

Research & Creative Activities

Fall 2023



**SOUTHERN ILLINOIS UNIVERSITY
EDWARDSVILLE**

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Giving Opportunities

Scholarship and Research Endowment

The SIUE Graduate School provides educational opportunities to nearly 2,500 students annually. Gifts to support student scholarship and research allow academically talented students with financial need the opportunity to pursue their educational goals.

Rosemarie Archangel, Ellen Sappington, and Stephen L. and Julia Y. Hansen Innovation and Excellence in Graduate Education Endowment

Faculty scholarship and teaching determine the quality of the education students receive. Gifts to support this endowment will build on SIUE's culture of scholarship and research by supporting innovative activities and progressive changes in existing and new graduate programs, as well as graduate faculty development related to the strengthening of graduate studies.

On the cover: Creating Inclusive, Accessible Degree Opportunities for Childcare Workers, page 7

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Making a Difference

“Great leaders don’t set out to be a leader, they set out to make a difference.”
- Lisa Haisha

Susan Morgan, PhD, Associate Dean for Research and Graduate Studies, Professor of Civil Engineering, Professional Engineer, will be retiring at the end of December 2023. Dr. Morgan joined the Department of Civil Engineering faculty in summer 1996, was appointed department chair in 2007, and stepped into her role as associate dean of the Graduate School January 1, 2012.

As I contemplated the upcoming interviews to fill the associate dean position, I tried to reflect on what essential skills, knowledge and experiences Dr. Morgan brought to the position that contributed to her success. However, it is nothing she learned or experienced. Dr. Morgan’s success as a leader originates from an inherent desire to make a difference — a difference to the institution, graduate studies, scholarship, the Graduate School staff and all that she addresses. It is simply a part of who she is, her authentic self.

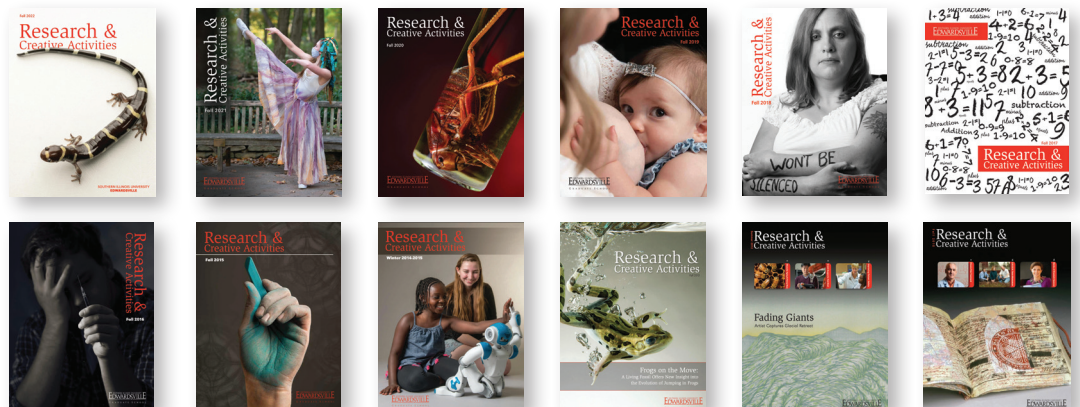
This will be my final Dean’s Message as I am retiring at the end of June 2024. Reflecting on my time over the Graduate School, I made one great decision from which all good things flowed. That decision was asking Dr. Morgan to join the Graduate School. Thank you, Susan, for the leadership you have provided to graduate studies, research and creative activities, and the University. Your impacts ripple beyond the walls of the institution and well into the future.

As I sign-out for the final time, I hope you find within this issue the activities of our faculty, staff and students compelling, and if you do, please consider a donation to the Graduate School to support their work across the University.

Sincerely,

Jerry B. Weinberg

Postscript: This is the 13th issue of Research and Creative Activities published during my tenure as Associate Provost and Graduate Dean. The covers of the previous 12 issues are pictured below. I am immensely grateful to the staff of University Marketing and Communications (UMC), who took pride in producing each issue, many of which received external recognition and awards. I particularly wish to recognize Beth Giese, assistant director of UMC, who provided leadership and expertise, and Howard Ash, University photographer, whose creative and excellent photos adorned the covers and graced the pages. And, of course, thanks go to Dr. Susan Morgan, who served as the Graduate School’s editor-in-chief.



Increasing Nursing Workforce Diversity to Improve Patient Care



A diverse nursing workforce is paramount to providing high-quality, culturally competent patient care and closing the health equity gaps that exist in communities across the U.S. Evidence shows that client trust and patient outcomes are improved when healthcare professionals are representative of the populations they serve.

Through a three-year project launched in September 2022, the SIUE School of Nursing is making a concerted effort to recruit and retain underrepresented nursing students while also ensuring their readiness to practice. A \$1,050,000 grant from the Health Resources and Services Administration (HRSA)* is supporting the School's endeavors to train nurses in acute care settings so they are prepared to improve health equity and health literacy in underserved and rural areas by addressing social determinants of health (SDOH).

According to the U.S. Department of Health and Human Services' Office of Disease Prevention and Health Promotion, SDOH can be grouped into five domains:

- economic stability
- education access and quality
- healthcare access and quality
- neighborhood and built environment
- social and community context.

"Our team is enthusiastic about the opportunities this grant allows for our students and our profession," said Angela Andrews, PhD, RN, CNE, assistant professor and principal investigator (PI). "We are excited about our collaboration with external school districts and clinical partners."

Along with Andrews, the project team of nursing faculty includes co-PIs Jerrica Ampadu, PhD, RN, CCP, associate professor; Amy Reed, PhD, RN, assistant professor; Sheri Compton-McBride, DNP, RN, assistant professor; Kelley McGuire, PhD, RN, assistant professor; and Ann Popkess, PhD, RN, professor.

The team is collaborating with school districts to create a pipeline program that will aid the School of Nursing's recruitment of students from disadvantaged and underrepresented backgrounds. To ensure their retention, graduation and post-graduation licensure success, students will be supported through evidence-based strategies, such as the creation of a preceptor program with clinical partners to provide students with experiential acute care learning opportunities in underserved and rural communities.

"I am proud of the grant team and their ambitious goals to infuse the social determinants of health into curriculum and clinical experiences," said Dean Judy Liesveld, PhD, PPCNP-BC, CNE, FAAN. "Their work will have long reaching benefits for our students, faculty and communities."

**This project is supported by HRSA of the U.S. Department of Health and Human Services as part of an award totaling \$1,050,000 with 0% financed with non-governmental sources. The contents are those of the author(s) and do not necessarily represent the official views of, nor an endorsement by, HRSA, HHS or the U.S. government. For more information, please visit [HRSA.gov](https://www.hrsa.gov).*

This collaboration will strengthen student recruitment and retention and improve the curriculum in areas of social determinants of health to better serve our community.

