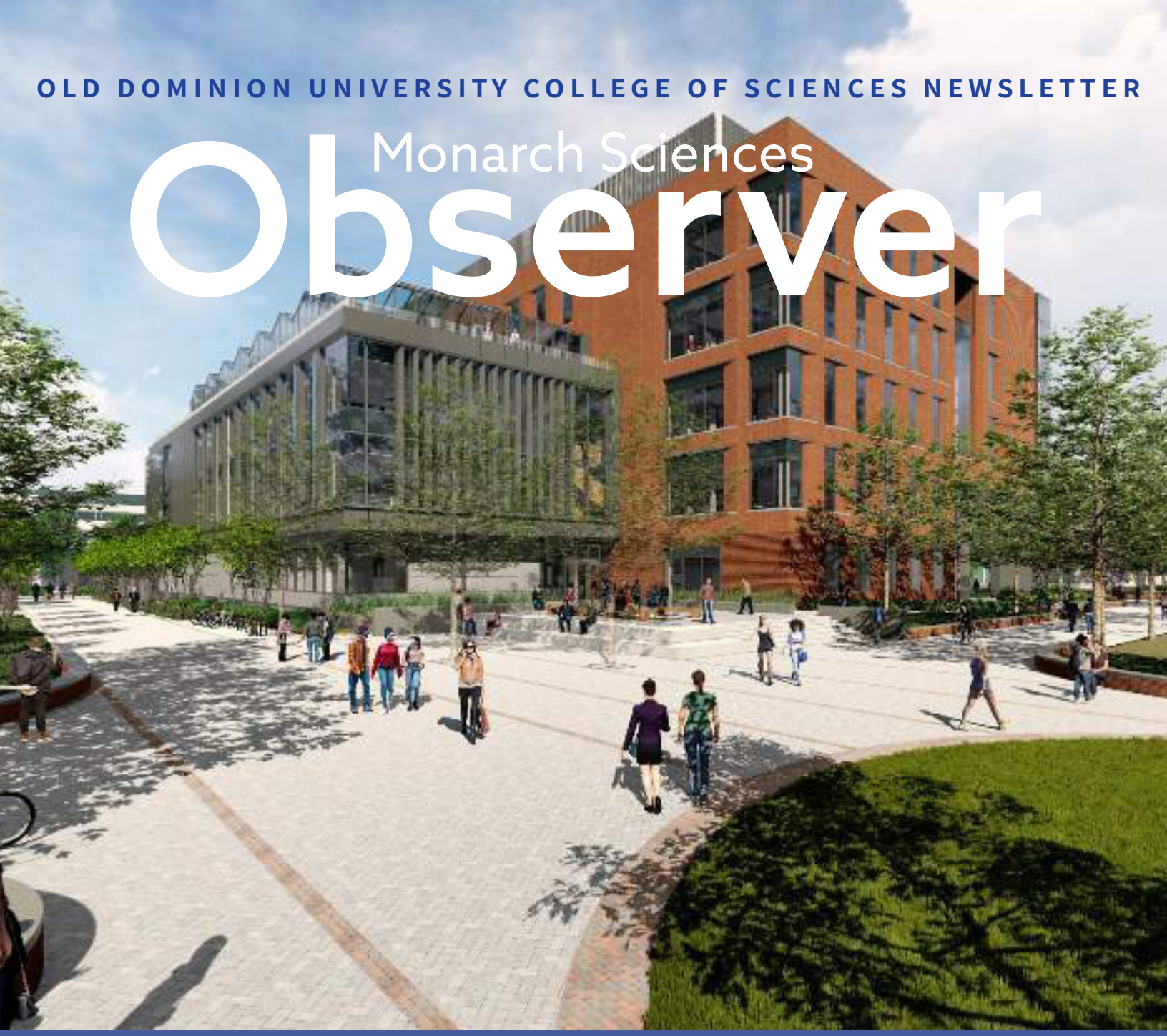
OLD DOMINION UNIVERSITY COLLEGE OF SCIENCES NEWSLETTER

Monarch Sciences Observer



FALL 2024, VOLUME 20

BUILDING OUR REPUTATION IN STEM

Read about students, faculty and alumni who are having an impact through research.

