WFIRM
Wake Forest Institute for Regenerative Medicine

The WFIRM Annual Undergraduate Summer Scholars Program
Introducing the 2023 Summer Scholars

Offering undergraduate students opportunities to engage in impactful, multidisciplinary regenerative medicine research at the Wake Forest Institute for Regenerative Medicine, at the interface of engineering and biology.

2023 – Scholar’s Profiles

Daniella Beiner
University of Mississippi

My name is Daniella Beiner, I am a rising Junior studying Biomedical Engineering with a biodevices emphasis at the University of Mississippi. I am an international student from Israel. From getting used to accents that sound straight out of a western movie to American football games, tornado alerts and country music, moving to the US has been a wild adventure that I’m excited to continue in Wake Forest this summer.

My first exposure to scientific research was back in my home country, at Ben-Gurion University of the Negev. Under the supervision of Dr. Ran Zalk, I conducted a 2-year research project aimed at heavy-metal labeling of proteins to achieve higher resolution 3D imaging using cryo-electron microscopy. Using RyR1 as our target protein, we purified the protein from native tissue, covalently labeled surface cysteines with gold clusters to increase contrast and help identify particles at close to zero defocus and successfully reconstructed the density map of RyR1, thus presenting a method to align ‘invisible’ proteins for 3D cryo-EM reconstruction.

Over the summer of 2022, I joined Dr. Michael Naughton’s biophysics lab at Boston College, Massachusetts. Our research was centered around manipulation of macrophage polarization.
This is an ongoing (not yet published) project at the Naughton lab. Through this experience, I learned about nanoparticle biofunctionalization and gained biological cell culturing, SEM, light and fluorescent microscopy skills. Working directly with graduate students has inspired me to pursue research at the graduate level myself.

I have also recently joined a biomedical engineering lab at my home university, Ole Miss. Dr. Yi Hua’s LESION lab conducts research on central nervous system biomechanics, with a focus on the eye and brain. My project for the next two years will be mapping the vasculature of the optic nerve head. A better understanding of the vessels of the back of the eye will help us understand the relations between vessel diameter (directly related to tissue oxygenation) and glaucoma, and may have translational applications in glaucoma treatment.

My long-term career goals are to conduct multidisciplinary translational research so as to apply my findings to help patients in need. I’m grateful for every opportunity given to me on my path to achieve this goal, and hope to pay it forward in the future once I’m in the position to do so by creating more research opportunities for international students. I am thrilled to become a Summer Scholar at Wake Forest Institute for Regenerative Medicine, and look forward to joining Dr. Yuanyuan Zhang’s lab to learn more about stem cell research.

Kyle Cheung
Binghamton University

Hello everybody! My name is Kyle Cheung, and I am a rising senior at Binghamton University majoring in Neuroscience and Environmental Studies. While my future goals are focused around becoming a doctor, I am really interested in pursuing research and creating new findings and breakthroughs to improve the field of medicine and healthcare. Previously I have had some previous research experience such as working as a clinical research assistant at the Icahn School of Medicine at Mount Sinai where I lead a study of environmental exposures, and last summer I worked on a research project at Boston University School of Medicine investigating cerebral microbleeds in the assessment of stroke and neurodegeneration.

Through the Wake Forest Institute for Regenerative Medicine (WFIRM) at the Wake Forest University School of Medicine, I will be able to delve deeper into population health and disease development through clinical research training where I hope to utilize my previous research experience with a project focused on regenerative medicine to develop treatments and level the disparities created by social determinants of health. Through WFIRM, I hope to use my passion to interact with other like-minded researchers and students and make a positive impact on restorative medicine and create a healthier tomorrow.
Besides research and outside of classes, my other passion and dedication are towards bringing awareness and understanding to others about the importance of healthcare and medicine. At Binghamton University, I established and led two health student organization to explore and weave together study of the environment, health, biology, and medicine. After being part of a medical humanitarian group in Indonesia in 2018, I have spent extensive efforts in helping locals rebuild and improve their access to life-sustaining resources by creating various fundraisers towards alleviating the health disparity for low socioeconomic individuals in Indonesia. For fun, I like to play/watch soccer and relaxing through video games and watching new TV shows. I love to interact with new people and am excited to make friends at WFIRM!

Michelle Ebu
Miami University

My name is Michelle Ebu, a sophomore at Miami University in Oxford, Ohio. I am a Biomedical Engineering major with a minor in Neuroscience. As an international student from Nigeria, I enjoy traveling and exploring new places and cultures. I also enjoy watching "medical" series (Grey's Anatomy and The Good Doctor are two of my favorites). I am a Global Ambassador, a Peer Health Educator, and a Lilly Leadership Institute member at Miami University.

In college, I have had the opportunity to assist a professor from the department of Chemical, Paper, and Biomedical Engineering in the lab. The study focuses on the integration of regenerative medicine and tissue engineering into drug delivery systems. For this project, we're investigating drug-coated balloons, a novel therapeutic strategy for peripheral vascular diseases. We are looking for methods to introduce these medications into balloons to elongate the effect it has on the body.

