

OUTLOOK

A portrait of Michael L. Klein, an older man with grey hair, wearing a dark blue suit jacket, a white shirt, and a striped tie. He is standing in front of a building with large windows and greenery in the background.

**Michael L. Klein:
Setting the course
for excellence**



For your leadership as dean
and inspiring example as a scientist and teacher,
thank you Michael L. Klein, FRS

for moving the College of Science and Technology forward
in research, teaching and engagement with the world.

From the students, faculty, staff and graduates of the College
of Science and Technology.

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Fall 2023

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Message from Michael L. Klein, FRS

The success CST has achieved over the past decade has been extraordinary, from expanding our research enterprise to helping power Temple's rise to R1 research status and opening the Science Education and Research Center to hiring outstanding researchers and enabling thousands of graduates to move into successful science and tech careers.

This year, we take another step forward as Migual Mostafá, CST's new dean as of October 1, 2023, charts the course for the college. You can learn more about his impressive career in *Outlook*. I wish him the best of luck as he continues to push our college forward.

After having served as CST dean and interim dean for more than 11 years, I have moved back to research and teaching full time. I will continue to run a vigorous collaborative research program as director of both the Institute for Computational Molecular Science and the Temple Materials Institute.

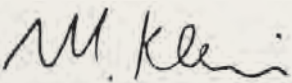
Leading our college was one of the great honors of my career. For me, CST graduation—seeing the joy and happiness on the faces of our graduating students and their families—never failed to lift my spirits.

I enjoyed working with so many talented students, who I see as our strongest hope for addressing the many challenges we face here on planet Earth. There are so many dedicated faculty and staff at CST, each making important contributions to teaching, research, advising, professional development, facilities and more. Thank you for your efforts.

I want to highlight one CST leader, Susan Jansen Varnum. As senior associate dean for undergraduate affairs, science education and community engagement, Sue and her team work tirelessly to attract, enroll, educate and graduate outstanding students. From analyzing enrollment data to creating a supportive learning environment, Sue has made CST a home for students who want to excel and make an impact on our world.

To CST's Board of Visitors, Alumni Board and to all our graduates and partners around the world, thank you for making our college stronger. Your willingness to help guide the college, meet with students, volunteer for events and support us financially was inspiring. CST could not have achieved so much without your dedication and commitment.

Thank you.



Michael L. Klein, FRS
Carnell Professor of Science



Miguel Mostafá joins CST as new dean

BY DEIRDRE C. HOPKINS

Following a nationwide search, Miguel Mostafá was selected as the new dean of the College of Science and Technology. Beginning on October 1, 2023, Mostafá succeeded Michael L. Klein, FRS who returned to CST faculty to pursue his research and teaching interests as Laura H. Carnell Professor of Science and director of the Institute for Computational Molecular Science.

With 17 years of distinguished service as a faculty member at three R1 universities in the U.S. and seven years at two national laboratories, Mostafá's academic journey is marked by exceptional achievements in research, teaching and leadership. In his most recent position, he was associate dean for research and innovation at the Eberly College of Science at the Pennsylvania State University (Penn State).

"I am truly honored to join the Temple University community," Mostafá said. "Together, we will forge a path of excellence and innovation, fostering an inclusive environment where cutting-edge research, transformative education and collaboration converge to shape the future of science and technology. Our college will empower our students, faculty and staff to achieve their highest aspirations and impact our world."

Mostafá earned a PhD in physics in 2001 at the Instituto Balseiro in Bariloche, Argentina. His thesis in high-energy particle physics was done at the Fermi National Accelerator Laboratory.

Throughout his career, Mostafá has significantly contributed to high-energy and multimessenger astrophysics. His cutting-edge research spans a wide range of areas, from gamma-ray observations using the High Altitude Water Cherenkov Gamma-ray Observatory to groundbreaking work on cosmic-ray anisotropies and particle interactions through the Astrophysical Multimessenger Observatory Network project, which he led at Penn State. His research has garnered widespread recognition, with 11 renowned papers with more than 500 citations each and more than 2,000 citations annually since 2017.

Mostafá has also been a driving force in increasing diversity in physics, actively engaging with organizations such as the National Society of Black Physicists and the Society for Advancement of Chicanos/Hispanics and Native Americans in Science. His mentoring efforts have led to numerous prestigious awards and fellowships for his students and postdoctoral candidates, making him a recipient of the Distinguished Mentoring Award at Penn State.

"I have been consistently inspired by Temple's dedication to teaching, research, service and outreach," Mostafá said.





Graduation celebrates Class of 2023 success

BY GREG FORNIA

On May 12, the College of Science and Technology held a graduation ceremony for the Class of 2023 inside The Liacouras Center. More than 800 graduates earned bachelor's, master's, professional science master's and doctoral degrees in 2023.

The ceremony began with remarks from Dean Michael L. Klein, FRS, who thanked the graduates “for all you have done to make the College of Science and Technology a stronger college, and an exciting place for others to learn and to grow.”

The keynote speaker was Charles Tsan-Jian Chen, a world leader in the biotech industry with more than four decades of accomplishments in developing, producing and implementing forefront vaccine and diagnostic technologies benefiting human and animal health. Introduced by Hai-Lung Dai, Laura H. Carnell

Professor of Chemistry, Chen was awarded an honorary degree presented by Board of Trustee members Solomon C. Luo and Barry C. Arkles, CST '70, '76.

The student speaker was Nathan Zubin, CST '23, who graduated with a bachelor's in neuroscience. He is attending the Lewis Katz School of Medicine with the goals of becoming an oncologist specializing in neurological tumors and eventually to teach future medical students.

Michael Remaker II, CST '06, president of the CST Alumni Board, welcomed the new graduates into the Temple alumni community and urged them to “when you're ready, consider what you can do to change a student's life.”

Learn more about the Class of 2023 at cst.temple.edu/Classof2023.

Celebrating two Goldwater Scholars

BY LINDSAY HARGRAVE

Two members of the Class of 2024 are breaking down barriers in STEM as the first two Temple University women to receive Goldwater scholarships in the same year. The two recipients are biology major Nala Hamilton and mechanical engineering major and chemistry minor Diana Tiburcio.

The Goldwater Scholarship is one of the oldest and most prestigious national scholarships in the natural sciences, engineering and mathematics in the United States. It is awarded to college sophomores and juniors based on their research merit and promise as a future researcher.

PHOTO: JOSEPH V. LABOLITO



Nala Hamilton

Originally from Harrisburg, Hamilton is a first-generation college student. She began her research journey the summer after her first year in Associate Biology Professor Rob Kulathinal's genetics lab, and she hasn't looked back since.

Her work in this lab focused on computational genetics, an area of study Hamilton had been interested in since high school. Immediately, Kulathinal gave her the freedom to choose what she wanted to work on within the field of genetics and create her own direction in research.

She began to research sex disparities in cancer to investigate whether they could be attributed to genetics, or whether the differences were environmental.

Hamilton emphasized that Temple has not only provided ample opportunities to pursue the research she loves, but also the resources to do so. "One thing that's really great about Temple is the university provides excellent research and scholarship opportunities," she said.

Hamilton has also received a Diamond Research Scholarship to continue to investigate sex disparities in other diseases besides cancer this past summer. After that, she's looking to apply to PhD programs to continue her research. In addition, Hamilton is a recipient of the Velay Fellowship, which supports her research.

An underlying theme throughout all of her research, Hamilton said, is making science communication accessible to everyone.

"With COVID-19 I got that science communication was something that people really struggle with, and the distrust in science is pretty big now," she said. "It's just been on my mind, and I'm super aware of it when I present. I want to be as clear as I possibly can and make it so that normal people like my grandma can understand it. That's my goal, and so I do that in my research."





PHOTO: JOSEPH V. LABOLITO

Diana Tiburcio

Tiburcio is a first-generation citizen from Mexican-born parents, and although she was born in Georgia, she spent the majority of her life growing up in Malvern, Pennsylvania. In addition to her commitment to researching clean water and nutrient recovery, Tiburcio is on Temple's fencing team.

She entered the world of research when looking for a job on campus. That's when she discovered how much she enjoyed working in a lab and participating in the hands-on, fast-paced research environment.