MATH STUDENTS COLLABORATE WITH ODU BASEBALL TEAM

STUDENT AND FACULTY PROFILES

REIGN IN SCIENCE DAY SERVES HAMPTON ROADS COMMUNITY

OLD DOMINION UNIVERSITY
College *of* Sciences

A MESSAGE FROM DEAN DODGE

It is an exciting time at Old Dominion University. The Eastern Virginia Medical School (EVMS) has now been integrated into ODU, creating the largest health sciences center in Virginia. The Macon and Joan Brock Virginia Health Sciences includes the Medical School, the Ellmer School of Nursing, the Joint School of Public Health (a partnership with Norfolk State University), the EVMS School of Health Professions, and the Ellmer College of Health Sciences. The integration allows ODU to solidify its standing in the top tier of research universities (Carnegie R1 designation) and supports increased faculty collaboration, especially in health sciences and biomedical sciences.

Focusing on the College of Sciences, we look forward to breaking ground on our new Biology Building in the coming months. This new building will provide outstanding teaching and research spaces for faculty and students (see page 8). We continue to emphasize the importance of research and other practical experiences for our undergraduate students - the facilities in the new building will enable more students to benefit from these opportunities.

In the pages that follow, we bring to you a few examples of the many accomplishments of our undergraduate and graduate students, as well as the research of our faculty. We have hired excellent new faculty in the past year, including nine that will bring new research capabilities to our college.

Please read about alumnus Mark Thiemens (MS '74), who was inducted into the Fellowship of the Royal Society as a "foreign member," and alumnus Tony Patillo (BS '96), who uses his technical expertise to ensure the security of intelligence data.

I'd like to close with an appeal to our alumni and friends of the College of Sciences. Please consider ODU as part of your year-end giving. There are many ways for you to have a lasting impact on our students, changing the trajectory of their lives by providing new opportunities. Supporting junior faculty is another way to affect ODU's reputation and research success. We'd like to connect with you to find a meaningful way that you can contribute to the success of our students and programs. You can create your own endowment or contribute to an existing fund in the College of Sciences. Below are a few giving options for your consideration.

- Create a new graduate or undergraduate endowed scholarship (or add to an existing award so that it impacts more students).
- Name a room in the Chemistry Building or the new Biological Sciences Building.
- Create a merit-based undergraduate award.
- Create an endowed fellowship for a junior faculty member, so they can establish their research program more quickly.
- Provide funds to support new teaching innovations.
- Make a gift to an existing departmental fund, which provides educational enhancements and support of the highest priorities in the department.

I would love to talk with you about your interests and priorities in supporting our mission. Please reach out to me **(gdodge@odu.edu)** or to our Development Officer, Krista Egekeze **(kkimme@odu.edu)** to discuss your philanthropic ideas. Together we can propel our students forward to a successful and rewarding career.

Go Monarchs!
Gail Dodge

PRIME RESEARCH BETWEEN MATH MAJORS & ODU'S BASEBALL TEAM

By Tiffany Whitfield

In an effort to expand undergraduate research initiatives at ODU, a new type of collaboration between mathematicians and athletes has been forged. Current math undergraduate students in MATH 494 (Entrepreneurship in Mathematics) are working alongside ODU's baseball players in a uniquely designed course to build a pipeline with data and America's oldest sport at the epicenter.

For the fall 2024 semester, Mathematics and Statistics Master Lecturer and Chief Departmental Advisor Robert "Bob" Strozak and Senior Lecturer Katie Rafferty have teamed up with ODU's baseball pitching coach Mike Marron to create a new collaborative undergraduate research course. The course offers students an opportunity to apply their knowledge of mathematics and analytical skills to the development of a new product, business, nonprofit program or other initiative, in this case helping Monarch baseball players develop and grow through data.

"This is the brainchild of Nick Murray who was our director of player development for two years," said Marron. "He actually got a job with the Boston Red Sox as the rehab pitching coordinator." Prior to his career move to Major League Baseball, Murray met with Strozak to get the ball rolling on working with the math department to provide data analytics for ODU's baseball team.

In this 400-level course, mathematics and statistics students are learning baseball in real time and how to apply their knowledge to data analytics. "The students are learning the fundamentals of baseball statistics and analyses, and how to present their results using the R programming language," said Strozak. Velocity, runners on base, number of pitches inside of the strike zone and more can all be calculated mathematically. Mathematical terms like XYZ coordinates and XYZ axis can be directly applied to Trackman© system which is an app to help track each pitch and how its data are used to support baseball analytics.

