FALL 2022

HensonNews

Produced by Salisbury University's Henson School of Science and Technology

From the Henson Dean's Office

Thank you for reading the inaugural issue of the relaunch of our newsletter for the Richard A. Henson School of Science and Technology at Salisbury University! We look forward to bringing you news and insights from the faculty, staff and students of the Henson School biannually. Given the number of amazing stories generated by the good work of the STEM community at SU, I am certain we will not have any trouble filling these pages.

The past several years have been extremely challenging in higher education, as in so many other areas. The obstacles posed by the global coronavirus pandemic response, and now its aftermath, have been felt acutely by those who are teaching and learning about science. Working in a laboratory manipulating materials and instruments, collaborating closely with colleagues in the scientific discovery process, and presenting those experimental findings to both your peers and a broader audience are all critical to conducting our science and all were rendered either suboptimal or impossible with COVID-19 protocols in place.

And yet, I can report that the Henson School team rose to the occasion with outstanding courage, determination and creativity. Lab kits were created to be explored at a student's kitchen table. Professors interacted with students remotely and in the classroom simultaneously. Massive online study sessions were organized by student leaders. The innovation and can-do spirit displayed by our faculty, staff and students was inspiring. The results speak for themselves, with student research continuing unabated through the summer, student retention at a level higher than the University as a whole and graduation rates that continue to crush the national average. As the articles in this newsletter will demonstrate, there is a tremendous amount of inventive and groundbreaking work in both teaching and research happening in the Henson School of Science and Technology. I hope that you'll reach out, reconnect and learn even more about what we're up to!

– Dr. Michael Scott, Dean

Henson Faculty Featured Scholarship

Dr. Josh Sokolowski & Dr. Seth Friese
Department of Chemistry

Detecting and treating cancer depends on accurately observing just where those tumor cells are in the patient. Magnetic resonance imaging (MRI) offers the ability to do just that but many of the reagents used to enhance imaging of tumor cells, called contrast agents, feature metal ions such as gadolinium that may have toxic side effects from long term use. What if oncologists could use contrast agents that have a less toxic metal instead? Undergraduate researchers working in the laboratories of Friese and Sokoloski have spent the summer working toward that goal of developing Iron-based MRI contrast agents that could be attached to biomolecules. Ann Thomas, Wren Adkins, and Zobia Rani in the Friese Lab have been synthesizing iron (ii) complexes that become more magnetic at higher temperatures, a property useful for surgical interventions such as thermal ablation. Ana Valdes, Emmanuela Angu, and Stefani Lanahan in the Sokoloski Lab have cloning, expressing, and purifying proteins such as p53 to be used as targets for these new contrast agents. They have also explored labeling strategies for attaching the compounds prepared by the Friese lab to either a small peptide or an antibody to selectively bind to proteins in high abundance in tumor cells. Through these efforts, these research groups hope to provide new tools for the detection of cancer.

Continued

Dr. Andrea Presotto

Department of Geography and Geosciences

Presotto works on large mammals (primate and elephant) navigation and spatial cognition. Her research is interdisciplinary. It combines GIS, remote sensing, environmental science, geography, biology, anthropology, and experimental psychology. Animal navigation studies investigate how wild animals travel within their home range. The field has evolved to the standard understanding that some species have a high cognitive ability to travel using cognitive maps while others use the lower system of habitual routes. Presotto's current work aims to elucidate the relationships between animal navigation strategies in response to their Landscape of Fear (LOF). Though monkeys and elephants differ in navigational strategy, both demonstrate an ability to adjust their navigation according to their LOF. Presotto is particularly interested in whether wild animals trade off travel efficiency for safety in high-risk areas. Geospatial science brings an unparalleled opportunity to investigate animal navigation under different anthropogenic activities in their habitat. Its use elucidates visually and quantitatively whether animal navigation strategies change in response to each influence imposed by human activities. Because the increase in the human population has impacted how wild animals deal with their home range more than ever, it is crucial to understand the effects of specific human activities on animals' daily navigation routes the most. Preliminary results of this work show that elephants in Zimbabwe increase the use of habitual routes in mixed vegetation, wetland, and woodland only when these landscapes are within hunting-allowed reserves. A similar effect was found for bearded capuchin monkeys that use habitual routes the most in locations where hunting occurs. The findings show both species can be flexible when selecting their navigational strategies, just like humans do under pressure and fear.