"[I worked in] an environmental engineering lab focused on collecting water samples in between the I-95 highway and the Delaware River, and then taking the metal concentrations of those water samples to see how metals are transported underground and run off from the highway," she said.

As a chemistry minor, Tiburcio has also worked in an inorganic chemistry lab under Chemistry Chair Ann Valentine, where she is researching proteins and trying to characterize how they reduce and react with metals such as iron and titanium. However, her passions still lie in environmental science, particularly access to clean water.

"I think water security is still a very prevalent issue in too many countries," she said. "Water is so present in so many issues, and not only influences the environment in so many ways, including human and public health. So I think that's one of my biggest goals still is to find better, more efficient ways to treat water, so that everyone can gain access to clean water."

In addition to being a Goldwater scholar, Tiburcio is also a MARC (Maximizing Access to Research Careers) scholar. MARC's goal is to "develop a diverse pool of undergraduates who complete their baccalaureate degree, and transition into and complete biomedical, research-focused higher degree programs."





PHOTO: KELLY & MASSA

BIOTECH ENTREPRENEUR CHARLES TSAN-JIAN CHEN HONORED AT CST GRADUATION CEREMONY

BY GREG FORNIA

Charles Tsan-Jian Chen, a world leader and entrepreneur in the biotech industry with more than four decades of accomplishments in developing, producing and implementing forefront vaccine and diagnostic technologies benefiting human and animal health, was awarded an honorary doctoral degree from Temple University at the College of Science and Technology's graduation ceremony.

A citizen of Taiwan, Republic of China, Chen is founder and CEO of the publicly listed Medigen Vaccine Biologics Corp. (MVC) and the privately owned Sweitzer Biotech Co. of Taiwan. He is also a major investor of Taiwan Bio Therapeutics Inc., a company dedicated to regenerative medicine and cell therapy.

MVC, in collaboration with the U.S. National Institutes of Health and Dynavax Co., successfully developed a COVID-19 subunit vaccine that has been received by millions of people in Taiwan and several other countries. The vaccine, because of its excellent immunogenicity, safety profile and stability at elevated temperatures, is the first vaccine selected by the World Health Organization's Solidarity Program for worldwide clinical trial and applications.

Chen received his BS in psychology from National Taiwan University in 1974. He has since self-taught to become an expert in vaccine and diagnostic technologies for human and animal diseases. He has coauthored dozens of scholarly papers in top journals such as *The Lancet*. Chen was also a Chair Professor of Industry-Academia Collaboration at National Yangming Chiaotung University.

"Today, you sit here, waiting for the tassels to be turned so you can walk out here to begin your life," said Chen, who was appointed a Distinguished Adjunct Professor of Biotechnology in CST's Department of Biology in 2015. "I say, remember, find the purpose in your life, and when you encounter difficulties, persist to prevail."



First geoscientist at Temple becomes Fulbright scholar

BY MARIA KLECKO

Growing up along the coast of the Black Sea, Ilya Buynevich was fascinated by the seaside landscapes and underwater mysteries.

Now an associate professor in the Department of Earth and Environmental Science, Buynevich has pursued his passion for marine and coastal geology. His work has earned him a Fulbright scholar award to teach, conduct field research and carry out a professional project in Estonia. Buynevich is the first geoscientist at Temple to receive this prestigious honor and the first-ever U.S.-based geology grantee in Estonia.

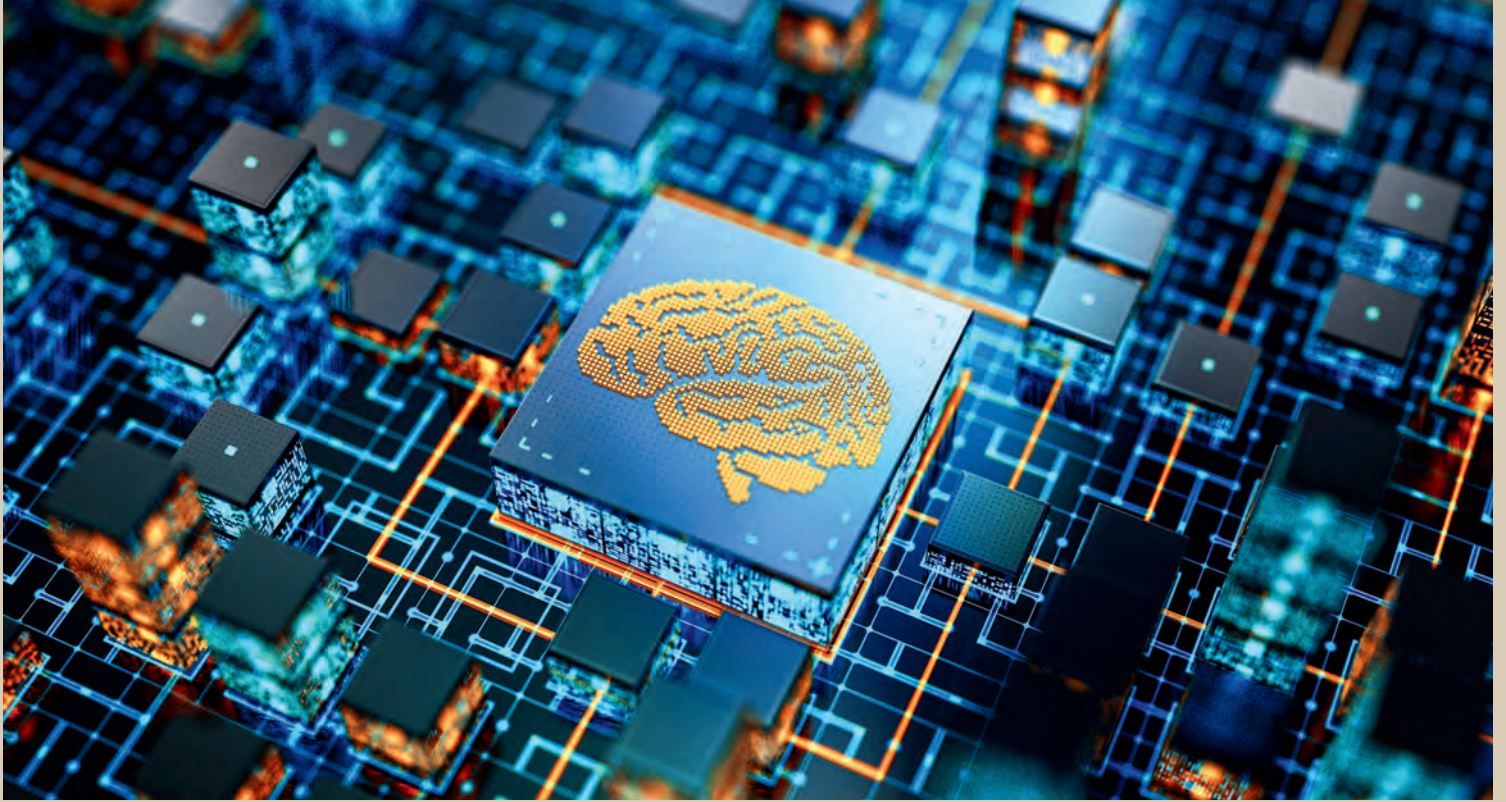
Buynevich is presented with a unique opportunity in Estonia because of the country's post-glacial uplift, which outpaces the rising sea level. This uplift means the land and sea floor are slowly rising, and consequently the geological archive of past climatic and oceanographic events is easier to study.

Buynevich will implement georadar and magnetic tools to identify, map and quantify the effect of intense North Atlantic and Baltic Sea storms along Estonia's coast. These tools show what's happening underground, allowing geologists to see deep into the subsurface of the beaches and coastal wetlands, which serve as a geological archive of climatic events. These events tell the history of not only intense storms but also long-term wave climate and the impact of sea ice.

He is examining wind records in sand dunes as well. A holistic approach is used for this work in which data is collected from different sources such as tree rings, minerals, X-rays of the beach and even conversations with local residents. "The coast is the most dynamic geological environment on Earth," said Buynevich. "We can see how humans have affected the coastal landscape."

In addition to field work, Buynevich teaches courses in coastal processes and geohazards at Tallinn University and contributes to the design of the newly developed Processes in Active Beaches and Coastal Landscapes and Management of Coastal Areas course.