Angela Andrews, PhD, RN-BC, CNE
Assistant Professor
School of Nursing

Moving Beyond Gender-Exclusivity and the Daddy-Daughter Dance

Fewer than half of children living in the U.S. are part of a traditional nuclear family according to the Pew Research Center. And, yet, gender-specific school and community events, such as father-daughter dances, continue to be the norm. While these events are meant to celebrate family and build connections, they also exclude children who do not fit within the constraints of the event.

“Gender-based guidelines promote exclusion and the marginalization of families with LGBTQ+ parents and children, families with single parents, and many others,” said Emily Love, research assistant at Goshen Education Consulting and two-time SIUE alumna. “These are public events often sponsored by public schools and funded by taxpayer dollars. Given that reality, these events need to be open and fairly accessible to all constituents — not the select few families who fit this outdated and unrealistic norm.”

Love contributed to research on this topic while earning undergraduate and graduate sociology degrees from SIUE in 2020 and 2022, respectively. She worked with Ezra Temko, PhD, assistant professor and applied political sociologist, and student researchers Destiny Baxter, Adam Loesch and Heidi Masching to study primary source data for information about the challenges faced by communities that hold gender-specific events.

Next, the researchers focused on communities that have changed their policies or events to be more inclusive. The researchers conducted more than a dozen in-depth interviews with individuals across the country who were involved in the changes, including school principals and board members, parents, and advocates.

“The most impactful moments for me were hearing from the parents and community members directly affected,” said Love. “Hearing them share their experiences of exclusion, their self-advocacy, and their resilience was both inspiring and heartbreaking. I think it is easy for people to shrug off this issue and see it as something a very small group of people are dealing with. But the truth is, the majority of families in communities across the country would likely need some type of accommodation to attend gender-specific events.”

The research team’s manuscript, “You can’t go to the dance because you don’t have a male role model in your life: Heteronormativity, Stigmatization, and Daddy-Daughter Dances,” has been accepted for publication in “Sociological Focus.” Additionally, the team partnered with the Young Elected Officials Network to publish the policy toolkit “Communities Moving Past the Daddy Daughter Dance: Adapting Gender Inclusive Events for the 21st Century.”

“This topic is personally meaningful to me because I witnessed and experienced the hardship these events can cause,” shared Temko. “When I was in graduate school, my foster daughters brought home invitations to the town’s Daddy-Daughter Dance and Mommy & Me Tea through their school. I hope our research will raise awareness about how gender-exclusive events can stigmatize diverse families while also providing communities with tools and resources to adapt their events to be more inclusive.”



Using Recovery Experiences to Support Others

Public health emergencies such as the COVID-19 pandemic have been shown to have adverse effects on individuals' mental health and well-being. These effects can translate into mental health disorders, such as depression and anxiety, and the adoption of unhealthy behaviors, such as substance misuse.

In recent years, behavioral health service providers have recognized the value of including individuals with their own recovery experiences in the treatment, education and advocacy of mental health and substance use services.

"In the post-COVID world, there is an incredible demand for behavioral health support and services, thus a greater demand for individuals with lived experience to be trained and certified to provide recovery support services," said Jayme Swanke, PhD, associate professor in the Department of Social Work.

Swanke serves as the program director for the SIUE Certified Recovery Support Specialist (CRSS) and Certified Peer Recovery Support (CPRS) Training Program housed in the Office of Online Services and Educational Outreach.

"This program assists in strengthening the behavioral healthcare and recovery support services in Illinois and creates career pathways for CRSS and CPRS professionals," Swanke added.

Using their own recovery journeys as a foundation, CRSS and CPRS professionals provide professional peer services for individuals in recovery from mental illness or combined mental illness and substance use disorders.

The SIUE CRSS and CPRS Training Program was established through a CRSS Success Program 814 grant awarded by the Illinois Department of Health and Human Services' Division of Mental Health in December 2021. The initial \$919,000 award funded tuition, fees and instructional costs for the first cohort of participants, including tuition, fees and instructional costs. Trainees also received a stipend for course time and internship hours, along with reimbursement for living costs, mileage, childcare, program supplies and internship necessities.

"The financial support offered by this program has really eliminated some of the barriers that folks typically run into as they pursue these certifications," explained Swanke.

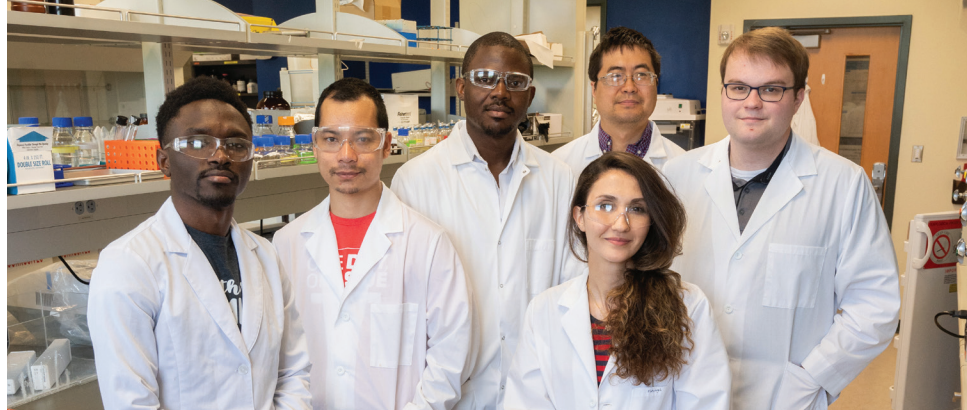
The training program requires 110 classroom hours, an internship seminar course and a 300-hour internship with a community partner. The first cohort included 19 trainees — 16 of whom completed the program in 16 weeks.

"To date, 12 of the 16 program alumni have taken one or both Illinois certification exams and passed," Swanke said. "This is an incredible success for the program's first run and demonstrates the dedication of the participants, course instructors and community partners in making this program a success."

The program received \$1,156,508 in funding for its second and third cohorts of trainees in August 2022 and has completed the final noncompetitive budget renewal for fiscal year 2024.



Giving New Life to Agricultural Waste



A group of researchers at SIUE led by Jie Dong, PhD, assistant professor of biochemistry and fermentation chemistry, and fermentation scientist at the National Corn to Ethanol Research Center (NCERC), is working to turn agricultural waste into chemicals that can be used in an array of products, from biofuels to food flavorings.

“We plan to use an integrated bioprocess to produce three useful chemicals simultaneously: butanol, butyric acid and butyl butyrate,” explained Dong. “Butanol is an important industrial solvent and also an attractive biofuel with superior fuel properties. Butyric acid is a specialty chemical widely used in the food, chemical and pharmaceutical industries. Butyl butyrate is currently used as a flavoring/fragrance compound in the food industry. It can also be used as a biofuel and oxygenator to enrich biodiesel.”

