



AUGUSTA UNIVERSITY
**COLLEGE OF SCIENCE
AND MATHEMATICS**



News and Highlights

2023/2024

[Biological Sciences](#)

[Chemistry and Biochemistry](#)

[Mathematics](#)

[Neuroscience](#)

[Physics and Biophysics](#)

Contents

| | | |
|--|----|---|
| Dean's Office | 3 | From the Dean |
| Dr. John Sutherland, Dean | 4 | Academic Recognition Day 2023 |
| Dr. Thomas Crute, Associate Dean | | |
| Dr. Seth Oppenheimer, Associate Dean | 6 | New Undergraduate Neuroscience Degree Launched |
| Dr. Cathy Tugmon, Associate Dean | | |
| Dr. Cliff Gardiner, Special Assistant to the Dean | 8 | Paying It Forward |
| Rita Patel, Business Operations | | |
| Sidhartha Wakade, Communications Strategist | 10 | CSM Highlights |
| Michelle Burns, Administrative Assistant | | |
| Contributors | 11 | Two New Departments Created in the College |
| Dr. John Sutherland, Dean | | |
| Dr. Thomas Crute | 12 | 2023 Honors Night |
| Dr. Cliff Gardiner | | |
| Sidhartha Wakade | 14 | Multiple Fields Converge in Research |
| Photography | | |
| Michael Holahan, Communications and Marketing | 18 | Dr. Guido Verbeck Receives National Recognition for Groundbreaking Inventions |
| Sidhartha Wakade | | |
| Design | 20 | Department of Physics and Biophysics Celebrates Inaugural Publication |
| Sidhartha Wakade | | |
| Cover and Contents Page | 21 | Annual Math Contest Engages High School Students |
| Photos from the College of Science and Mathematics | | |
| Fourth Floor opening ceremony, | 22 | Faculty Awards and Accolades |
| Photos by Mike Holahan | 24 | Dr. Siva Panda Celebrates a Year of Awards |
| | 26 | Interdisciplinary Research Labs Officially Open: Fourth Floor Showcase |
| | 30 | Meet Our Fourth Floor Research Faculty |

From the Dean

The past year has seen exciting developments in the College of Science and Mathematics. The table of contents of this magazine highlights some of the accomplishments that will have lasting positive impact.

Key to the vision of the new Science and Mathematics Building on the Health Sciences Campus was inclusion of modern research facilities. The fourth floor is dedicated to research and following a year of build-out was recently celebrated in a ribbon-cutting ceremony.

A structural change in the departmental organization of the College was implemented this year for clearer alignment with the characteristics of a comprehensive research university. From the prior Department of Chemistry and Physics two new departments were created: the Department of Chemistry and Biochemistry and the Department of Physics and Biophysics. Implicit in the names of these new departments is the emphasis on the relevance of these fields to studying biological systems. Chemistry professor Dr. Guido Verbeck has joined us this year as one of the inaugural chairs, bringing a distinguished record as a scientist and leader.

Fall semester 2023 greeted the launch of a new degree program in the college: BS in Neuroscience. Inherently interdisciplinary, neuroscience is an ideal addition to the College. We have recruited two outstanding faculty thus far, with the expectation of adding a third this coming fall semester.

A top priority at AU is students, and they continue to impress with their achievements. In this issue we highlight students who are making an impact in the classroom and working alongside faculty in research labs. A recent graduate working at the Savannah River National Laboratory has been mentoring a current nuclear science student. Mathematics major Joseph McElmurray earned a top academic distinction to represent our university as the University System of Georgia Academic Recognition Day Scholar.

Join me in celebrating the accomplishments of the students and faculty in the college as we continue our arc of development in impactful education and research.

Dr. John Sutherland, Professor of Physics and Dean of the College of Science and Mathematics



Academic Recognition Day 2023



Each year the University System of Georgia honors one undergraduate from each institution as the Academic Recognition Day Scholar. The Augusta University representative for this prestigious award in 2023 was Joseph McElmurray, a senior mathematics major. His selection came as a complete surprise to him, and he almost missed the call that notified him.

“I was definitely surprised. I didn’t even know it was a thing,” recalls McElmurray. McElmurray, an Augusta native, is a senior pursuing a Bachelor of Science in Mathematics from Augusta University’s College of Science and Mathematics (CSM). He is also minoring in Spanish as a way to keep close to his Nicaraguan roots.

Academic Recognition Day is a 35-year-old tradition in which the University System of Georgia awards one student from each of the system’s institutions for their academic achievements. Every year, each USG institution selects a student with a 4.0 GPA who best represents the high standards of the system.

The ceremony was held April 25 in Atlanta, where honorees received a resolution from the Georgia House of Representatives and a letter of commendation from USG Chancellor Sonny Perdue.

McElmurray has applied his love for math to his capstone thesis research with Dr. Olusegun Otunuga, an assistant professor in the College of Science and Mathematics. McElmurray is working on modeling infectious disease transmission in cases where vaccinated individuals can still be infected by an emerging variant. This model is being used to analyze epidemiological parameters for COVID-19 variant cases in the United States.

“His analysis and coding show his mastery of the concepts taught,” Dr. Otunuga said. “He brilliantly demonstrates logical understanding of all mathematical and statistical concepts taught in the class. He is dedicated and punctual, always attending every class lecture.”

Not surprisingly, McElmurray has received other academic recognition including the Department of Mathematics 2023 “Outstanding Senior in Mathematics” award. The award is given to students who in addition to strong academics, have participated in research, actively volunteer within the department and serve as model students for their peers.

McElmurray plans to remain in Augusta post-graduation and seek out data analysis work. He said there is no “secret potion” to how he balanced his time at AU while juggling his academic and other responsibilities.

“It boils down to consistency and self-discipline,” McElmurray said. “Just having the discipline to keep going is definitely key. And again, I think having the balance is helpful --having school and then something else to really mitigate any sense of burnout.”

Academic Recognition Day Awardee, Joseph McElmurray, recognized by the University System of Georgia.

New Undergraduate Neuroscience Degree Launched



Dr. Sara Guediche and Dr. Evan Goldstein are the first new hires for the College of Mathematics Bachelor's in Neuroscience Program.

Beginning fall semester of 2023, for Augusta University students interested in science the College of Science and Mathematics has added a new Bachelor of Science in Neuroscience degree.

The program was approved by the University System of Georgia Board of Regents at its April meeting and the program began accepting students in Fall 2023. While Augusta University's Graduate School has a graduate neuroscience doctoral program, this is the first time a degree in neuroscience is available to undergraduates.

"If I had the opportunity to focus on neuroscience in my undergrad, then I certainly would have," said Kirstyn Denney, a student at AU's graduate neuroscience program.

"It would have provided a more structural foundation of the major concepts in neuroscience."

The college has hired two new faculty, Dr. Evan Goldstein and Dr. Sara Guediche, as the first faculty hires for the neuroscience program. Both are recruiting students to pursue neuroscience research projects and have begun offering introductory courses in the neuroscience curriculum.

The courses are designed with both conceptual and lab-based elements, giving students a well-rounded experience. "You will get a little biology, pharmacology, chemistry, math, physics and psychology," said Dr. Amy Abdulovic-Cui, director of the neuroscience program. "There are many opportunities for a

neuroscience major."

"Anyone with an interest in the subject can take classes from the program. You don't need any specific background," Dr. Goldstein said. Introductory courses and upper-division electives are not just for neuroscience majors; any student can take the introductory classes as well as upper-division elective courses if they meet the prerequisites.

"It's perfect for those who want to see how different types of science relate to neuroscience," Dr. Guediche said.

One of the misconceptions is that neuroscience is strictly or primarily a pre-medical degree, which it is not, according to Dr. Goldstein and

Dr. Guediche. The degree offers students access to many career paths, not just medical school or other graduate programs.

"It applies to things they don't consider," Guediche said. "Business principles and advertising really depend a lot on neuroscience research."

"We could talk about alternate careers all day," Dr. Goldstein said.

