneration, neuroinflammation, and age-related disease. Today, we are integrating immune metabolism, mitochondrial function, lipid biology, and biomaterials to identify new therapeutic strategies that promote healthy aging.

**Breege Howley ([howley@musc.edu](mailto:howley@musc.edu)) \***

***Research Topic: Breast cancer biology***

Our research focuses on the function and therapeutic targeting of E3 ubiquitin ligases in triple-negative breast cancer. We study the molecular pathways that control breast cancer cell survival, using cell culture models and molecular biology techniques to investigate how specific proteins impact response to chemotherapy and cancer progression. This project provides hands-on experience in basic cancer research, data analysis, and scientific communication while exploring the molecular mechanisms that drive cancer cell survival and chemoresistance.

**Casey Langdon ([langdonc@musc.edu](mailto:langdonc@musc.edu))**

***Research Topic: Pediatric cancers, cancer biology, cancer therapeutic development***

My laboratory works on childhood sarcomas. Sarcomas can develop anywhere in the body. They are some of the most deadly and hard to treat cancers which affect kids. For many of these tumors, we are using the same therapies for decades. We are interested in 1) how these tumors grow and develop, 2) how best to model these tumors so that they closely resemble the human disease, and 3) finding the most effective and tolerable therapies to treat these tumors so these kids can have long and fulfilling lives.

**Shub Mehta ([mehtash@musc.edu](mailto:mehtash@musc.edu)) \***

***Research Topic: Pancreatic cancer immunotherapy and drug discovery***

The Hawkins Lab seeks new therapies for pancreatic cancer by studying ways to target cancer cells and activate the immune system. We use computational biology, laboratory models, and human tissue data. We welcome curious, committed undergraduates passionate about biomedical science and discovery. No prior research experience is required.

**Jorge Munera ([munera@musc.edu](mailto:munera@musc.edu)) \***

***Research Topic: Colon organoids and inflammatory bowel disease***

We use human induced pluripotent stem cells (iPSCs)-adult cells to generate "mini-colons," called human colonic organoids (HCOs), that contain most of the cell types found in the human colon, including immune cells. We aim to understand how inflammation alters the colonic lining and contributes to diseases like ulcerative colitis.

**Kenyaria Noble ([noble@musc.edu](mailto:noble@musc.edu))**

***Research Topic: Preclinical drug development***

Are you an undergraduate student passionate about biomedical science, drug discovery, or biotech entrepreneurship? Are you curious about what happens between laboratory discovery and life-changing therapy? The Cowan Lab is recruiting motivated undergraduate volunteers to join our team. This is a unique opportunity to gain real-world exposure to preclinical drug development and biotech startup operations. The Cowan Lab is in the Neuroscience Department of MUSC and dedicated to developing first-in-class therapies for rare pediatric neurodevelopmental disorders. Our team is advancing a proprietary therapeutic platform targeting MEF2C Haploinsufficiency Syndrome (MCHS) — a rare genetic condition affecting children — with the goal of filing an Investigational New Drug (IND) application by 2027. We translate cutting-edge biomedical science into real-world therapies that can change lives.

**Jian Ouyang ([ouyangji@musc.edu](mailto:ouyangji@musc.edu))**

***Research Topic: Understanding and targeting genomic instability in cancer cells***

Genomic instability is not only a hallmark of cancer but also a driving force of cancer evolution. Various mechanisms are utilized by cancer cells to maintain a delicate genome stability to avoid

cellular catastrophe, which constitute vulnerabilities that can be exploited for therapeutic interventions. Currently, our research focuses on understanding the transcription-dependent mechanisms that maintain genome stability in cancer cells. Ultimately, we hope to target these genome maintenance mechanisms to create synthetic lethality in cancer cells, to boost anti-tumor immunity by enhancing cancer cell immunogenicity and innate immune response, or to modulate the tumor microenvironment, for the development of novel therapeutic strategies for cancer therapy.

**Sophie Paczesny ([paczesns@musc.edu](mailto:paczesns@musc.edu))**

***Research Topic: Immunology, cancer, leukemia***

1. Proteomics and discovery of biomarkers: Using omics workflow system as a discovery engine for new biomarkers of complications post-allogeneic bone marrow transplantation including acute and chronic graft-versus-host disease (GVHD), and graft-versus-leukemia (GVL) as well as antitumoral signatures following antibody-based or cell-based immunotherapies.
2. Allogeneic hematopoietic cell transplantation, graft-versus-host disease (GVHD) and graft-versus-leukemia (GVL) biology and novel treatment: Implementing non-invasive blood tests for risk stratification of complications and discovering inhibitors of drug targetable biomarkers and new cell therapies to alleviate GVHD and increase GVL.
3. Novel immunotherapies to treat acute myeloid leukemia: Enhancing antitumor specific antitumor immunity via vaccination or adoptive cell transfer (ACT) or antibody-based targeting of the tumoral microenvironment.
4. Alarmin IL-33/ST2 axis in immune cells during inflammatory diseases and as a therapeutic target: Immunotherapy which has been the most compelling anti-cancer approach of the last decade drives the tumor microenvironment balance towards an anti-tumoral response. Alarmins such as IL-33, can promote cancer cells resistance to cell death.

