SPECTRUM

FLORIDA STATE UNIVERSITY COLLEGE OF ARTS & SCIENCES

Winter 2024

From the Dean

Welcome to the Winter 2024 edition of Spectrum magazine, the alumni publication of Florida State University's College of Arts and Sciences. Before we look ahead to what the new year — and this issue — will bring, I would like to share with you some of the highlights from 2023.

We welcomed an energetic and well-prepared class of 6,000 freshmen in August, drawn from a pool of nearly 75,000 applications. The Class of 2027 includes students from all states and every Florida county, plus an international cohort covering 61 countries. At least one-quarter of these students will major in disciplines in the College of Arts and Sciences, and all of them will take courses in A&S departments.

The fall semester started with a disruptive bang as Hurricane Idalia struck near the Big Bend, just east of Tallahassee. While we were fortunate to avoid a direct hit, our friends in Taylor County were not so lucky and were pummeled by wind, rain and storm surge. Our meteorology faculty and students monitored Idalia from the Powell Weather Observatory atop the Earth, Ocean and Atmospheric Science building. Alumni were engaged as well, including deploying on hurricane hunter flights to gather data and reporting on the storm through media channels.

Leadership changes across the college and university continue to take place. This has included the appointment of five new department chairs who started in the fall, an involved process that includes significant departmental input to help identify the best candidates. Currently, a national search is underway for the next director of the National High Magnetic Field Laboratory, as FSU recruits a replacement for Greg Boebinger, who is concluding his 20-year run as director. I look forward to sharing the results of this search as soon as it concludes.

In this issue, you will find fresh stories covering activities of our outstanding alumni, faculty, and students, and you will get a sneak peek of emerging initiatives. Among these is the launch of the Native American and Indigenous Studies Center, whose founding director is Allen Morris Professor of History Andrew Frank.

I am pleased this issue will showcase FSU's new Vice President for Advancement Marla Vickers who found time to share her strategic vision. Marla, an A&S alumna from our Department of History (M.A., 2000), is smart and savvy, and we are so pleased to have her leading university-wide fundraising efforts.

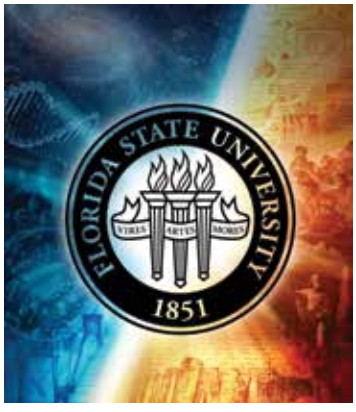
As 2023 comes to a close and we look forward to a new year, Florida State University is thriving, and we in the college continue our relentless pursuit of academic excellence. Thank you, as always, for being part of the Arts and Sciences family.

Sam Huckaba
Dean, College of Arts and Sciences

SPECTRUM

FLORIDA STATE UNIVERSITY COLLEGE OF ARTS & SCIENCES

FEATURES



On the cover
The interdisciplinary atmosphere of the FSU College of Arts and Sciences sparks inspiration and allows students and faculty to harness the collaborative power of the humanities and sciences to spur groundbreaking discoveries that can change the world. Illustration by Marc Thomas.

Securities transfer, a simple solution for giving

Making a gift of appreciated financial securities is an excellent way to show your support for FSU's College of Arts and Sciences and provides significant benefits to you as the donor. Giving stock, bonds, or mutual funds is easy, and the donor may take an immediate charitable dedication for the full market value of the security and avoid capital gains taxes that would ordinarily come due upon sale of the investment.

Use the information below as a guide to the process of making a gift of appreciated securities to FSU.

When donors' securities are held in a brokerage account, the donor should instruct their broker to transfer the securities to the following FSU Foundation account:

Raymond James & Associates
DTC#0725
Account of FSU Foundation, Inc.
Account # 10194903
Attn: Billy Stevenson and Brenda Joyner
850.785.9614

Donors should also request their brokers send confirmation of transfer to the FSU Foundation, Inc. The confirmation should include the donor's name, the security being transferred, the FSU Foundation account to which it should be applied, and the date of transfer.

The confirmation from the donor's broker and the donor's letter should be sent electronically to Nancy Smilowitz, the college's assistant dean of development and alumni affairs, at nsmilowitz@fsu.edu. Physical certificates can be sent to:

Nancy Smilowitz
Assistant Dean of Development
and Alumni Affairs
College of Arts and Sciences
Florida State University
125 Convocation Way
Tallahassee, FL 32306-1280

The college is honored to be considered in your philanthropic priorities, and it also values the A&S alumni who give their time to share career expertise and mentor today's students. For more information, or if you have questions about making a gift, call 850.294.1034 or email nsmilowitz@fsu.edu.

** The information in this article is not intended as legal or tax advice. For such advice, consult an attorney or tax adviser.*

Nole Notes

The top news from around the college

Thomas Joiner

Psychologist honored with lifetime achievement award for suicide prevention research

Robert O. Lawton Distinguished Professor of Psychology Thomas Joiner is the 2023 recipient of the International Association for Suicide Prevention Lifetime Achievement Award.

Joiner serves as director of the Laboratory for the Study and Prevention of Suicide-Related Conditions and Behaviors, which focuses primarily on studying the nature, causes, and management of suicidal behavior and related disorders. He has earned or shared in nearly $50 million in external funding to support his research from entities such as the National Institutes of Health, National Science Foundation, Department of Defense, the U.S. Department of Veterans Affairs, state agencies, private foundations and more.

History doctoral student receives Fulbright Fellowship to conduct research in Japan

Emily Lu, a doctoral candidate in the Department of History, has been awarded the Fulbright-Hays Doctoral Dissertation Research Abroad Program fellowship.

Lu will use this fellowship to support research on the intersection of the arts and politics in imperial Japan during the wartime periods leading up to 1945. Using this fellowship's funding, Lu will travel to multiple cities in Japan to conduct research in archives and museums for her dissertation, tentatively titled "Towards an East Asian Utopia: Ambition and Illusion in Japanese Military Music, 1868-1945."

Emily Lu

Mathematicians explore geothermal energy, carbon sequestration climate solutions in DOE's Energy Earthshots initiative

Associate professors Sanghyun Lee and Feng Bao from FSU's Department of Mathematics are taking part in the U.S. Department of Energy's Energy Earthshots, a nationwide initiative aimed at accelerating breakthroughs in clean energy solutions.

As part of a multi-institutional team, the pair will use a three-year, $4.9 million grant to build a computational model to understand what is occurring at multiple scales in subsurface energy storage and recovery systems and

Sanghyun Lee

Feng Bao

facilitate more accurate predictions, tackling two of the Earthshots initiatives: the Enhanced Geothermal Shot and the Carbon Negative Shot.

Chemist to receive American Chemical Society Award in Surface Chemistry

Distinguished Research Professor of Chemistry and Biochemistry Hedi Mattoussi has been selected to receive the 2024 ACS Award in Surface Chemistry.

Hedi Mattoussi

Mattoussi's research focuses on understanding and tailoring the surface properties of colloidal inorganic nanocrystals, and his lab works to identify ways to control and optimize several key aspects of nanoparticle growth, structural and optical characterization, ligand design and surface coordination. Researchers use techniques such as photochemistry and nuclear magnetic resonance spectroscopy to characterize the surface properties of these nanomaterials and develop approaches to control their interactions with their surrounding environment as a means for energy harvesting and sensor design.

English alumnus claims Flannery O'Connor Award for Short Fiction

Ihoema Nwachukwu, who earned a doctorate in creative writing in 2018, has earned the Flannery O'Connor Award for Short Fiction, a prestigious award bestowed by the University of Georgia Press annually that includes a $1,000 prize and publication of a book-length collection of the winner's work.

Nwachukwu's roots as a writer are grounded in Lagos, Nigeria, where he grew up with scarce money and resources. Nwachukwu's "Japa and Other Stories" is set to be published by the University of Georgia Press next September.

Ihoema Nwachukwu

Philosopher awarded NEH grant to archive, translate the works of trailblazing German philosopher

Associate professor of philosophy Courtney Fugate has received a $300,000 grant from the National Endowment for the Humanities to archive the works of the renowned 18th-century German philosopher Johannes Nikolaus Tetens.

Over the next three years, Fugate and a team of graduate researchers will build a comprehensive collection of Tetens' work in German and publish the first-ever publicly distributed volume of his collected writings translated into English. The resulting work will provide other scholars with resources to pave the way for new research areas in 17th- and 18th-century German philosophy.

Courtney Fugate

Office of STEM Teaching Activities receives National Academies grant for developing, implementing marine food web curriculum

FSU's Office of STEM Teaching Activities has been awarded a National Academies of Sciences, Engineering and Medicine grant to implement an educational curriculum focused on exploring the biology and ecology of the Apalachee Bay watershed.

The grant funds classroom testing, professional development for teachers, and classroom excursions for students. The curriculum centers on food webs and trophic interactions, and students learn about these by investigating harmful algal blooms as an anchoring phenomenon.

In July, teachers from local middle and high schools were invited to FSUCML for professional development through hands-on experiences ahead of testing the curriculum in their classrooms during the 2023-2024 school year. Program testing will continue in the 2024-2025 academic year.

FSU-led research shows shifting nesting timing not enough to prevent fewer sea turtle hatchlings

New research led by Department of Earth, Ocean and Atmospheric Science associate professor Mariana Fuentes shows potential adaptive responses by sea turtles may not be

Mariana Fuentes

enough to counteract projected impacts from climate change on hatchling production.

For this study, which was published in Global Change Biology, data was gathered from 24 nesting sites across the world used by four species of sea turtles. The resulting information is used to predict how turtles might shift the timing of nesting and what hatchling success they might expect.

For full details on these stories and more, visit artsandsciences.fsu.edu/news

Green sea turtle hatchling. Adobe Stock photo.

Meteoric Rise

Florida State alumnus Tevin Wooten is an Emmy-winning meteorologist and 2023 Grad Made Good

By Amy Walden

Growing up in a small town in Arkansas, Tevin Wooten loved science and math and, like many kids his age, dreamed of becoming an astronaut. But during college, Wooten found a career path even more perfectly suited for him... one he didn't realize as a child was a possibility.

"I'm a firm believer in if you can see it, you can be it. I didn't see someone who looked like me doing weather until I was much older," Wooten said, recalling the first time he watched Florida State University meteorology alumna Janice Huff forecasting on WNBC-New York.

Photo courtesy NBC Boston.

Wooten began his college journey at the University of Arkansas, pursuing an engineering degree before transitioning to broadcast journalism.

"It wasn't until my college TV station needed a weather anchor that I found a way to combine my love for teaching, science, and television into one job, and that's how I landed in TV weather," Wooten said.

After earning his first bachelor's in 2014, Wooten spent two years as a multimedia journalist and fill-in weather anchor for KNWA and FOX 24 in Fayetteville, Arkansas. He covered shifts for the meteorologist at every opportunity and even earned an Emmy Award in 2016 for his reporting during a holiday season severe weather outbreak. But he knew obtaining a degree in meteorology would be crucial to developing his craft, and FSU's Department of Earth, Ocean and Atmospheric Science topped the list.

"I fell in love with Florida State because of its reputation in the weather community," Wooten said. "I researched other programs, but I kept going back to FSU because of its expansive network of meteorologists across the country. It is the standard of excellence."

Wooten arrived at FSU in 2016, pursuing his bachelor's in meteorology with a minor in mathematics. The workload didn't come easy even though he had always excelled in school.