"Over the last five to 10 years there's a ton of information that's out there that have always been in existence, but we are finally starting to have some technology that allows us to objectively measure it and use it," said Marron. Statistics and analytics have always existed since the beginning of the game from batting average to earned run average, but recently the amount of data and analytical tools available has increased dramatically.

"Seeing and using data to help ODU baseball players has been really valuable and beneficial from a development standpoint," said Marron. Also, Marron posed these questions to the mathematicians in the course, "What can we use that's out there informationally to help our guys learn the game better, or learn who they are as baseball players, and what can we do to get them in a better path from a development standpoint?"

The collaborative work in having math majors drill down into the data analytics of each individual ODU baseball player will create innovation and problem-solving skills. "The course will prepare the students to work for ODU's baseball team (should they choose to) in the Spring," said Strozak. "The team will visit the class periodically, and we will visit the baseball field on occasion." All students in the class will create ePortfolios containing their class projects, and these ePortfolios will be viewed by ODU's baseball team. "Hopefully, the ePortfolios can be used outside of the university as students pursue employment opportunities," said Strozak.

"There are business opportunities out in the game, in professional sports, that never existed before to this level," said Marron. "From an analytics viewpoint, there's a ton of opportunities that we get to explore through this course." For each student, the final project of the course will be a set of reports requested by the baseball team. After completion of MATH 494, the students will be prepared to become members of ODU's baseball data analytics team (if they choose to) and can start working with the baseball team the following Spring.

"There are business opportunities in professional sports that never existed before."

UNDERGRADUATE STUDENTS SEIZE OPPORTUNITIES

Josh Wager, a third-year physics undergraduate student, is pursuing research in the field of atomic physics. Wager and Physics Assistant Professor Matt Grau are working on ion traps. This summer, he did research at the U.S. Naval Research Laboratory, "where I expanded my knowledge of physics and acquired new practical skills essential for atomic physics research including beam walking, fiber coupling, laser evaluation, real-time computation, and vacuum-systems troubleshooting." He worked on two projects: developing a Rubidium based modulation transfer spectroscopy setup for laser frequency stabilization in quantum sensors and creating a real-time phase estimation system for an atomic matter-wave interferometer used in inertial sensing.

Jocelyne Dempsey, an Arlington, Virginia native, has become the first-ever Old Dominion University student to participate in the Virginia Tech Carilion Early Identification Program (VTCSOM EIP). As a biochemistry major, she has plans to become an obstetrician-gynecologist (OBGYN). She welcomes the challenge of pursuing biochemistry at ODU because of her passion for both biological sciences and chemistry. During the summer of 2024, she spent ten "intensive yet rewarding" weeks participating in VTCSOM EIP which was an "immensely enriching and exciting experience," according to Dempsey. She conducted hypothesis-driven research at the Fralin Biomedical Research Institute in Roanoke, VA.

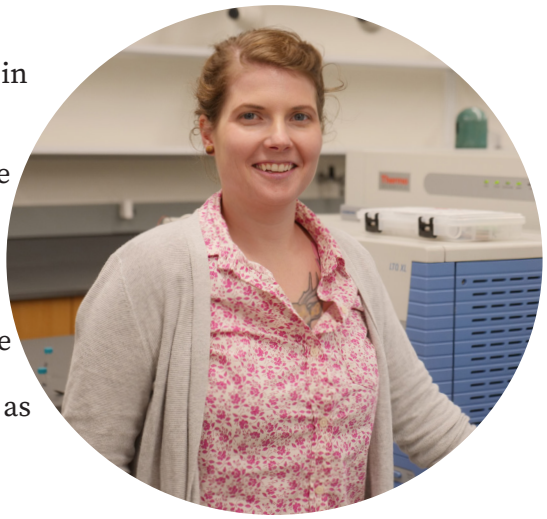
Michael Evans a, fourth-year Department of Computer Science student, is intrigued by research. "My interest in computer science stemmed from an interest in problem solving," said Evans. "Similar to mathematics, or physics, or engineering, computer science is a powerful method for answering complex questions." The summer after he graduated from TCC with an Associate's Degree he began conducting research as part of an NSF-funded Research Experience for Undergraduate (REU) project at ODU. "Our research investigated the use of large language models (LLMs) on the task of scientific claim verification," said Evans. "In our experiments, we aimed to determine if the GPT-3.5-turbo model could apply reasoning to discern real news claims from fake claims when provided with a published research paper on the topic of the news."