These three chemicals are currently produced from crude oil, a non-renewable resource. Dong’s team is taking advantage of agricultural waste, such as corn stover, to create the chemicals. Corn stover is made of the stalks, leaves and cobs left after the corn kernels have been harvested. The researchers will feed the corn stover to engineered microorganisms, which will convert the waste into chemicals.

“We are converting waste into useful products,” Dong said. “If this technology is successfully industrialized, then farmers can gain profits from selling corn stover, which is just a waste for them now.”

Dong’s research is funded by a \$300,000 grant from the U.S. Department of Agriculture*. NCERC is the leading organization for the grant, providing both lab space and equipment to support Dong’s research.

The team will focus on using yeast to synthesize an enzyme known as lipase in order to produce butyl butyrate. Lipase is a promising biocatalyst in the production of esters, which are common biological materials with a fruity odor that is beneficial in the flavor/food industry.

“Compared to traditional toxic, environmentally unfriendly and non-specific chemical methods for ester production, lipase’s mild reaction condition and high catalytic efficiency are attracting great research interests,” said Dong.

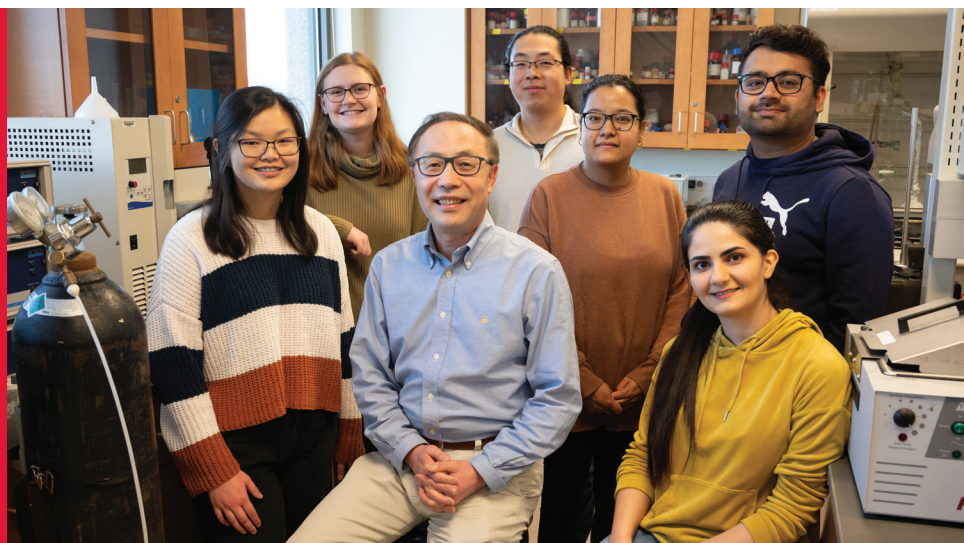
The research is part of a three-year project which began in June 2022. Dong expects to have initial results by the end of 2023.

“During this project, I’m hoping to establish a nationally renowned enzyme expression lab,” he added.

**This project is supported by the U.S. Department of Agriculture with an award of \$300,000 as part of an award totaling \$800,000, of which \$800,000 are federal funds with 0% financed with nongovernmental sources. The contents are those of the author(s) and do not necessarily represent the official views of, nor an endorsement by The Ohio State University, the U.S. Department of Agriculture or the U.S. government.*



Pioneering Study Addresses Questions Surrounding Enzyme Catalysis



Catalytic power describes an enzyme's ability to accelerate a chemical reaction. Enzymes catalyze chemical reactions in living organisms at a much faster rate than the corresponding reactions in water, but the origin of their catalytic power is still in question by the scientific community.

“The search for the origin of the enormous catalytic power of enzymes has a long history and has led to many proposals,” said Yun Lu, PhD, professor in the Department of Chemistry. “Understanding the origin of enzymes’ catalytic power can help understand the nature of life, establish catalytic theories for drug design, as well as find biocatalysts to promote useful reactions in industry.”

Lu is working to provide further clarity on the topic through his biomolecular chemical reaction mechanism study funded by a \$433,000 grant from the National Institutes of Health*.

“Over the past 20-plus years, the dominant focus on enhanced transition state binding as the origin of enzyme catalysis has given way to the challenging question as to whether there is an active site compressive effect that can help enzymes achieve the huge rate accelerations,” Lu explained.

“In this project, we will design enzyme model reactions and use the same methodologies that enzymologists have begun using to replicate the observations in enzymes in an attempt to provide insight into the questionable physical origin of enzyme catalysis,” he continued. “Our results are expected to help develop theories for enzyme catalysis that can guide future efforts to design efficient drugs and biocatalysts.”

Lu's team of undergraduate and graduate students is pioneering the use of enzyme model reactions and the kinetic isotope effect technique to study the role of molecular dynamics in the chemical processes. Results are expected to provide insight into the role of protein vibrations in enzyme catalysis. He believes this project will attract significant attention from the scientific community and direct his team's research for many years to come. It will also provide Lu's students with valuable research experience that will prepare them to enter a variety of fields following graduation.

“The students will be trained to make chemical compounds, study the chemical properties, operate chemical instruments, and collect, analyze, and discuss scientific data,” said Lu. “With these experiences, the students are prepared to be teachers, problem-solvers for chemical and pharmaceutical companies, and to enter health-related professional schools or PhD programs.”

“We are the first and the only group to use these methodologies to systematically study the enzyme model reactions in solution,” Lu added. “In addition to supporting our students’ research, the grant will also help improve the lab facilities to form a solid infrastructure for our future research.”

**This project is supported by the National Institutes of Health (NIH) as part of an award totaling \$433,500, of which \$433,500 are federal funds with 0% financed with nongovernmental sources. The contents are those of the author(s) and do not necessarily represent the official views of, nor an endorsement by, the NIH or the U.S. Government.*

Creating Inclusive, Accessible Degree Opportunities for Childcare Workers

The U.S. Bureau of Labor Statistics projects openings in the childcare industry will exceed 170,000 per year for at least the next eight years. With a 10% decline in the number of childcare workers across the country as compared to before the COVID-19 pandemic, the industry is in dire need of qualified early childhood educators.

The SIUE School of Education, Health and Human Behavior's (SEHHB) early childhood education program is working to alleviate some of the stress on this sector. In addition to its traditional pathway to earning a bachelor's in early childhood education, the SEHHB also offers the Early Childhood On-Site (ECHOS) program for students already working in an early childhood setting. Courses are offered at times and locations convenient for working adults, and additional resources are in place to ensure students are able to successfully complete the undergraduate degree program and earn their teacher licensure.

One support mechanism that was initiated in fall 2022 is the Early Childhood Access Consortium for Equity (ECACE) Scholarship Program, which is administered by the Illinois Student Assistance Commission in partnership with the Illinois Board of Higher Education and the Illinois Community College Board. SIUE received a grant for \$937,313* to award scholarships that cover up to the total

cost of attendance after other financial aid. The scholarship can be used to cover tuition and fees, room and board, and books and supplies.