The undergraduate degree comes at a good time for students who are interested in neuroscience. According to Dr. Lynette McCluskey, a co-director of the PhD neuroscience program at AU, there is a need for neuroscientists now more than ever.

The undergraduate program also allows for a pathway into the graduate degree and for collaborations with the Medical College of Georgia's (MCG) researchers.

"We will have neuroscientists being trained at AU from the time they enter as a freshman, and we are excited about a subset staying to complete their PhD work," said Dr. McCluskey.

While the B.S. in Neuroscience program is just getting established at AU, a number of students have now declared neuroscience as their major. The number of majors is expected to grow as the college schedules more course offerings and begins to add more faculty positions in neuroscience.



Kirstyn Denney, a graduate student in the Medical College of Georgia's Neuroscience program (above) and students in the undergraduate neuroscience program demonstrating MRI scans (below).



Paying it Forward



Macy Peyton (left) and Brooke Stagich (right), both followed an almost identical path through the Nuclear Science Program at the College of Science and Mathematics.

It is not uncommon for a college student to enter college with a definite choice of major and sense of life path. Neither is it uncommon for that student to change their major and alter their chosen career path. In the case of Macy Peyton, a senior chemistry major in the College of Science and Mathematics, her path of development at Augusta University has followed an arc almost parallel to that of a recent CSM alumna, Brooke Stagich.

Both Peyton, a senior chemistry student, and Stagich, who works at Savannah River National Laboratory as an environmental health physicist, were initially cell and molecular biology majors who intended to become physicians. After taking several biology courses, however, both changed their

major to chemistry. And both elected to pursue the nuclear science concentration in chemistry.

For Peyton, the decision between biology and nuclear science was immediately clear.

“I wanted to go to med school to do psychiatry,” Peyton said. “I took cell biology and decided that I never wanted to look at anything to do with a cell ever again. I went that day after I took my final and changed my major to chemistry.”

Stagich, who graduated from AU with a B.S. in chemistry, was on a pre-medical track, too. She ended up switching after taking more of the nuclear science courses that were offered and learning that she loved chemistry and physics more than biology. “I started realizing

I really liked the nuclear fuel cycle and reactors,” Stagich said.

Both of them took nuclear science classes with Dr. Joseph Newton, an associate professor of physics at CSM. Dr. Newton introduced Stagich to Dr. Tim Jannick, a scientist at the Savannah River Nuclear Lab (SRNL). This led to an internship in 2015, formation of a mentoring relationship with Jannick, and a transition to full-time employment in 2019.

Years later, the similarities between Peyton and Stagich led Dr. Newton to introduce the two, resulting in Peyton’s internship at SRNL and Stagich becoming her mentor. Their parallel experiences at AU and re-imagining of career choices led Dr. Newton to come up with a Nickname for Peyton.

“He calls me Baby Brooke,” Peyton said.

Now Peyton is Stagich’s intern, Stagich is Peyton’s mentor, and the research Peyton has done at SRNL has led to her presenting the research at a national conference.

“I think it is amazing to watch one of our alums, who was an SRNL intern and decided to turn that path into a career in the nuclear workforce, now also be a mentor for the next generation,” Dr. Newton said.

In February 2023, Peyton was invited to present her research at the Waste Management Symposia in Phoenix, Arizona. It is one of the largest nuclear waste management conferences in the world, with over 2,000 industry professionals from more than 30 countries in attendance.

Peyton’s research involves using a statistical method to calculate the amount of radioactive cesium in deer and hog populations onsite at SRNL. Based on her presentation at the conference, she was awarded the Roy G. Post scholarship.

“I was a little overwhelmed at first, but I presented the second day and I thought that it was such an amazing experience,” Peyton said. “I met a lot of people in the nuclear industry and that was very cool. It made me feel very accomplished.”

Peyton credits Stagich for helping her prepare to speak publicly about the research at SRNL.

“I ensured—and almost everybody in my group does not like me for this—that all the interns had to give an oral presentation,” Stagich said. “That way you know you’re actually having to present to one huge group, and that is how you get more

comfortable in that setting.”

Peyton is continuing her work in the lab, but she has plans to apply to graduate school. Her first choice at the moment is Clemson, where Stagich got her masters in environmental health science. Stagich has since introduced Peyton to her advisor from her time at Clemson.

“My mentor introduced me to my advisor at Clemson, so I did the same,” Stagich said. “She focuses on the same research Macy and I found interesting. It’s just kind of a cycle starting back over.”

Regardless of what graduate program Peyton gets into, though, she knows exactly what she is going to do after it. “I’m going to come back and work at the lab,” Peyton said. “Nothing is as exciting as working in a national lab.”

Peyton presents her research in a poster session to peers and faculty at the College of Science and Mathematics.



CSM Highlights

■ Biological Sciences
 ■ Chemistry
 ■ Mathematics
■ Physics
 ■ Neuroscience
 ■ Graduate Degrees

Enrollment Growth in the CSM

- 20%** of all Augusta University undergraduates are CSM majors
- 6%** increase in students majoring in CSM programs
- 13** new faculty members hired for academic year 2024
- 47** undergraduates in the first classes of the new Neuroscience B.S. program



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| 519 BS in Biology | 45 BS in Mathematics |
| 292 BS in Cell & Molecular | 45 BS in Physics |
| 32 BS in Ecology | 47 BS in Neuroscience |
| 147 BS/BA in Chemistry | |
| 9 MS in Biomolecular Science | |
| 6 MS in Biological & Computational Math | |

Faculty Grant Awards

\$2.8 Million

Internal and External Funding 2023-2024

Notable External Sponsors

- American Chemical Society
- American Physical Society
- Augusta Utilities
- Board of Regents of the University System of Georgia
- US Department of Energy
- Georgia Tech Research Institute
- National Institute on Aging
- National Cancer Institute
- National Institute of General Medical Sciences
- National Institute of Child Health & Human Development



New Healthcare Careers Living Learning Community for Spanish-Speaking Students

In response to the growing need for bilingual medical personnel, the College of Science and Mathematics is preparing to launch a new Living-Learning Community (LLC) to support Augusta University students who are interested in healthcare and who speak Spanish.

An LLC provides students with a supportive academic experience that clusters like-minded students in the same on-campus residence hall, allowing them to live and study together while pursuing similar programs of study. In general, students in an LLC tend to earn higher GPA's and have higher rates of retention in college.

First-year students who are accepted to enroll at AU in Fall 2024 are encouraged to participate in this LLC at the time they apply for on-campus housing. To learn more about the LLC, scan the QR code.



Two New Departments Created in the College



Dr. Guido Verbeck, Chair of the Department of Chemistry and Biochemistry (left), and Dr. Tom Colbert, Interim Chair of the Department of Physics and Biophysics (right).

A structural change in the departmental organization of the College was implemented this year for clearer alignment with the characteristics of a comprehensive research university. For decades the Augusta University physics and chemistry programs were housed in the Department of Chemistry and Physics. This year separate departments were created for each of the disciplines.

Dr. Guido Verbeck, Professor of Chemistry, has joined the College to serve as the inaugural chair of the Department of Chemistry and Biochemistry. A distinguished researcher and inventor, Dr. Verbeck also brings a wealth of administrative experience. Dr. Tom Colbert, Professor of Physics, is serving as the interim chair of the Department of Physics and Biophysics this year. The College is conducting a search during 2023-24 for a permanent chair.

The creation of the separate departments allows each discipline to develop optimally, and is better reflective of the organizational structure in high research universities. In addition, the relevance of each discipline to the study of biological systems is reflected in the inclusion of biochemistry and biophysics in the department names, and signals an important research focus within each department.