Hafsah Sarfraz is a junior majoring in Biomedical Sciences with a Pre-health concentration and a minor in Chemistry. Originally from Pakistan, she came to the United States six years ago. Sarfraz chose Biomedical Sciences because it aligns with the prerequisites for medical school. "During winter break of my sophomore year in high school, I was in a tragic accident that changed my life," said Sarfraz. The compassionate care she and her mother received led her to want to become a doctor. Over this past summer she helped Assistant Professor Kyle Lambert with his preparatory forensic lab class. "I gained valuable hands-on experience of Blood Alcohol lab, Fiber Analysis, and Soil Analysis," said Sarfraz. "I like doing research because I like seeing the synthesis of drugs/medicine."

STELLAR GRADUATE STUDENTS SETTING THE BAR HIGH

Biological Sciences graduate student Kori Carr was awarded the 2024 National Science Foundation (NSF) Graduate Research Fellowship. The grant totals $159,000, which will support her financially through her graduate degree, giving her the stability to pursue her passion of wetland plant ecology. As a first-year master's student, Carr is setting the bar high. Grant funding begins in the fall of 2024 and will last until the fall of 2027. In addition to research on wetlands impacted by habitat degradation and destruction, she will use the grant to work with and inform K-12 students in the Hampton Roads area about the importance of local wetlands within our communities and protecting wildlife and biodiversity.

Emily Junkin is a doctoral candidate in the Virginia Consortium Program in Clinical Psychology, a unique training program comprised of the Departments of Psychology at Old Dominion University and Norfolk State University. She proudly began her doctoral studies in 2019 under the mentorship of ODU Professor Cathy Lau-Barraco, who established the Behavioral Alcohol and Related Studies Laboratory. Most recently, Junkin completed data collection for her dissertation study, Project Task, which is notable for being ODU's first alcohol administration study. This novel project explores the phenomenon of impaired control over alcohol use. Now in the last year of her doctoral training, Junkin is completing a full-time, pre-doctoral internship at the University of Delaware's Center for Counseling and Student Development.



Shannon Stephens, a Chemistry doctoral candidate, began her studies at ODU in 2020 as a post-baccalaureate. She joined the U.S. Navy as a nuclear machinist's mate in 2013, and while serving on an aircraft carrier, she worked toward a bachelor's degree in mathematics. "Having fallen in love with Chemistry in the Navy, I wanted to pursue a Ph.D. in Chemistry after my service was complete," said Stephens. Her area of scientific research combines mathematics and chemistry as a computational chemist. Computational chemistry allows her to predict chemical reaction outcomes using high performance computing and machine learning. "The skills I'm learning at ODU will allow me to join the workforce in designing new pharmaceuticals," said Stephens. "ODU is an up-and-coming university that allows students of diverse backgrounds to develop as professional chemists."

This summer, Shania Sanderson an Ecological Sciences doctoral student who previously earned a M.S. in applied mathematics, took part in a plethora of opportunities. As part of ODU's Tick Team under Biological Sciences Chair and Professor Holly Gaff, she worked on a collaborative project with NASA Langley AFB. Also, she validated the results of a research project focused on simulation of the interactions between *Dermacentor variabilis*, the pathogen *Rickettsia rickettsii*, and two different host types in ticks. Also, she attended a workshop in Washington, D.C., to learn about time-series analysis methods for her future research.

ODU ALUM INDUCTED INTO ENGLAND'S NATIONAL ACADEMY OF SCIENCES

By Tiffany Whitfield

Mark Thiemens (M.S. '74) was inducted into the Fellowship of the Royal Society – the United Kingdom's national academy of sciences on July 11 in London. He was one of 21 new foreign members elected to the 364-year-old society whose past inductees include Isaac Newton, Ernest Rutherford, Albert Einstein, Charles Darwin and Stephen Hawking.