"The ECACE funding recognizes and is responsive to the needs of the current early care and education workforce, which are primarily women, including women of color," said Stacie Kirk, professor, early childhood education program director and co-principal investigator (PI) on the grant. "These are professionals who often are not able to go back to school and increase their education and knowledge base because they need to continue working full time to support their families."

In addition to providing scholarship opportunities for students, the ECACE program grants third-year status to students who have already completed the Associate of Applied Science (AAS) degree in early childhood education.

"The AAS pathway, along with the scholarship opportunity, creates more feasible opportunities for working professionals to return to school to complete an undergraduate degree and earn teacher licensure," Kirk explained.

The ECHOS program has always placed significant emphasis on equity and inclusion for its students. Participating in the ECACE program was a natural progression for the SEHHB.

"Our dean, Robin Hughes, PhD, did not hesitate to activate our invested faculty when the ECACE initiative launched," said Natasha Flowers, PhD, assistant dean for anti-racism, equity and inclusion, and PI on the grant. "With more state-level support for ensuring culturally responsive pedagogy, credentialing more hardworking early childhood educators, and striving to leave no community without available, competent, inclusive early education, SEHHB will not refuse the resources to build on our momentum!"

**This project is supported by the Department of Health and Human Services (DHHS) through the Illinois Board of Higher Education as part of an award totaling \$937,313, of which \$937,313 are federal funds with 0% financed with nongovernmental sources. The contents are those of the author(s) and do not necessarily represent the official views of, nor an endorsement by, the DHHS or the U.S. Government.*



Watershed Management to Reduce Flooding Hazards

Flooding has become a major issue in the Midwest due to a variety of factors, including changes in land use and the loss of natural rainwater storage. As a result, communities throughout the region have suffered negative economic and environmental impacts.

Through funding from the Illinois and U.S. Environmental Protection Agencies*, SIUE partnered with Heartlands Conservancy, and several other local, state and federal entities to study the Prairie Du Pont Creek Watershed located in St. Clair County, Illinois, focusing in the municipalities of Cahokia Heights and East St. Louis. This area has suffered extreme flooding several times in the past decade, leading to repeated structural damage to homes and businesses, water quality concerns, and overwhelmed sanitary sewers, among other issues.

Together, the project team sought to create a long-term watershed plan to address flooding issues, and improve drainage and water quality. This vision involved both technical analysis of existing conditions and public input.

Rohan Benjankar, PhD, associate professor and graduate program director in the Department of Civil Engineering, served as SIUE's lead researcher on the project. With the support of two SIUE graduate students, Benjankar developed integrated watershed hydrological and hydraulic models to study flood hazard in the watershed and identify the areas at greatest risk for flooding. Modeling is a backbone to develop a strategy for watershed management for the future.

"In order to reduce flooding hazard and improve water quality, it is important to manage water flow within urban areas as well as in the entire watershed," explained Benjankar.

The project team is creating a comprehensive flood management strategy using data plus input from local residents and local, state and federal agencies. This plan will detail recommendations for decreasing flood damage, and the study can also be used for improving water quality, reducing soil erosion, and restoring fish and aquatic habitats.

Participation in the two-year project has been a valuable learning opportunity for the graduate students who have supported the research process.

"This project funded part of the students' graduate study," said Benjankar, "But, more importantly, it provided them with valuable experiences on process-based modeling for watershed management to tackle real-world problems. Perhaps most important of all, the project also allowed the students to contribute to work that will ultimately improve the quality of life for those living in the region."

**This project was partially supported by the U.S. EPA. The contents are those of the authors and do not necessarily represent the official views of, nor an endorsement by, the U.S. EPA or the U.S. Government.*

Watch the video



siue.edu/watershed-management



GeoMARC and NGA Partnership Provides High-Quality Maps and Student Learning

SIUE has built a strong connection with the National Geospatial-Intelligence Agency (NGA) over the past several decades due to the volume of its graduates who have established careers at the agency's St. Louis headquarters.

GeoMARC, Geospatial Mapping, Applications and Research Center, is taking the University's partnership with NGA one step further through its participation in NGA's Geospatial Intelligence (GEOINT) Production and Professional Development Program. Over the course of the three-year contract, SIUE students are producing 1:50,000-scale topographic maps of various regions of the world using unclassified data provided by NGA. The agency then uses the maps to advance its mission to provide world-class geospatial-intelligence and lead the global GEOINT enterprise.

"GeoMARC's partnership with NGA is twofold: to provide students with specialized, real-world training and experience, and to create high-quality maps in support of NGA's work," said Randall Pearson, PhD, professor and director of GeoMARC. "SIUE is one of three universities in the country working with NGA on this project."

Sara Chamberlin, MS geography '22, has worked on this program for two years, first as a graduate student and now full time as program manager. She is also collaborating with Pearson to develop a 400-level course for undergraduate and graduate students that will be available during the winter or spring 2024 academic term.

"The goal is to prepare future students to help complete the next round of maps for this contract and to provide cartographic training that can lead to their employment at NGA," explained Chamberlin. "As more students work on this project, my hope is they will also expand their skill sets and be better prepared for future professional environments."

Several undergraduate and graduate students have participated in the project, applying their knowledge and skills to a real-world project while gaining relevant GIS experience. Stefanie Pryor, BS geography '22, is pursuing a master's in geography and was selected for one of the graduate assistant positions created by the project. She is responsible for editing automated TM 1:50k topographic maps with the goal of accurately depicting Earth's physical and cultural features, while also improving the readability of the final products.

"This experience gives me a significant advantage when I embark on my job search upon graduation," Pryor said. "Alongside the hands-on experience gained from working on these maps, I have also been privileged to participate in NGA's Cold Start training. This invaluable training has allowed me to learn directly from subject matter experts in the field and gain valuable insights into advancing my career."