My interest in research only grew while I was growing up and attending high school in a nation where it was not really given much attention. I enjoy pushing myself to learn new things, improve my problem-solving abilities, and take on new challenges. As an undergraduate who is simultaneously very interested in engineering and medicine, the program not only enables me to follow my interests but also allows me the chance to collaborate directly with accomplished faculty and goal-driven students. I am very excited to be a part of this summer research program because it touches on crucial subjects like regenerative medicine and how it can be applied to my interests in neurodegenerative and genetic diseases. Aside from this, I am also interested in receiving advice on graduate schools from people who have experience in this area. I want to hear their stories and learn from them. I am grateful to work with WFIRM this summer and cannot wait for the learning experience this summer would bring!
Hi! My name is Kaci Gordon, she/her, and I am a rising senior at Purdue University in West Lafayette, Indiana. I am majoring in Biology with a minor in Sociology. I became interested in research through my laboratory classes at Purdue, specifically BIOL232: Cell Structure and Function. I’m currently enrolled in CHM33901: Biochemistry Laboratory. In this laboratory, we are studying chronic myeloid leukemia, specifically the mutational resistance to Gleevec in the BCR-Abl oncogene. All my course-based undergraduate research experiences have been essential in developing a plethora of general laboratory skills, however, I’m excited to amplify these skills with more research experience and guidance from an experienced faculty member. The WFIRM program includes the unique opportunity to complete individual research with assistance from a faculty mentor, as well as further explore my research interests with short courses and seminars in regenerative medicine. I feel very appreciative of the opportunity to participate in the 2023 WFIRM Summer Scholars Program in Regenerative Medicine.

Outside of classes, I am also involved in numerous organizations across campus, including College Mentors for Kids, Boiler Gold Rush Orientation Program, and the Panhellenic Association. I currently serve as the Vice President of Engagement for College Mentors for Kids. In this position, I manage the recruitment of over 200 college students and pair them one-on-one with local 1st-6th grade children for weekly after-school activities. In the BGR Orientation Program, I serve as a supervisor to train team leaders so that they are prepared to welcome 8,000 new students to Purdue at the start of the school year. This title has provided me with the opportunity to give back to the program that helped settle my nerves in my startling move across the country from Seattle, Washington to Indiana amid the COVID-19 pandemic. I was also selected to join the Inclusion, Diversity, Equity, and Accessibility Committee at Purdue Panhellenic. As a committee member, I work alongside others to provide resources to chapter leaders, form connections with the Multicultural Greek Council, and plan educational events for all 21 sororities in the Panhellenic Association.
Hi! My name is Bailey Hadley, and I am a rising senior biology pre-med student at North Carolina A&T State University. I am from Cincinnati, Ohio, and I enjoy trying new foods and hanging out with friends in my free time. I am grateful to have some previous research experience. Last summer, I was a researcher at UNC Chapel Hill in the Microbiology and Immunology department. I worked in the Kristina DeParis lab, which mainly focused on women’s health. My specific project dealt with studying spontaneous preterm births (SPBs) in HIV+ pregnant women from Zambia, a third-world country.

The background of my experiment was based on the theory of microbial translocation in the vaginal tract. Essentially the thought was that when HIV infects, it lyses your cells causing there to be gaps in the epithelial layers of mucous membranes (like the vaginal tract) allowing bacteria to escape. The escaped bacteria induce an immune system response which calls immune system markers to the area. The thought is that the more immune system markers, the more microbial translocation. My hypothesis was that there will be a higher concentration of immune system markers (I looked at CD14, LBP, and IFAB) in the vaginal tract of HIV+ pregnant women compared to HIV- pregnant women. I performed an ELISA on vaginal swabs, which is an immunosorbent assay used to measure the quantity of different soluble markers. I analyzed the information from this assay using Prism. This experience at Chapel Hill allowed me to become familiar with an academic lab setting, immunosorbent assays, and how to write and follow my own procedure.

This experience was extremely beneficial in introducing me to a lab setting and helped further my excitement for research. I am so excited to participate in the WFIRM summer research because of its blend of engineering, biology, and biotechnology, which showcases just how versatile and multidisciplined science can be. Regenerative medicine is a relatively foreign concept to me, and I am grateful for the opportunity to learn more about a new and interesting topic this summer!
Hello! My name is Evan Halvorson, and I am a rising senior at the University of North Dakota (UND), in Grand Forks, North Dakota. I am currently majoring in biology with an emphasis in pre-professional health/pre-medicine. Throughout junior high and high school, I was actively involved in scientific research. Each academic year, I took the opportunity to conduct an independent research project, with my science teacher overseeing my progress. I had excellent success with my research projects, competing at both the regional and state levels. As I made the transition from high school to UND, I knew that I wanted to continue immersing myself in the field of scientific research. As a result, I applied to and was ultimately accepted into the Maximizing Access to Research Careers (MARC) Undergraduate Student Training in Academic Research (U-STAR) Program on the UND campus. Through the MARC U-STAR Research Program, I have gained valuable knowledge in the areas of responsible conduct for research, utilizing and accessing library resources, and research ethics. On the UND campus, I am currently conducting research in the area of Biomedical Sciences with Doctor James Foster, where our research efforts are focused on understanding the process of phosphorylation and palmitoylation of the dopamine transporter in Drosophila.