2023 Honors Night

Biological Sciences

Dr. Dianne C. Snyder Distinguished Service Award:

- Sandra Bangiyev

Emil K. Urban Research Award

- Abbie Bryant (Lab-Based)
- Terra Newell (Integrated)

Outstanding Senior in Biology

- Alyssa Findley

Academic Excellence Award

- Chloe Johnson

Chemistry and Biochemistry

Outstanding Nuclear Science Award

- Wayne Benson

Richard T. Mixon Chemistry Award

- Rebecca Lang

Student Service Award in Chemistry

- Eduardo Ortiz

Best Undergraduate Research in Chemistry

- Abbie Flint
- Julio Chavez

John W. Pearce Award for Outstanding Student in Organic Chemistry

- Abraham Raji

Academic Achievement Award

- Anna Parviainen
- Rebecca Lang
- Drew Vincent

Physics and Biophysics

Best Undergraduate Research in Theoretical Physics

- Andrew Zimmerman

Best Undergraduate Research in Experimental Physics

- Jazz Neal
- Josephine Widjaja

Outstanding Undergraduate Student in Physics

- Garret Zills

Ronnie L. Ezel Physics Service Award

- Dean Meyer

Mathematics

Outstanding Senior in Mathematics

- Joseph McElmurray

McCrary Award in Mathematics

- Kayli Hendricks

Faculty Awards

Excellence in Research Award

- Dr. Abdul Malmi-Kakkada

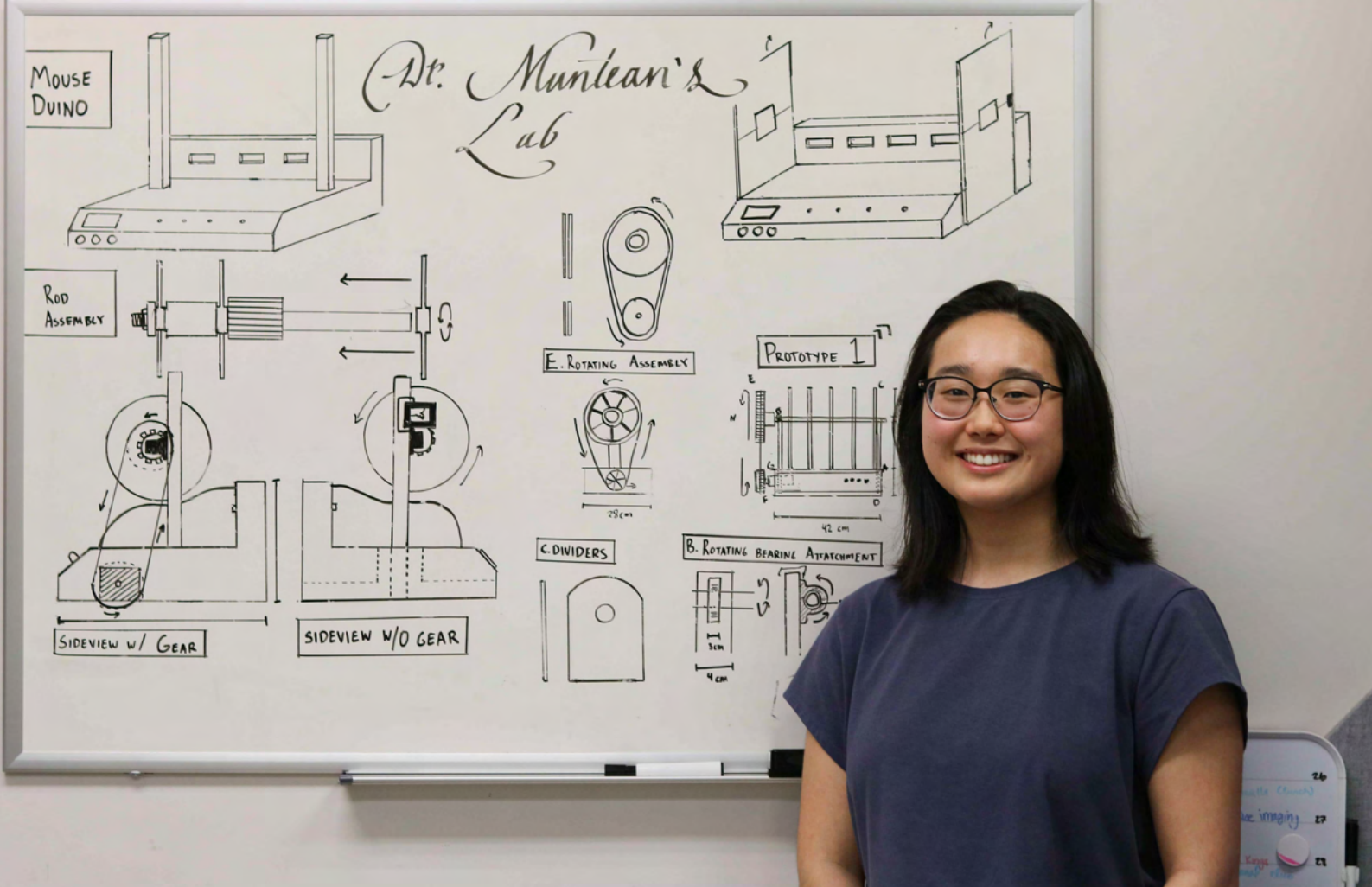
Outstanding Teacher Award

- Dr. Brian Agee

Exceptional Service Award

- Dr. Josefa Guerrero-Milan





Josephine Widjaja, a graduate of the College of Science and Mathematics Cell and Molecular Biology program, designed a cost-effective rotarod prototype used in her lab to this day.

Multiple Fields Converge in Research

It is rare to see a Cell and Molecular Biology student win an award for noteworthy research in physics. It is rarer still to earn that physics award based on research done in a Pharmacology and Toxicology lab. But Josephine Widjaja, a graduate of the College of Science and Mathematics (CSM), is no ordinary student. Widjaja, who researched in Dr. Muntean's lab at the Medical College of Georgia, has always been fascinated by physics despite her chosen major in Biology. Her love of physics started in high school. "I didn't know I liked it until I had applied to college pretty much," Widjaja said.

Widjaja, while a student at CSM, made significant contributions to the Muntean lab by developing a new research tool: a custom rotarod – a device used to test the motor coordination and learning ability of a subject, typically mice – with more features than a commercial rotarod.

Widjaja's interest in physics was sparked in her senior year of high school. "I didn't know I liked it until I applied to college," Widjaja said. She considered pursuing an engineering degree.

Earlier, however, Widjaja had decided dentistry would be her ideal career path. "At the time, the coolest person I knew was a dentist. I'm not kidding you, that was my reasoning for originally picking dentistry," Widjaja said. "Then after shadowing and interning, I was like, 'Oh, I think this is something I can potentially spend my life doing.'"

The dual nature of her interests led her to apply to two institutions: Augusta University, for its Professional Scholars Program leading to both the BS in Biology and the DMD degrees, and Georgia Tech, for its engineering programs.

Widjaja admitted that the highly selective Professional Scholars program at AU felt like a long shot, however, and she was fully prepared to become an engineer. "I didn't think I was going to get into the Professional Scholars Program," Widjaja said.

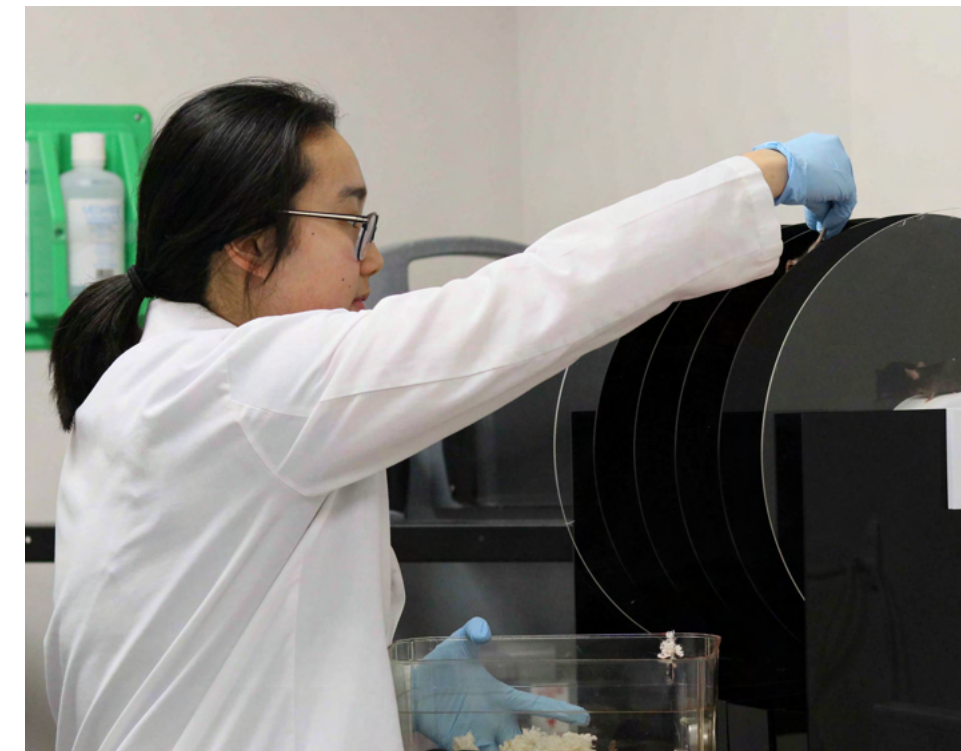
To her surprise and satisfaction, she was accepted into AU's Professional Scholars Program. In the fall semester of 2020, she entered the program as a member of the first-year cohort.