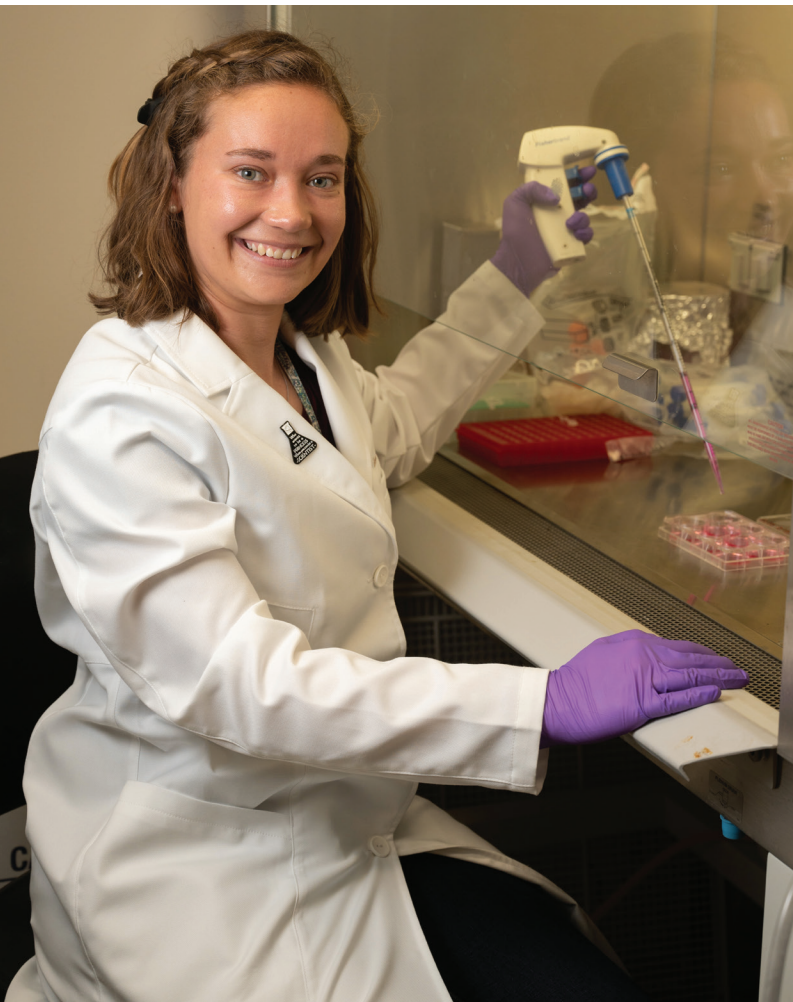
This invaluable training has allowed me to learn directly from subject matter experts in the field and gain valuable insights into advancing my career.

Stefanie Pryor, BS Geography '22

Selected Grants for Graduate Students

Advancing New Possibilities in Alzheimer's Disease Treatment

Ariel Magee, Doctoral Candidate,
Pharmacology and Neuroscience



“Nearly everyone knows someone who is affected by Alzheimer’s disease, but there is no medication available today that can reliably treat the disease.”

Ariel Magee
Doctoral Candidate
Pharmacology and Neuroscience

An estimated 6.7 million Americans age 65 and older are living with Alzheimer’s disease (AD) according to the Alzheimer’s Association. AD is a brain disorder that leads to progressive memory loss and cognitive decline. It is the most common type of dementia and the seventh leading cause of death in the U.S.

“Nearly everyone knows someone who is affected by AD, but there is no medication available today that can reliably treat the disease,” said Ariel Magee, who is currently studying the disease as part of the Doctor of Philosophy in pharmacology and neuroscience co-op program between SIUE and the SIU School of Medicine.

The few therapeutic options for AD only temporarily treat or slow down the symptoms of the disease. Magee’s research is focusing on drug discovery and development, specifically using a novel σ_1/σ_2 receptor modulator known as BBZI, which was created by Michael Crider, PhD, chair and professor of pharmaceutical sciences.

“My investigations assess BBZI across behavioral animal models to determine the effects on learning, memory, anxiety and general motor movement in an AD-mouse model,” explained Magee. “This work coincides with biochemical analyses of key brain tissues involved in these behavioral responses, as well as AD pathology.”

“Initial evaluations identify an enhancement of learning and memory with BBZI dosing,” Magee continued. “With the initial animal testing performed, I am now advancing into cellular models to delineate biochemical pathways of effect respective to BBZI, with focus on neuroinflammatory and oxidative stress markers.”

Magee began her research alongside Ken Witt, PhD, professor of pharmaceutical sciences, in 2021 and expects the project to continue for at least two more years in order to make adjustments along the way.

“The σ -receptor field has been rapidly growing, with a significant push for new drug candidates able to modulate these receptors,” said Witt. “A dual-receptor modulator has great potential, and Ariel’s work will add substantially to the field.”

Magee hopes her research will clarify the actions of sigma receptors as a target for treatment of AD and eventually lead to human trials.

“When asked about what I do in school, nearly everyone has a story about a family member or relative who is affected by AD,” added Magee. “While the disease is devastating and the stories are emotionally difficult to hear, it helps me keep in perspective the importance of my lab work and moving forward with the project to find a better treatment option.”

Auxin Production of Root-Associated Bacteria in Illinois Prairie Orchids

Noah Pyles, MS Biological Sciences '23

Spiranthes orchids are a native Illinois prairie plant under threat due to urbanization, overgrazing, overcollection and difficult cultivation methods. These orchids rely on microbes present in the soil to successfully germinate, because they lack endosperm, a carbohydrate nutrient source which functions to feed the developing embryo.

“Orchids are fascinating, because they require a fungal partner in order to germinate and develop properly,” Pyles said. “Orchid fungi deliver sugars and nitrogen to the orchid seeds since they lack endosperm.”

According to Pyles, most research focuses on these orchid fungi. He took a stark pivot and explored all the various microbes present in the roots of *Spiranthes* orchids, not just the fungi, to observe if there are other unique relationships occurring. Specifically, Pyles looked at bacteria which produce auxin, a plant hormone thought to have a direct impact on orchid growth.

By exploring these types of bacteria and other microbes, Pyles aimed to provide a better understanding of the root microbiome of orchids to aid in the conservation of *Spiranthes* orchids.

Pyles worked with three species of *Spiranthes* orchids, including the following.

- *Spiranthes magnicamporum*: Globally vulnerable.
- *Spiranthes cernua*: Vulnerable in Illinois.
- *Spiranthes vernalis*: Critically imperiled in Illinois.

Using the auxin-producing bacteria, he conducted growth studies to observe their impact on seed germination and development. Research results include:

- All three orchid species contained bacteria that produced auxin.
- Bacteria were observed to directly stunt the growth of primary roots in the model plant species *Arabidopsis thaliana*.
- After being reintroduced into the roots of orchids, the bacteria were able to live within the root cells.
- These orchids could have as many as 1,000 unique fungal and bacterial species present within their roots.

Funding from the Illinois Native Plant Society bolstered Pyles' research which explores what other microbes are found in orchid roots and the possibility that these may also play a role in enhancing germination and growth. Pyles' results may mean that bacteria have a role in the growth and development of seedlings and adult plants.

“We have limited knowledge of the identity, function and interactions of microbiomes associated with orchids,” said Pyles' faculty mentor Betsy Esselman, PhD, professor of biological sciences. “Studies like this, identifying bacterial species present, are essential first steps to developing successful conservation strategies.”

“Ultimately, these results have the potential to help inform conservation groups of important bacterial and fungal families needed within a specific habitat to ensure happy and healthy orchids.”