Aside from my academic and research efforts, I am actively involved in a number of extracurricular activities. One of my most notable activities is the work that I have done as an Emergency Medical Technician (EMT). For the past five years, I have been an active member in providing emergency medical care for both the Spirit Lake Nation and Lakota Volunteer Ambulance Services. At the college level, I served as an Undergraduate Teaching Assistant in the UND Psychology Department for one academic year. Through this opportunity, I was able to instruct, provide guidance, and collaborate with students from different majors and backgrounds. Furthermore, I currently serve as the Vice-President of the UND Undergraduate Medical Association. As Vice-President, I am able to connect with and provide valuable information to pre-medical students that are interested in pursuing graduate level education. Lastly, I am a regular volunteer at a local senior center and at the United Way of Grand Forks. At United Way, I assist in packaging bags of food for school children that lack the necessary nutrition during the school week and on the weekends. In addition, I assist in sorting and assembling clothing packages for families that lack the resources to purchase these necessary items.

I am extremely grateful to have been selected to participate in the Wake Forest Institute for Regenerative Medicine (WFIRM) Summer Scholars Program. Through this experience, I will be able to further explore the multidisciplinary field of medicine and scientific research. I am confident that the knowledge and skills that I have learned in both the classroom and in the lab
on the UND campus will enable me to contribute to the mission of the Wake Forest Institute for Regenerative Medicine.

Elsa King  
*Rose-Hulman Institute of Technology*

My name is Elsa King, and I am a junior at Rose-Hulman Institute of Technology. Ever since I was a child, I have loved learning and solving problems. I have especially been interested in biology and engineering, so as I grew older, the choice to pursue biomedical engineering became obvious. Prior to coming to college, I had little experience or knowledge about research, but as I became familiar with the biomedical engineering faculty at Rose, I began to learn more about how research can further our current knowledge. At Rose-Hulman, I have been able to immerse myself in hands-on biomedical engineering topics and work with my peers and professors.

I have had the opportunity to work on three separate research projects within the field of biology and biomedical engineering. My first research experience involved material property testing of a splint thermoplastic material for a local occupational therapist who was using it to make splints for patients. In this experience, I learned about the basics of research on human-centered products. At Rose, I have also worked on characterizing intrinsically disordered Spectrin mutants using FRET analysis. My most extensive research project was at Wake Forest last summer. I worked with Dr. Weaver to create patient-specific finite element models of the proximal femur. I specifically worked on extracting patient CT scan data to map the nearest-neighbor cortical thickness values to the models and create the most accurate patient-specific femur models.

Outside of school and research, I am a varsity member of the women’s soccer and track and field teams. Being an athlete and a part of a team has always been a huge part of my life. I love having an outlet from school where I can work toward non-academic goals. Being a part of these teams has also created an amazing community where I have been able to improve my communication, time management, and leadership skills. I also enjoy working on STEM outreach service opportunities to help provide more opportunities for those in my community to become exposed to various stem topics.

With both my passion for research and biomedical engineering, my next major goal in life is to pursue a Ph.D. in biomedical engineering to learn more about how to continue improving healthcare. After earning a Ph.D., my career goal would be to become involved in the translational portion of biomedical engineering. I would like to be at the forefront of discovering new therapies and techniques to improve the health of others by bringing new
biomedical solutions to the market. I would like to use the skills gained from becoming more experienced in research and engineering to use both skills and create impactful products that improve healing, injury, and illness.

I am excited to learn more about regenerative medicine at WFIRM and to have the opportunity to work on innovative research!

**Karishma Lawrence**  
*University of California, Berkeley*

Hi! My name is Karishma Lawrence and I’m a freshman at UC Berkeley. I’m a Molecular Environmental Biology major with a minor in data science on a premed track. I’m from Connecticut and Saint Martin, an island in the Caribbean. I’ve always been compelled by science, and as I’ve grown older this interest has transformed into a passion for medicine.

During high school, much of my research experience was environmentally based. Having grown up between the Caribbean and US, I’ve always felt strongly about protecting nature, and channeled this passion into environmental research projects. Most recently, I completed a fellowship studying the impacts of riverbank restoration techniques on water quality in the Connecticut River. I am extremely excited to apply and expand this experience towards medically oriented research at WFIRM.

Personally, I love to hike, surf, and travel. I’m a big outdoors person and always appreciate new music suggestions! At Berkeley I’m in a few premed clubs, a sorority, and my school’s chapter of Project RISHI. In RISHI, which stands for Rural India Social and Health Improvement, I work on the Womens’ Health and Empowerment team. I’m looking forward to connecting with others so passionate about science and gaining such exciting experience!
Hi, my name is Stephanie. I am a transfer student studying at the University of California, Davis in biomedical engineering. I am actually from Davis so I didn’t go too far from home. I would have loved to do my undergrad somewhere else, but at the time that I transferred I was just not ready to live on my own and since I was struggling already with my academics, I thought it might just be best to stay at home. I also thought UCDavis at the time would be a good fit for biomedical engineering.

I realized I wanted to do biomedical engineering when I was a senior in high school. I attended an event at UCDavis in which we had the opportunity to talk to students about their majors and what they did. I met a student while there who told me about biomedical engineering, specifically about regenerating a heart. I was fascinated by that. I knew that I wanted to do something combining chemistry, biology, and math so when I heard about biomedical engineering, I set my eyes on that field.

Little did I realize how much I would struggle in my undergrad. I was a perfectionist while in community college and excelled in my classes but even while in community college, I struggled to take a full time course load so I usually had to be part time. In the university, I had to be full time but it put too much pressure on me mentally and I wasn’t very good with taking care of my emotional and physical wellbeing so I had to begin going part time. I also worked temporarily in one of the labs at UCDavis but did it while taking a full time course load. I soon realized it would never work out unless I was going part time. However, I found that I really liked the lab environment and when I easily grasped things, it felt more like a break from my academics which was nice. The lab that I was in was studying atherosclerosis. It wasn’t my top interest but any lab experience I was willing to do and I had the opportunity to learn some lab techniques such as doing western blots, ALISA assays, changing media, counting cells, and doing cell lysates. Of course, I never had the chance to get super comfortable with it though which is unfortunate because I still had to focus on my academics and my PI wanted me to get to a place where I could feel confident with my academics.