**Ludivin Renaud ([renaudl@musc.edu](mailto:renaudl@musc.edu)) \***

***Research Topic: Lung fibrosis and tissue regeneration***

Studies lung fibrosis and how damaged or scarred tissue might be repaired. Using human tissues, cells, advanced molecular techniques, and animal models, we investigate how cells contribute to fibrosis and explore potential treatments that could help reverse established disease in the lungs and other organs.

**Ozgur Sahin ([sahin@musc.edu](mailto:sahin@musc.edu)) \***

***Research Topic: Cancer drug discovery and systems biology***

We are working on drug development, drug discovery, breast cancer, and kidney cancer system biology.

**Zengdun Shi ([shize@musc.edu](mailto:shize@musc.edu)) \***

***Research Topic: Liver fibrosis and hepatic cell activation***

Molecular and cellular study on hepatic cell activation in liver injury/fibrosis

**Xiao Song ([songx@musc.edu](mailto:songx@musc.edu))**

***Research Topic: Glioma biology and tumor immunology***

Our research focuses on understanding the molecular and immune mechanisms that drive glioma progression, therapy resistance, and immune evasion. We study alternative RNA splicing, tumor-immune interactions, and microglial biology using functional genomics, transcriptomics, patient-derived glioma models, iPSC models, with the goal of identifying new therapeutic strategies for brain tumors.

**Mouna Trabelsi ([trabelsi@musc.edu](mailto:trabelsi@musc.edu)) \***

***Research Topic: Age-related macular degeneration and retinal aging***

Our research explores how aging and chronic cellular stress contribute to age-related macular degeneration (AMD). Using molecular, cellular, imaging, and metabolic approaches, we study changes in retinal cells that lead to dysfunction and degeneration, with the long-term goal of supporting the development of new therapeutic strategies.

**Justin Van Beusecum ([vanbeuse@musc.edu](mailto:vanbeuse@musc.edu)) \***

***Research Topic: Cardiovascular and renal complications of lupus and hypertension***

Investigates how dysregulation of the endothelin system contributes to hypertension and cardiovascular and renal fibrosis in systemic lupus erythematosus (SLE) and other chronic inflammatory conditions. The long-term goal is to define biomarkers and therapeutically actionable mechanisms that can identify individuals at risk for progressive cardiorenal fibrosis and provide a foundation for interventions that prevent or limit irreversible end-organ damage in SLE and HTN.

**Jen Wang ([wangha@musc.edu](mailto:wangha@musc.edu))**

***Research Topic: Cancer immunotherapy***

The overall research interest in Wang's lab is understanding molecular mechanisms of cancer progression and cancer immunotherapy resistance and translating mechanistic insights into novel cancer therapeutics. Dr. Wang was trained at Harvard Medical School and she developed a broad range of research expertise in molecular cancer biology and cancer immunology. The recent work in Wang's lab showed that cyclin dependent kinase 6 (CDK6) phosphorylates tyrosine phosphatases to decrease the phosphorylation of CD3zeta in T cells, and targeting the phosphatases enhances adoptive immunotherapy (Cell Reports). Complementing with her research, Dr. Wang have a pleasant experience and great enthusiasm for training students. Wang's lab is currently recruiting college students and a technician/postdoc.

**Noel Warfel ([warfeln@musc.edu](mailto:warfeln@musc.edu))**

***Research Topic: Cancer biology***

My lab studies the effects of hypoxia (low oxygen) as a driver of cancer progression. We use biochemistry and live cell microscopy to study how hypoxia changes signaling pathways that drive drug resistance and tumor metastasis, with a goal of identifying new therapeutic targets.

**Yongren Wu ([wuy@musc.edu](mailto:wuy@musc.edu)) \***

***Research Topic: Musculoskeletal biology and tissue repair***

Studies how soft tissue and bone interact, adapt, and repair, and how deterioration at this interface affects movement and joint function. Using modeling, cell and tissue studies, and animal models, we seek to better understand musculoskeletal disease and improve approaches to diagnosis, treatment, and rehabilitation.