Noah Pyles, MS Biological Sciences '23

Radicalizing Home: A Study of Diaspora Women's Autobiography

Rodaina Mousa, MA English Language and Literature '23

When Rodaina Mousa placed the texts of two impressionable memoirs authored by bi-racial authors side by side, she noted that the publishing dates made them ideal bookends for the last decade. "The Girl Who Fell to Earth" by Sophia Al-Maria (2012) and "Aftershocks" by Nadia Owusu (2021) struck Mousa, herself an international scholar from Egypt, as radical in that they wrote against the expectations of their genre.

Mirroring this duality from her own identity, the two memoirs and the experiences of other international students, Mousa completed a project that explores ways literary and artistic works represent dislocation from home, nation, ethnicity and culture. She completed a written critical paper addressing the radical features of both memoirs and created a visual exhibit that encourages critical engagement with these two diaspora women's autobiographies.

"I knew I wanted to create an accessible, inclusive space for the audience to come close to and interact with diaspora women's writings and experiences," Rodaina said. "Identity and home are constantly changing, so is the nature of my exhibition."

The two memoirs explore and grapple with themes of diaspora, belonging, home and identity. Rodaina's exhibition brought these ideas to life in ways that are visual, tactile and accessible to the public.

"I was able to offer the public a space of learning and exploration beyond academic journals."

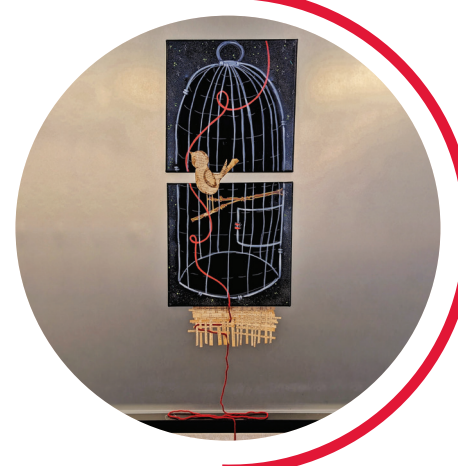
Rodaina Mousa, MA English Language and Literature '23

Held in SIUE's Lovejoy Library, the exhibition featured interactive art pieces that reflected Mousa's visual analysis of the two memoirs. The show was centered around the audience's own experiences alongside her's in ways that encourage them to interact with the artwork and make it their own. Artworks ranged from mixed-media canvases and sculpture to prints and artist books representing, addressing, imagining and reimagining "Home and Away."

"SIUE announced its largest international student population in fall 2022," Mousa said. "Yet, public humanities and intellectual programming that directly addresses international student audiences remains limited. My project seeks to address that gap."

The immersive exhibit offered a gateway to learn about diaspora women's writing and the international experience. The exhibit opened first to SIUE's international student body, who were especially encouraged to take part in the creation of the pieces, which were designed to prompt student reflections on their experience as international student-scholars, who are by this classification, scholars who are dislocated from their homelands.

"It's crucial for our graduate students to consider the challenges and opportunities that intersecting academic and public work presents," said Associate Professor of English Elizabeth Cali, PhD. "Exit options in the English master's program offer an opening for this kind of intellectual, public facing work. I'm thrilled that Roudi embraced the challenge to produce a project that spoke especially to our international student community at SIUE."



Emeriti Faculty Association Research Spotlight

The Life of Leaves

Written by Richard Keating, PhD

Professor Emeritus, Department of Biological Sciences

Most are aware of the services provided by leaves, first for their role in making plants grow, but even more for us, their removal of carbon dioxide from our warming atmosphere. Numerous adaptations make all this possible. Leaves breathe in two directions: absorbing carbon dioxide for photosynthesis while they release water vapor, which arrives into leaves after transporting minerals from the roots, thereby supporting all growth and maintenance. This atmospheric transfer is facilitated by tiny pores called stomates, which in oaks occur on the lower leaf surface.

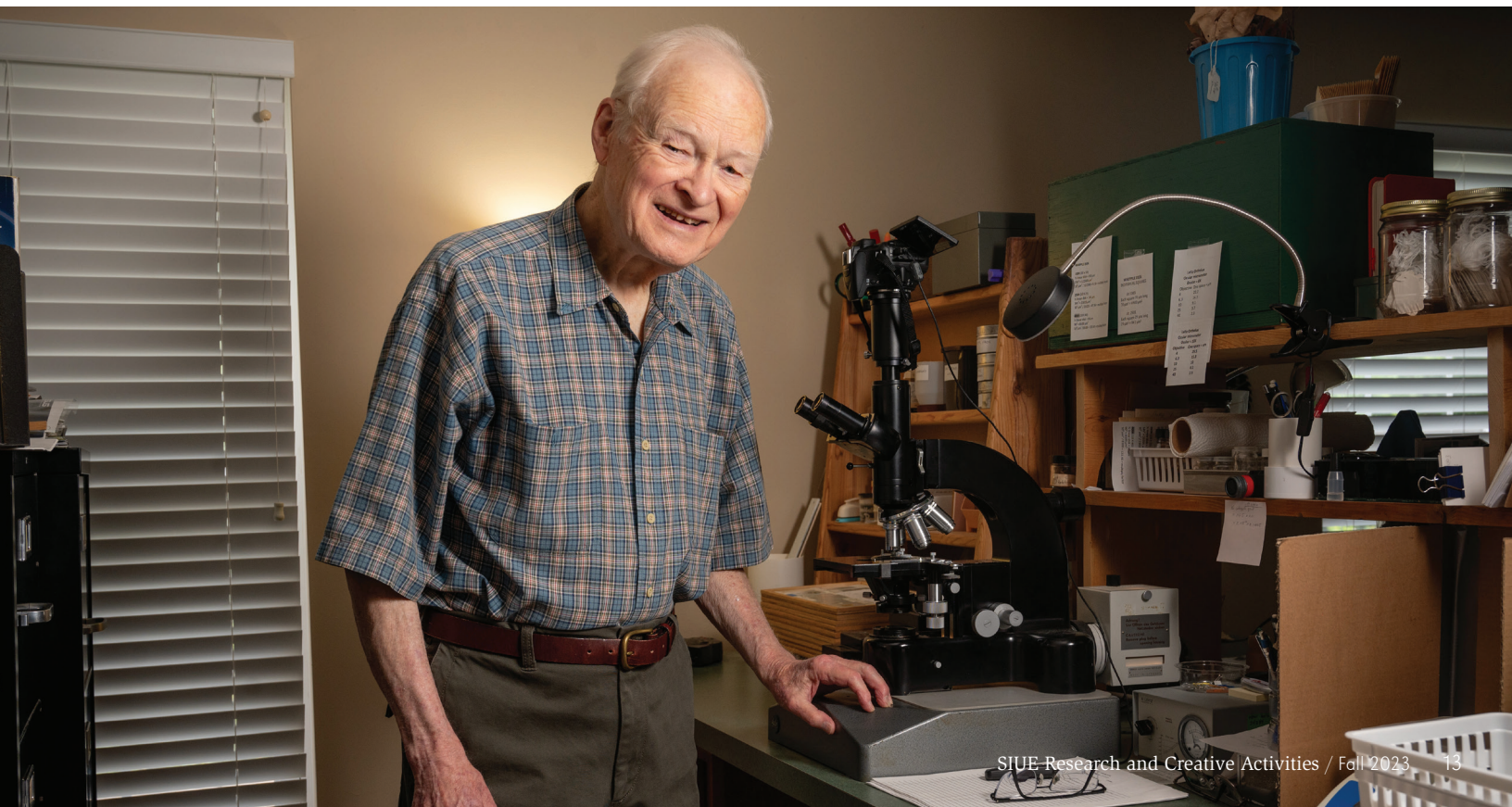
My research studies some of the structural adaptations that vary in plant species as these processes take place. Working mostly with white oak (*Quercus alba*), I have made some interesting observations, not previously described in this species.