Now my goal is figuring out exactly what I want to do in biomedical engineering. I found that I really liked my biomaterials, tissue engineering, biomechanics, and materials science classes but taking classes can only take me so far. I am interested to see how what I have learned is applicable to the field. Not only that, but I have always had an interest in understanding how our organs work, how diseases occur, and how they affect organ function and since I am specializing in tissue engineering, I am eager to see it in action. After doing projects on type I diabetes and heart valves, I am eager to see what awaits us in this program especially since it is my first official internship related to biomedical engineering and we have the opportunity to do research on real world problems.
Quinn Morris
Wake Technical Community College

My name is Quinn Morris and I use he/him pronouns. I am a student at Wake Technical Community College in Raleigh, North Carolina and hope to be transferring to NC State University in the fall. I’m currently completing an Associate of Science at Tech, and intend to major in Genetics at NCSU with a minor in Tissue Engineering. Someday I wish to enter the field of regenerative medicine as a researcher working to achieve the full development of lab-grown organs fit for implantation.

I’ve enjoyed biology more than any other school subject for as long as I can remember. In particular I remember being particularly fond when I was introduced to genetics in high school, and in particular, when we were learning about cloning I remember being enthralled at the idea of manipulating genes and cells to create entire new organs and organisms to suit the needs of society. In particular, I want to grow organs to replace the ones that people have lost, need replaced, or were born without. I wish to see a world where dialysis machines are a thing of the past and where people will never have to live without a kidney, a heart, or a lung. As a transgender man, I wish to see a world where transgender people are able to grow the organs they were never born with so that they can live as they were always meant to.

I have very little experience with medical and genetic research, and limited experience with research as a whole. In the spring semester of 2022, I was afforded the opportunity to participate in the START Internship offered by Wake Tech, and during this internship I gained experience with environmental and ecological research. My project was focused on assessing the water quality of the local stream and the biodiversity of its ecosystem, as well as the potential impacts of environmental run-off on the health of the stream. This was my introduction to research as a whole, though it is unrelated to the field of genetics, and it gave me many insights into the process of conducting research and the challenges that researchers face. Aside from that, I’ve had the opportunity to do a small research project in one of my biology classes where I used DNA barcoding to identify two plant species and assess their relatedness. I had a great deal of fun with this project despite its small scope, and it only further affirmed my desire to have a career in research.

Outside of school and science, I enjoy many artistic hobbies. I perform in several ensembles throughout the year at NC State, including the marching band and pep band, and I enjoy painting, writing, reading, and drawing. I enjoy playing Dungeons & Dragons with my friends every Sunday and sometimes I go rock climbing with them when we can make the time. I also have a wonderful cat named Cocoa who I cherish more than anything, and I hope that anyone who is able to meet her loves her as well.
Hi! My name is Anna Munro and I am a rising junior at Wake Forest University studying Biochemistry & Molecular Biology. Although I am from Columbia, Maryland, I am excited to be staying in Winston-Salem this summer conducting research as a WFIRM Summer Scholar. My interest in cellular biology and the medical field as a whole originated in high school when I used a microscope for the first time to visualize red blood cells infected with *Plasmodium malariae*. I was fascinated by life at the cellular level and knew I wanted to diagnose, treat, and develop cures for disease.

I first started research during my senior year of high school when I interned at the DasSarma Lab at the University of Maryland School of Medicine to study using gas vesicle nanoparticles produced by *Halobacterium* sp. NRC-1 as drug delivery systems for treating sepsis caused by gram-negative bacteria. This introduced me to the fields of immunology, microbiology, and drug delivery, along with sparking my desire to develop treatments for sepsis. Since May 2022, I have been conducting research in the McCall Lab at the Wake Forest University School of Medicine to examine the relationship between the expression of peroxiredoxin 3 (PRX3) and pyruvate dehydrogenase complex activity when THP-1 cells are stimulated with lipopolysaccharides to understand its role in energy deficiency during septic conditions. Last summer, I interned at the Johns Hopkins University Applied Physics Laboratory in their biological sciences department. Although this research did not relate to sepsis, I learned many laboratory techniques I will be able to apply in the future.

Outside of class and research, I enjoy tutoring chemistry, indoor rock climbing, and volunteering as a first responder with Wake Forest’s student-run emergency medical services organization. After graduation, I intend to attend medical school and integrate researching treatments for sepsis into practicing clinical medicine. I am grateful for the opportunity to learn more about the field of regenerative medicine at WFIRM this summer and hope to expand my research interests while relating the field to sepsis recovery. Specifically, I hope to learn about regenerating tissues damaged by infections and creating miniature organs to better model septic conditions and test drug delivery methods. I look forward to meeting everyone soon!
Hello, my name is Christine Ogbuebile, and I am thrilled to introduce myself as a rising senior at Pennsylvania State University. As a Biology major with a minor in Computer Engineering, I have always been fascinated by the intersection of medicine and engineering. This upcoming summer research program will provide me with practical insight into the challenges surrounding tissue engineering and regenerative medicine, allowing me to explore my passion further.