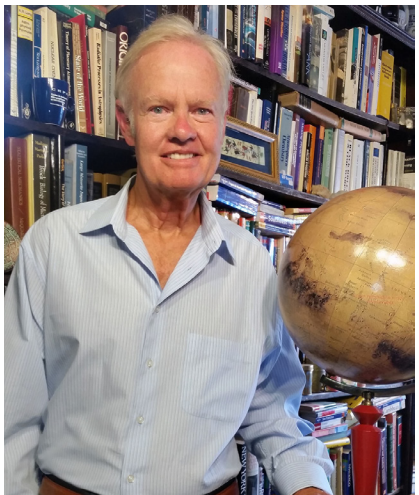
Thiemens studied oceanography at Old Dominion University and is now a Distinguished Professor of Chemistry and Biochemistry at the University of California San Diego (UCSD). "I want to make the point that ODU played a real role in this process," he said.

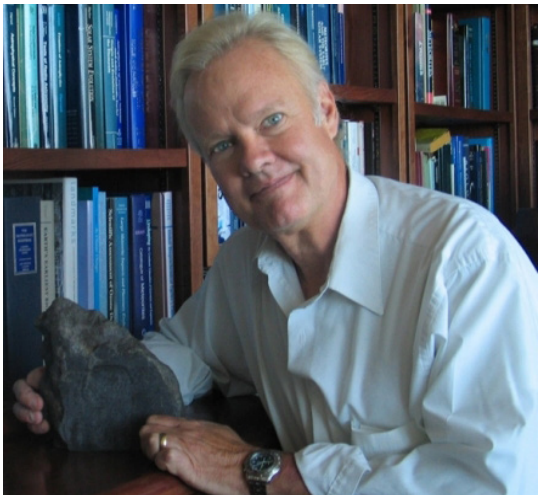
Already a notable scientist and member of the U.S. National Academy of Sciences, the American Academy of Arts and Sciences and numerous National Resource Council boards, Thiemens's induction signifies his invaluable contributions to science with worldwide implications. This year, he joins former Chief Medical Advisor to the U.S. President, Professor Anthony Fauci; Nobel laureate Professor Emmanuelle Charpentier and more than 90 scientists worldwide as international members of the Royal Society. The new inductees come from various disciplines including academia, medicine, engineering, science, industry and society at-large. During the three-day ceremony, Thiemens added his name to the society's official record book. The Fellowship of the Royal Society is the oldest scientific academy in continuous existence.

Sir Adrian Smith, president of the Royal Society, said, "I am pleased to welcome such an outstanding group into the Fellowship of the Royal Society. This new cohort has already made significant contributions to our understanding of the world around us and continue to push the boundaries of possibility in academic research and industry. From visualizing the sharp rise in global temperatures since the industrial revolution to leading the response to the Covid-19 pandemic, their diverse range of expertise is furthering human understanding and helping to address some of our greatest challenges. It is an honor to have them join the Fellowship."

Thiemens is best known for his discovery of the mass-independent isotope effect, which has improved scientific understanding in areas as diverse as the origin of the solar system and the accumulation of greenhouse gasses. His work helped develop the first means by which the origin of life may be quantified from the earliest rocks around 3.8 billion to 2.2 billion years ago. This work led to his selection as the 1998 Ernest O. Lawrence Medal winner, the most prestigious award given to scientists by the U.S. Department of Energy.

As a professor, Thiemens explains how he uses his enthusiasm for science to inspire his students to figure out the unanswered questions of the scientific world. "We've had astronomy for 600 years, and we don't even know what 80% of the universe is made from. How's that for a big problem?" he said. "We can't balance the carbon cycle on Earth, even though people have been studying it for 60 years. I tell my students. 'Here's some big stuff for you to work on,' and that way, it makes it more interesting."