Building the Rotarod

In her sophomore year, Widjaja asked Dr. Muntean to join his lab. His research project focuses on movement coordination and learning pathways. It ranges from the study of proteins which are important in these pathways to studies on how changes in circadian rhythm affect movement.

"Back in high school I had taken some drafting and design classes," Widjaja said. "That's where I learned to do 3D printing, AutoCAD, stuff like that. Then I came here and I didn't think I would ever use those skills anymore."

Dr. Muntean knew about Widjaja's experience with drafting and design, and he assigned her to use a 3D printer to customize a cover slip to fit a microscope because the



Widjaja's rotarod has become a staple at the Muntean Lab.

original did not fit. Seeing her technical skill, he took a chance and talked with her about the need for a specialized rotarod for the lab. A rotarod consists of a rotating rod that spins at a constant rate. In his research, mice are loaded onto this rod to see how well they can maintain their footing.

In Dr. Muntean's lab, this device is used to test motor function in mice after certain genes have been "knocked out" of lab mice. The device also helps probe how abnormal changes in circadian rhythm can affect how lab mice learn movement patterns.

The limited functionality of the commercially available rotarod limited the sophistication of research the lab could perform. The rod itself was fixed into one position, it had no capacity to vary ramping speed, and it turned in only one direction.

As Widjaja explained, "With the commercial device, it wasn't possible to pinpoint the exact RPM or vary the RPM at time intervals such as 3 seconds or 150 seconds. There's no capacity for fine tuning and no specifics."

"We realized she has a real aptitude for engineering," Dr. Muntean said. "We were just talking and got the idea, 'It's a relatively simplistic machine, do you want to make one of these?' From there, she just took the initiative."

She liked the challenge of designing an improved device and figured it would be a helpful way to hone her engineering skills.

"In my head I was thinking, 'This sounds really interesting, and it's also giving me a component of education that otherwise I may not ever get. This is a once in a lifetime opportunity,'" Widjaja said. "I said to myself, 'Yes let's do this.'"

Design work for the rotarod officially began in August 2021 and was finished in April 2022. Most of her lab time was spent building the rotarod. Widjaja made use of projects from her other classes to design parts of it, including Dr. Andy Hauger's physics lab where students learn how to control Arduinos, programmable microcontrollers.

Dr. Hauger worked with Josephine on a weekly basis. Getting the code to work took about 4 months. Widjaja clocked 20-25 hours a week working on the device that semester.

"In our introductory physics lab courses, students have the opportunity to work with modern electronics including Arduinos," Dr. Hauger said. "These devices can be interfaced to a vast array of sensors -- distance, angle, force, voltage, sound, etc. -- and can also be used to actuate or 'control' things like switches and electric motors."

The finished result was a machine that could be programmed to

change speeds at customizable intervals, rotate both directions, and use interchangeable rod sizes for different tests. The final model outperforms its commercial counterpart in both function and cost, and it has fully replaced the old rotarod in Dr. Muntean's lab.

Plans after Undergrad

Her innovations on the rotarod design earned her praise not just from her research lab, but faculty at CSM as well. Despite being a Cell and Molec major, Widjaja was awarded Best Undergraduate Research in Experimental Physics Award during the CSM 2023 Honors Night ceremony.

Her work was subsequently published in *eNeuro*, an open-access, peer-reviewed scientific journal published by the Society for Neuroscience. The manuscript details how the device was made and the different tests that were created using the new rotarod. According to Dr. Muntean, any lab can use the manuscript as a

reference to build their own cost-effective rotarod. "It's a pretty wonderful accomplishment for any student, let alone an undergraduate," Dr. Muntean said.

While Widjaja helmed the project and did most of the heavy lifting, she is thankful to others for the help they provided in critical moments of the rotarod's development. She credits Douglas Sloan, Dr. Muntean's lab assistant, for helping put together the early designs of the project.

She also credits Dr. Hauger for helping her with the coding aspects of the project. Widjaja says that while the Arduino lab she did for Dr. Hauger's class was brief, it created a foundation for her to build her rotarod.

"He kind of put it in my head that you can manipulate the environment through Arduino," Widjaja said. "You can control technology. You can do all this stuff just with a simple motion controller and understanding how to code."

"This was very much an effort she led and completed," Dr. Hauger said. "Josephine was really top-notch to work with the entire time."

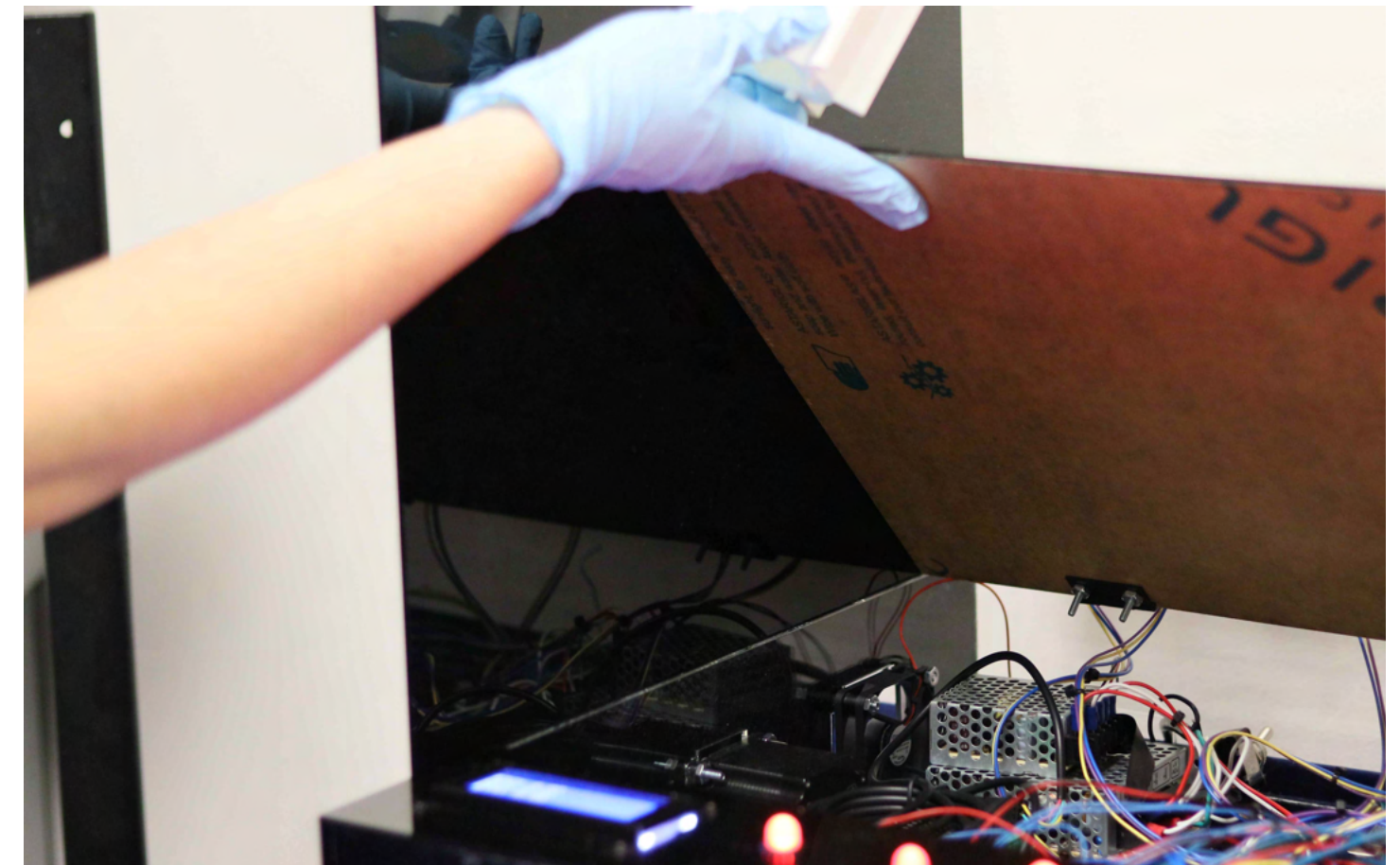
At AU Widjaja has found the best of both worlds. Her love of physics and engineering has been fed through the rotarod redesign project while she has pursued her degree in Cell and Molecular Biology and her passion for her dentistry career.