Being a Biology student at a university with over 45,000 students, I am fortunate enough to have both laboratory experiences through my classes and diverse perspectives from my peers. I cannot wait to collaborate with researchers of varying backgrounds and engage with different areas of science and engineering. This opportunity will undoubtedly expose me to intellectually curious minds, and I am excited to broaden my knowledge in the field.

When I am not in classes or labs, I devote my time to two organizations I am incredibly passionate about. As a volunteer at Autism Ally, a non-profit organization that provides resources to support, create awareness, and empower individuals with autism and other disabilities, I strive to enable those with autism to become more integrated into their communities and society. Additionally, I am honored to be a part of THON, a student-run philanthropy dedicated to enhancing the lives of children and families impacted by childhood cancer. Our mission is to provide emotional and financial support, spread awareness, and ensure funding for critical research, all in pursuit of a cure for cancer.

I am profoundly grateful for the research opportunity at Wake Forest and cannot wait to meet everyone. Thank you for your time and consideration.

My name is Ethan Potts, a rising Senior at the University of Arkansas in Fayetteville, AR. I am majoring in Biomedical Engineering with a minor in Computer Science. I am originally from Rogers, AR which is about 25 minutes north of campus, however, I was born in Winston-Salem, so I am excited to return to my birth city this summer! Since my freshman year, I have worked in the Cardiovascular Biomechanics Lab under Dr. Morten Jensen. In this lab, I have worked on multiple projects that investigate heart properties and diagnosis methods to better develop treatments in emergencies and for patients with Congenital Heart Disease. In this, I
apply my passion and skills for programming with my work as a Biomedical Engineering Student to find new ways to further the treatment of cardiovascular patients.

Outside of my classes, I am heavily involved in the University of Arkansas Band program. I play trumpet in the Razorback Marching Band, HogWild Athletic Band, and the University of Arkansas Wind Symphony. Over the year, I am able to perform in front of over one-hundred-thousand fans across the football and basketball seasons. In this, I am fortunate to travel across the country with the HogWild Band to perform at games and cheer on the basketball team which has brought me to places like Nashville, TN, Buffalo, NY, and San Francisco, CA. In addition, I serve as President of the Lambda Chapter of Kappa Kappa Psi, National Honorary Band Fraternity, which serves our band programs in many ways throughout the year. I also love working out as it is a way to rest my brain and work towards a goal outside of my academic life. This includes walking, running, hiking, biking, lifting, or anything that can get me away from my work desk.

Overall, I am very excited to see what this summer holds not only in my research but overall as an experience to grow as a student and person.

**Samuel Ramirez**  
*Elon University*

Hey everyone! I'm Samuel Ramirez, a rising Senior at Elon University. I'm from Medellin, Colombia but I've lived most of my life in Charlotte, NC. I'm majoring in Biology (Biotechnology / Molecular track) with minors in Chemistry, French, and Art. This means if you want to find me, the first place to look outside the lab is in the ceramics studio or at my comfy study spot in the world languages building. If I'm not there, chances are I’m cooking with my girlfriend (making a mess), hidden away studying for class (in this case, I don’t want to be found), or at the gym suffering with my best friend (please rescue me). I try to avoid letting school consume me and spend my time doing things I enjoy. That being said, I really like school.

At Elon, I am a teaching assistant, tutor, and supplementary instructor for genetics, introductory cell biology, and human physiology, respectively. I appreciate my on-campus jobs for the interactions that I can have with my peers as well as the mentorship I receive from professors in a different academic capacity from coursework. These positions have confirmed my interest in teaching and mentorship, as well as bolstered my passion for scientific dissemination. To push this forward, I helped start the first student-led biology journal club with the rest of Elon Biology Club exec members to discuss primary literature with other
students. I’m hoping this project continues after I graduate as a tangible impact that will outlast my time at Elon and that I can feel proud of nurturing.

My parents tease me by saying I like school so much that it seems I’m never planning on leaving it. They’re right. My long-term career goal is to become a biology professor at an undergraduate-focused institution where I will be able to shape the lives of students and mentor others the way my professors have done for me. A more immediate goal of mine is to be a researcher and contribute to the biomedical sciences. I aim to complete a Ph.D. in translational biology. This is why I have pursued undergraduate research at various institutions.

Currently at Elon, the focus of my research within Dr. Jennifer Uno’s lab is to further explore and define how acute and long-term ethanol exposure impacts the gut-brain axis and to determine what role it plays in the behavior associated with alcohol abuse. I am using a zebrafish model to evaluate gut microbiome composition and its relationship with behavior and expression of relevant genes in the brain following antibiotic and acute/chronic alcohol challenges. Then to diversify my research background, I completed an NSF-supported summer REU at UF Scripps. There, I dipped my toes into the field of structural biology with my mentor, Dr. Huan Bao, in a project focused on membrane pore formation.