Additionally, he's studying the impact of large animals on the coastal landscape, which he says can be a challenging pursuit. "I like a good challenge, like learning Estonian," said Buynevich. "I like the challenge of finding something not as obvious and sometimes buried. When you go after the biggest challenge, you end up with the greatest reward."



NSF awards Temple and others \$19.5 million for artificial intelligence research in education

BY JENNY LACKEY

Temple University, along with the University of Illinois at Urbana-Champaign, the University of Florida and Educational Testing Services, will have five years and \$19.5 million to pursue inclusive and intelligent technologies for education, as part of the National Science Foundation's National Artificial Intelligence Research Institutes Accelerating Research, Transforming Society and Growing the American Workforce program.

"The challenge we are addressing is that in the United States, our K-12 school systems are designed around rigorous standards for learning, and there are significant gaps in access, relevance and outcomes, particularly for learners that come from underserved populations," said Jamie Payton, chair of the Department of Computer and Information Sciences, who is leading the Temple project. "We see social and emotional learning as the key missing component that would offer learners equal access to academic achievement."

The NSF-funded Institute for Inclusive and Intelligent Technologies for Education (INVITE) will reimagine how educational technologies interact with learners by developing AI tools and approaches that address the national challenge of an equitable education for all. With

a higher response to learner needs, behaviors and development, this new generation of systems align with a holistic approach to learning. The institute will advance AI research to create intelligent tools in support of three social and emotional learning skills: persistence, academic resilience and collaboration. Research and outreach activities will include 96,000 learners across 24 school districts and nonprofits that span eight states.

The aim is to amplify what teachers already do, with the added benefit of machine learning and natural language processing. INVITE's AI research will focus on classroom integration of AI-based tools that empower teachers to support learners more holistically and in more developmentally appropriate ways.

"I am so proud that a National AI Research Institute is now at Temple University," said Payton. "At Temple, our mission is to provide an excellent, affordable and inclusive education to all students. As a public university in the heart of Philadelphia, we want to build bridges in our local, national and global communities to advance education and opportunity for all."

NEW TEMPLE RESEARCH INSTITUTE EXPLORES SCIENCE OF CELL MEMBRANES AND NON-BIOLOGICAL SURFACES/INTERFACES

BY BRUCE E. BEANS

Researchers from the College of Science and Technology, the Lewis Katz School of Medicine (LKSM) and Fox Chase Cancer Center have come together to launch the Temple University Institute for Membranes and Interfaces (TIMI).

"Membranes and other interfaces represent the boundaries between various matter in nature, and a vast number of processes in nature and in industry occur at these surfaces and interfaces," said Hai-Lung Dai, TIMI's director and Laura H. Carnell Professor of Chemistry.

For example, current research involving surfaces and interfaces includes improving solar cell efficiency; the trapping and conversion of carbon dioxide at the surface of catalytic materials to mitigate global warming; and improving the transport of pharmaceutical molecules through human cell membranes.

The study of surfaces/interfaces are particularly important for research of nanoparticles. "The smaller particles get, what is happening at the surface becomes more and more important," Dai said. Furthermore, "understanding cell membrane functions is critical to the understanding of mechanisms of life and to the development of biomedical strategies for treating diseases, including assisting drug design."

TIMI's growing list of researchers come from both within and outside of Temple. Researchers include Michael L. Klein, Laura H. Carnell Professor of Science, and Vincenzo Carnevale, associate professor of biology, who are world leaders in developing computational capabilities for investigation the structure of and processes involved at membranes and interfaces. Dai is a pioneer in the development of laser-based methods for studying surfaces. Eric Borguet, professor of chemistry, is a leader in laser spectroscopic studies of electrode surfaces.

TIMI also includes researchers from LKSM and Fox Chase. External collaborators include researchers from the University of California-San Francisco Medical School, the Air Force Research Laboratory and the Army Research Laboratory.



PHOTO: RAHUL BHADANI

Mathematicians part of key study on AI-powered cruise control

BY BRUCE E. BEANS

CST mathematicians played a key role in the world's largest-ever test to determine if cars equipped with artificial intelligence (AI) technology can help maximize fuel efficiency and mitigate traffic jams.

During morning rush hour traffic over five days, the CIRCLES Consortium, a collaboration involving university researchers, automakers and the Tennessee Department of Transportation (TDOT), collected 3,800 hours of vehicle driving data. The test was conducted on a four-mile stretch of Interstate 24 near Nashville, which has been fitted with about 300 ultra-high-definition, pole-mounted cameras to digitally track every vehicle's behavior.

The test studied the impact of 100 vehicles with AI-enhanced adaptive cruise control (ACC) systems on traffic flow to demonstrate that vehicles with automation capabilities, if properly supervised and controlled, can make traffic flow smoother on real highways and also reduce fuel consumption and fuel costs, greenhouse gas emissions, and air pollution and offer protection for both vehicles and drivers.

The study expands on earlier findings that demonstrated that just one well-controlled automated vehicle could modify the driving behavior of 20 other cars and smooth human-caused traffic waves, reducing fuel consumption 40%.

The vehicles used in the study have a stock ACC system, equipped with sensors and the capability to slow down the vehicle automatically if the vehicle ahead is slower than the set speed. Researchers replaced the stock ACC logic with trained AI solutions to fuse external big-picture traffic density information with the sensor information provided from the vehicle sensors.

"This new data set will lead to so many new insights into how we drive and how this affects the flow of traffic," said Professor Benjamin Seibold, an applied and computational mathematician and director of CST's Center for Computational Mathematics and Modeling, who has a long record of researching the theoretical dynamics of traffic waves. Assisting Seibold on the project are Mengsha Yao, a postdoctoral researcher, and Nour Khoudari, a mathematics PhD student.

The CIRCLES Consortium research is supported by NSF and the U.S. Departments of Transportation and Energy.

Physics leading national effort to study quarks and gluons

BY GREG FORNIA

CST's Department of Physics is part of a national wide-ranging collaboration focusing on solving challenging problems central to advancing knowledge in nuclear physics.

The U.S. Department of Energy (DOE) announced funding for five collaborations focusing on theoretical topics in nuclear physics. Temple will lead the Quark-Gluon Tomography (QGT) Collaboration. The principal investigator (PI) on the project is Martha Constantinou, associate professor of physics, who also holds one CST's Selma Lee Bloch Brown Professorships. The co-PI is Andreas Metz, professor of physics.

Using tomography—a process of forming images of the interior of an object from measurements made from high-energy scattering processes—the QGT Collaboration will develop the theoretical framework for exploring the three-dimensional (3D) internal structure of visible matter's core: the nucleons and nuclei. With such a theoretical framework, the collaboration will be able to make state-of-the-art predictions on the properties of fundamental particles.

"Fundamental particles like the nucleon are made out of quarks and gluons, which govern their properties," explained Constantinou. "Understanding how quarks and gluons build the visible universe is one of the grand challenges of modern science."

With a 3D map of the motion and spatial position of quarks and gluons within the nucleons, Constantinou said researchers can address many essential—and still unanswered—questions such as how do the spin and orbital angular momentum of quarks and gluons within the nucleon combine to make up its total spin?

The QGT Collaboration, which will receive more than \$2.5 million in DOE funding over three years, is a consortium of 12 universities and three national laboratories. "Having a diverse group of scientists with different expertise is imperative to the success of the scientific goals of the QGT Collaboration," said Constantinou. "Collaborating with national labs will also benefit our graduate students and postdoctoral fellows, as it can offer mentorship, networking and research opportunities at DOE laboratories."

Three physics graduate students are currently part of the initiative. Joshua Miller is using supercomputers based in both the U.S. and Europe to study the quark component of the proton's 3D structure. Chris Cocuzza is investigating the spin structure of the nucleon in terms of quarks and gluons and Joey Delmar is studying the gluon structure of fundamental particles like the proton, pion and kaon.



Martha Constantinou,
associate professor of physics



PHOTO: JOSEPH V. LABOLITO

CST HELPS INSPIRE STUDENTS AT LONG-RUNNING CARVER SCIENCE FAIR

BY REMY ANDREA

In early March, 41 teachers and 291 students representing 36 schools from across the Philadelphia region gathered on Temple's campus for the annual George Washington Carver Science Fair, organized by CST and Temple's Office of Community Affairs and Engagement.