"After class, I studied in Dirac Science Library until they locked the doors at 1 a.m. every morning. I left after every football game to go back and study in the library," Wooten said.

The hard work paid off. By the time Wooten graduated in 2018, he already had a job offer from The Weather Channel. He moved to Atlanta, earned his Certified Broadcast Meteorologist credential from the American Meteorological Society, and began forecasting in studio and from the field, covering the nation's top breaking weather news including countless hurricanes, winter storms and tornadoes. Viewers connected with Wooten's warm personality and his keen ability to make the science of meteorology accessible.

"It's great because every day, I'm teaching viewers something they may not have known about in a way that's easily digestible," Wooten said. "It's something they can take each day, apply to the forecast, and apply to their daily lives. For me, that's the ultimate satisfaction of being a meteorologist. I enjoy being the happy person on TV, but I enjoy teaching even more."

Even off-screen, Wooten's passion for meteorology shines in his efforts to increase participation in the field by individuals who have not been widely represented in STEM disciplines. With The Weather Channel, Wooten launched "America's Science Lab," a series of physics and weather experiments geared toward elementary school students. In 2022, he was named to Forbes' prestigious "30 Under 30" list, which recognizes the brightest young entrepreneurs and leaders "destined to change the world" and make meaningful impacts on society.

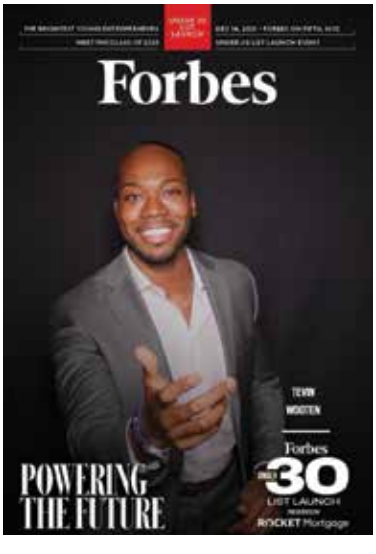
After four years with The Weather Channel, Wooten decided in 2022 to set down roots in Boston where he is now a broadcast meteorologist with NBC10. Wooten also dedicates his time as a member of the FSU Pride Alumni Network Board of Directors, the National Association of Black Journalists, and the American Meteorological Society's Culture and Inclusion Cabinet and Board on Representation, Accessibility, Inclusion and Diversity.

He still makes time to return to Tallahassee, including a special visit during FSU's 75th Anniversary Homecoming weekend where he was honored as one of the FSU Alumni Association's 2023 Grads Made Good. The designation is presented by the association to a select few alumni each year who have made outstanding contributions in their community or chosen field.

"I'm so excited for Tevin and what he's accomplished," said fellow Grad Made Good Janice Huff. "I know he's worthy of the honor as he represents Florida State University and the field of meteorology with excellence and the highest standards. Having mentored him through the years, I've watched him grow and witnessed his passion for weather and climate, as well as his Seminole pride. I couldn't be a prouder mentor and FSU Seminole!"

For now, Wooten hopes his journey inspires others to see what's possible and chase their own dreams.

"My favorite thing about being a meteorologist is the opportunity to influence at least one aspiring kid who maybe doesn't know what they want to do with their life when they get older," he said. "This is my opportunity to be a beacon of light for them. I don't take that for granted."



Left: Artwork courtesy Forbes Magazine. Above: Tevin Wooten and Janice Huff. Photo courtesy Tevin Wooten/ Facebook.

On the Advance

Vice President for University Advancement and FSU Foundation President Marla Vickers brings Nole knowledge to leadership role

By Amy Walden

Photo by Devin Bittner.

When Marla Vickers looks out her office window over FSU's Westcott Plaza, she feels right at home. That's because Vickers, vice president for university advancement and president of the FSU Foundation, is an FSU alumna herself, having earned a master's in public history and historic administration here in 2000.

Vickers brings more than two decades of experience in higher education to her position, gained in development roles at Emory University, Yale University, the University of Chicago, George Washington University, Duke University and Georgetown University. She holds a bachelor's from the University of Georgia and an MBA from GWU, and she is currently pursuing a Doctor of Education from Vanderbilt University.

At FSU, Vickers spearheads the university's academic fundraising and alumni relations and oversees a diverse endowment portfolio with 2,114 endowed funds totaling $723 million as of June 2023.

Spectrum Magazine sat down with Vickers to learn more about her vision for FSU and her perspective as a graduate of the College of Arts and Sciences.

Spectrum Magazine: You returned to FSU just over a year ago after serving in senior fundraising roles at some of the nation's top institutions. How did those roles prepare you to lead here?

MV: Having the chance to come back to my alma mater in this capacity is a dream. My 20 years at various universities, all of that knowledge and experience, and the wonderful people I've learned from, culminated in taking on this role. Being the first woman vice president of university advancement at FSU is truly a dream come true. I feel honored and incredibly lucky.

SM: FSU has cemented its status among the nation's top public universities in terms of both student success and research activity. How does the FSU Foundation support university success?

MV: Philanthropy plays an incredible role in our nation's public and private institutions. The State of Florida has been very generous in providing substantial funding too FSU. However, philanthropy covers the gap state funding leaves as well helping FSU achieve an extra margin of excellence in a variety of areas that are historically underfunded. With 400,000 alumni, plus a sizable population of FSU parents and friends who give, philanthropy enables FSU to keep rising.

SM: Tell us about the university advancement model and what it means for FSU's fundraising and alumni relations activities.

MV: The university advancement model is an integrated model I've worked with President Richard McCullough and my senior leadership team to build over the past year. Through this integrated approach, we can have broader impact across the university and our alumni base, allowing us to be more engaged in the academic arena and aligned more closely with our colleagues outside of advancement, including in athletics and Seminole Boosters. Think of university advancement as a garnet-and-gold umbrella. The FSU Alumni Association, all academic fundraising activity, all advancement events and communications, and all advancement services funcations that were formerly part of the FSU Foundation as separate areas are now unified under one university advancement umbrella.

Among FSU's hallmarks is its interdisciplinarity, so fundraisers now have greater ability, both organically and collaboratively through the new structure, to, for example, present funding opportunities to donors at the intersection of science and business in ways they couldn't before. The opportunities for collaboration are unlimited.

SM: How has your experience as an FSU student and alumna shaped your approach to this role?

MV: This role is very personal. I came to FSU right out of undergrad and received a full scholarship. That was a game changer for me financially. FSU had a great reputation then, particularly for my program, and now it is even

FSU Foundation Fast Facts

$723 million
Total FSU Foundation Endowment*

2,114
FSU Foundation Endowed Funds*

*Fiscal 2023 data

Vickers presents an award during the 2023 Seminole 100 celebration. Opposite: Vickers takes social media viewers on a parade of campus to build momentum for the Great Give 2023. Photos courtesy FSU Alumni Association.

stronger. When I speak to FSU alumni, parents, and friends, I start with my story because I'm from a single-parent family and could not have pursued graduate school without that critical scholarship support. I had the pleasure of working with former Governor Ruben Askew as his personal archivist for two years as a graduate student, cataloging his personal memorabilia as part of the work of the Florida Institute of Government. I know definitively how truly special that experience was, and I often share my experience working with Governor Askew with alumni I meet.

SM: What are some of your fondest memories from your time as an FSU student? What does it mean to you to be part of the team creating those memories for a new generation?

MV: I was studying U.S. history with particular emphasis in the Civil Rights era and worked with [history professor emeritus] the late Neil Jumonville. He and other faculty have continued to influence me over the years. That direct faculty interaction was key, and now I'm aligning relationships with alumni and their former professors to experience those 'reunion moments.' It's been magical to play a direct hand in orchestrating that for alumni who aspire to reconnect with faculty who have influenced their lives and careers.

SM: How has your FSU experience contributed to your career success?

MV: My experience as a graduate student here impacted nearly everything I've done professionally. Foundationally, it's the critical thinking and

> *"Having the chance to come back to my alma mater in this capacity is a dream. Being the first woman vice president of university advancement at FSU is truly a dream come true. I feel honored and incredibly lucky."*
>
> *— Marla Vickers*

synthesizing of information — I was challenged in ways I hadn't been before. I will always be grateful for the opportunities to build confidence and courage to interface with academics, deans, and even the governor. After grad school, I began working for the mayor of Nashville, Tennessee. I wouldn't have had the confidence and political know-how to do that if I hadn't spent two years working with Governor Askew and various professors at FSU.

SM: College of Arts and Sciences alumni account for more than 25% of living FSU graduates, from age 22 to 102. What would you most like your fellow Arts and Sciences family members to know about the lifelong value FSU brings to alumni and why it's important they continue to invest in FSU?

MV: No one can take away your education. Having a degree from FSU, particularly from my own experience as an A&S graduate, led me to appreciate interdisciplinarity. Among the many strengths of the college is the exposure students have to a variety of disciplines — that exposure impacts your ability to think differently. That's the biggest takeaway: Whether you're a mathematician, a geologist, or in the humanities, as an A&S graduate, you are touched by experiencing the interplay of those disciplines and how they affect our world.

As a graduate, I encourage alumni to invest in FSU and give back however they can. Private support, whether it's $1 or $100,000, really matters. I see the difference philanthropy makes through both small and large gifts. You're affording future generations of FSU graduates the same kind of experience you had, or better. Private philanthropy truly makes the difference, especially at public universities like FSU.

SM: What advice do you have for new alumni as they step into their next chapters?

MV: First, be yourself. Authenticity matters. I've met so many alumni this past year, and FSU grads are uniquely themselves. Second, go for it as you launch your career, and go big! We have a robust network of 400,000 alumni worldwide. Everywhere you turn, theres an opportunity to connect with an FSU grad, whether it's through Seminole Clubs or alumni networks supported by the FSU Alumni Association — we're here to help you stay connected to your alma mater. You're never alone.

Space Race

Florida State biophysics alumnus Afshin Beheshti looks to the stars to unlock mysteries of disease progression

By Devin Bittner and McKenzie Harris

Space may be the final frontier, but scientists like NASA researcher and Florida State University physics alumnus Afshin Beheshti are proving the cosmos can also hold answers to human medical mysteries.

NASA astronaut and Expedition 68 Flight Engineer Woody Hoburg rides the Canadarm2 robotic arm while maneuvering a roll-out solar array toward the International Space Station's truss structure. NASA photo.

Afshin Beheshti

Beheshti currently works with Blue Marble Space Institute of Science, BMSIS, at NASA Ames Research Center in California's Silicon Valley, analyzing how spaceflight affects humans and looking to space to better understand disease progression and identify earlier indicators of health risks. Specifically, Beheshti works with microribonucleic acids, or miRNAs, molecules that play a large role in gene expression, and mitochondria, the cell's powerplants, to identify cellular changes caused by disease or lengthy periods living in space.

"Space is a model for a lot of accelerated diseases, which include mitochondrial diseases, cancer risk, cardiovascular issues and more," Beheshti said. "My background in biophysics, which uses physics approaches and methods to study biological phenomena like human health, also gives me a unique lens to understand how space travel affects the human body."

Among Beheshti's past projects is NASA's GeneLab platform, now part of the NASA's Open Science Data Repository, the first database of its kind allowing users to upload, download, and share spaceflight data about human cells from experiments conducted by NASA scientists as well as recipients of NASA grants, free of charge. Discoveries made using GeneLab helped scientists better understand the foundations of many cellular anomalies that result in disease as well as prepare astronauts to withstand the rigors of long-duration spaceflight.