ODU COMPUTER SCIENCE ALUMNUS EXCELS AS DATA EXPERT

By Tiffany Whitfield

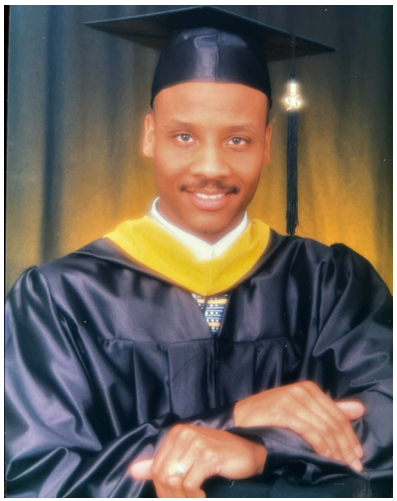
ODU Computer Science alumnus Tony Patillo (B.S. ’96) extrapolates data to keep the companies he’s worked for over the last three decades safe from hacks, cybersecurity breaches and more. As a first-generation student who also worked a full-time job while attending ODU, he knows the value of perseverance. Patillo credits ODU for his success as a computer science professional because of the foundational skills he obtained to help launch and sustain his career as a data expert.

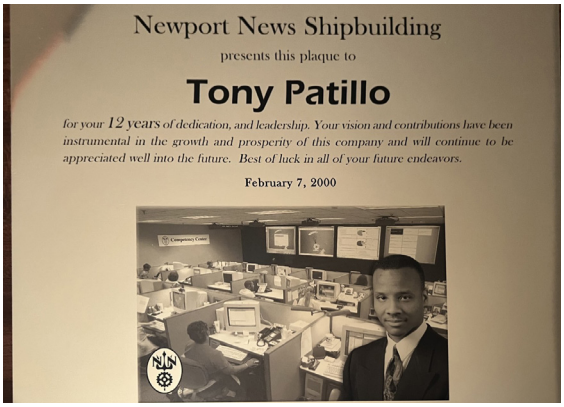
He was recently promoted to the position of Senior Director of Engineering for Peraton, a private U.S. national security and technology company. “We build, we integrate and we orchestrate technological capabilities in areas such as outer space, cybersecurity, national defense, homeland security and citizen security, health systems and U.S. intelligence,” said Patillo. Peraton operates in the intelligence sector to support many of the 17 agencies that do intelligence work for the United States including the big five agencies. “The operating unit that I’m responsible for has as its primary customer the Defense Intelligence Agency (DIA),” said Patillo. “The bulk of what we do is classified but I can assure you that everyday our teams do tremendous work, and they make very significant contributions to national security.”

Striving to be a leader in his organization took time, but Patillo has worked for several big companies in Virginia advancing their information technological infrastructure. Prior to his current position at Peraton, Patillo worked at Northrop Grumman Corporation, and while he was an undergraduate at ODU in the late 1990’s, he worked full-time at Newport News Shipbuilding. Because of his wealth of knowledge, Patillo understands what is important for the various companies he’s worked for – data.

“I always view data as the star that all of the other planets revolve around,” said Patillo. He believes it’s important to safeguard data when cybercriminals and hackers are out there trying to infiltrate resources. “They’re not trying to get to your systems, they’re not trying to get to your software or infrastructure, but they are trying to get to your data,” said Patillo. “It’s important that as computer science engineers, when we architect, and we design and build and when we integrate we always do that with a mindset for data.”

Since data is the guiding light in protecting and safeguarding information technology capabilities of companies, Patillo also knows trends in the field. “We’ve seen that over the years; how the introduction of cell phones led to the demise of long-distance services, and we’re seeing it now with artificial intelligence, machine learning, ChatGPT and what those services mean to the future of how we interact, how we legislate, how we defend, protect, and quite frankly how we would even maintain order in a free society.” He has a call to action for current and future Monarchs. “We need responsible people with vision to help us grow and evolve over time, and that’s a call to all those Old Dominion University computer science students out there; the world needs you,” said Patillo.




Newport News Shipbuilding

presents this plaque to

Tony Patillo

for your 12 years of dedication, and leadership. Your vision and contributions have been instrumental in the growth and prosperity of this company and will continue to be appreciated well into the future. Best of luck in all of your future endeavors.

February 7, 2000

NEW BIOLOGICAL SCIENCES BUILDING BREAKING GROUND SOON

By Tiffany Whitfield

The new Biological Sciences building will be located in the heart of campus, nestled in the science quad adjacent to the Mills Godwin building, the Webb Center and the Oceanography and Physical Sciences building. Contractors will demolish the Alfriend Chemistry Building, the Pretlow Planetarium, and the Arthur and Phyllis Kaplan Orchid Conservatory to build the new five-story facility that will house the Department of Biological Sciences, the new Arthur and Phyllis Kaplan Orchid Conservatory, and state-of-the-art classrooms, teaching labs, research labs and the College of Sciences Dean's Office Suite. With this transformative building, ODU students, faculty, and those in the community will be able to experience science on an immersive level.