Featuring sessions for elementary, middle and high school students, project topics ranged from traditional sciences such as chemistry and biology, to computer science and psychology. Students tested windmill efficiency, crafted their own bath bombs, measured the effects of anxiety on lung capacity, designed roller coasters and more.

A 40+ year collaboration between Temple and the community and one of the longest-running urban science fairs in the country, the Carver Science Fair "gives opportunities to hundreds of elementary through high school students to hypothesize, experiment and develop a love for STEM," said Sarah Wengryniuk, associate professor of chemistry, who has volunteered for the fair since 2015.

Seanna Monroe, CST '22, a math with teaching major who volunteered at the most recent fair, explained that the Carver Science Fair does not simply teach the procedure of science but bestows a lesson of curiosity amongst its participants, something that all students can benefit from.

"When it comes to science fairs, it gives them a chance to facilitate their own learning and give them a 'eureka moment,'" said Monroe. "I hope that I can do what my math teacher did, which is instill a sense of confidence in the next generation of STEM students."

TEMPLE-LED RESEARCH ESTABLISHES IMPORTANT, NEW NUCLEAR PHYSICS PUZZLE

BY BRUCE E. BEANS

A Temple-led consortium of 46 U.S. and international physicists from 18 different universities and national laboratories has identified an anomaly that establishes a new, important puzzle for nuclear physics.

"We were able to measure, with unprecedented precision, the electric generalized polarizability (EGP) of protons," said Nikos Sparveris, associate professor of physics, principal investigator and spokesperson for the Virtual Compton Scattering (VCS) collaboration. "It is a fundamental property of the system that characterizes the susceptibility to deformation, or 'stretchability', of the proton in the presence of an external electric field."

Sparveris said the findings are significant not only for physics but for science in general because proton is the only composite building block of matter comprised of fundamental particles that is stable in nature.

Titled "Measured proton electromagnetic structure deviates from theoretical predictions," the research began seven years ago with experiments that involved scattering of an electron beam from a liquid-hydrogen nuclear target at Thomas Jefferson National Accelerator Facility. The resulting data was analyzed over three years. The paper was published in *Nature*, one of the world's most prestigious journals.

According to the paper's referee reports, this is a novel and important experimental result that should be of wide interest to the scientific community, establishing a 'proton EGP puzzle' that should generate significant efforts to understand and explain the puzzle.

The group's research introduced new features in the experimental methodology and confirmed the puzzling behavior of this property much more accurately. Next, the group will propose a second-phase of experimental measurements at Jefferson Lab to further refine their results.

Besides Sparveris, principal investigator, Temple researchers included lead author Ruonan Li, CST '22; Hamza Atac, Temple research professor and three additional members of the Temple nuclear physics group. The consortium also included researchers from Jefferson Lab, Argonne Lab and the Artem Alikhanian National Lab in Armenia; 12 U.S. universities; and universities in Canada, India and Italy.

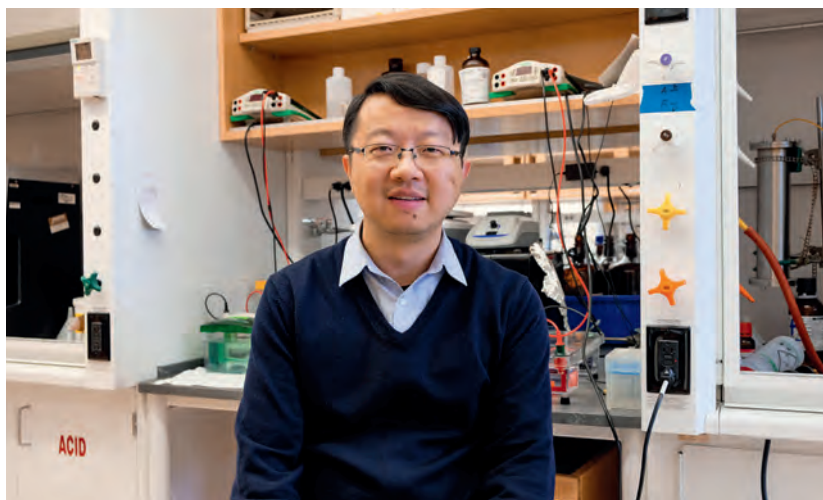


PHOTO: REMY ANDREA

Temple chemistry professor wins Young Chemical Biologist Award

BY GREG FORNIA

The International Chemical Biology Society (ICBS) has selected Rongsheng (Ross) Wang, assistant professor of chemistry, as a 2022 Young Chemical Biologist awardee.

ICBS cited Wang's significant contributions to the field of bioorthogonal chemistry (the study of chemical reactions that occur inside of living systems without interfering with native biochemical processes) through his pioneering work in developing a selective fluorine displacement reaction. These tools are being further developed to explore cell biology in various disease states, which could lead to new diagnostic tools for human diseases such as cancer, inflammation and autoimmune disorders.

"I'm honored to join an international community of outstanding researchers working to uncover solutions for diseases and promoting research and education at the interface of chemistry and biology," said Wang.

Earlier this year, Wang received a five-year, \$700,000 award from the National Science Foundation to develop chemistry-aided imaging techniques of cellular components.

"Ross has established a thriving research group at Temple and we are thrilled with his success," said Ann Valentine, professor and chair of the Department of Chemistry. "His team is doing groundbreaking research in bioorthogonal chemistry and chemical biology probes, one of the hottest areas of chemistry right now and the focus of the chemistry Nobel Prize this year. We're so proud that ICBS recognized Ross's research excellence."

Selection of this year's three awardees was made on the basis of accomplishments, groundbreaking contributions to chemical biology and promise as future leaders who will serve the chemical biology community.

According to Wang, the Chemistry Department has built a very welcoming atmosphere for researchers, faculty and students. "I appreciate the department's support for me to pursue interdisciplinary research and establish a chemical biology research group over the past six years," said Wang. "I've been given enough room to set up a vigorous chemical biology education program here with new courses."



PHOTO: JOSEPH V. LABOLITO

BREAKING DOWN THE MAGICAL MATH BEHIND TETRIS

BY LINDSAY HARGRAVE

Released in 1984, Tetris was the first popular puzzle video game and has sold more than 70 million physical copies and over 425 million digital downloads to date. To this day a variety of Tetris editions remain popular; the game is available on more platforms than any other video game in history and its reach continues to grow through Twitch streamers, content creators and professional tournaments.

Today, Tetris.com hosts several different versions, including the battle royale-style Tetris 99 and the multiplayer Tetris Friends. The movie *Tetris*, which recounts the race to license and patent the game, was released earlier this year.

David Futer, professor of Mathematics, explained that the game is intriguing from a mathematical perspective because there is a limited space on the screen and only seven shapes to use. “The elegance of the game comes out of the simple geometry involved,” Futer said. “Mathematicians like games where very simple rules lead to complex phenomena.”

He explained that not only do Tetris’ rules and endless possibilities create an interesting puzzle, but such puzzles have captured the minds of mathematicians for thousands of years. One of these games is Go, an ancient strategy board game in which two players compete to surround more territory than the other. Similar to Tetris, Go has simple pieces and rules, but can create seemingly endless combinations of moves and situations.

“Mathematicians and gamers alike are fascinated by simple puzzle games that lead to an infinite number of complex outcomes,” said Futer. “Tetris has mastered this formula.”

Buckets and Beakers showcases chemistry to local school children

BY GREG FORNIA

The College of Science and Technology, the Department of Chemistry and Temple women’s basketball partnered for Buckets and Beakers, a day of chemistry and basketball for more than 30 5th and 6th grade students from the Paul L. Dunbar School located adjacent to Main Campus.

With funding from CST’s Diversity Innovation Initiative Fund, Buckets and Beakers helped to spotlight chemistry for students from groups that are often underrepresented in STEM-related fields.

“Our main goal for the first iteration of Buckets and Beakers was to get young students excited about science,” said chemistry graduate student Zac O’Dell, one of eight graduate students from Professor Katherine Willets’ chemistry lab who participated in the event.

The morning session in Beury Hall featured interactive sessions on fireworks colors, chemiluminescence, color precipitation reactions, pH rainbow with dry ice and polymer chemistry, also known as ‘slime’ chemistry. After lunch, the students went to McGonigle Hall for a tour and a shootaround with the women’s basketball team. The day ended with a snack of liquid nitrogen ice cream.