Dr. Jennifer Bergner & Dr. Michael Bardzell

Department of Mathematical Sciences

Dr. Randall Groth

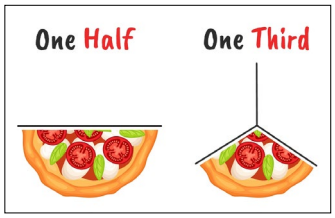
Department of Secondary and Physical Education
National Science Foundation (NSF) • Experience for Undergraduates (REU) in Mathematics Education



In summer 2022, Salisbury University welcomed eight undergraduates to campus for its 10-week NSF REU in mathematics education. Undergraduates came from a variety of institutions, including University of Maryland College Park, Syracuse University, Miami University, and Salisbury University. Bergner and Bardzell from the Mathematical Sciences Department mentored the undergraduates along with Groth from the Secondary and Physical Education Department.

Undergraduates prepared for the REU by studying research literature on the teaching and learning of fractions. Through this process, they learned about common patterns of student thinking about fractions as well as teaching strategies to help students' thinking develop. This background knowledge prepared undergraduates to design and test mathematics lessons for children from the local community during the on-campus, 10-week summer experience.

During their first week on campus, undergraduates conducted clinical interviews with the children they were to teach. They used findings from the interviews, along with research-based teaching strategies from the literature, to design lessons to advance students' thinking about fractions. Undergraduates designed and taught sequences of seven weekly lessons for small groups of local fifth graders. Each lesson was video recorded and collaboratively analyzed by the undergraduate cohort and the SU faculty mentors shortly after it was taught. During these analysis sessions, instructional strategies were fine-tuned with an eye toward optimizing children's understanding. Teaching strategies for subsequent lessons were chosen on the basis of the children's observed mathematical needs and related teaching strategies from the research literature.



At the conclusion of the summer, undergraduates conducted post-interviews with the children to assess the impact of the lesson sequences they had designed. They summarized their findings in posters, abstracts, and oral presentations. Undergraduates will go on to present these research products at local and national conferences in the upcoming academic year.

To learn more about the project and its history, visit www.salisbury.edu/pathways.

Dr. Enyue Lu

Department of Computer Science
National Science Foundation (NSF) • REU Site: Explore Emerging Computing in Science and Engineering (EXERCISE)

The NSF REU EXERCISE Program is an interdisciplinary project that explores emerging paradigms in parallel computing. Students apply emerging parallel computing models, including graphics processing unit (GPU) computing with NVIDIA CUDA, a local parallel processing system, and MapReduce computing on Amazon Elastic Compute Cloud (EC2), a distributed parallel processing system, to tacking data and compute-intensive problems in science and engineering.

The REU EXERCISE has been hosted at Salisbury University since 2012. In summer 2022, they had a total of 10 REU students from Salisbury University, University of Maryland Eastern Shore, Community College of Baltimore County, Susquehanna University, Liberty University, Brown University, and University of Puerto Rico Rio Piedras. They worked on cutting-edge problems in network anomaly detection, medical image reconstruction, oyster activity monitoring, harmonic changes analysis, and gesture sensing.

The 10-week summer undergraduate research program includes a $6,000 stipend and $600 travel allowance, an on-campus housing and meal allowance, field trips and social activities, and research opportunities in emerging computing with applications in science and engineering.

Students are eligible for the program if they are a U.S. citizen or permanent resident; a science, technology, engineering, and mathematics (STEM) major; have a GPA of 3.0 or above; and have programming knowledge in C, C++, Java, Python, or MATLAB.