To get into the weeds, er trees, a bit, one can observe that seedlings or understory saplings have the largest leaves, broad with shallow sinuses between the lobes. This gives them a greater chance to capture sunlight flecks that occasionally pass through the shade. High in the canopy, the leaves are exposed to light for hours, are much smaller, and have deeper sinuses between narrow lobes. Well understood by now is that this deep lobing assists greatly in cooling by increasing air turbulence around the leaf.

For this species I have discovered that the frequency of stomates per square millimeter varies by leaf shape and size significantly. Small canopy leaves often have over 1,000 stomata per square millimeter while larger leaves of the understory have significantly fewer stomatal counts. So, why don't the canopy leaves dry out and die faster? I've also found that the interior photosynthetic cells, called the mesophyll, are much denser in canopy leaves. This reduction in air space results in resistance to excess water loss.

At least for me, it gets more interesting. The network of veins or vascular bundles — that transport water upward from the roots and manufactured sugars downward — is different in many canopy tree species. Their unusual structure isolates the interior spaces (areoles) into nearly independent neighborhoods. There are multiple advantages. The leaves are stronger, thereby resisting high physical stress. Also, insect or fungal damaged areas are isolated from adjacent areoles.

Many questions remain. The work appeals to my interest in visiting mature woodlands and then preparing specimens for the microscope in laboratory space. A great match for enjoying a life in natural history.



Research Spotlight and News

SIUE in Autonomous Vehicle Project for NSF Engines Development Award

SIUE is a key partner with Governors State University, in collaboration with the Illinois Innovation Network, in receiving one of the first National Science Foundation Regional Innovation Engines (NSF Engines) awards to lead the Advancing Smart Logistics team in an effort to lay the foundation to make Illinois one of the nation's most advanced transportation and logistics hubs. The \$1 million NSF award supports a two-year planning phase to create connections and develop local innovation ecosystems, with the goal of preparing a strong proposal to become an NSF Engine and receive up to \$160 million to positively impact Illinois' economy, accelerate technology development, address societal challenges, ensure equity for those in underserved communities, advance national competitiveness, and create good-paying, local jobs.

Early Childhood Center Awarded Grant for Student-Parents

The U.S. Department of Education's Child Care Access Means Parents in School (CCAMPIS) program has awarded SIUE's Early Childhood Center (ECC) a \$1.7 million four-year grant. With this grant, the ECC will help student-parents by removing the financial and emotional burdens of childcare while they are in class. The grant will support student-parent retention and graduation while ensuring the young children of students have exceptional childcare services at the ECC.

School of Dental Medicine Professors Participate in Inclusion Research

Nathalia Garcia, DDS, MS, was invited to contribute as a lead author for a manuscript related to advancing women, parity and gender equity in a special issue of the Journal of Dental Education about Diversity, Equity, Inclusion and Belonging (DEIB). Garcia along with SIU SDM's Debra Dixon, DMD, MSc, joined other women leaders in dental education to execute the project. The two professors, along with the other coauthors of the manuscript, were invited to present the topic at the 2022 American Dental Education Association (ADEA) Diversity, Equity, Inclusion and Belonging Workshop. This special issue of the Journal of Dental Education is the latest in a series of ADEA projects aimed at bringing a sharper focus, and greater progress, to diversity and inclusion.

Associate Professor Furthers Field Knowledge and Advocates for Change

Adriana E. Martinez, PhD, associate professor in the Departments of Geography and Geographic Information Sciences and Environmental Sciences, participated in the River-based Immersive Education & Research (RIVER) Field Studies Network river rendezvous this summer along the San Juan River in southern Utah. Designed to strengthen undergraduate education in and around rivers by creating a network of educators, The RIVER Field Studies Network is a National Science Foundation funded grant through the Directorate for Biological Sciences, Division of Biological Infrastructure, and the Directorate for Education and Human Resources, Division of Undergraduate Education.

Martinez also was selected as a member of the American Association of Geographers' first-ever cohort in the new Elevate the Discipline program which will train and showcase geographers in action in the media, as voices for public policy and in advocating for change on this year's theme of Climate and Society. Fifteen geographers were selected through a competitive process.

School of Business Professor Published on Bias in Entrepreneurial Funding

Shivendu Pratap Singh, PhD, assistant professor in the School of Business' Department of Computer Management and Information Systems, has a published article in the December 2022 edition of Service Business by Pan-Pacific Business Association. The article is entitled "Overcoming bias against funding of female-led entrepreneurial initiatives: the democratizing influence of online crowdlending platforms." Singh's article conveys the message that female entrepreneurs should not be discouraged by any bias they experience in the traditional financing environment. He describes how crowdlending platforms help entrepreneurs, especially those that are disadvantaged, in acquiring funding for their businesses.

Donor Roll

School of Nursing Gains Historic Grant for Mobile Health Unit

SIUE's School of Nursing received its largest grant in history — \$4 million from the Health Resources and Services Administration (HRSA) — to develop a mobile health unit that will provide community-based services in East St. Louis, Fairmont City and surrounding communities. The four-year project is entitled, “Nurse education, practice, quality and retention-mobile health training program – WE CARE REACH: Responding, educating and advocating for community health.” Serving as an extension of the School's WE CARE Clinic on the Wyvetter H. Younge Higher Education Campus in East St. Louis, the mobile unit, WE CARE REACH, will offer primary and chronic care management services and will be staffed by healthcare providers and graduate nursing students. The program has several goals, but a core focus will be educating nursing students about promoting health equity and social determinants of health in a community setting.

SIUE Receives Grant for Inclusivity in STEM

The Howard Hughes Medical Institute (HHMI) has announced SIUE as a recipient of \$531,600 as part of a multi-institutional \$8 million grant through its Inclusive Excellence 3(IE3) initiative. SIUE is part of one of seven Learning Community Clusters that will be simultaneously pursuing three projects: faculty development, student engagement and agency, and curricular change. Through collaboration and accountability of the institutions, they will work to catalyze institutional change with respect to diversity and inclusion. The award will provide SIUE faculty the means to redesign their courses to align with principles of inclusion, as well as develop the SIUE STEM Student Ambassadors Program which allows students to work collaboratively to find practical solutions to STEM inclusion.