"The new Biological Sciences building will exemplify the outstanding educational and research opportunities available to the ODU community," said Gail Dodge, dean of College of Sciences. "We look forward to increased collaborative research with the faculty and students in the Macon and Joan Brock Virginia Health Sciences Center, enabled by the flexible space in this building."

The design takes advantage of north light by positioning the research labs on the north with full glass exposure. The student commons opens to the west taking advantage of the lush pond environment with a multi-story glass volume. There will be modern classrooms and teaching laboratories including a 120-seat active learning lecture hall.

"I am thrilled to share with you the exciting news that we are about to start the process of building a new Biological Sciences building," said Holly Gaff, chair and professor of Bioligical Sciences. "The new facility has been designed with the needs of our students, faculty, and staff in mind."

There are many ways that you can help multiply the impact of this beautiful new facility through philanthropy. Your gift would allow us to provide engaging learning experiences, including opportunities for hands-on training and research with faculty. Please contact Krista Egekeze at **kkimme@odu.edu** for information on how you can make an impact at ODU. Explore opportunities to name a space in the new Biological Sciences building and further advance our mission to provide exceptional opportunities for all ODU students. To stay up to date on progess of the building or to learn more **visit us at the website by scanning the QR code.**

MEET NEW TENURE-TRACK FACULTY READY TO PROPEL MONARCHS

Associate Professor Isaura Simoes

Research: Rickettsia-host interactions and proteolysis in infections

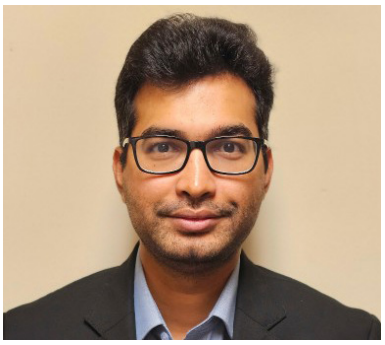
Research: Ecology and conservation of filter-feeding fishes and whales

Assistant Professor Shirel Kahane-Rapport

Assistant Professor Yuting Zhu

Research: Analytical chemistry & photo-chemistry of chemical species remote sensing

Research: Biological network, biophysical model-ing, and biological data analysis



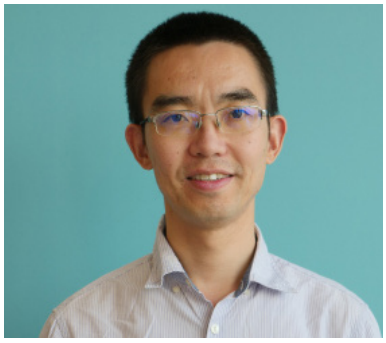
Assistant Professor Pratip Rana

Assistant Professor Dushan Wadduwage

Research: Biomedical optics, machine learning, and electronic engineering

Research: A.I., machine learning, computa-tional biology and genomics and data science

Associate Professor Hong Qin



Assistant Professor Xuping Xie

Assistant Professor Arkaitz Rodas Bilbao

Assistant Professor Alex Gnech

Research: Computational and applied mathematics

Research: Hadron spectroscopy using Lattice QCD and other computational techniques

Research: Structure and reactions of light atomic nuclei

FEATURED FACULTY DRIVING INNOVATION IN SCIENCE RESEARCH

ODU Associate Professor Cassie Glenn is conducting significant research to improve mental health for young people in the Hampton Roads area and beyond. Her work delves into a very sensitive subject because it relates to suicide prevention among youth. Through her suicide prevention research, Glenn and a team of scientists at ODU in Norfolk and across the country are searching for answers and ways to combat this issue to save lives. “Our research broadly is interested in understanding factors that lead young people to have thoughts or engage in behaviors related to harming themselves to better understand how those types of thoughts develop, how they might escalate and how we can best support them to reduce risk and improve their well-being for them and for their families,” said Glenn.