Following these experiences, I grew more interested in translational science. While writing a review paper for my molecular biology class, I learned about cell-free stem cell secretome therapies for liver fibrosis. Through reading papers from different journals, I discovered the field of regenerative medicine, a sort of “aha” moment for me. In this space, my interests in biology and research align with the common goal of helping others heal. It’s a very exciting development that ultimately led me to this program. I’m incredibly grateful for all the support I’ve received from friends, family, mentors, and scholarships that have brought me to this point. Now that I will be joining the team at WFIRM as a summer scholar, I am ecstatic to meet and learn from so many awesome people!
Danielle Rice
North Carolina A&T State University

Hi! My name is Danielle Rice, and I am a highly motivated young professional pursuing a Bachelor of Science in Biomedical Engineering and Biology. I am a first-generation college student from Sumter, South Carolina, attending North Carolina Agricultural and Technical State University. After five years of undergraduate school, in May 2023, I will graduate from the number one public Historically Black College and University in America and from the College of Engineering, which is the #1 producer of African American graduates in engineering in the United States. As an A&T student, I am in many organizations. I held several executive positions, including Miss Biomedical Engineering Society, National Council of Negro Women Financial Secretary, Rosa Foundation Executive Board Member, Society of Manufacturing Engineers Treasurer, Mentor Collective Mentor, and Society of Women Engineers Secretary Intern, to name a few. In the future, I plan to apply to graduate school to expand my knowledge of bioengineering and advance my career in artificial design.

To provide some context, I discovered that my mother had a chronic back injury while in school. My mother has three herniated discs and has been experiencing horrendous back pain for some time. The doctors told my mother that she might lose her ability to walk if she underwent surgery. Because of the severity of her injury, she would require a spinal prosthesis, which was both rare and costly. This information inspired me to pursue a career as a biomedical engineer specializing in neuromuscular rehabilitation and spinal orthotics.

I'm embarking on a journey to make the dream a reality. So far, I've attended numerous neuromuscular rehabilitation informational sessions hosted by prestigious universities such as John Hopkins; job shadowed at a bionic prosthetic and orthotics company called Restore POC, interned at UNC Chapel Hill for two years under the Department of Applied Physical Sciences, and excelled in nearly all of my academic classes maintaining over a 3.5 GPA while serving in various roles in several related organizations.

Over the previous two summers, I conducted undergraduate research in the Department of Applied Physical Sciences at UNC-Chapel Hill. I investigated a complex process involving mucus adherence to mucin interactions in Cystic Fibrosis patients. These patients suffer from impaired Mucociliary clearance (MCC) in the lungs, leading to infection and inflammation. Previous MCC promotion efforts focused on decreasing mucus rheology, but little is known about the role of mucociliary adhesion in MCC. In the superfine lab, I measured adhesion forces by pulling on protein-coated magnetic beads attached to mucus-coated glass substrates modified by silanization, hydrolysis, and protein coupling. It was critical for the success of this test that the substrate be uniformly coated. I used epifluorescence microscopy to evaluate the homogeneity of the substrate. To test the uniformity of silane deposition, I attached 100 nm fluorescent...
amine-coated beads. The adhesion was measured by removing fluorescent, magnetic, 24-micron-diameter lectin-coated beads from a mucus-covered substrate. My findings suggest homogenous silanization, activation, and coupling. PEG-coated beads were negatively controlled and exhibited a lower detachment force from a mucus-coated substrate than lectin-coated beads. The findings, as expected, revealed the presence of sticky contacts between lectins and mucus, as well as mucus-mucus interactions.

In the future, I plan to attend graduate school to research brain activation to understand the interface between humans and robots better. My goal is to improve the quality of life for people with physical disabilities, such as people who are paralyzed and amputees, by recreating a patient’s nerve so that a connection between the disabled person and a prosthetic allows the disabled person to move their limbs as normally and efficiently as possible. This research experience at The Wake Forest Institute for Regenerative Medicine would enable me to gain hands-on experience, improve my lab skills, and kick-start my research career. An internship in regenerative medicine could teach me how to replace or regenerate damaged human cells or tissue to restore them to normal function. As a future Neuromuscular Rehabilitation Engineer, I hope to master four aspects of neuromuscular rehabilitation; biomaterials, neuromuscular control, biomechanics, and computational engineering. Because tissue and human cell engineering are two topics we will cover in this internship program, it will benefit my overall development and broaden my knowledge as a future engineer. During my time there, I plan to learn as much as possible about this topic to get one step closer to my dream of having a firm working on the most significant projects in artificial designs of our time.

Jacqueline Saulnier
Bryn Mawr College

Hello! My name is Jacqueline Saulnier, and I am a junior at Bryn Mawr College pursuing a major in Biochemistry and Molecular Biology alongside a minor in French. I am originally from New Jersey but have spent most of my life in Maryland, moving there when I was six years old. As a result, MD is home to most of my earliest memories, including when I first felt a strong curiosity in the natural world and its wide variety of lifeforms. This sense of wonder, that I believe to be universally shared among youth, was substantially cultivated through many enriching experiences I acquired with a local environmental organization over my childhood, teenage years, and into early adulthood. It is my relationship with this organization, in addition to the influence of my scientist parents, that fueled my interest in biology and chemistry, the two joining forces in the biochemical coursework I am now undertaking, and that I intend on delving further into in the future. While I have not yet identified a specific area of biochemistry that I am most passionate about, I am generally driven by the desire to understand the biochemical processes supporting life as we know it.
Given my inclination toward the natural sciences coupled with my enduring curiosity in how the world works, I entered college with the goal to begin acquiring formal research experience, to get a taste of what it is like and whether such a career path - specifically as an MD-PhD - is well suited to me. In the spring of 2022, I joined the lab of Dr. Tamara Davis, a biology professor studying genomic imprinting. Genomic imprinting refers to how imprinted genes are differentially expressed in a parent-of-origin-dependent manner. The lab is particularly interested in how different methylation profiles, a form of epigenetic modification, are established at regions associated with imprinted genes and directly or indirectly regulate the differential expression of their alleles. So far, my time has been dedicated to testing our hypothesis that the high frequency of asymmetric methylation unique to one type of these regions, termed secondary differentially methylated regions or secondary DMRs, is due to the constituent DNA bases being enriched for the oxidized form of the methyl group.