"I really, truly love dentistry. I'll be able to contribute genuine uncompromised good to others," Widjaja said. "I'll be able to help people."

The rotarod designs were modeled on Widjaja's computer (right) before the parts were 3D printed.



Douglas Sloane, an assistant in the Muntan Lab (below), helped Widjaja design the early version of the rotarod.



The internal wiring of the rotarod (above) was programmed through Arduino micro-controllers, taught to Widjaja in Dr. Andy Hauger's physics lab.

Dr. Guido Verbeck Receives National Recognition for Groundbreaking Inventions



Dr. Guido Verbeck, recipient of a Bill & Melinda Gates Award, Fellow in the National Academy of Inventors class of 2023, and the recently hired Chair of the newly made Department of Chemistry and Biochemistry.

Dr. Guido Verbeck has been busy since he arrived at the College of Science and Mathematics. His recent appointment as the chair of the newly made Department of Chemistry and Biochemistry coincides with his inventions and patents gaining national attention.

Dr. Verbeck has been awarded a Bill & Melinda Gates award and been named in the 2023 class for the National Academy of Inventors (NAI) for his work in the field of mass spectrometry. His research has led to practical advancements and the invention of several sensing devices with a wide array of uses.

His Bill & Melinda Gates award was granted for his research into disease detection, specifically for malaria and tuberculosis. The devices pick up biomarkers that are associated with the diseases to help catch them before they spread.

The concept is not limited to just these two diseases, either, and can be applied in detecting certain cancers, metabolic diseases, and other respiratory illnesses, according to Dr. Verbeck.

“My outcomes would be to create a non-invasive, portable analyzer for early detection of these disease

states,” Dr. Verbeck said. “One that is ultimately affordable and rigged to put into any environment, even outdoors, if needed.”

A similar device that he designed was used in the first FDA-approved COVID-19 breath test, and other applications also include things like drug detection for law enforcement. Dr. Verbeck credits InspectIR, the company that collaborated with him in designing the devices, for the efficient construction and deployment of them in the field.

Dr. Verbeck’s research continues to refine his inventions and create new applications for them. His latest patent involves remote smell, which are devices that contain odors that can be dispersed to make the subject perceive smells or to generate smells that are not actually present. This technology can be used in situations where the sense of smell is lost over time or in VR training where smells can be simulated to better create immersion.

The NAI fellowship, of which Dr. Verbeck was the only recipient from Augusta University, seeks to recognize his long line of patents and inventions, not just one specific one. Every December, the NAI selects inventors from around the world whose inventions have made a tangible benefit to society. The 2023 Class of Fellows includes 162 inventors from 35 states and 10

Dr. Verbeck adjusts a mass spectrometer in his lab.

countries, representing 118 research institutions. They collectively boast over 4,600 U.S. patents.

“It is truly an honor,” Dr. Verbeck said. “This is a devoted group of researchers that produce a tangible product or idea at the end of the day, to really see their research come to life, and I feel humble to be counted among them.”

The breadth of impact from the Bill & Melinda Gates Foundation award and the NAI fellowship also includes opportunities for students who will be working in Verbeck’s lab to engage in groundbreaking research. Students in his lab have already worked on some of the inventions.

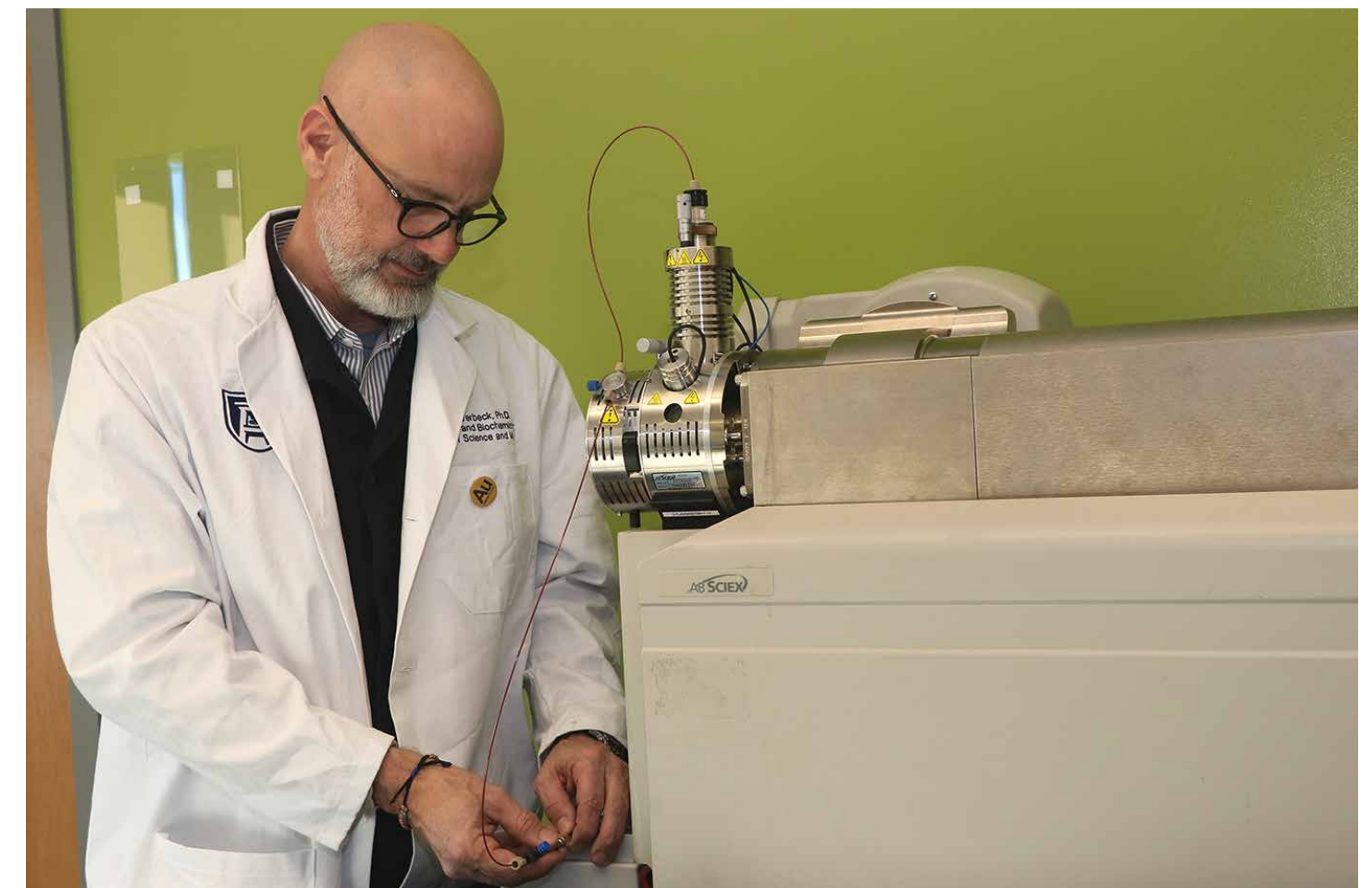
Wilbert Murillo, who worked as a graduate student in Verbeck’s lab, helped work on some of the inventions using mass spectrometry to

detect drugs in different settings. He now works at AU as a research associate in Verbeck’s lab and is excited about the possibilities the technology allows for.