"Working on GeneLab allowed me to explore how to creatively use existing data to produce novel and important findings," said Beheshti, who earned a bachelor's in high-energy physics at the University of Minnesota in 1997 before coming to FSU for graduate school. "GeneLab expands the possibilities of open science and allows people who don't have NASA grants or the ability to send samples to space to explore data in this field."

Beheshti always wanted to pursue research to enhance people's quality of life, but he wasn't sure of the approach until an FSU adviser explained how being a physicist allows you to be a jack-of-all-trades, viewing different disciplines through the lens of physics to better understand the fundamentals of each. He completed his master's degree in physics here in 2001 on the way to earning a biophysics doctorate.

"While at FSU, I worked with professor of physics David Van Winkle on how DNA moves through structures in the body," Beheshti said. "The technical skills I developed allowed me to pursue postdoctoral research in the medical field outside my realm of experience. After I graduated in 2002, I completed one postdoctoral appointment in an oral microbiology lab and another in a cancer systems biology lab."

> *"I love what I do so much that it doesn't seem like work. My hope is that the work I do makes a small dent to improve life everywhere."*
> *— Afshin Beheshti*

Following these experiences, Beheshti accepted an assistant professor of medicine position at Tufts University in Massachusetts. During this time, he was also an associate investigator at St. Elizabeth's Medical Center overseeing microscope facilities before transitioning to assistant professor of medicine at Tufts Medical Center.

There, Beheshti developed a technique to use miRNAs as biomarkers — measurements like pulse rate, body temperature, and blood pressure used to assess a patient's condition — to potentially identify disease earlier in the diagnostic process. Beheshti discerned a miRNA signature associated with diffused B cell lymphoma, a finding that bolstered his work in the field: By learning a key miRNA signature, Beheshti can monitor disease progression.

"In my current lab at BMSIS at NASA, through the grants I've obtained, I've adapted this miRNA technique to determine a particular signature caused by space radiation and microgravity," Beheshti said. "This miRNA signature indicates health risks caused by the space environment, and I hope to use this research to determine when the point-of-no-return occurs regarding astronaut health risks. By showing these miRNAs are good biomarkers and developing ways to mitigate physiological damage in space, we can apply these techniques to a clinical context on Earth."

Utilizing research from his colleague and a founder of the field of mitochondrial genetics, Doug Wallace, Beheshti analyzes key mitochondrial changes occurring due to different diseases and the effects of spaceflight. The two first met when Beheshti reached out to Wallace for assistance interpreting some mitochondrial alterations — the findings indicated spaceflight suppresses mitochondrial activity in humans and impacts energy levels and job performance in space.

"Afshin is a committed and enthusiastic leader and scientist who is highly collaborative and inclusive," said Wallace, director of the Center for Mitochondrial and Epigenomic Medicine at the Children's Hospital of Philadelphia Research Institute and a member of the National Academy of Sciences. "He is an expert bio informaticist talented in applying computational tools to a wide range of biomedical problems."

While Beheshti's work necessitates he think beyond our atmosphere, he remains grounded by focusing on the molecules comprising the human body and enjoying his day-to-day research.

"I love what I do so much that it doesn't seem like work," Beheshti said. "My hope is that the work I do makes a small dent to improve life everywhere."

The Massbox. Photo courtesy Exum Instruments.

Tech Trailblazers

Florida State alumni create next-generation scientific instrumentation for use on Earth and beyond

By McKenzie Harris

The holiday shipping rush is over, but there are still important packages to send. The package Jeff and Jon are about to ship is headed farther than across the country — it's going into space.

Their special delivery, the Massbox, is a miniature laboratory. Users place organic or inorganic samples into this compact, portable instrument and directly analyze solid material for quantifiable, trace-level chemical mapping.

The Massbox is the brainchild of Exum Instruments, a Denver-based company co-founded by Florida State University Department of Earth, Ocean and Atmospheric Science alumnus Jeff Williams and joined by Department of Chemistry and Biochemistry alumnus Jon Putman that provides scientists and industry professionals with high-impact scientific instrumentation.

As both hardware and software, the Massbox combines analysis, data processing and storage, which means users can analyze and report results for immediate use, such as chemical analysis of next-generation metals for 3D printing for aerospace use or assessment of contaminants in environmental samples like soil, which can provide early insights in the event of a chemical spill.

Like some of the most successful companies in American history — Apple, Microsoft, Amazon — Exum started in a garage. Since building its first prototype in 2018, the company has received millions in funding and investment, including a grant from the International Space Station to send the Massbox up for use by crew members conducting elemental and chemical analysis in orbit.

"I love tinkering, I love building instruments, and I especially love seeing our product making scientists' and other users' jobs easier," said Jeff Williams, Exum's CEO and chief technology officer and a 2013 geology program graduate.

Exum was born in 2017 when Williams, who earned a master's in cosmochemistry at the University of New Mexico, reinvented a laser ablation technique used to decipher chemical elements comprising a sample. Williams developed a laser ionization analysis technique, which uses one laser beam to vaporize the surface of a sample and another laser to ionize the vapor, allowing the material to be chemically analyzed.

With this technique, Williams eliminated time-consuming steps needed to complete geochemical analysis of materials. The Massbox is the first commercially available laser ablation laser ionization time-of-flight mass spectrometer.

From left: Jeff Williams and Jonathan Putman. Courtesy photos.

"Jeff is a uniquely self-motivated and hard-working person. He was always brimming with ideas — all he needed was a little direction and a few resources," said Munir Humayun, professor of geochemistry and a researcher at the FSU-headquartered National High Magnetic Field Laboratory. "He brings a can-do attitude to scientific problems, and he's not shy to try out new techniques or approaches in the laboratory and elsewhere."

While at FSU, and for a year after graduation, Williams worked with Humayun at the MagLab where he fell in love with the freedom he had to pursue wide-ranging research interests.

"The FSU geology program is a great community, and transitioning to the MagLab with additional brilliant people and motivated researchers was incredible," Williams said. "I'm thankful to have had that opportunity, freedom, and supportive environment."

A deep-rooted love of rock-climbing motivated Williams to pursue geology, and he worked at Tallahassee Rock Gym throughout his studies, first at Tallahassee Community College then FSU. At the gym, he also met and worked with fellow climber Jonathan Putman, a two-time FSU alumnus who is now Exum's director of applications.

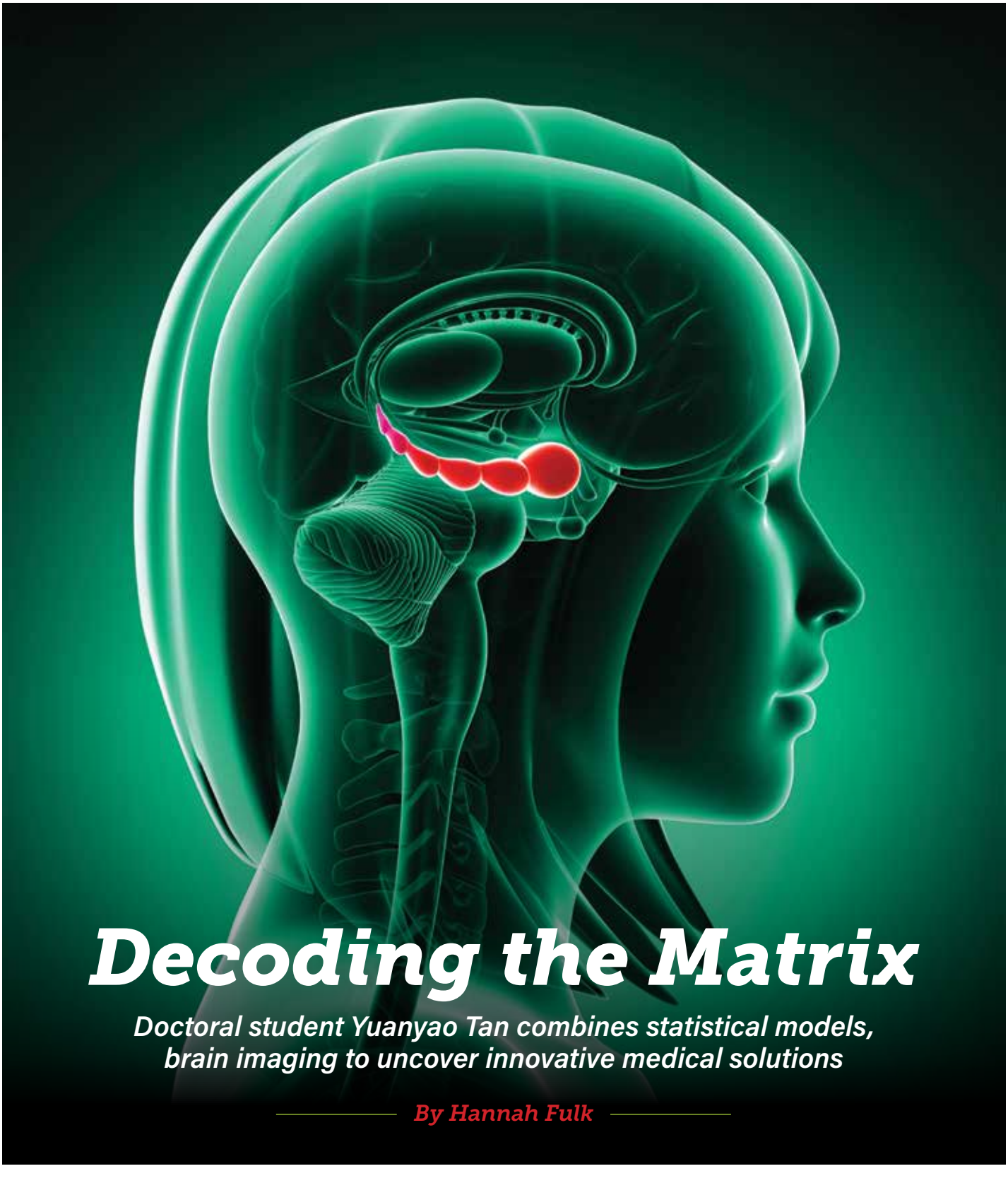
"We did a few summer internships together when I worked at the MagLab as an analytical chemist for Future Fuels Institute. We even lived together for a bit," said Putman, who also studied at TCC before earning his bachelor's in 2013 and doctorate in 2020 at FSU. "We chose different paths after undergrad: He earned his master's and started Exum while I pursued my Ph.D. When finishing my program, I jokingly asked Jeff when he would hire me."

For Williams, it was serendipity. The company, then a two-and-a-half-year-old startup, was seeking a talented analytical chemist to fine-tune the Massbox.

"I had a smooth transition from working with complex mixtures in mass spectrometry with [Robert O. Lawton Professor of Chemistry] Alan Marshall's group during my doctoral program to working with elemental samples for the Massbox," Putman said. "I love analytical chemistry because I love solving problems. At Exum, there's a new challenge and different application to work on every day."

Currently, the Massbox has applications in environmental science, battery research, academics, nuclear research, mining and oil, and the food and beverage industries. With several instruments already installed around the country, Exum is now integrating user feedback for product enhancement. Watching the company grow to more than 20 talented scientists, engineers, and developers strengthens Williams' motivation to continue expanding Exum's product line.