While I find the subject of my current research highly interesting given the goal to elucidate chemical mechanisms within a biological context and its potential for eventual therapeutic applications, I am very excited to branch out of this area and its associated, more-so-molecular biology techniques. Seeking out new research areas where I can apply and build upon different scientific knowledge and other interests that have surfaced throughout my undergraduate education, and where I can develop my research repertoire, these are the primary reasons why I am drawn to the summer program in regenerative medicine at WFIRM.

Outside of academics, I enjoy spending time outdoors, mainly by going for walks, but, when the occasion arises, by hiking and camping as well. I also enjoy playing piano, drawing and painting, and horseback riding. My extracurriculars in college consist of working in the dining hall, serving as a hospice volunteer, and volunteering in the emergency room of a local hospital. Giving back to the community, and recognizing how human health is intrinsically connected to the health of and how we care for our surroundings, are core values of mine that I intend on continuing to devote myself to in my future engagements.

**Jake Silk**

*University of Notre Dame*

My name is Jake Silk, and I’m a rising senior at the University of Notre Dame studying Science-Business. I have a focused passion for the health sciences, whether it be Chemistry, Cell Biology, Biochemistry, or anything of the sort. I would also say that I have a slight (major) obsession with fitness and nutrition. I am constantly trying to understand how nutrients or supplements impact the physiological function of the body. This has been the case ever since I developed a bone disease in my knees that forced me to stop playing soccer. Because of this, I am very interested in stem cells and cell therapies that promote organ and tissue regeneration, which is why WFIRM will be such a great experience.
In undergrad, I have had the privilege of working in many labs under amazing professors. Some of my particular favorites include my biology labs in which I developed an experiment to test the effect of salinity and water level on the growth of *Schoenoplectus americanus*. I also investigated the effects of green fluorescent proteins, using SDS PAGE and Coomassie stains in my analysis. In addition, performing my own organic syntheses allowed my creative and meticulous ambitions to flourish within the academic setting. Even my other labs in Physics or General Chemistry have also given me a rich understanding and appreciation of the development, execution, and analysis of laboratory research.

Outside of class, I have multiple passions that I pursue daily. As I mentioned before, I am obsessed with fitness and nutrition, so I develop weightlifting and nutrition programs for myself and my friends, in addition to a love for sports like soccer, basketball, and football. In a complete 180, I am also Treasurer of my a cappella group, *Halftime*. This group allows me to express my artistic spirit, and I’m very proud of the work we’ve done these last three years (check us out on all streaming platforms). In addition, I work as an ambassador for ND Listens, which is a student engagement group that continuously builds connections with alumni through daily phone calls. This gives me the opportunity to give back to the school I call home.

Regarding career trajectory, I have not decided exactly what I want to pursue, but I know that I want to be a part of the behind-the-scenes research and development of scientific products and treatments that improve people’s lives while also being a part of the promotion and marketing of these. WFIRM offers an amazing opportunity for me to enhance my love for the health sciences, while also giving me an experience that will hopefully give me more direction towards where I would like to take my career, so I’m very excited!

**Emily Silva**  
*Wake Forest University*

Hi! My name is Emily Silva, and I am a current sophomore at Wake Forest University as a biology major and chemistry and neuroscience minor. I am from Greensboro, North Carolina, which is about 40 minutes away from Wake Forest, so I am basically still at home. I also play on the varsity soccer team at Wake Forest, so one of the biggest challenges of college is learning to balance my schoolwork and soccer schedule. It’s tough, but I have a lot of teammates who support me and help me figure it out. Ultimately, I am grateful for the opportunity to play in college and for the teammates I have met along the way.

The life I have at Wake Forest is something I cherish every day. As a biology major and soccer player, I am learning an abundance of skills that I hope to use towards others in the future. I
love volunteering, so outside of school and soccer, I volunteer coach recreation teams as well as other children who do not have the money to play soccer at an organization. Moreover, with my lifestyle, there is not a lot of free time, so when there is, my teammates and I love to hang out together. Whether it is watching a movie, going out to eat and get dessert, or taking a road trip for a weekend, I treasure the times I get to be with my teammates and friends.

As a STEM major, I hope to go to medical school and become a doctor. I am unsure what kind of doctor I want to be, but my neuroscience courses have been my favorite courses so far, so I am leaning toward being a neurologist. Most importantly, I want to use what I learn and share it with everyone. I hope to one day work at a local nonprofit clinic to provide medical care to those who cannot afford it, or one day work at a nonprofit hospital such as St. Jude’s Children Research Hospital. As I stated earlier, I love volunteering, so being able to volunteer and use my future medical skills sounds very appealing to me. To ensure this future, I try to gain as much experience as I possibly can. I worked in a neuroscience laboratory the summer of my freshman year, learning about the effects of certain drugs in relation to pain, and I really enjoyed it. I hope to continue this passion through WFIRM. I am really grateful for this opportunity to meet new people and work with them!