“A lot of credit and a huge thank you goes to the chemistry team that prepped some really fun demos for the students,” O’Dell said, “but the real stars of the show were the members and staff of the women’s basketball team. Moving forward, we hope to build on this basketball-chemistry collaboration, and keep looking for creative ways to make science fun for young students.”

PHOTO: RYAN S. BANDENBERG





PHOTO: REMY ANDREA

Data science course offers first-year students problem-solving tools

BY ELISA LUDWIG

With a goal of better preparing students for their work at Temple and beyond, CST has launched SCTC 1013: Elements of Data Science for the Physical and Life Sciences, a course open to all CST students and a requirement for all biology students, natural science majors, TUteach majors, and students within all four environmental science concentrations.

The course focuses on basic computer programming in Python and statistical inference through hands-on data projects in biology, ecology, environmental science, genomics, chemistry and physics. The course was also developed as a web-based interactive textbook with live coding that students can access through laptops, iPads and other devices.

The course not only gives CST students, regardless of major, the data science tools they may need to solve problems, but also a methodology for applying those tools, a learning process which is fostered by aid from course assistants.

“We want to introduce students to working with data in a robust way—first, how do you bring in a data set, but then how do you think about it statistically using probability, even simulation,” said Jonathan Smith, director of Data Science First Year and an associate professor

of instruction in the Department of Chemistry. “Then ultimately toward the end of the course, we give them an introduction to machine learning and artificial intelligence.”

Students start with the basics of coding, looking at variables and data types, and then work up from smaller problems to larger data sets, practicing analysis and visualization. Each week, students meet for hands-on lab sessions, which steadily become more challenging over the course of 14 weeks, and the transformation instructors see over that time can be dramatic.

“By the end of the class, students are running a pretty sophisticated analysis of data sets, developing the code to analyze and visualize that data. And they’re presenting group projects on novel data sets that they have an interest in whether from their potential major or otherwise,” Smith said.

“One thing I love about the class is that regardless of experience or skill level with math, students can be successful,” said Susan Jansen Varnum, senior associate dean for undergraduate affairs, science education, and community engagement, who views data science as a critical tool in confronting nearly every global challenge. “The class builds quantitative skills, analytical reasoning, and logic, as a core foundation.”



Setting the course for excellence

BY ELISA LUDWIG

Michael Klein's enduring influence at CST—on teaching, advanced research, and support for students, faculty and staff—will leave a lasting legacy.

As dean of the College of Science and Technology for more than a decade, Michael L. Klein, FRS, led the college through a period of critical transformation. This year, he moves on from that role as he continues to pursue advanced research at Temple University.

Trained as a chemist, Klein has built an impressive body of interdisciplinary research, first bridging from chemistry to physics, then touching on chemical engineering and bioengineering, and more recently through biophysics to medicine. Klein was an early pioneer of using computer simulations to look at the behavior of molecules in complex systems and his work has been highly influential, with almost 117,000 total citations over his career and more than 700 articles with at least 10 citations each. His Hirsch-index, $h = 128$, is a measure of both impressive productivity and citation impact.

Klein's extraordinary career includes membership in the U.S. National Academy of Sciences and the World Academy of Sciences and as a Fellow of the Royal Society (FRS), whose members have included Isaac Newton and Albert Einstein. At the same time, Klein has honed a passion for teaching at several institutions including the University of Pennsylvania, before arriving at Temple in 2009.



Establishing research centers

Early on, Klein set out his priorities for CST, including a strategic plan for strengthening its research capabilities. Central to this plan was the development of new institutes and centers of excellence to drive research in emerging areas. Under Klein's leadership, a dozen institutes and centers of excellence were created. He also oversaw the final development and completion of the Science Education and Research Center in 2014, which is home to many of these research entities as well as teaching labs and classrooms.

"The centers serve as attractors for like-minded faculty, and even more importantly, their affiliated students and post-doctoral researchers," Klein says. "The latter offer undergraduate research experiences, potentially more rewarding than working with an isolated faculty member. Institutes and centers of research excellence often generate new topics for the undergraduate curriculum, new courses at the graduate level and new master's programs."

Building scholarly excellence

Among the emerging academic subject areas CST invested in during Klein's tenure as dean are high performance computing, evolutionary biology and functional genomics.

"These are now the research areas in which we are considered excellent, and they have become big areas of research around the world," says Sudhir Kumar, Laura H. Carnell Professor of Biology and Computer and Information Sciences and director of the Institute for Genomics and Evolutionary Medicine.

These investments had a cascading effect, says Kumar, heightening Temple's profile as a top research university, expanding CST's research funding portfolio and enabling the college to offer new undergraduate degree programs. For example, genomic medicine was one of the first of its kind in the nation and has seen strong enrollment growth since launching several years ago. "Students can now pursue cutting-edge careers that were not possible without the recruitment and investments that were made by the college," Kumar says.

Making research accessible

Klein also recognized that preparing students for STEM careers does not begin and end in the classroom, but must also encompass hands-on opportunities for conducting research. He nurtured the college's Undergraduate Research Program, now known as the CST Research Scholars Program (CST-RSP).

"Mike understands that undergraduate research is not only something that qualifies you for your career or for advanced study or for professional school. It's actually a pathway to graduation," says Susan Jansen Varnum, senior associate dean for undergraduate affairs, science education and community engagement. "As an undergraduate researcher, you immediately have a set of colleagues, people who are like minded, who will teach you skills and support your work."

Interest in research has exploded in recent years, she says, with up to 160 undergraduates pursuing CST-RSP projects each year. Many more are working on research through the Science Scholars Program for incoming students and sophomores, research opportunities available through CST's six academic departments and summer and international research experiences. "Research is not for the select few," says Varnum. "It's for the many, and Dean Klein has made that a reality for our students."

"Research is not for the select few. It's for the many, and Dean Klein has made that a reality for our students."

-Susan Jansen Varnum



Attracting top talent

Developing an exceptional research institution requires the consistent recruitment and retention of top faculty with high research impact. Klein focused his efforts on attracting promising assistant professors that either brought new research directions or helped bridge existing areas of expertise in the college, allowing for multidisciplinary collaboration.

Sudhir Kumar was one such recruit, brought to Temple from Arizona State University. He was impressed by many things about CST, but he was especially drawn to the school's vision for collaborative research efforts—in his case, combining computation, biology and medicine in the context of studying evolutionary changes to DNA.

Engaging with undergraduates

Even as he was spurring major growth in Temple's research areas, Klein remained committed to undergraduate students and improving the student experience.

"Dean Klein stayed personally involved in the undergraduate life of Temple, whether that was showing up for a Saturday Experience Temple Day, welcoming new students or playing cornhole at Convocation," says Ann Valentine, professor of chemistry and department chair.

Recognizing that science education at the university level faces numerous challenges, including students arriving to campus underprepared for science majors, Klein supported the creation of a new student seminar in 2019, a requirement for every incoming freshman at CST.

"There was an initial challenge of getting some faculty to understand the value of the course," says Tom Price, assistant dean of advising and student success. "Dean Klein took the initiative and agreed to teach it himself. To take the time and energy from all of his other obligations and connect with first semester students was beyond fantastic."

Not only did students have the rare opportunity to interact with the dean in 20-person cohort groups, but he set a powerful example with this act of leadership, says Varnum. "When a National Academy member and a fellow of the Royal Society is teaching a freshman seminar, that inspires other faculty to join in."

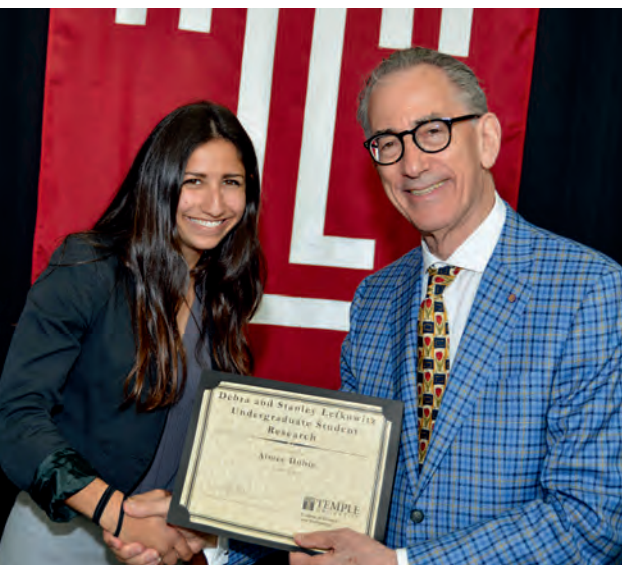
Supporting community initiatives

Klein promoted strategic outreach and community engagement efforts, such as programs aimed at middle and high school students from North Philadelphia and throughout the region, to spark interest in fields related to STEM and help demystify the path to higher education.