“The work is cutting-edge,” Murillo said. “Seeing what I am doing every day being applied to a real-world challenge is incredible.”

Aside from his accomplishments in the field, Murillo also praises Dr. Verbeck for his passion for the field of mass spectrometry and his mentorship of the next generation of chemists.

“He’s very passionate about helping the new generation,” Murillo said. “I would not be in this position today if it was not for his guidance. Not only is his research groundbreaking, but also his passion for the students.



Department of Physics and Biophysics Celebrates its Inaugural Publication

“It is a satisfying feeling to have the scientific outcome of a collaborative initiative between Lawrence Berkeley National Lab and Augusta University Department of Physics and Biophysics to be published in the prestigious Nature family of journals.”



Dr. Trinanjan Datta authored the inaugural publication for the newly created Department of Physics and Biophysics in npj Quantum Materials.

Trinanjan Datta, PhD, a faculty member at the College of Science and Mathematics' Department and Biophysics, recently published in *npj Quantum Materials*, part of the Nature family of journals.

The article marks the inaugural publication of the department under its new name Physics and Biophysics. Physics faculty were originally part of the joint Department of Chemistry and Physics until the two disciplines branched into separate departments last June, and the publication is an important step for physics faculty to specialize their department further.

Datta's research in this article deals with the chirality—structures which whose images cannot be placed on top of each other, like left and right hands — of molecules and crystal structures and how it affects their magnetic properties.

Datta's recent research shows that an achiral — structures whose images can be placed symmetrically on top of one another — magnet can lead to steps in magnetization in response to a magnet field.

“Apart from applications in spin-electronics (spintronics) and computer memory devices due to the presence of magnetic skyrmions (twisted magnetic spin textures), the investigated magnetic phenomenon can provide additional technological applications such as in metrology and sensing devices,” Datta said.

The article was published as a collaboration between Lawrence Berkeley National Lab in California and Augusta University, and Datta was the lead theorist on the research.

“It is also great to share with the scientific community our new findings on the nature of novel future generation magnetic materials.”

Annual Math Contest Engages High School Students



Dr. Seth Oppenheimer, chair of the Department of Mathematics (right), and Lakeside High School's A Team, the winners of the 2024 Math Contest (left).

The College of Science and Mathematics annual high school math competition returned bigger and better in 2024. This year's competition featured 19 schools and a total of 131 participants.

“This contest is a way for talented students who enjoy the challenge, beauty, and fun of mathematics to get together to meet and compete,” Dr. Seth Oppenheimer, chair of the Department of Mathematics, said. “These student get to see some of what Augusta University has to offer and be recognized for their hard work and effort.”

The event was organized by Dr. Michael Otunuga and Dr. Atanaska Dobreva, both faculty members in the Department of Mathematics. The tournament serves as a showcase for AU as well as a chance for the local community to interface with the college. Faculty, staff, and students from the department all joined in to set up for the competition, and there are plans to expand the contest in the future.

“Nineteen schools came this year, eight more than last year, and we are hoping to have even more in the future,” said Dr. Dobreva.

“We are glad to serve as organizers of the Mathematics Contest, which is a major community engagement event for our department.”

Lakeside High School's A Team took home first place during the final round of Math Jeopardy, beating out three other teams to secure victory. They continue a winning streak started by the team from last year's event.

Faculty Awards and Accolades

Grants Funding 2023-2024

Biological Sciences

Dr. Karen Wiles

- “Creation of a Custom Interactive Histology Atlas and Workbook for Anatomy and Physiology I Lab,” 2023
- Board of Regents of the University System of Georgia

Dr. Jessica Hoffman

- “The Metabolomic Consequences of Small Size and Long Life in vivo,” 2023
- National Institute on Aging/ NIH/ DHHS

Dr. Paul Langridge

- “Developing a platform for engineering customizable cell-cell signaling in vivo,” 2023
- National Institute of Child Health & Human Development/ NIH/ DHHS

Dr. Jessica Reichmuth

- Augusta University’s - St. Catherine’s Island Research Program, 2023
- American Museum of Natural History

Dr. Maria Sabbatini

- “Characterizing the fibrogenic role of NADPH oxidase 1 in the transition from chronic pancreatitis to pancreatic cancer,” 2023
- National Cancer Institute/ NIH/ DHHS

Chemistry and Biochemistry

Dr. Shaobin Miao

- “Development of PDE5 Inhibitors for Localized Delivery to Prevent Colorectal Cancer,” 2023
- National Cancer Institute/ NIH/ DHHS

Dr. Angela Spencer

- “Promoting Opportunities and Pathways for Undergraduate Persistence in STEM (POPUPS),” 2023
- National Science Foundation

Mathematics

Dr. Atanaska Dobreva

- “Uncovering insights into vision loss and approaches to treatment via mathematical modeling and analysis,” 2023
- Occidental College

Dr. Jia He

- “Using Constructive Mathematics Pathways to Advance Preservice Elementary Teachers’ Learning, 2023”
- Boise State University

Dr. Anastasia Wilson

- “Collaborative Proposal: Advancing Chemical Separations Simulations: Computational Algorithms and Optimization with Implicit Adsorption Isotherms,” 2023
- National Science Foundation

Dr. He Yang

- 2022-23 CURM Mini-Grant
- Occidental College

Physics and Biophysics

Dr. Josefa Guerrero Milan

- “Effects of Surface Charge in Water-oil Interfaces,” 2023
- American Chemical Society

Dr. Joseph Hauger

- “Augusta University Partnership for Inclusive Innovation - Happy Hands Community Research Team (Lynsey Steinberg),” 2023
- Georgia Tech Research Institute
- Augusta Utilities Internship Program, 2023
- Augusta Utilities

Dr. Joseph Newton

- Workforce Opportunities in Regional Careers (WORC II)
- Savannah River Site Community Reuse Organization
- SRSCRO Workforce Opportunities in Regional Careers (WORC I) PROJECT, 2023
- Savannah River Site Community Reuse Organization

Dr. Trinanjan Datta

- “APS Student Research Program,” 2023-2024
- American Physical Society

Dr. Siva Panda Celebrates a Year of Awards

Each year, the faculty member with the most impressive combination of teaching excellence, research, and service contributions is recognized with the Outstanding Faculty Award, sponsored by the Augusta University Faculty Senate. The College of Science and Mathematics honored Dr. Siva Panda with this award in 2023.

Dr. Panda, an associate professor of chemistry at the CSM, was excited to be recognized for his efforts. "It's a great feeling," Dr. Panda said. "To be nominated and recognized by my peers and the whole college, it's a different feeling. It feels awesome."

This is not the only award he has received in 2023 for his work, either. In June 2023, he was awarded the Boundless Teaching Award, a biannual award created by the Augusta University Center for Instructional Excellence to recognize outstanding teachers every semester. Dr. Panda's teaches medicinal chemistry and biochemistry.

Dr. Panda's research has been recognized as well. His research awards for this year include a Research Scholarship & Creative Activity Grant, which helps cover research for the summer and provides students working in his lab with some financial aid. He also received a Summer Scholars Program Award from AU's Center for Undergraduate Research and Scholarship, which also provides students in his lab a stipend during the summer. In both instances, students benefit from engagement in



Dr. Siva Panda, Department of Chemistry and Biochemistry (above) and students in his lab (below).



research rather than taking a job off campus to support themselves.