For application and more information about program, please visit SU REU EXERCISE website (http://faculty.salisbury.edu/~ealu/REU/REU.html) or email Project Director Lu at elau@salisbury.edu.

Dr. Jathan Austin

Department of Mathematical Sciences

Austin has varied scholarly interests and is particularly interested in scholarship that informs undergraduate instruction. Most recently, Austin has focused on exploring the mathematics of various games. With colleagues at Kennesaw State University and Kutztown University of Pennsylvania, Austin recently published a book chapter on using the board game Catan in undergraduate teaching. The chapter appeared in *Teaching Mathematics Through Games,* a book published in the American Mathematical Society/Mathematical Association of America (AMS/MAA) Classroom Resource Materials series. Austin's most recent peer-reviewed article, with Emelie Curl of Hollins University, discusses using a board game to explore combinatorics and graph theory at the undergraduate level and will soon appear in *The College Mathematics Journal (CMJ). CMJ* is a national publication of the Mathematical Association of America that focuses on content pertaining to undergraduate mathematics. Austin has presented work with coauthors at various venues, including the Salisbury University Department of Mathematical Sciences Colloquium, the annual summer conference of the MAA, the Joint Mathematics Meetings of the AMS and MAA, and Bryn Mawr College as part of the De-stressing Math Collective Seminar Series.

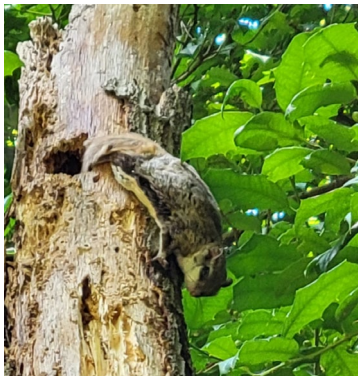
Dr. Angela Freeman

Department of Biological Sciences
National Science Foundation (NSF) • Building Research Capacity of New Faculty in Biology (BRC-BIO)

Freeman is to be awarded $480,233 for the grant over three years starting in September 2022. The general goal of the NSF grant is outlined online at https://beta.nsf.gov/funding/opportunities/building-research-capacity-new-faculty-biology-brc-bio.

This award will fund Freeman's lab (including Freeman, several undergraduates, and one graduate student) to study the neuroendocrinology of flying squirrel social behavior. These squirrels are common on the Eastern Shore of Maryland, though they are nocturnal and most people have never seen one. Many Marylanders don't know they live here right in our backyards.

Freeman's lab is trying to understand broadly what brings these animals together to co-nest. It has long been hypothesized that flying squirrels gathered in large numbers to stay warm in the winter, given their small size and the fact that they do not hibernate. However, flying squirrels co-nest across all latitudes (Canada to Florida) and the number of co-nesters is independent of temperature. They just really like to cuddle!



Freeman has hypothesized that the neuropeptides oxytocin and vasopressin, which modulate social behavior and bonding in many animals, are likely contributors to this behavior. The grant will explore these questions through work in the field and lab using southern flying squirrels as a model. Freeman hopes to determine where oxytocin and vasopressin are being made, where they are acting during these "cuddling"/co-nesting events, and how these peptide systems change over the seasons.

Students working on this grant will learn animal husbandry, field work skills (navigating in the woods, trapping and handling wild squirrels), and immunocytochemistry with fluorescence; and a select group will be traveling in the final year of the grant to Cornell University to learn receptor autoradiography with a collaborator (Alex Ophir). Overall, Freeman is hoping to understand more about these selective friendship-like relationships that develop during co-nesting to understand more about flying squirrels and ourselves.

Salisbury UNIVERSITY
HENSON SCHOOL
OF SCIENCE AND TECHNOLOGY
1101 Camden Avenue
Salisbury, MD 21801-6860

ADDRESS SERVICE REQUESTED