"He put as much effort and energy into that as he did into his own research and teaching," says Varnum. "He just has this huge commitment to the students and student communities."

For many, Klein put the mission of the college into action and in doing so expanded the reach of Temple's STEM programs. "We now offer quite a variety of educational activities, not only benefiting undergraduate and graduate students at Temple, but also pre-college students from local communities," says Hai-Lung Dai, Laura H. Carnell Professor of Chemistry and a former CST dean himself.





Setting the example

CST faculty and staff recognize Klein's contributions to the college and his focus on encouraging growth, providing opportunities, mentoring where needed and building trusting relationships.

“When I first came to interview here, it was already clear that he was someone important and a leading figure in the college. Later, when I was vice chair, he was a tremendous partner in listening to what we needed and being responsive to what would grow the department and keep us robust and healthy,” says Valentine.

CST faculty expect to see Klein's legacy live on in his innumerable contributions to the college. “Michael Klein is a true academic leader—he was able to recruit top scholars and guide the process of tenure and promotion of faculty in CST. He has been devoted to education at all levels,” Dai says.

“Michael Klein embodies the finest attributes of the academic scholar: incisive intelligence, collegiality and dedication to education,” says Barry C. Arkles, CST '70, '76, a Temple University Trustee and a member of the CST Board of Visitors. “Coupled with strong humanism, sense of humor and the active engagement with local and global scientific communities, he has built a reputational legacy for himself and Temple's College of Science and Technology.”

Getting back in the lab full time

Even while serving as dean, Klein continued to make important discoveries in his field, and he is looking forward to devoting more time to his research.

“It has been a privilege to serve as dean of the College of Science and Technology at Temple University for the past 10 years,” says Klein. “I was motivated by the desire to enhance the reputation of the college and provide all our students with a valuable educational experience.”

He has funding for his research lined up for the next several years and he remains active both nationally and internationally, serving on advisory panels and organizing international scientific conferences.

In the meantime, he envisions that the work in many ways has just begun: STEM education will play a major role in ensuring a more sustainable future for planet Earth.

“CST has embraced this challenge and started by creating new cross-school initiatives, new cross-department programs and new majors, such as ecology, evolution and biodiversity,” explains Klein. “Notably, we are only at the very beginning of this journey. Designing an optimal path forward for this important challenge will be one of the tasks awaiting the new CST dean.” ■



Learn more about how you can get involved at cst.temple.edu/alumni or email Jena Jefferson, CST Alumni Affairs, at jena.jefferson@temple.edu

Message from the CST Alumni Board

In my remarks to the Class of 2023, I stressed that “you never know what the world will throw at you, but it’s refreshing to see the camaraderie amongst Temple alumni wherever you go.”

I encouraged the most recent graduates of the College of Science and Technology to explore the opportunities available to alumni. That same advice applies to all of us, regardless of the year—or the decade—we graduated. Tap into Temple alumni resources and benefits. You can find them at alumni.temple.edu. Sign up for the Owl Network at ownetwork.temple.edu. Reach out and stay connected, whether it’s Homecoming, attending a college event or reviewing CST student resumes before one of the college’s job fairs. And when you’re ready, consider what you can do to change a CST student’s life and education.

The Alumni Board does this through its Endowed Alumni Scholarship Fund for talented students and the Owl to Owl Mentor Program. We are always looking for mentors who want to help guide a student on their academic and professional journey. You can have a tremendous impact in just a few meetings a year. Go to cst.temple.edu/OWL to learn more.

Whenever I see someone wearing a Temple shirt or fleece, I stop and say hello. I encourage you to do the same. Taking the time to make that extra connection can lead to so many amazing opportunities. Together, Owls can make a real difference in each other lives and the world around us.

Sincerely,

Michael Remaker, CST '06
CST Alumni Board President

Jennifer Gresh, CST '98 named to Gallery of Success

A leader in the environmental consulting industry, Jennifer Gresh has been named to Temple University’s Gallery of Success. A collaboration of Temple’s Office of Alumni Relations and Career Center, the honor recognizes outstanding alumni for their inspiring success.

Gresh, a U.S. Air Force Veteran and Licensed Professional Geologist, has dedicated her career to supporting the environmental needs of private and public sector clients throughout the Mid-Atlantic. Gresh was awarded the 2021 Touchstone Award by the Society of Women Environmental Professionals (SWEP) of Greater Philadelphia.

During her 25-year career, Gresh has provided high-level consulting services to the cities of Philadelphia and Wilmington along with numerous economic redevelopment agencies. These services have included strategic real property assessment, remediation, and planning for brownfield redevelopment projects and managing large multi-disciplined projects.

Before taking on her current role as Mid-Atlantic Environmental Practice Leader at Verdantas, Gresh served as the company’s

Philadelphia Division Director. Gresh’s recent projects include EPA Brownfield-funded environmental assessment and cleanup of abandoned oil terminals along the Schuylkill River to support redevelopment as Bartram’s Trail, city-wide assessments of Philadelphia’s parks and recreation properties for potential lead impact, and developing and implementing a soil and groundwater management plan for over 200,000 tons of excavated materials in support of construction activities for the Betsy Ross Bridge-Aramingo Avenue Interchange project.

A proud Temple alumna, Gresh is a past president of CST’s Alumni Board and has been a dedicated supporter of Temple University and the College of Science and Technology.





PHOTO: RYAN S. BRANDENBERG

David Dugue, CST '15, MED '21 Operating Room Artist

David Dugue remembers the dedication his single mother, Margaret Cesarius, put into her job as a nurse taking care of surgery patients. “She’d work insane hours,” Dugue recalled, leaving his maternal aunt and grandmother with “pretty involved hands” in raising him and his sister.

When Dugue’s aunt, Marie Lourdes Cesarius, was diagnosed with multiple sclerosis, helping to care for her fostered his interest in healthcare. But his aunt’s passing in middle school shook Dugue’s resolve in a way that resonated all the way to his biology and pre-med undergraduate work at Temple.

“A lot of my desire to go into medicine was to help her,” Dugue said. “But, at the same time, my motivation also wavered when she passed away.”

In college Dugue felt stagnant. His grades at Temple were “okay,” but he wasn’t sure they were adequate for admission to medical school. Instead, he pursued a master’s degree in biology at Drexel University, figuring he’d follow a talent for research into pharmaceutical development.

Dugue realized he disliked spending so much time in a laboratory. His desire to help people directly was rekindled, and with it came a new determination. He went back to Temple to pursue his medical degree.

At Temple, Dugue finished in the top third of students at the Lewis Katz School of Medicine, receiving the Jerry Zaslow Memorial Award for students who demonstrate high academic and well-rounded achievement. Dugue’s hard work paid off, helping to secure a postdoctoral residency at the Weill Cornell Medical College. Dugue is in training to become a plastic surgeon.

“In general medicine, I was unsatisfied with the prolonged treatment course,” said Dugue, who explained that much of the plastic surgery field deals with restoring “form and function” to people after traumatic injuries or treatments. “I like having the power to fix a problem at the tip of my fingers.”

**30
UNDER
30**

The 30 Under 30 program recognizes trailblazing young alumni who have demonstrated professional success in any industry, significant

community involvement or a commitment to maintaining a lifelong relationship with Temple University. 30 Under 30 highlights outstanding Owls from the more than 55,000 young Temple alumni who exemplify what it means to be Temple Made.

Anuj Mehta, CST '17 Driven Doctor

Surgery to repair an anterior cruciate ligament one week before he started medical school led Anuj Mehta to become fascinated with orthopedic surgery. Now, as an orthopedic surgery resident at Temple University Hospital, Mehta is devoted to helping people struggling with acute injuries get back to the same or better level than they were before.