During the summer of 2024, ODU Ocean & Earth Sciences (OES) Assistant Professor Joseph Tamborski led collaborative work in Cape Cod, Massachusetts. The team investigated the “blue carbon” sink of coastal wetlands. Blue carbon ecosystems such as salt marshes remove carbon dioxide from the atmosphere, so these sensitive coastal habitats play an important role in combatting climate change. This project is in collaboration with scientists from the U.S. Geological Survey Woods Hole Coastal and Marine Science Center and from the Woods Hole Oceanographic Institution. “Our research broadly impacts carbon crediting,” said Tamborski. “If successful, this work would greatly increase the inventoried value of tidal wetlands and justify future ecosystem conservation and restoration.”

Researchers from ODU’s Department of Biological Sciences collaborated with researchers in Japan during the summer of 2024 as part of a Japanese Society for the Promotion of Science research exchange. ODU Associate Professor Dan Barshis along with several graduate students and a postdoctoral associate worked with scientists at the University of the Ryukyus in Okinawa, Japan. Their research focused on examining the temperature tolerance of corals in Okinawa to assess their health and to compare them to other corals around the Pacific. “Our research focused on testing the upper temperature tolerance limits of reef building corals in Okinawa and comparing the limits of common shallow species to those of common species that live deeper on the reef (up to 150 ft deep),” said Barshis.

Curiosity is the engine that drives research amongst faculty in the College of Sciences, and uncovering new ways to fight one of the world’s most antibiotic-resistant pathogens is what drives Associate Professor Erin Purcell. At Old Dominion University, Purcell’s area of research focuses on signal transduction pathways in *Clostridoides difficile (C. difficile)* which is a human pathogen that causes damage to the colon and can be fatal. The focus of her research looks at how the pathogen survives in the body under various conditions and creates new ways to combat the pathogen. “I’m interested ultimately in designing new antibiotics and antibacterial treatments,” said Purcell.

REIGN IN SCIENCE GROWS TO MEET COMMUNITY STEM NEEDS

By Tiffany Whitfield

More than 500 students in grades K-12 along with their parents took part in the fourth annual Reign in Science Day at ODU on Sat., Sept. 28. ODU undergraduate and graduate students along with community partners helped the next generation of scientists discover Monarch science. The event was free, and students came from as far as Richmond and Yorktown as well as from all seven cities in the Hampton Roads region.

Students participated in a wide array of hands-on S.T.E.M.-related activities that were lined up outside between the Chemistry Building and the Oceanography and Physical Sciences building.

ODU Chemistry Assistant Professor Trandon Bender, one of the co-organizers of the Reign in Science Day, said, "The big idea was to take our graduate student population at ODU (this includes all of the departments of science) and show that we're doing a lot of really exciting research at ODU. The community around maybe doesn't realize what we're doing here, and since we are a publicly funded institution, we wanted to show the surrounding area that there's a lot of impactful, very interesting science happening at ODU."

Parents were just as enthused as their children as they learned about different types of science together. Mary Ellen, a mom to a 13-year-old who she said, 'now wants to attend ODU', commented on the event: "Many thanks for a wonderful day at ODU! We enjoyed ALL of it so very much. It was a real treat to be on campus and meet all the wonderful students. The experiments were terrific."

Emma Wolbrueck, a mom who homeschools her two children, said, "Both of my kids are art kids so being able to do a task that they like to do and gather information like this today and learning about viruses is great for them."

ODU Chemistry Assistant Professor Kyle Lambert, a co-organizer of Reign in Science Day, said: "This year we really broadened the areas of science that were showcased in 40 interactive science demonstrations through participation of faculty and student volunteers across ODU, local universities, and several community organizations."

ODU students from the College of Sciences, Batten College of Engineering, MonarchTeach and ODU Environmental Engineering Student Association along with other students from Christopher Newport University, Norfolk State University and Virginia Wesleyan University ensured that the youngest to the oldest participants learned something about science in a fun and easily digestible way. Some of the hands-on demonstrations dealt with climate change, coastal waterways, nanotechnology, forensic fingerprinting, germs, saltwater marshes, habitats and more.

ODU Chemistry Lecturer Emily Hardy, one of the co-organizers for Reign in Science said, "I really hope that the students who came here today were able to get a feel for what a scientist can look like. There are different age ranges, people from different backgrounds, and I think that our volunteers helped portray that today because they come from all different walks of life, and I believe any of the students who attended today can be a scientist too."

DISCOVER MONARCH SCIENCE

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