Dr. David E. Ault and Mrs. Roberta L. Ault '88 '91
Dr. Laura W. Bernaix '78 and Mr. Terry W. Bernaix
Mr. James L. Boyd and Dr. Mary A. Boyd '76
Dr. Sharon A. Brown '74 '76
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Dr. Gregory Budzban and Mrs. Mary Ann Budzban
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Dr. Brian E. Donnelly and Mrs. Susan F. Donnelly
Dr. Christine R. Durbin and Dr. Patrick H. Durbin
Ms. Katherine A. Eilers '16
Dr. Dixie A. Engelman '72 '73
Dr. Patricia R. Forni
Dr. Charlotte J. Frisbie
Mr. Joseph C. Grimoldi '01
Mrs. Linda S. Grinter '06 and Mr. Mark Grinter '08
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Dr. Walter M. Hansel Jr. '70
Mr. Marc Hansen
Mrs. Julia Y. Hansen '01 and Dr. Stephen L. Hansen
Dr. Roger C. Hill
Mrs. Andrea P. Tolden-Hughes '83 '89
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Dr. David I. Steinberg
Dr. G. G. Stephen and Mrs. Mary B. Stephen
Dr. Jerry B. Weinberg and Mrs. Lori A. Weinberg
Dr. James J. Weingartner and Mrs. Jane Weingartner
Dr. David J. Werner and Mrs. Kay B. Werner '88
Dr. Marcia A. Whitson and Dr. S. William Whitson
Mr. Larry C. Yager, Dr. Susan E. Yager and Larry C. Yager
and Susan E. Yager Trust

Driving Change Through Research

Vaughnie Lindsay New Investigator Award

Presented to junior faculty members to recognize and support individual programs of research or creative activities that have the promise of making significant contributions to their field of study and to SIUE in general.

- **Cedric Harville II, PhD, MPH, Assistant Professor, Department of Applied Health**
Harville's research evaluates the links between food access, food choices and obesity-related health disparities among African Americans.

Distinguished Research Professor Award

Rank recognizes faculty members who have made an outstanding contribution to research or creative activities as a result of their continued commitment to scholarship beyond the period of promotion to professor.

- **Kimberly Archer, DMA, Professor, Department of Music**
Archer has been commissioned to compose works by more than a dozen different bands and wind and percussion ensembles, including the U.S. Marine Band for the 2021 Presidential Inauguration. She is one of the most respected composers of wind band music working in the U.S. today and will publish a book on band orchestration, a topic that is not typically covered and accessible to students through text.

Paul Simon Outstanding Teacher-Scholar Award

Recognizes a faculty member for being an outstanding teacher and researcher and for demonstrating the belief that to be a good teacher one must also be a good scholar. Winners have successfully integrated those contributions into their teaching and mentoring practices.

- **Dennis Bouvier, PhD, Professor, Department of Computer Science**
Bouvier's research interest is in the area of computing education, specifically improving the educational experience for novice programmers.

Outstanding Student Awards

Outstanding Thesis and Dissertation Awards

Recognize a master's student's thesis and a doctoral student's dissertation that have been identified as outstanding among all those completed in the previous academic year.

Outstanding Thesis

- **Alexa Agne, MS Kinesiology** "Acute Glucose Responses Following Combined Arm and Leg Cycling"

Outstanding Dissertation

- **Patrick Ayres, PhD Historical Studies** "The Conservative Heart of the Nation: Political Conservatism in the Civil War Era West"

Outstanding Teaching Assistant Awards

Recognize and reward graduate students at the master's and doctoral levels for outstanding performance in teaching and instruction.

- **Rodaina Mousa, MA English Literature**
- **Goksu Avdan, Doctoral Candidate Engineering Science**

By the Numbers

Sponsored Projects FY23

- 188 awards for \$32.8 million
- 201 proposals for \$140 million

Details can be found in the Office of Research and Projects Annual Report.
siue.edu/graduate/about



Selected Publications

College of Arts and Sciences

Brooks, Tisha. *Spirit Deep: Recovering the Sacred in Black Women's Travel.* University of Virginia Press, 2023.

Gurfinkel, Helena. "A Very 80s Love Affair: Joanna Hogg's Formalist Feminism in The Souvenir I." *The '80s Resurrected: Essays on the Decade in Popular Culture Then and Now*, edited by Randy Laist, McFarland, 2023. pp. 137-149.

Gurfinkel, Helena. "Resisting Readability: Dyslexia and Sexuality in Alan Hollinghurst's The Sparsholt Affair." *symplokē*, vol. 30, 2022. Numbers 1-2, pp. 277-295.

Manuel, Jeffrey T. "Pittsburgh's Colony in St. Paul's Hinterland: Tensions over Environmentalism in Northeastern Minnesota's Iron Range." *In Nature's Crossroads: The Twin Cities and Greater Minnesota*, edited by Christopher W. Wells and George Vrtis, Pittsburgh: University of Pittsburgh Press, 2022, pp. 229-244.

Robb, Megan A. *Group Art Therapy: Practice and Research.* Routledge, 2022.

Schmitz, Johanna. "You are here: Curatorial Interventions for The Displaced Visitor at The Rose Playhouse Historical Site from 1999 to 2019." *Shakespeare and Tourism*, editors Robert Ormsby and Valerie Clayman Pye, Routledge, 2022. pp. 266-284.

Simidchieva, Marta, Hristov, Miroslav; Radoslavov; Ilia. *Irminden: One hundred years of Bulgarian Piano Trios.* Blue Griffin Label, 2022.

School of Education, Health and Human Behavior

Hupp, Stephen and Santa Maria, Cara. *Pseudoscience in Therapy: A Skeptical Field Guide.* Cambridge University Press, 2023.

Hupp, Stephen and Wiseman, Richard. *Investigating Pop Psychology: Pseudoscience, Fringe Science, and Controversies.* Routledge, 2023.

Gopalan, Chaya and Kirk, Erik. *Biology of Cardiovascular and Metabolic Diseases.* Elsevier, 2022.

School of Engineering

Celik, Serdar. *Sustainable Energy: Engineering Fundamentals and Applications.* Cambridge University Press, 2023.

Umbaugh, Scott. *Digital Image Processing and Analysis: Computer Vision and Image Analysis.* 4th Edition, CRC Press, 2023.

Umbaugh, Scott. *Digital Image Processing and Analysis: Digital Image Enhancement, Restoration and Compression.* 4th Edition, CRC Press, 2023.

School of Nursing

Luebbert, Rebecca and Boyd, Mary Ann. *Essentials of Psychiatric Nursing.* 3rd Edition, Wolters Kluwer, 2023.

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