"That our product will be sent to space is a huge deal for me, especially being from Tampa and watching rocket launches as a kid," Williams said. "I can't wait to continue building Exum to reach its full potential, our full vision. I hope to send more scientific instruments to space — one day, I'll join one of my products up there."



Decoding the Matrix

Doctoral student Yuanyao Tan combines statistical models, brain imaging to uncover innovative medical solutions

By Hannah Fulk

What if someone receiving the devastating diagnosis of Alzheimer's disease could immediately access personalized treatment based on their demographic details and brain physiology, a plan that could delay progression of debilitating symptoms?

That's the future envisioned by Florida State University biostatistics doctoral student Yuanyao Tan who applies unique mathematical methods to brain imagery in pursuit of data that could unlock early interventions for a disease that affects over 6 million Americans today, a number projected to more than double by 2050.

Now in her fourth year in the FSU Department of Statistics, Tan's work using statistical modeling and demographic data analysis aims to generate new perspectives in the worldwide interdisciplinary study of Alzheimer's. Her work is, in part, inspired by a familial connection to the disease.

"I want to address the everyday problems faced by individuals needing specialized treatment through the key question: Is there a statistical solution for this?" Tan said.

The hippocampus, one part of the brain affected by Alzheimer's, is part of the limbic system, which manages our functions of feeling and reacting. This complex structure is embedded deep in the brain and is responsible for long-term memory formation, memory retrieval and spatial memory. The hippocampus can change shape as people age due to decreasing brain elasticity, life stressors, or injury, which is why individuals showcasing sudden behaviors like getting lost or misplacing things may be experiencing initial signs of the disease.

Tan specializes in functional and manifold data analysis, a statistical method used to interpret high-dimensional sets of data where the number of variables observed are close to or much larger than the number of observations. High-dimensional data, or a data matrix, is typical in health care because human genetic diversity leads to varied responses, driving data collection for nuanced genetic insights. Tan applies manifold data analysis to hippocampus images collected from different subjects to uncover patterns in the data matrix that connect back to physical manifestations of Alzheimer's in a person's life.

People may experience varied impacts due to differences in gender and in aging; however, the data reflecting these changes can be organized into subgroups related to disease progression that reflect common elements of change among a group of individuals. Tan's work has significant implications for diagnosing and treating Alzheimer's, as manifold data analysis allows her to maintain the original organization of data on the hippocampus and create four classes of subgroups that can be used to inform new treatment plans.

Yuanyao Tan. Photo by Devin Bittner.

"My work analyzes the relationship between brain imaging data, such as the shape of a person's hippocampus, and the demographic factors associated with this data, like age and gender, using manifold data analysis," Tan said. "We leverage nontraditional methods to investigate the ways in which human variables impact the onset and effects of Alzheimer's disease."

Tan has worked with her major professor Chao Huang, FSU assistant professor of statistics, on several projects using 2D and 3D data on the brain, and she has collaborated with Elizabeth Slate, FSU's Duncan McLean and Pearl Levine Fairweather Professor of Statistics, on another project involving functional and shape data analysis. For Tan, biostatistics is a means of connecting abstract mathematical tools to real-life problems and solutions in modern healthcare.

"Yuanyao fosters an environment of expertise by bringing in fresh perspectives and stimulating intellectual discussions that promote interdisciplinary research," Huang said. "Her ability to convey complex concepts and share her knowledge contributes to the department's reputation for educational excellence."

Tan earned a bachelor's degree in 2018 from Guangdong University of Technology and a master's in early 2020 from Sun Yat-sen University, both in Guangzhou, China, before coming to FSU where she has been captivated by the university's outstanding research reputation across psychology, biology and physics. Tan began her doctorate in biostatistics in Fall 2020 and has since presented at conferences hosted by the International Chinese Statistical Association and the Society for Industrial and Applied Mathematics.

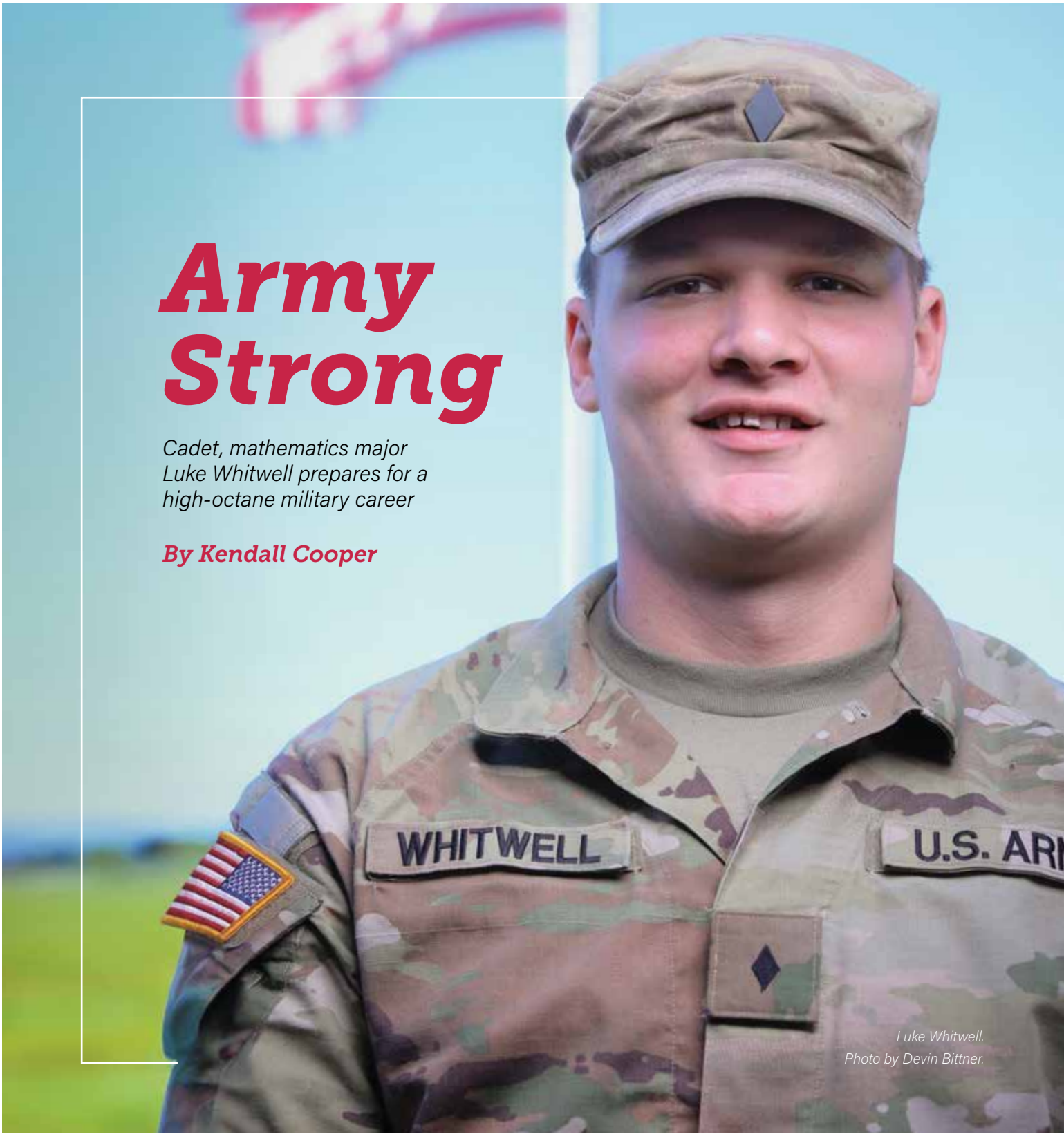
Tan has several internships lined up that she expects will help guide her towards the right job once she graduates next fall. Most of all, she hopes her biostatistics contributions show that concrete applications of mathematical tools can lead to better health care outcomes for patients with brain disorders.

"My efforts to understand Alzheimer's through statistical modeling would be impossible without inspiration from others I've met in labs and at conferences," Tan said. "The essence of manifold data analysis is examining an entire matrix of information instead of breaking it apart to understand individual pieces, and I believe this same idea can be applied to my personal experience by envisioning the entire picture of what my research can do for those around me."

Army Strong

Cadet, mathematics major Luke Whitwell prepares for a high-octane military career

By Kendall Cooper



Luke Whitwell. Photo by Devin Bittner.

Deep in the woods, hours past midnight, Luke Whitwell's day is finally coming to a close.

He just completed Army Reserve Officer Training Corps land navigation training with his fellow cadets at the park surrounding the Pat Thomas Law Enforcement Academy in Tallahassee. Whitwell's 30,000-step day began with ROTC physical training at 6 a.m. followed by a "theory of numbers" midterm, for which he stayed up late studying, a full day of classes, and finally, eight hours of land nav.

For the Florida State University Army ROTC cadet and senior pure mathematics major, this lifestyle is one he expected. With two Sailors in the family — his father served for 23 years and his mother for 12 — Whitwell always knew he wanted to serve.

"My dad loved what he did in the Navy, and it brought him and my mother great job satisfaction," he said. "That opened my eyes to opportunities the military could give me in the future; I want to serve and give back to the country that has given us everything."

Whitwell wasn't clear on the details of how he'd serve until he found further inspiration at home. His brother, Kenneth, led the way as an FSU Army ROTC cadet, graduating in Spring 2023 with a bachelor's in psychology. The brothers, who are a year apart, both joined ROTC during their respective freshman years, which allowed Kenneth the opportunity to show his brother the ropes.

"He is my best friend, and we even roomed together for a year at FSU," Whitwell said. "Growing up, we always knew we wanted to serve, so this was a logical step in our college experience."

He initially entered FSU on the pre-med track before opting for a major in the Department of Mathematics. Pure mathematics is largely reliant on theoretical concepts, studying and answering mathematic questions without practical intrusions from fields like engineering or physics. The field of number theory, which Whitwell favors, examines numbers themselves and how all possible numbers might interact with one another.

"Numbers always made sense to me," Whitwell said. "I love math more as I progress through the program, and it has become a passion rather than just classwork."

Many pure mathematicians often become professors and researchers, while others pursue careers as actuaries, business analysts, and even computer scientists. In the military, mathematicians have had storied careers as cryptographers, creating and breaking codes to protect U.S. servicemembers and operations. Math is also used by Explosive Ordinance Disposal teams in disarming and neutralizing threats from unexploded rounds or explosive devices.

Keen logic, such as is developed through a mathematics education, also equips an officer to meet the daily challenges and multi-layered problems one encounters as a professional Soldier.

"In math, problem solving is a hard skill, but in the Army, it is a critical soft skill," Whitwell said. "I plan to leverage my math experience by taking advantage of this transferrable skill."

Whitwell's primary training and development as a future officer, however, has been enhanced through a series of leadership roles featuring levels of responsibility.

As executive officer, the Seminole Battalion's second in command, Whitwell directs staff officers under the battalion commander's guidance. Similar to the role of a chief of staff, he trains juniors in basic ROTC skills and collaborates with fellow seniors to plan training activities.

As an extension of the role, Whitwell attended summer training at Fort Knox in Kentucky where he and other rising senior cadets were tested on comprehensive ROTC knowledge, culminating in a 12-day field exercise cadets must pass in order to commission.

"Cadet Whitwell earned one of the highest scores at summer training," said Army Lt. Col. Travis Owen, department chair and professor of military science. "Faculty and staff already recognized his talent, and his summer training performance further confirmed making him executive officer was the right decision."

After graduating and commissioning as a second lieutenant this spring, Whitwell plans to become an EOD specialist at Eglin Air Force Base, near his hometown of Perdido Key, Florida.