Andrew Spong

Duke University

My name is Andrew Spong (he/him) and I am a rising Sophomore at Duke University. I am majoring in mathematics, with minors in chemistry and (unless plans seriously change) computer science. As a first-year student, I have had my fair share of exposure to laboratory experiments as well as academic research into topics of all subjects (natural sciences, mathematics, global politics...). Beyond the classroom, I have enjoyed adjusting to a new environment and learning from perspectives from all over the world.

Throughout this past year, I have gotten a hands-on look into the world of medicine through my work as an EMT on Duke University EMS. With this, I have been able to discover how so much of what I love with math is present in the world of medicine—the differential diagnoses I develop as an EMT follow the same logical flow as mathematical proofs, where each step clarifies what was once a jumbled pile of questions into a cohesive narrative.

At WFIRM, I have the ability to continue developing and uncovering new connections between these two fields that I love—and allow me to bridge the gap between the ultra-theoretical of mathematics and the ultra-practical of emergency medicine. I am extremely excited to delve deeper into the world of research and learn more about the biomedical techniques behind
WFIRM’s lab research as well as the ethics and socioeconomic impacts of regenerative medicine on a broader scale. Over the next several years, I hope to continue delving deep into research and ultimately pursue a career as a physician after graduation.

Pirya Tomerline
University of Florida

Hello! My name is Priya Tomerlin and I am a rising sophomore at the University of Florida. I am majoring in Microbiology and Cell Science and am working toward a minor in Biomolecular Engineering. My ultimate career goal is to become an orthopedic and sports medicine physician/surgeon. Currently, my future plan after obtaining a bachelor’s degree is to participate in an MD-PhD program, as I value both aspects of one-on-one patient care and academic research.

The summer before my senior year of high school, I participated in the 2021 WFIRM High School Summer Research Exposure Program, where I was both able to expand my knowledge about research paths in the realm of regenerative medicine and have the wonderful opportunity to interact with the faculty of WFIRM and high school students who had shared my passions for research and learning. After completing this program, I realized my passion for the regenerative medicine sciences with regards to orthopedics, and used the knowledge I gained to begin my own independent research exploration on the regenerative capacity of the Ambystoma mexicanum (axolotl) for a paper required to obtain my International Baccalaureate Diploma. In this paper I explored the research question “To what extent can studying the regenerative capacity of the Ambystoma mexicanum facilitate advancements in regenerative medicine sciences?”, as axolotls are known to be able to regenerate their primary body axis.

With regard to in-lab research experience, I currently have very little, and am looking forward to taking advantage of the opportunity to learn how to become a good researcher, and gain insight from everyone around me this summer at WFIRM. I have also been fortunate enough to be accepted into a research lab through the University of Florida’s Center for Regenerative Medicine, and look to working with a PI in the fall semester of 2023. I hope to use experience gained through the Summer Scholars Program to guide me in my research endeavors at UF.

Beyond research, one organization I am most passionate about being a part of at the University of Florida is the Freshman Leadership Council (FLC). Through FLC, I have enjoyed attending weekly personal growth seminars and workshops, and have been able to help organize a project catered to facilitating the writing and delivering of handwritten letters to hospitals, nursing homes, and veterans local to Gainesville, FL. This project is very exciting to me as it parallels involvement in services to the armed forces I had engaged in through volunteering with the American Red Cross in high school.
I am so grateful to have been given the opportunity to work with both the faculty and staff at WFIRM as well as the members of this year’s cohort, and I am extremely excited to spend the summer with you all!

Evan Zelt

Wake Forest University

Hello! My name is Evan Zelt, a rising Junior at Wake Forest University in Winston-Salem, N.C. I am pursuing a B.S. in Computer Science with a minor in Chemistry, a seemingly unlikely combination. My studies of the medical and digital world have provided me with insight into their intersection, however, and have opened my eyes toward unique ways of improving healthcare. Over the past year, I have been serving as a research intern at Atrium Health Wake Forest Baptist and engaging in Bioinformatics. Specifically, my work focuses on developing deep learning model architectures under natural language processing (NLP) that extrapolate social and medical concepts from patient encounter notes. The field of machine learning, as a whole, has experienced a boost in efficiency and accuracy with the introduction of transformer architecture. As a result, many NLP approaches have shifted from rule to deep-learning-based. The primary goal of our team is to find ways to use these models to extract medically relevant information from unstructured data.

The use of computer science and artificial intelligence in medicine is an incredibly fascinating yet sensitive field of study. With the potential to skyrocket the accessibility of healthcare, I hope to pursue this intersection as a clinical researcher. My understanding of the technicalities of large data models and computation will enhance my ability to communicate the ethical use of AI in medicine with other providers. Protecting patient interests is a crucial step in our movement toward the use of this newfound technology.

Outside of academics, one of the things I enjoy is volunteering at the Community Care Center in Winston-Salem. I provide care by obtaining vital information regarding patient health and history. The ability to serve patients who otherwise are unable to acquire healthcare is rewarding and illuminates the true joys of healthcare. I have made it a lifelong goal of mine to find ways to bring medical care to underserved communities.

Some other interests of mine include web development, 3D printing/design, hiking, skiing, scuba diving, and sailing. Nature has brought me closer to my understanding of medicine by teaching me the importance of balance and showing the complexities that such balance requires. With all these experiences, I hope to provide novel ideas that advance our pursuit of knowledge in medicine. I am incredibly excited to bring these to research in Regenerative Medicine, where breakthrough technology is reshaping our interaction with the body.