“I really enjoyed my time at Temple, and Temple really provided me with the opportunity to become the person I am today in my career,” said Mehta.

In his second semester, Mehta became an undergraduate research assistant who served as a project liaison between two research labs—one led by Darius Balciunas, associate professor of biology, the other by Madesh Muniswamy, professor of medical genetics and molecular biochemistry in the Department of Translational Medicine at Temple’s Lewis Katz School of Medicine. The focus: using CRISPR/Cas9 gene-editing technology on zebrafish to study tissue regeneration capabilities.

“I thought the research was magical and it was paramount in me going to medical school,” said Mehta.

While at Temple, Mehta also trained to be a volunteer Temple emergency medicine technician. When a hospital patient’s heart stopped beating one day, Mehta immediately began CPR, which, in combination with the use of an automatic external defibrillator, saved the patient’s life. “It was scary, but at the same time it was an incredible feeling knowing that, in any setting, you can help someone,” he recalled.

While at Temple, Mehta helped found Phi Delta Epsilon Medical Fraternity in 2014 along with Riya Kulkarni, CST '17, now a pediatrics resident in Phoenix who recently became his fiancé.

Returning to the Temple Health in mid-2021 for his five-year orthopedic surgery residency was a no-brainer. “I wanted to come back to help treat people who really need it,” he explained. “Temple does a good job treating every single patient the same way, regardless of their resources or healthcare options.”

PHOTO: JOSEPH V. LABOLITO



Alexandra "Lexi" Jones, CST '18 Wave Whisperer

One Temple professor opened her eyes to the possibilities of a mathematics degree, another helped her land a research internship at the National Aeronautics and Space Administration (NASA). Now Alexandra "Lexi" Jones is combining her two passions: mathematics and understanding the Earth system.

Drawn to Temple because she liked the sound of its Honors Program, what also sparked her interest was access to plenty of STEM-related research opportunities.

As a PhD candidate in the MIT-Woods Hole Oceanographic Institution joint program in oceanography, Jones sometimes looks back at her blue-collar upbringing and marvels at the journey she’s taken.

“Anyone can be a scientist,” she said. “It’s who you meet along the way, and how they encourage you, that give you the confidence to make it a reality.”

At the end of Jones’ first semester, Professor Maria Lorenz sent her home with a book called *101 Careers in Mathematics*. From there, Jones started getting a clearer picture of her career options and switched her major from physics to mathematics. Then, as a sophomore, she conducted research on evolutionary genomics with Professor Rob Kulathinal, which led to an internship at NASA.

“During that internship, we took satellite data to study the ocean and I learned about phytoplankton,” said Jones. “Studying the behavior of phytoplankton really appealed to me because there’s a lot of physics, math and visualization involved.”

Jones’ current research looks at how ocean currents—which are experiencing the effects of climate change—shape where different kinds of phytoplankton live.

“I use a combination of satellite data, mathematical models and shipboard data where you actually go out and collect water samples,” she said. “I went on a monthlong ocean cruise where I took of some of the highest resolution DNA samples of phytoplankton ever taken before.”

Currently, in her department, she is mentoring undergraduates who need help in formulating their vision for the future, like she once did.



Learn how you can be part of CST's success by contacting me at **215.204.4704** or **kathleen.mcgady@temple.edu**

Message from Development and Alumni Affairs

When you build financial support in higher education and encourage alumni to get involved in the life of a college, there is no greater asset than an engaged, enthusiastic dean. By that measure, Michael L. Klein, FRS, has been an extraordinary ambassador for the College of Science and Technology. His unwavering commitment to our college, our students and our graduates has shaped CST's bright future.

Dr. Klein has championed faculty research, supported the Alumni Board and its Owl to Owl Mentor Program and built financial resources for scholarships, undergraduate research and many other areas. Thank you, Dr. Klein, for your service as dean. I know that we will continue to work together to move CST forward.

Throughout *Outlook*, you can see CST's remarkable achievements. This year, two CST students are breaking down barriers in STEM as the first two Temple women to receive Goldwater scholarships in the same year. Chemistry's Ross Wang earned a prestigious Young Chemical Biologist Award, an acknowledgment of his outstanding contributions to the field. In research, there is our shared NSF grant of \$19.5 million for artificial intelligence research in

education and a new research entity, the Temple Institute for Membranes and Interfaces.

Alumni philanthropy plays a vital role in our continued success. Your generous gifts support merit scholarships that attract talented students. Estate gifts, a vital tool in financial planning, help CST set a course for its own future. Grants and gifts from national foundations and corporations validate the impact of CST's research.

I look forward to sharing with our new dean, Miguel Mostafá, PhD, the impact of our college, our faculty, our students and our amazing graduates and donors.

Our future achievements are intricately tied to your continued support. Thank you for all you do for CST. Together, we can propel CST to even greater heights, making a lasting impact on science and technology and society at large.

Sincerely,

Kathy McGady
Assistant Dean for Development and Alumni Affairs

How can alumni and friends of CST support students?



Be a mentor.

Learn about CST's Owl to Owl program at cst.temple.edu/o2o



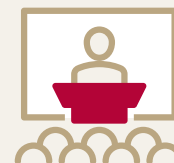
Support scholarships.

Make a gift to the Dean's Scholarship Fund at giving.temple.edu/givetocst



Fund young researchers.

Learn about CST's Undergraduate Research Program at cst.temple.edu/giving/urp



Support faculty.

Make a gift to the Dean's Endowed Term Professorship Fund at giving.temple.edu/givetocst



GRATEFUL AND THRILLED TO GIVE BACK

Colleen Edwards, CST '80, and her husband Joel Zinberg established the Edwards Zinberg Merit Scholarship with a gift of \$95,000 to provide a merit-based full-tuition scholarship to one incoming CST freshman who is also a Pennsylvania resident. The scholarship will be awarded solely on the basis of merit and is renewable for a maximum of three years.

Edwards, an internist and hematologist, earned a full-tuition, merit-based scholarship when she attended Temple University. "This scholarship not only convinced me to attend Temple over an Ivy League institution, where I was offered admission, it also allowed me to graduate college debt free," explained Edwards. "That's no small thing and I am grateful."

Edwards described herself as a middle-class student "grateful for the recognition of my academic achievement in high school and for the much-needed money. I am now in the financial position to return the favor and am thrilled to do so."

REALIZING THAT NOW IS THE TIME

Lynne Doherty, CST '95, established the Lynne Doherty Scholarship with a gift of \$95,000 to provide a full-tuition, four-year scholarship to one incoming CST student who is a graduate of the public School District of Philadelphia.

Doherty, who earned a degree in mathematics and computer science, is grateful for the education she received at CST as well as the many 'life lessons' that have helped her professionally and personally through the years. "College is truly what you make of it," Doherty said, "and Temple offers so much—you just have to take advantage of it!"

While Doherty received a full academic scholarship while at Temple, she wasn't always sure about making the university a philanthropic priority. "I have often thought about giving back to Temple, but have always thought there were other 'better places' to donate, like cancer research or food banks," she explained. "Recently, I have come to realize that if the person who donated the scholarship that I received thought the same way, I wouldn't have received the scholarship that made a huge difference to me. So, I decided to give the same scholarship back now."

For Doherty, the problems of the future will be solved by science and technology. "We need to build the next generation of talent that will find new ways to use technology to help us improve for generations to come."

CONTINUING THE LEGACY

George Bruce Taggart, CST '71, who passed away in September 2023, made a huge impact during a 35-year career that spanned academia, corporate America and the National Science Foundation. A \$1.4 million gift from his estate will now establish three distinct endowed funds at the College of Science and Technology: the Bruce Taggart Endowed Professorship, the Dean's Endowment for Undergraduate Research Opportunities and the Robert H. and R. Elizabeth Taggart Endowed Scholarship Fund.

Selected to Temple University's Gallery of Success—which recognizes outstanding alumni for their inspiring success—in 2022, Taggart earned a physics undergraduate degree from the College of William and Mary and a doctorate from Temple.

He began his career as an assistant professor at Virginia Commonwealth University in 1971. During his career, he conducted research at the Oak Ridge National Laboratory, Naval Research Laboratory and the National Institute of Standards and Technology. During the 1980s, Taggart worked with several prestigious companies, including Ford Aerospace. In 1989, he joined NSF as a program director for condensed matter and materials theory in material research.