EOD is the only group open to members from all branches of service. With family background of Navy members, nearly four years of Army training, and plans to complete EOD training at an Air Force base, Whitwell epitomizes a joint-force mindset.

"Cadet Whitwell displays the character and drive of a successful future Army officer," Owen said. "He has interpersonal tact, values, and humility, which are indicative of a servant leader. I have no doubt he will lead our warfighters into the future." <

From left: FSU Army ROTC cadets and brothers Luke and Kenneth Whitwell. Courtesy photo.

Rituparna Kahn.
Photo by Devin Bittner.

Predicting Progression

Doctoral student Rituparna Khan's new tool gives health care providers an edge in diagnosing, treating early-stage cancer

By Kendall Cooper

To many people, the never-ending stream of letters, numbers, and symbols on Rituparna Khan's computer monitor are nonsensical cyan, magenta, yellow, and white characters floating on a plain black background. To her, however, the screen represents years of hard work and a breakthrough in cancer research.

Khan's area of expertise is in bioinformatics, an interdisciplinary field developing methods and software tools to understand biological data, especially large and complex data sets.

The sixth-year doctoral student in the Department of Computer Science is combining her passion for medicine with computer programming and coding to better treat early-stage cancer. The software Khan developed characterizes and predicts cellular mutations that lead to cancer, and it is two-and-a-half times more accurate than the only other similar tool in existence.

"My software tool, ScLongTree, shows promise for the improved care of early-stage cancer patients because when it is successfully implemented, medical professionals can use it to predict how a particular patient's cancer will likely progress," Khan said. "Accurately predicting the cancer's progression leads to better-informed treatment plans."

Cancers spread by acquiring new mutations at different stages of advancement. Knowing the specific moment in time when a mutation is set to happen is critical for determining accurate diagnoses, delivering realistic prognoses, and developing personalized treatment plans that can minimize side effects and improve patient outcomes.

Single-cell DNA sequencing makes it possible to determine genetic differences within a single tumor and provides a clearer understanding of how a particular patient's cancer has developed. As the cost of single-cell DNA sequencing has decreased in recent years, it has become possible to check in on patients every few years, which has generated data allowing researchers to sample across longer timelines. Based on a particular patient's collected data from their existing mutated cells, Khan's tool can predict their future data, or their cancer's progression.

"The beauty of computer science is that it has such a wide variety of applications," said Khan, who had originally planned to go to medical school before pivoting to her current area of research. "Coding and programming have the ability to solve incredibly difficult and complex issues in nearly any field."

The only other tool like Khan's is the Longitudinal Analysis of Cancer Evolution, better known as LACE, which was first published in the Journal of Computational Science in 2022. Compared to ScLongTree, LACE is limited in terms of scalability, meaning it cannot compute more than four timepoints. ScLongTree is also more accurate — in a triple negative breast cancer dataset with three sequencing time points, ScLongtree was able to recover the evolutionary history of the cancer and detect a novel mutation at the second sequencing time point, which was not flagged by LACE. In this particular scenario, ScLongTree's insights could help doctors determine if the patient needs a mastectomy or only chemotherapy and radiation.

Prior to coming to FSU in 2017, Khan earned an undergraduate degree in computer science at the Future Institute of Engineering and Management in Kolkata, India, and worked as a senior project engineer for Wipro, an IT consulting company headquartered in Bengaluru.

"I decided to pursue my doctorate after nearly four years at Wipro because I wanted to dive even deeper into the field," Khan said. "Now, applying my computer science skills in cancer research feels like a full-circle moment with my dream of working in medicine coming true."

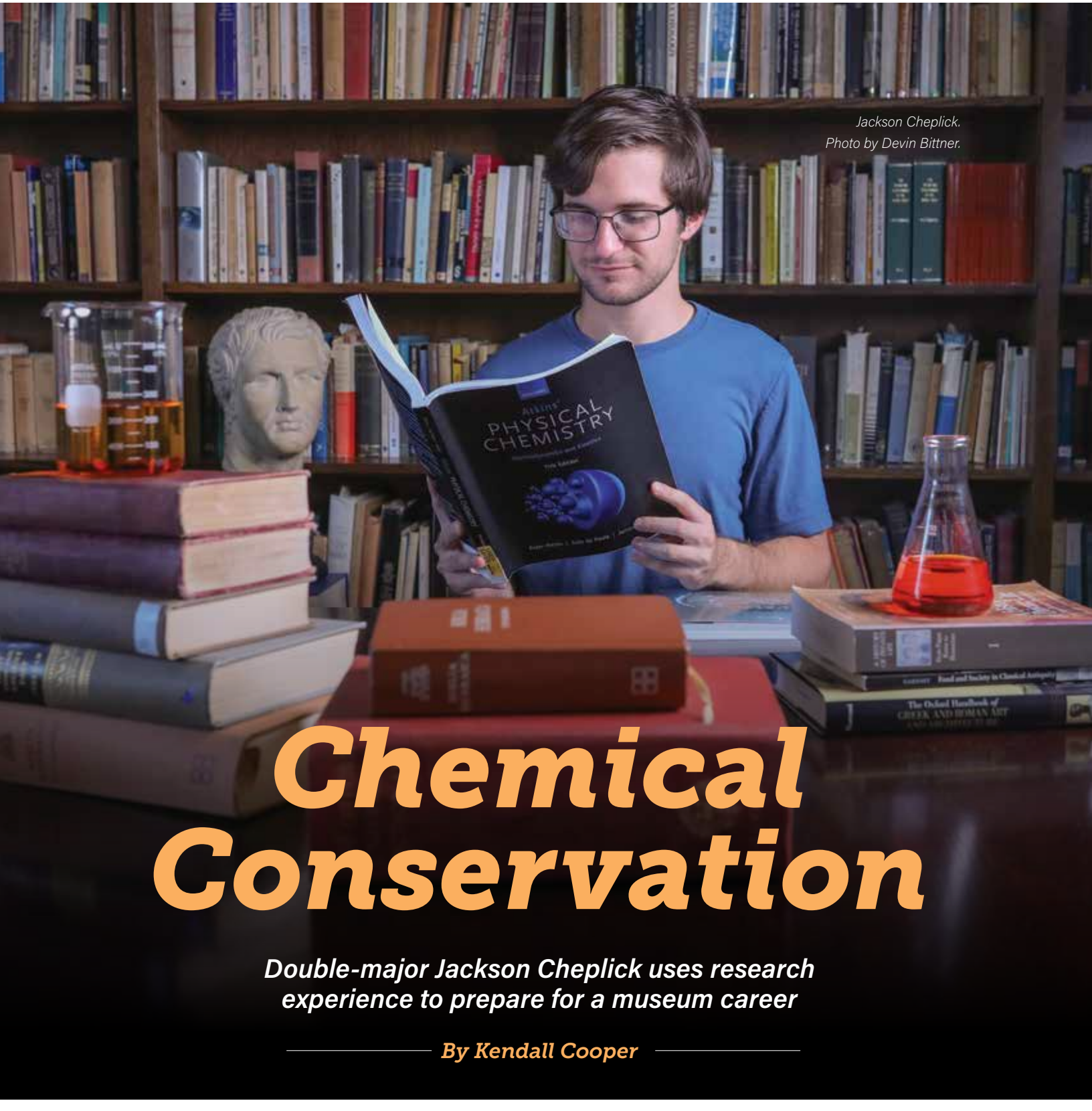
After more than a year and two revisions, Khan's paper on her tool is awaiting approval for presentation at the Research in Computational Molecular Biology's 2024 conference in Boston. Having her research published is the next step towards reaching her primary goal: Wide implementation of and access to her software tool.

"Ritu has an incredible talent for presenting her research, and this skill will take her far whether she goes into academia or industry," said Xian Mallory, assistant professor of computer science and Khan's doctoral major professor. "She is also easy-going and selfless, and she is currently mentoring an undergraduate student in my stead."

Upon her anticipated graduation this spring, Khan aspires to enter industry and sees herself working for pharmaceutical companies or national laboratories.

"Having the opportunity to advance cancer research through my work is a blessing," Khan said. "While cancer research is absolutely challenging, I enjoy working through the challenge, and knowing that my research can help so many people in the future drives me to do my best. I am happy that my research is helping the computer science community solve larger issues."

Rituparna Kahn at work on ScLongTree. Photo by Devin Bittner.



Jackson Cheplick.
Photo by Devin Bittner.

Chemical Conservation

Double-major Jackson Cheplick uses research experience to prepare for a museum career

By Kendall Cooper

Van Gogh is an artist known the world over for his stunning landscapes, still lifes and portraits, but an element of his paintings, beyond visual style, sets his artworks apart on a chemical level — the cadmium in the yellow paint van Gogh used had an extra electron. For museum conservators, this compositional difference means van Gogh paintings must be cared for more frequently, as the oxygen in the air causes this particular yellow to chemically decompose, or oxidize, faster than the other colors.

While it may come as a surprise, this is why the world's top museum conservators, professionals who restore and preserve priceless paintings and other artworks, are trained in chemical analysis. Florida State University junior Jackson Cheplick is frequently asked why he chose to double major in chemistry and classical civilizations and has become a pro at fielding the question.

"It is certainly not a traditional double major, but believe it or not, there is a connection between the two," Cheplick said. "Art is composed of atoms and molecules just like everything else, and you can use chemical analysis to better understand ancient artifacts and art with the goal of conservation."

For Cheplick, the pairing is the starting point for a career as a museum conservator. He plans to leverage his organic synthesis chemistry research and experience gained on an archaeological excavation experience in Italy to enter to a specialized graduate program for future conservators.

While taking organic chemistry as a sophomore, Cheplick developed an affinity for the subject and connected with assistant professor of chemistry and biochemistry Joel Smith who investigates efficient strategies to chemically synthesize some of nature's most complex molecular structures.

"Jackson has an innate enthusiasm for chemistry that is unmatched by his peers," Smith said. "He is a careful and diligent experimentalist who has a wont for learning, discovery and self-improvement. This curiosity is an unteachable quality central to the development of young scientists."

The Smith Lab's current goals involve investigating the potential of psychedelic molecules in the treatment of various neurological diseases and complex, organic marine matter's potential to provide key insights for fundamental pharmaceutical discovery. Cheplick began working with Smith in early 2023, and his role at the lab involves creating the beginnings of chemical synthesis for further modification by Smith and graduate students.

Jackson Cheplick on the dig site at Cetamura, Italy. Courtesy photo.

"Jackson is a genuine individual with an unbridled proclivity for positivity," Smith said. "Chemistry requires discipline and resilience, and Jackson exudes these qualities with the utmost integrity. I am confident that if he remains on current trajectory, he will be an exemplary FSU graduate destined to make a monumental impact through his multifaceted career goals."

Over the summer, Cheplick took a brief break from his chemistry research to gain hands-on archaeology experience, adding to his unique skillset in both the arts and sciences. He joined the team conducting excavations at Cetamura del Chianti, a research site in Italy's Tuscany region operated by FSU's Department of Classics.

The Cetamura settlement, located in the mountains of Chianti, was occupied by three major groups in its history: Etruscans and Romans in antiquity and by Italians during the Middle Ages.

"Jackson took direction well, asked his supervisors insightful questions, and worked on his site with precision," said Gregg Anderson, Cetamura advisory board member and 1978 alumnus of FSU's College of Communication. "He was also a good friend to his fellow students on the dig, many of whom did not know anyone else and had never traveled abroad."