Panda's lab focuses on designing new drugs. Impressively, in 2022 he authored or co-authored 17 publications. His most recent research involves modifying the structure of curcumin, a compound found in the spice turmeric, to create new drugs to treat breast cancer. He has filed a patent for that work, along with his collaborators Dr. Vinata Lokeshwar and Dr. Muthusamy Thangaraju.

He is collaborating with Dr. Lokeshwar's lab in the Georgia Cancer Center through a research grant provided by the U.S. Department of Defense for the new breast cancer drugs. That research has shown promising results, according to Dr. Panda.

According to Dr. Panda "The tumor size reduced after the drug was given orally to the animals."

Under Dr. Panda's mentorship, students in his lab have thrived, too. For the last seven years straight, students in his lab have received the College of Science and Mathematics Best Undergraduate Research Award, and more recently the college's Excellence in Graduate Research for the last two years.

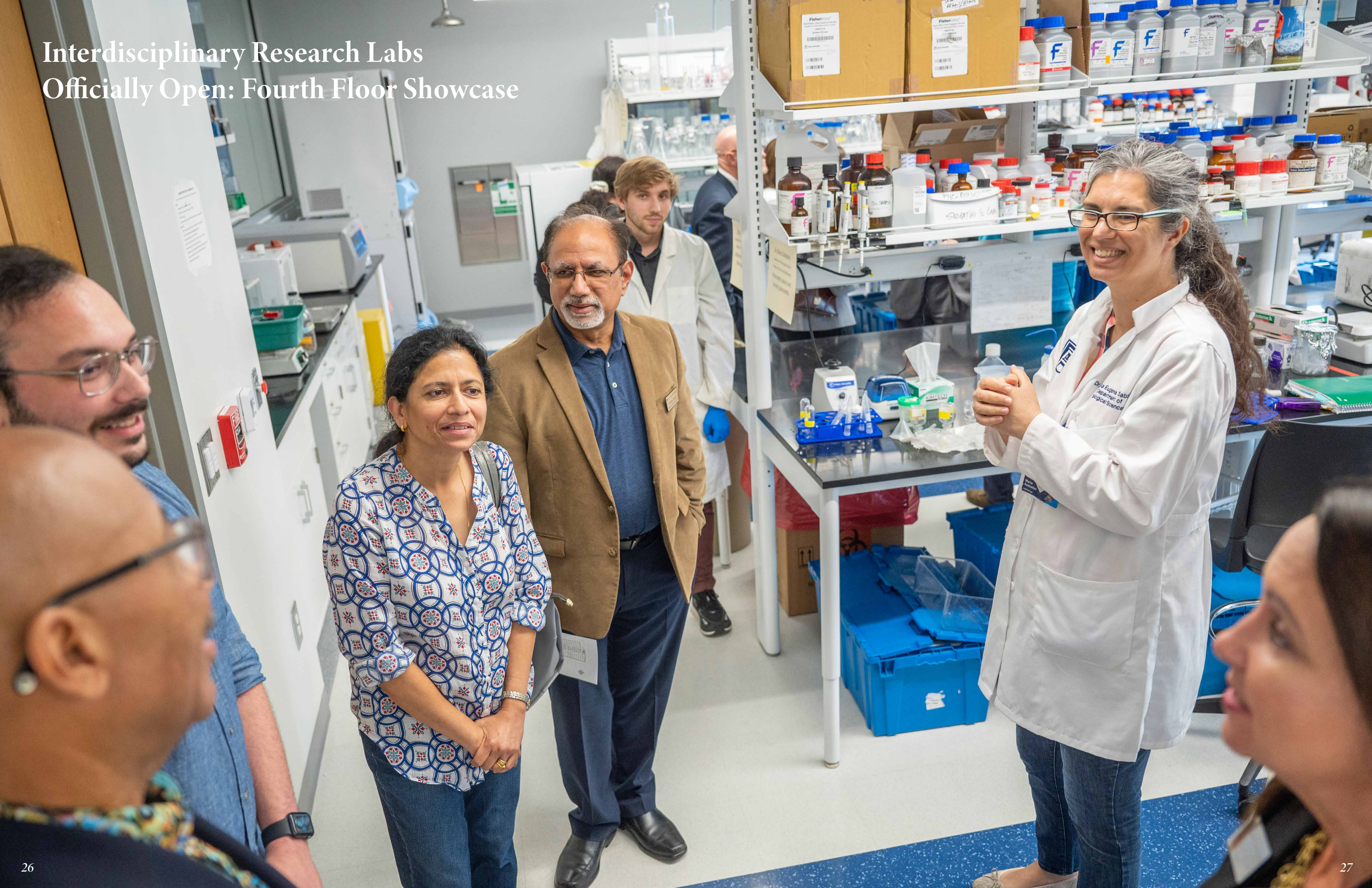
One of his master's students, David Hansen, published a book chapter in 2023 in *Advances in Green Chemistry*. Students often

continue to do research in Dr. Panda's lab over summer break, and he credits them with how far the lab has come.

"It's because of the hard work of the students," he said. "I can't do it without their motivation and encouragement. That is the driving force, and I feel privileged. I am here because of my students."



Interdisciplinary Research Labs Officially Open: Fourth Floor Showcase



In a step forward for research at Augusta University, new research laboratories have been added to the Science and Mathematics Building. Following a 16 month-long design and construction project, the fourth floor of the building now houses new labs that are open to researchers across the university.

The floor has many different kinds of research spaces and equipment, including four wet labs for areas such as molecular biology, chemistry, and neuroscience. There are also labs dedicated to mass spectrometry and nuclear magnetic resonance, as well as a computational research space with numerous desktop stations available.

The plan to dedicate the fourth floor of the building to research is in line with the move of the College of Science and Mathematics to the Health Sciences Campus to facilitate more interdisciplinary research. The creation of these laboratories is a fulfillment of the vision that Rickey Hicks, PhD, the founding dean of the College of Science and Mathematics, had when he first proposed moving the college.

Post-docs, graduate students, and undergrads will work alongside faculty in these labs. The Science and Mathematics Building is connected to the Interdisciplinary Research Building by a skybridge, practically and symbolically representing the connections between multiple disciplines. Students and faculty from both buildings can move easily between the two, allowing collaborators with complementary expertise to work together in shared spaces.

The ceremony for the fourth floor was followed by guided tours of the labs (right).



Nuclear Magnetic Resonance (NMR) instruments set up on the fourth floor (above).



Mass Spectrometers in a faculty lab (above).



Computational research spaces (above).

Meet Our Fourth Floor Research Faculty



Dr. Matteo Borgini

The Borgini lab focuses on Organic Chemistry, Medicinal Chemistry and Drug Discovery with an emphasis on developing new medicines for those diseases characterized by unmet medical needs including some types of cancers and neurodegenerative diseases. For most diseases that lack pharmacologic treatments, "undruggable" proteins (proteins with flat surfaces and undefined 3D structures, lacking distinct ligand-binding pockets) are key players in the pathologic mechanisms. Our group uses novel medicinal chemistry approaches, including protein-protein interaction inhibitors as well as covalent inhibitors, to modulate "undruggable" targets (e.g., KEAP1, Nrf2, KRAS, etc.), and identify new therapeutic agents.



Dr. Jennifer Bradford

The Bradford lab investigates nuclear factor-kappaB (NF- κ B) signaling in various aspects of biological and biomedical research, from innate immune system responses to the role of the pathway in the tumor microenvironment. The lab uses a novel knockout model to study NF- κ B signaling specifically in bone marrow-derived macrophages. A major focus is the study of how NF- κ B signaling in tumor-associated macrophages (TAMs) promotes cancer. The lab is currently investigating the relationship between TAM NF- κ B signaling and triple negative breast cancer, but has also previously studied this interaction in glioblastoma (adult brain cancer) with collaborators at the Georgia Cancer Center. Dr. Bradford has prioritized mentorship of student researchers in all aspects of her work.