According to Taggart, he learned physics at William and Mary but learned how to be a physicist at Temple.

BUILDING A PARTNERSHIP

The Penn Mutual Life Insurance Company, chartered in 1847, is supporting CST's Center for Hybrid Intelligence through a \$350,000 gift over the past five years.

Under the direction of CIS Professor Slobodan Vucetic, the center is committed to promoting research, education, and software development activities towards building computer systems that could learn from experience, adapt, exhibit intelligent behavior, cooperate with humans, and improve the human condition.

Mark Dash, CST '84, chief technology officer, Information Management & Technology at Penn Mutual, and former president and current treasurer of the CST Alumni Board, was instrumental in helping to bring this partnership together.



PHOTO: RYAN S. BRANDENBERG

Nisarg Patel, CST '23 Temple Made for Temple Med

BY BRENT BAUM

First-year medical student at the Lewis Katz School of Medicine, biochemistry major Nisarg Patel credits one of his Temple professors for getting him one step closer to becoming a physician.

Why Temple: Growing up in Bucks County meant that Patel, frequently heard about Temple University's reputation as a top research institution. When he finally visited Main Campus as a high school senior, he felt a connection. He was drawn to the university's academic resources, which he felt were unmatched by other state schools, and would give him the support he needed to achieve his dream of becoming a doctor.

Favorite professor: Nisarg's favorite professor at Temple was Vladimira Wilent, associate professor of instruction in chemistry. She engaged students in hands-on activities in the biochemistry industry. His favorite class under Wilent was the capstone course *Research Techniques and Biochemistry*. Through his research on the impact of pesticides on humans, he was able to link his classroom experience with the real world by understanding what happens on a

molecular level. This opened his eyes to the impact that biochemistry has in medicine.

Philly life: Nisarg loves the pride and passion of Philadelphia sports fans that runs deep throughout the city. He was thrilled to experience the excitement of fans pouring into the streets after the Eagles clinched their place in this year's Super Bowl and when the Phillies made it to the World Series. Aside from its sports pride, he also loves the city because of its food scene.

Temple Made moment: Patel felt with the increasing rate of health disparities in Philadelphia it was valuable to teach CPR to others because it is a skill that can save countless lives. He taught CPR on Temple's campus, where he trained over 150 undergraduate students. Throughout Philadelphia, he taught hospital staff, medical workers and anyone in the public who signed up for his classes.

Hootable: "Temple created an atmosphere for me to succeed and gave me the steppingstones I needed to make a positive change in the world around me. Being a Temple student has a significant impact on who you end up being after graduation."



PHOTO: BETSY MANNING

Ben Rittenhouse, CST '23 Big internships lead to Capital One

BY JONNY HART

Ben Rittenhouse, a computer science major, credits internship opportunities for getting his foot in the door at Capital One as an associate software engineer.

Why Temple: As someone who grew up in the Philadelphia suburbs, Rittenhouse was drawn to the fact that while Temple was close to home, it was just far enough to feel exciting because of its city-based location. After visiting campus several times, Rittenhouse fell in love with Main Campus' walkability and its city-within-a-city vibe.

Standout internships: Rittenhouse landed internships with the Federal Reserve Bank of Philadelphia and Lincoln Financial Group during his time at Temple. Those opportunities were pivotal for Rittenhouse because they introduced him to the corporate world and gave him a better understanding of what professional life looks like. The internships also introduced Ben to the finance and banking sectors, and he credits the skills he picked up with helping him get his foot in the door at Capital One.

Philly life: There are two reasons that Rittenhouse has a particular fondness for Philadelphia: sports and food. To him, there is nothing like the convenience of catching the Broad Street Line to watch a weekday afternoon Phillies game. And the food options are, as Ben describes, "endless." In particular, he has found a lot of great Mexican restaurants around the city. He's also a big cheesesteak guy, and he's backing Dalessandro's in the great Philly cheesesteak debate.

Temple Made moment: Rittenhouse's transformational moment came when he opened the email announcing he landed his internship with Lincoln Financial Group. He had invested countless hours preparing for the opportunity at job fairs, resume workshops and mock interviews. When he finally opened that confirmation email, he knew all of his hard work had paid off, and the rest was history.

Hootable: "I give a lot of credit to Temple's professional development. When it came time as an upperclassman to get serious about applying for jobs and internships, it struck me that I've already been prepared for this. It was a lot less nerve-wracking. It was just a matter of applying myself."



PHOTO: KELLY & MASSA

Nathan Zubin, CST '23 Graduation speaker now at medical school

Nathan Zubin, a neuroscience: cellular and molecular major, was the student speaker at the College of Science and Technology's May 2023 graduation ceremony.

While at Temple, Zubin's research experience included work in the Department of Neural Science at Temple University's Lewis Katz School of Medicine and Fox Chase Cancer Center.

In addition to lab research, Zubin has volunteered at Jefferson University Hospital reviewing patient information for clinical studies. As a Global Health Virtual Fellow for the Foundation for International Medical Relief for Children, he helped develop an education curriculum for a domestic violence project in India. He also has extensive volunteer experience through Temple Hospital, a crisis network and a program aimed at supporting older people and schoolchildren.

At Temple, he was an active member of the student group Leadership, Education, & Development in Science and first violin and assistant concertmaster in the Temple University OWLchestra Symphony Orchestra. Zubin now attends the Lewis Katz School of

Medicine with the goals of becoming an oncologist specializing in neurological tumors and eventually to teach future medical students.

After thanking CST's advisors and faculty for their support, Zubin focused on the themes of community, support and perseverance, telling his fellow graduates:

"Class of 2023, we have already faced a real world, which shows we strongly represent the value of perseverance.

As it says in our motto: perseverance conquers. My fellow graduates, I can proudly say we have conquered. And so, for today, I just want to say to all of you, as you get your degree and graduate, be proud of what we have achieved, because we have achieved it in times of tribulation.

Be confident in our future and be confident in the strength of our community. If we can weather through a global pandemic, I have full faith all of us together can face our future. And so, congratulations once again on this incredible achievement, and I wish everyone the best for a bright and successful future."



PHOTO: REMY ANDREA

Byron Jenkins, CST '19 Paving the way to success

BY JENNIFER L. PENNISE

Byron Jenkins has applied his background in computer science and coding to earn notable positions at TD Bank and Capital One. He looks back fondly at his time at Temple and CST, where he perfected his tech skills and pursued challenging internship opportunities by utilizing the college's job fair and the Office of Student Professional Development.

"I had some challenging times during my time at Temple, but I'm not a quitter," explained Jenkins. "I just needed to use on-campus resources and cut down time at part-time jobs." Seeking to give back to the educational environment that fostered his own ambition, he is now an adjunct instructor and classroom support specialist in the college's SciTech Scholarship program.

But to thousands of followers on TikTok and Instagram, Jenkins is just "codeherk."

As a nod to his father's boxing name Herk, Jenkins launched the @codeherk handle in 2016. He started creating content in 2019 when he was unsatisfied with how his career was progressing. With the isolation brought on by the pandemic, Jenkins had more time to build his technical skills and share his expertise and advice with beginner

coders on social media. "Sometimes the best way to learn is by teaching others," said Herk.

In short one- to two-minute videos, Jenkins covers topics such as job search assistance, computer coding tips, free tech resources, product giveaways and many others. Collaborating with brands, including AfroTech, Autonomous, Tidbyt as well as other tech social media accounts, he hopes to grow his brand further and work with other high-performing companies.

Jenkins also focuses heavily on advocacy and breaking barriers in the tech industry where he openly discusses difficulties he faced as an African American man trying to establish a tech career. "Finding your voice and walking into a room being the only one that looks like you, it's challenging to offer something different," stated Jenkins.

In the SciTech Scholarship program, Pell Grant eligible students from the departments of Biology, Chemistry and Earth and Environmental Science can add a technology minor, gain access to enhanced academics and receive scholarship money. "I'm teaching students how to code," said Jenkins, "and students thrive off of someone that looks like them because it confirms for them that the journey is possible."



CST Convocation 2023

Welcoming the Class of 2027 and transfer students to the College of Science and Technology.



PHOTOS: JOSEPH V. LABOLITO AND GREG FORNIA



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