FSU faculty, staff, and students have studied the site for 50 years, aiming to uncover the realities of daily life during each period by examining a variety of excavated artifacts ranging from waterlogged grape seeds to pottery to the remains of a Roman bath.

"It was a great experience that I wish lasted longer than four weeks," Cheplick said. "I am fascinated by learning how people lived in the past, and it was surreal to dig up pieces of history people built and interacted with hundreds of years ago."

Taking inspiration from his classics and chemistry research, Cheplick is in the beginning stages of an Honors in the Major thesis, which will focus on using chemical analysis to uncover details held inside the ancient grape seeds. The waterlogged grape seeds found at Cetamura are one of the site's most important discoveries; the water trapped in the seeds preserved them well enough for researchers to understand more about wine and culture in the ancient world.

Cheplick will examine both waterlogged and dried-out grape seeds found across a wide geographic area for his thesis, aiming to uncover more about the historical spread of grape seeds and wine-making practices in Western Europe. The project will also enhance his diversity of experience ahead of grad school.

"Whether you are in a lab working on chemical synthesis or in a museum working with artifacts, you need scientific analysis skills and a chemical intuition," Cheplick said.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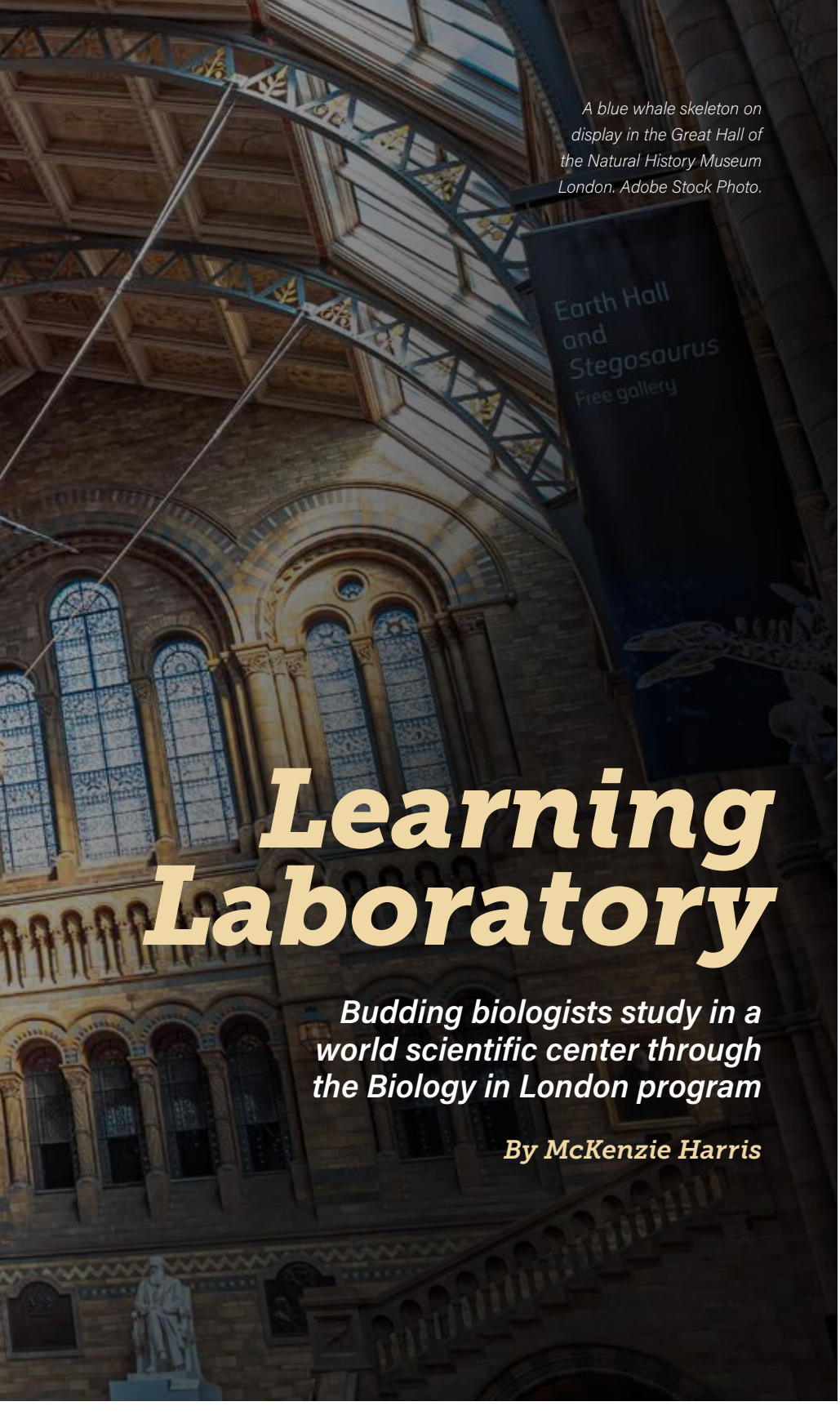


A blue whale skeleton on display in the Great Hall of the Natural History Museum London. Adobe Stock Photo.

Learning Laboratory

Budding biologists study in a world scientific center through the Biology in London program

By McKenzie Harris

Among the bustle of Buckingham Palace, in the shadow of Big Ben, and under the watchful gaze of the London Eye are a collection of research, historic, and museum facilities that make the UK's capital one of the world's best places for the study of the life sciences.

While science may not be top of mind when considering a visit to London, this living, learning laboratory has been the site of some of the most important advances in history, from the Scientific Revolution of the 17th century to Stephen Hawking's exploration of quantum gravity and black holes.

Today, it is also home to one of the most highly requested international experiences available to Florida State University students — the Biology in London Program. Since 2022, BIL has attracted young biologists and other aspiring life scientists to explore and study scientific history and trailblazing discoveries through unrivaled hands-on experiences at the physical locations where they happened.

"If you think of biology as organisms living in London, it might not seem like a biological center," said Scott Steppan, professor of biological science and the program's director. "Historically, as an intellectual center, London offers more than almost anywhere else in the world — I can't think of any place better to study biology. So much biological progress has been made in this city, the biology-oriented museums here are unrivaled, and access to prestigious universities, advanced research facilities, and learned societies bolster the academic excellence."

This summer, students led by professor of biological science Scott Stagg will study cell structure and function while teaching faculty Kevin Dixon guides them in the examination of large, complex organisms such as plants, animals and fungi, known as eukaryotic diversity.

"London has an enormous impact on cell biology, and we'll explore museums with important historical instruments, attend exhibitions that fuse art with medicine, and visit the University

of London where I have colleagues who are actively researching some of the topics we cover in the course," Stagg said. "I'm excited to see the microscopes that were used to view the very first microorganisms, the original model Watson and Crick made of the DNA double-helix, and other important artifacts, and I'm even more eager to share this experience with my students."

Classes are small and intimate, and each faculty member leverages the scientific prowess of the city to provide real life examples of class concepts. In professor of biological science Marie Charrel-Dennis' infectious disease course, students learned about disease-causing microorganisms while visiting the water pump that was the source of major cholera outbreaks in the 1800s.

"My class was out and about every day," said Charrel-Dennis, who taught during the first BIL program in 2022. "We also visited a former plague pit that is now a beautiful square and playground on the south side of London, and it was surprising for students to realize that thousands of people were buried there during the plague."

While the Biology in London program is designed to satisfy degree requirements for biology majors, other FSU science majors and non-majors are also encouraged to enroll.

"I feel very lucky to have been a part of the first Biology in London program. The program offered electives that not only counted toward my major but also furthered my interest in fields I likely would not have explored without studying abroad," said Sara Ballesteros, a senior biological science major who attended the program's inaugural session. "The excursions and behind-the-scenes experiences we were given were immeasurable in their worth, and it was a privilege to have been able to have such a dynamic learning experience. The program also fostered relationships between like-minded peers and faculty that are difficult to replicate in traditional classes."

> *"Biology in London was the best experience I have had in my time at FSU so far. Taking courses abroad for my major gave me a unique opportunity … and made me feel as though I was learning out in the field for the first time."*
>
> *— Nia Everidge, biological science major*

Facing page, far left and below: Scenes from the 2023 Biology in London program. Courtesy photos. Left: Scott Steppan, Biology in London program director. Photo by Devin Bittner.

For students interested in participating, scholarship opportunities exist. To learn more about available funding and how to apply for the Biology in London scholarship and the College of Arts and Sciences Travel Abroad scholarship, visit **bio.fsu.edu/London**.

Classes are taught in two sequential four-week sessions for a total of eight weeks spent studying in the city, visiting Charles Darwin's Down House, exploring the world's largest and most diverse botanical and mycological collection in the Kew Royal Botanical Gardens, and receiving private tours of the collections at the Natural History Museum. They also get to partake in cultural programming, including viewing and participating in performances at the Globe Theatre, among other excursions.

Debi Fadool, a distinguished research professor of biological science and neuroscience, taught human physiology in London in 2023 alongside her husband Jim, also a professor of biological science and neuroscience, who instructed general genetics.

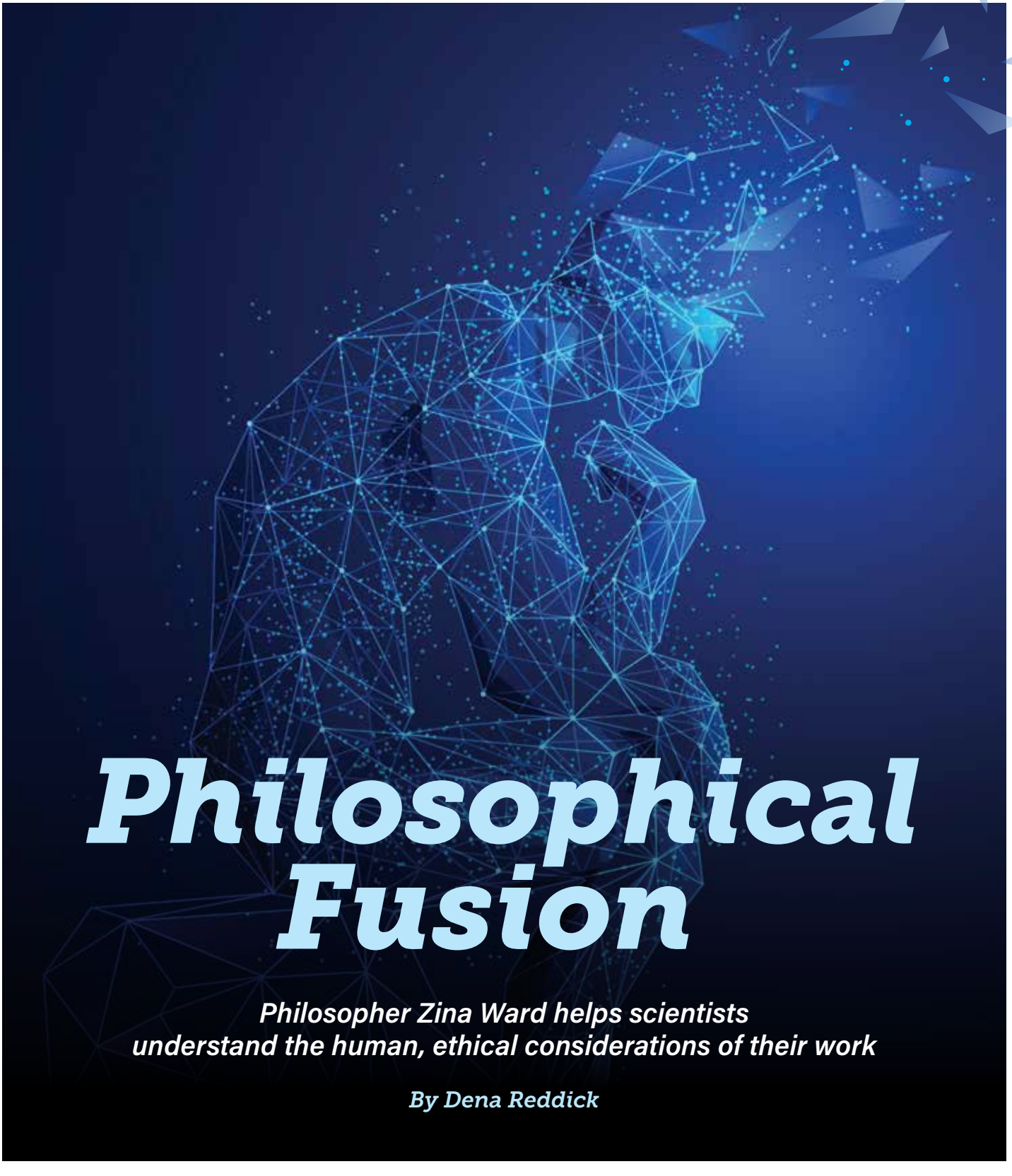
"Because biological science is one of the university's most popular majors, many biology classes on campus are composed of hundreds of students," Fadool said. "On campus, biology courses can be as large as several hundred students, but in London with classes of 20 students or less, studying biology is a far different experience. We appreciated the one-on-one time with our students as much as they did. It was also unique for the students who we taught back-to-back as a team effort, delivering two core classes in the major."