Dr. Mustafa Culha

The Culha lab investigates implementation of the nanotechnology concept for the solution of challenging problems in medicine and biotechnology, fields now known, respectively, as emerging nanomedicine and nanobiotechnology. The synthesis, chemical modifications, and assembly of nanomaterials for cancer treatment, toxicity of nanomaterials, cancer detection and diagnosis from body fluids using surface-enhanced Raman scattering (SERS), and DNA nanotechnology to construct novel drug carriers are the ongoing research efforts in his research group.



Dr. Trinanjan Datta

The Datta research group specializes in frustrated magnetic materials and strongly correlated electronic systems. Theoretical and computational tools are used to investigate magnetic and electronic properties of technologically relevant novel compounds that assist in the development of data storage devices, green technology, and quantum information science and to study time-dependent non-equilibrium behavior of magnetic systems. Spectroscopic signatures from RIXS, Raman, INS, and spin transport techniques are investigated for bulk and thin film materials which are relevant for information manipulation in technological devices.



Dr. Theja DeSilva

The DeSilva group uses theoretical and computational methods to gain an understanding of physics on the scale of single electrons/atoms/molecules. Strongly correlated and collective quantum mechanical phenomena in many-particle systems at this scale have promising potential technological applications, especially for electronic materials, ultra-cold atoms and biological cells.



Dr. Evan Goldstein

Brain damage induced by premature birth is the leading cause of neurodevelopmental disabilities. The Goldstein lab investigates the pathogenesis and repair of diffuse white matter injury – the most common neuropathological outcome of premature birth. Clinical studies demonstrate that environmental factors can benefit recovery from white matter injury; however, specific mechanisms that drive progression and recovery are not well understood. Our previous work found that recovery in an enriched environment ameliorates developmental brain injury and promotes functional recovery. Current focus is to identify how environmental stimuli direct cell and molecular changes in the brain, especially the role of histone modifications in white matter injury, with a goal of developing improved therapeutic options for preterm infants.



Dr. Sara Guediche

The Guediche lab employs behavioral and functional magnetic resonance neuroimaging (fMRI) methods to study the neural systems that support spoken language processing. The mechanisms that enable flexibility and plasticity in mapping sensory input onto meaningful information are of particular interest. Research questions are motivated by an interdisciplinary approach that applies neuroscientific principles to the intersection of cognitive science, experimental psychology, and speech, language and hearing research.



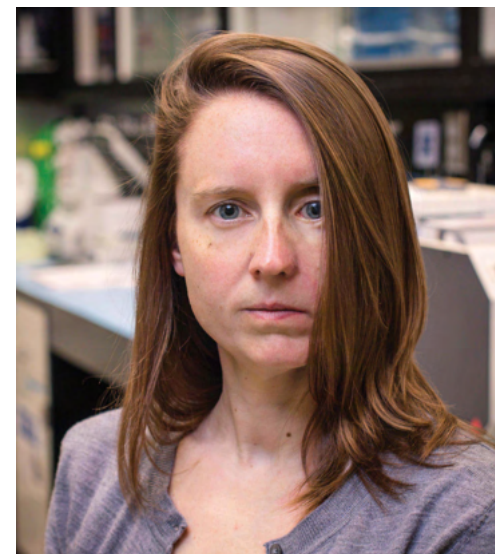
Dr. Josepha Guerrero-Milan

Controlled generation of micron and sub-micron sized drops continues to be of interest for the scientific community due to the variety of applications of emulsions in fields like cosmetics, food industry, and drug delivery. The Guerrero-Milan lab focuses on microfluidics to offer a route to fabricate these systems. By flowing two immiscible liquids into a microfluidic device, emulsion drops with a minimum size of the order of the tip size can be made. Adding an external electric field, similarly to what it is done in classical electrospray, allows the generation of droplets with sizes below the smallest geometrical characteristic of the device. Regimes such as whipping, with applications to fiber generation, can also be studied.



Dr. Paul Langridge

The Langridge group studies how cells communicate with one another, specifically a form of communication involving a cell surface receptor called Notch that is activated by a signal tethered to the surface of a neighboring cell. This physical link between cells has fascinating mechanical properties which we are investigating to help develop synthetic cell-cell communication pathways that may one day be used in regenerative medicine and tissue engineering. The approach uses cutting edge *Drosophila* genetics combined with molecular biology techniques, fluorescent confocal microscopy, and computational modeling.



Dr. Jessica Hoffman

The Hoffman lab is interested in understanding the genetic, metabolic, and environmental factors that influence aging and longevity across species. We predominately work with the fruit fly, *Drosophila melanogaster*, to uncover novel genes and individual metabolites that can increase lifespan when manipulated, and specifically look at modulation of tryptophan metabolism on health and longevity. In addition to fly work, we collaborate with Dr. Shruti Sharma in Genomic Medicine to study inflammation and aging in mice and participate in the nationwide Dog Aging Project, looking at metabolic and epidemiological factors associated with age and health in companion dogs.



Dr. Shogo Mori

Natural products, organic molecules synthesized by enzymes in nature, are a primary source of medications. The Mori group focuses on understanding the biosynthetic enzymes of natural products for two purposes: (1) engineering enzymes to produce biologically valuable “unnatural” natural products and (2) engineering microorganisms to produce compounds that can be used as novel scaffolds for the development of synthetic drugs. These approaches may lead to the discovery of new medications.



Dr. Siva Panda

In the Medicinal Chemistry and Natural Products laboratory of Dr. Panda, the focus is developing potential drug candidates (small molecules) using a rational drug design approach and molecular hybridization. The research combines various disciplines to achieve innovative and impactful discoveries. The blend of analytical, computational, medicinal, and organic chemistry approaches provides unique perspectives on problem-solving in conditions such as Alzheimer's disease, cancer, infections, and inflammation.



Dr. Abdul Malmi Kakkada

Biological systems such as cells and tissues generate, sense and respond to physical forces. How biological systems adapt to physical forces critically determines processes such as embryo development and tumor growth. The Malmi Kakkada group uses computational and theoretical methods grounded in physics to understand collective cell behaviors such as migration and proliferation in biological systems.



Dr. Maria-Eugenia Sabbatini

The Sabbatini group focuses on studying pancreatic disorders, including pancreatic cancer and chronic pancreatitis. Currently, the lab investigates the extent to which and the mechanism by which reactive-oxygen-species-generating enzymes participate in the transition from chronic pancreatitis to pancreatic cancer.



Dr. Guido Verbeck

The Verbeck lab harnesses mass spectrometry for a variety of applications. Monitoring changes in breath chemistry can detect biomarkers for infectious diseases with applications towards COVID-19, malaria, and tuberculosis. The lab produces devices that detect these markers, and they are now being tested in other areas as well such as cancer, metabolic diseases, and other respiratory infections. Other applications for the technology developed in the lab include detection of illegal drugs.



Dr. Olusegun Michael Otunuga

Dr. Otunuga mentors both undergraduate and graduate students in mathematical biology and data analysis. Current undergraduate capstone projects include analyzing the effects of CAR-T therapy and Inhibition of TGF-Beta treatments on the volume of tumor and cancer stem cells. Graduate projects include studying the effects of noise perturbations on the stochastic dynamics of Predator-Prey populations.

Congratulations on Promotion and Award of Tenure!

2023

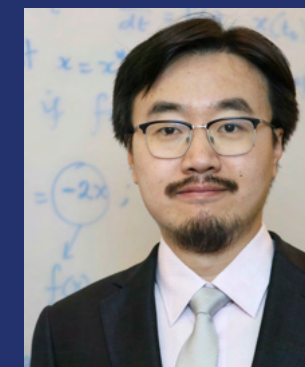


Dr. Joseph Newton
Physics and Biophysics
Awarded Tenure
Promoted to Associate Professor

2024



Dr. Jia He, Mathematics
Mathematics
Awarded Tenure
Promoted to Associate Professor



Dr. He Yang
Mathematics
Awarded Tenure
Promoted to Associate Professor



Dr. Maria-Eugenia Sabbatini
Biological Sciences
Promoted to Professor



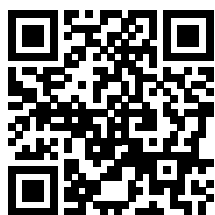
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