For both students and faculty, the highlight is the opportunity to work more closely with their peers.

"Biology in London was the best experience I have had in my time at FSU so far," said Nia Everidge, a senior biological science major. "Taking courses abroad for my major gave me a unique opportunity to connect more closely with my peers and professors. The smaller, hands-on learning environment consisting of lectures, excursions, museum tours, and more cultivated my learning in a way I had not experienced and made me feel as though I was learning out in the field for the first time."

Studying abroad is a life-changing experience, but the costs associated can put the opportunity out of reach for many talented and deserving students. The Biology in London Program Study Abroad Scholarship was established to help lower barriers to participation so these unrivaled opportunities are available to more of FSU's future scientific leaders. Visit give.fsu.edu/fund/f09466 to learn more and make a gift.

"When our alumni studied abroad, there were few science classes available, possibly none in their major," Steppan said. "The Biology in London program, for the first time, offers courses for students majoring in biological science and related STEM disciplines to study abroad and take rigorous coursework that contributes toward progress in their major. We invite our alumni to help ensure all eligible students can access this transformative educational opportunity."



Philosophical Fusion

Philosopher Zina Ward helps scientists understand the human, ethical considerations of their work

By Dena Reddick

For thousands of years, philosophers, from Plato and Aristotle to Immanuel Kant and John Rawls, have pondered the ethical and social constructs that underpin human behavior and the societies people construct. Today, philosophers like Zina Ward are still helping us make sense of today's world in which some of the most pressing questions revolve around decidedly modern creations like artificial intelligence and big data.

Ward's expertise is in the philosophy of science, which explores the foundations, methods and implications of science. As an assistant professor in Florida State University's Department of Philosophy, Ward leverages philosophical theory to prepare students across disciplines to respond to present-day ethical situations.

For Ward, science plays a central role in daily life, whether in shaping individual decisions or contributing to privacy, economic, health care, education, trade or other policy. With its unique ability to help humanize thought processes of decisionmakers, philosophy of science is a key component to understanding and helping policy keep pace with the volume of data generated globally, which is projected to exceed 180 zettabytes, or 180 billion terabytes, by 2025.

"Philosophy and the sciences have a lot to offer each other," Ward said. "Data science as a field is increasingly interested in ethical questions about autonomy, privacy, and fairness, and philosophers have been exploring these concepts for a long time. How should we understand autonomy? Why is privacy important? What does fair treatment require? There are quite literally centuries of philosophical thinking about these topics that are now relevant to data scientists."

Ward, who obtained a doctorate in history and philosophy of science in 2020 from the University of Pittsburgh, joined FSU's faculty just after graduating. She teaches courses on philosophy of science and applied ethics in the philosophy department as well as a required course on data ethics for students in the Interdisciplinary Data Science Master's Degree Program.

Concepts touched on in the IDS program, including machine learning, AI and data collection, are relevant to both philosophers and the next generation of data science professionals.

"It's especially interesting to hear from students in this class who have experience with privacy issues like workplace surveillance," Ward said. "I learn a lot from those students. Their real-world experiences enrich the course for everyone."

AI, far from being an objective source, is subject to inaccuracies and bias and holds risks for user privacy, as individuals' data may be gathered, stored, and utilized without their knowledge or consent. Likewise, transparency and accountability regarding unethical data gathering practices may be lacking. In recent years, even the trustworthiness of photo, video, and audio have been called into question as deepfakes, digitally manipulated media that convincingly replace one person's likeness with another's, and other synthetic media have become a serious issue.

Zina Ward. Photo by Devin Bittner.

According to the Department of Homeland Security, threats posed by deepfakes and synthetic media don't arise from technology used but rather from people's natural inclination to believe things they see. Even unsophisticated fakes can spread misinformation.

From the earliest days of the program, Gordon Erlebacher, IDS program director and a professor in the Department of Scientific Computing, supported Dean Huckaba's goal to include data ethics as a core part of the curriculum.

"Understanding usages of AI helps to increase responsible data usage and reduce the chance of inadvertent misuse," Erlebacher said. "Zina ensures our students are well-informed in ethical considerations as they prepare to take their place in the workforce, and she challenges our students to think about pivotal data ethics issues."

While philosophy isn't typically considered a collaborative discipline, Ward eagerly embraces the cooperative undercurrents emerging in recent years, especially across disciplines. Three of her current projects are collaborations, and she's also created Ethics, Data and Technology, a new course for philosophy undergraduates, to address cross-disciplinary interests in technology and philosophical thought. Ward also leads the interdisciplinary Philosophical Psychology Group, which organizes research presentations and discussions each semester.

"Zina has an impressive research record," said Randolph Clarke, FSU philosophy chair. "To give just one highlight, her 2022 article, 'Registration Pluralism and the Cartographic Approach to Data Aggregation across Brains,' received the Popper Prize. Named for the eminent philosopher of science Karl Popper, the award recognizes the best article of the year in the British Journal for the Philosophy of Science, one of the most prestigious in philosophy. The selection is quite an honor."

As society races to adopt the latest innovations, Ward's philosophical preparation and collaboration can help decision-makers understand the human costs of choices surrounding technological and scientific advancements.

"A general ambition for my work in philosophy of science is to be relevant to practicing scientists, including data scientists," Ward said. "Philosophy of science helps us ensure our science is ethically sound, methodologically robust and interpreted properly. I'm proud my research is a small part of that."

Mayly Sanchez.
Photo by Amy Walden.

Minute Matter

Physicist Mayly Sanchez studies the smallest known particle to understand the origins of the universe

By McKenzie Harris

Think about the tiniest thing you've ever seen, then think smaller. Whatever it is, you're still probably not thinking as small as the neutrino, a tiny fundamental particle that can give scientists a window into the history of the early universe.

For Florida State University particle physicist — and neutrino expert — Mayly Sanchez, the biggest leaps forward in scientific knowledge often start when the unseen is revealed.

"My passion for particle physics began when I realized one way to understand the universe is by starting with the smallest details," said Sanchez, who holds the Wyatt-Green Endowed Chair in Physics and is part of FSU's renowned High Energy Physics group, which has participated in some of the most important discoveries in the field, including that of the Higgs boson particle in 2012.

Although new to FSU, the Venezuelan-born Sanchez has led the way in neutrino research for almost three decades. After completing a doctorate in physics at Tufts University in Boston, she conducted postdoctoral research at Harvard University in Cambridge and simultaneously joined the Main Injector Neutrino Oscillation Search team at the U.S. Department of Energy's Fermi National Accelerator Laboratory near Chicago. Sanchez also received two prestigious National Science Foundation awards for her work with neutrinos — the Early Career Development Award in 2011 and the Presidential Early Career Award for Scientists and Engineers in 2012.

While FSU's HEP group has concentrated on theory and experiments related to discovery of fundamental particles for nearly 70 years, pursuing research that enhanced understanding of neutrinos had remained on the wish list.

"Mayly's research program fits exceptionally well with the HEP group, and she's providing expert leadership as we expand in neutrino physics," said Sam Huckaba, College of Arts and Sciences dean. "She's an influential researcher and a dynamic addition to our faculty."

Fundamental particles like the more widely known protons, neutrons, and electrons form the atoms composing all known matter — substances that make up the observable universe. While protons, neutrons, and electrons can decay into neutrinos and other particles, neutrinos are as small as matter gets, and their properties are largely unknown. They're produced constantly by natural and manmade processes when atoms come together or break apart, from star explosions to the natural radioactivity of potassium in bananas.

"When the universe initially came to be, there were equal amounts of matter and antimatter that could be entirely annihilated. That we are here means something caused more matter to survive. There's a good possibility this was caused by particles decaying into neutrinos, so neutrinos absolutely connect to fundamental questions about the universe," said Sanchez, who was named among Latin America's top 10 women scientists by the BBC in 2013.

While neutrinos, which scientists first discovered in the 1950s, are known to have mass, no experiment to date has succeeded in measuring them. They're also difficult to study because they rarely interact. To better observe neutrinos, researchers engineer massive detectors where intense sources of neutrinos are directed to create interactions.

"The way neutrinos interact is very elegant," Sanchez said. "When a neutrino interacts with the nucleus of a material, charged particles like electrons are produced. A clean interaction occurs when we clearly see particles coming out of the interaction."

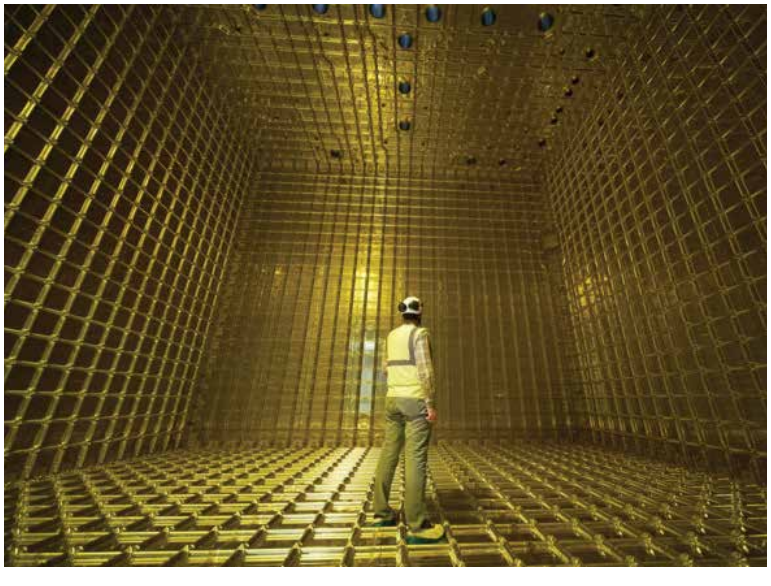
The Wyatt-Green Chair in Physics Sanchez holds is made possible by the generosity of physicist, entrepreneur, and FSU alumnus Philip Wyatt who endowed the chair. The name also honors nuclear theorist Alex Green, founder of FSU's nuclear physics program and one of Wyatt's faculty mentors. In this role, Sanchez enhances research within the department and fosters critical collaborations among FSU researchers and scientists from around the world. Her work, including the Fermilab experiments, adds to the legacy of HEP research at FSU.

"One project, the Deep Underground Neutrino Experiment, DUNE, is a large international collaboration among over 1,400 scientists and involves giant underground neutrino detectors at Fermilab and the Sanford Underground Research Facility in South Dakota," she said.

Another project Sanchez leads, the Accelerator Neutrino Neutron Interaction Experiment, ANNIE, consists of a 26-ton water-based neutrino detector at Fermilab and supports scientists developing a next-generation detector equipped with advanced photosensors.

Sanchez is also shaping the future of the entire field. She serves on the 25-member Particle Physics Project Prioritization Panel, which meets every 10 years to prioritize research most critical to propelling physics forward in the next decade and to advise DOE and NSF.

"Thanks to Mayly, FSU has a huge leadership role in ongoing and new U.S. physics experiments," said Emeritus Professor of Physics Kirby Kemper. "Her involvement in the preparation of the latest long-term plan for high energy physics is a clear demonstration of the community's respect for her advice and expertise in moving this important field forward." <



A look inside one of 12-meter cube prototype neutrino detectors developed to test technology ahead of the detector build for the Deep Underground Neutrino Experiment at Fermilab. Photo courtesy Max Brice/CERN.

Seminole Scholarship

Historian Andrew Frank unites disciplines, amplifies voices within Florida State's Native American and Indigenous Studies Center

By Dena Reddick

Most new students arrive at Florida State University excited to become the newest class of Seminoles, but few understand at that moment the depth of history, courage, and community imbued by the name.

Enter Andrew Frank, Allen Morris Professor in the Department of History, who teaches one of the most highly attended courses each semester — History of the Seminoles and Southeastern Indians. The course, which may be the lone chance some students have to take a Native American history class, attracts interest from nearly every FSU discipline and introduces non-history majors to this pivotal part of history.

Andrew Frank. Photo by Devin Bittner.

Frank, who joined FSU's faculty in 2007, takes seriously the opportunity and aims to demonstrate that historical scholarship goes beyond reading old books to memorize and reshuffle facts according to tenets of modernity.

"There's so much we don't know about the past and so many details we haven't paid attention to because we didn't deem them important," he said. "But when we look at a wider range of evidence and ask new questions, the past can look really different."

Since graduate school, Frank's research has centered on Indigenous peoples. His doctoral studies at the University of Florida focused on the Creeks, and his dissertation-turned-book, "Creeks and Southerners: Biculturalism on the Early American Frontier," examined families formed in the American South between Creek mothers and English fathers. As an assistant professor at Florida Atlantic University in Boca Raton in the mid-2000s, Frank inherited an extensive collection of works on Seminole history, which, along with his proximity to the Seminole Tribe, inspired his specialization and eventual transition to FSU.

"I hope to help the Seminoles as they tell their own history," he said. "Among the things I provide is an academic voice to echo what they've said about their history for a long time. Seminoles are the best repositories of their own history. They do a marvelous job of educating the public with the world class Ah-Tah-Thi-Ki Museum on the Big Cypress Seminole Indian Reservation."

Using archeological records, written documents, oral history, and collective communal knowledge, Frank explores the history of the Seminoles and Indigenous Floridians from before the written record to present day. His work reframes the Seminoles as Indigenous people rather than migrants. The year in which the Seminoles migrated to Florida is a common historical misconception: In archeological and historical record, as well as oral history, the Seminoles have been in Florida longer than the written record.

Frank helps communicate Seminole history via lectures, media engagements, and books, including "Before the Pioneers: Indians, Settlers, Slaves and the Founding of Miami," and the forthcoming "Those Who Camp at a Distance: The Seminoles and Indians of Florida."

With the formal establishment this fall of the Native American and Indigenous Studies Center, of which he serves as founding director, Frank is further broadening Indigenous scholarship at FSU and beyond.

"The center works from the knowledge that the Seminole Tribe of Florida and other Indigenous nations see Tallahassee and other FSU campuses as their homelands," Frank said. "It also acknowledges that FSU has called itself the 'Seminoles' since it became a coeducational school in 1947. This relationship extends beyond our use of the tribe's name and symbols in athletics. The center exists as part of a larger commitment of the university to collaborate with the Seminole Tribe of Florida as intellectual partners."

The NAIS Center intellectually unites more than two dozen experts from FSU programs and entities, including anthropology, art, art history, geography, history, modern languages and linguistics, music, nursing, religion, social work and the FSU Libraries, to create scholarship on past and present Indigenous communities and serve as a hub to share research.

The physical center is envisioned as an inviting space for students to connect with Native American culture and interact with Indigenous art and cultural artifact displays on loan, and its College Avenue location and proximity to the iconic Westcott Plaza are intentional marks of respect.

"The NAIS Center adds a necessary component previously missing from our academic community, and we're pleased to provide support," said College of Arts and Sciences Dean Sam Huckaba. "Andrew Frank and his colleagues across campus have been working with and studying Indigenous communities for many years. The center provides a more cohesive approach and opens doors to meaningful outreach and engagement opportunities."

NAIS researchers have already connected with Native American historic preservation offices to incorporate their voices into the center, including the Seminole Tribe of Florida, the Seminole Nation of Oklahoma, the Miccosukee Tribe of Indians of Florida, the Catawba Nation in South Carolina, and the Muscogee (Creek) Nation and Choctaw Nation in Oklahoma.

"Our goal is to become the regional showcase for what partnering with a tribe means and the intellectual benefits derived, both for these tribes and ourselves," Frank said. "Florida State can become a centerpiece of scholarship on Native American and Indigenous studies." ‹

Learn more about the Native American and Indigenous Studies Center at nais.fsu.edu.

The physical home of the new FSU Native American and Indigenous Studies Center sits along College Avenue, just steps away from the historic Westcott Plaza. Photo by Devin Bittner.

A Bird's Life

Biologist Emily DuVal investigates complex rituals of lance-tailed manakins and what such animal behaviors can mean for human relationships

By Hannah Fulk

In today's age of dating apps, the average person has likely swiped through hundreds of profiles looking for a match. Whether it's someone's eyes or smile, such characteristics intrigue potential partners and can be the spark for a lifelong partnership.

Emily DuVal holds a male lance-tailed manakin as part of a research trip in the islands of Panama. Courtesy photo. Facing page: Emily DuVal. Photo by Devin Bittner.

In the animal kingdom, mate selection can be just as challenging. Instead of swiping on Tinder, OkCupid or Match, however, animals rely on complex rituals to select mates based on chosen characteristics, and birds, including the lance-tailed manakin, put on some of the most exciting mating displays in nature.

These compact birds, just about five inches long, are found in the forests of Central and South America, and male manakins are marked by their red cap and blue cape on an all-black body. Their unique mating ritual involves one male manakin repeatedly jumping over a cooperating male partner — a wingman — to attract the interest of a female.

Florida State University professor of biological science Emily DuVal has spent nearly three decades studying these birds while investigating the underpinnings of sexual selection, the process through which animals choose mates. Her work cultivates a deeper understanding of how manakins make mating decisions, engage in cooperation tactics, and form alliances to ensure survival of their species. What she's learned can help explain, on a simplified scale, human relationships.

"Animals do amazing things and lead lives filled with complicated social interactions," DuVal said. "We've discovered birds have neighbors, partners and family, and some birds have rich individual histories like us. As I learn more about how these birds' decisions produce patterns in the wild, it raises questions about why animals behave the way they do in all their beautiful complexity."

Research on sexual selection has often focused on flashy traits and behaviors in male birds. While the flamboyant males' displays factor into female manakins' mating decisions, they may not be the sole criteria. DuVal's research team has found that male birds' age, experience, and proximity to their neighbors are important for mating success, but some of the team's main insights stem from investigating the female birds' perspective, such as how they assess male birds and how their search behavior changes as they age.

"In part inspired by the intricacies of manakin relationships, my team developed a mathematical model, Inferred Attractiveness, that proposes a new idea about how females choose mates," DuVal said. "We suggest females learn from each other's mate choices but use the context of other males to decide what makes a chosen male attractive. Because observing females aren't mind-readers, they can make 'mistakes' in inferring what traits are important, and this generates some interesting patterns over time. This model is designed to explain why our observations don't always match up to current theories, which for example suggest 'good' genes drive mate choices in many species."

DuVal, who is also 2023 president-elect of the Animal Behavioral Society, a non-profit scientific society founded to encourage and promote the study of animal behavior, publishes collaborative works using high-quality data that tell a story about lance-tailed manakins for future work in genetic differences among bird species. She has returned to the same field site to track individual manakins for the past two decades, and she plans to collect another 10 to 15 years worth of data with the goal of establishing one of the most complete evolutionary studies on bird mating behaviors, which can offer potential insights into the human sexual selection process.

"I originally wanted to become a veterinarian, but I quickly realized animals visiting the vet were not happy," said DuVal, who earned a doctorate in animal behavior in 2005 at the University of California, Berkeley before joining FSU's faculty in 2008. "I wanted to experience and study animal behaviors in their most natural states because that's when they teach us most about ourselves."

DuVal is also committed to helping up-and-coming biologists match with opportunities that will allow them to pursue their own lines of research. While at Berkeley, she funded her doctoral research via the National Science Foundation Graduate Research Fellowship Program, among other sources, and she illuminates the program's funding process for her own doctoral students and others as cohost of FSU's annual NSF GRFP workshops.

"I love working with Dr. DuVal. Our collaboration has involved how to develop research questions and hypotheses, as well as mastering the art of expressing them within grant applications," said doctoral student Pearl Rivers. "She has been an unwavering pillar of encouragement throughout my graduate school experience."

"I originally wanted to become a veterinarian, but I quickly realized animals visiting the vet were not happy. I wanted to experience and study animal behaviors in their most natural states because that's when they teach us most about ourselves."
— Emily DuVal

FLORIDA STATE UNIVERSITY
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Construction underway on new Interdisciplinary Research and Commercialization building

From left: FSU Director of Research Facilities Design, Construction and Maintenance Mary Jo Spector and project engineer Marcus Williamson, from the Whiting-Turner Contracting Company, conduct a site visit at the Interdisciplinary Research and Commercialization Building. Photo courtesy FSU Facilities/Chelsey Falb.

A Florida State University project a decade in the making is expected to reach completion in December 2024 and provide a hub for expanding research and creative activity across disciplines.

The 116,000-square-foot Interdisciplinary Research and Commercialization Building, located in the Innovation Park corridor of FSU's Southwest Campus, is designed to facilitate interactions in laboratories, core facilities and strategically placed collaboration spaces. It will consist of three floors of mostly open labs, sized for up to 30 research groups, 24 postdoctoral researchers, and 155 graduate and undergraduate students.

Faculty from College of Arts and Sciences departments including chemistry and physics will share IRCB with researchers from the FAMU-FSU College of Engineering, and the new facility is strategically located near the FSU-headquartered National High Magnetic Field Laboratory, the High-Performance Materials Institute, and the Aero-Propulsion, Mechatronics and Energy Building.

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