PRINCETON UNIVERSITY BULLETIN
Volume 106, Number 1 Sept. 29, 2016

Eisgruber welcomes Class of 2020: 'We're all in it together'

Emily Aronson

Stressing a theme of community, Princeton President Christopher L. Eisgruber welcomed the Class of 2020 to the University on Sunday, Sept. 11, during Opening Exercises marking the start of the academic year.

"Those of you who begin your undergraduate or graduate careers today, or who enter the ranks of the staff and the faculty, have joined a community," Eisgruber said. "Our destinies are linked to one another in myriad ways — not just for the years that you spend on this campus, but long beyond them. Being a Princetonian is now — was from the day that you accepted your offer of admission, really — a part of your identity."

After a week of Orientation activities, first-year students wearing shirts representing their residential colleges gathered for the event in the University Chapel. The interfaith ceremony, a tradition dating to at least 1802, includes the first-year class as well as other undergraduates, graduate students, faculty and staff. Classes began on Wednesday, Sept. 14.

"Today you join the ranks of students who have left their marks on the Princeton campus — and the world — for generations through their intellect, creativity and passion," Eisgruber said. He called the 1,306 first-year students an "extraordinarily accomplished and diverse" group, hailing from 48 states and 53 countries besides the United States.

In addition to Eisgruber's address, Opening Exercises included music, prayers and readings from various religious and philosophical traditions. Undergraduate students also were recognized for their academic achievements during the previous year.

While the event featured festive celebration, such as the processional into the chapel followed by students waving colorful kites and African drum music, this year's ceremony also included somber reflection.

Photo by Denise Applewhite

Students holding the Class of 2020 banner lead the Pre-rade through the walkway in front of Nassau Hall, followed by students carrying the gonfalons of the University's residential colleges.

"September is an ebullient time on college campuses. … It is, by its very nature, a season of fresh starts and high expectations. It is a season of optimism," Eisgruber said. "This afternoon, however, we gather not in a season of carefree high spirits, but in the closing weeks of a summer stained by violence, sorrow and loss. We gather, moreover, on a date — September 11th — forever marked as a tragic day in American history."

Eisgruber then noted cities in the United States and abroad that were the sites of mass shootings and acts of terrorism this summer, asking the audience to join him in a moment of silence.

As students start a new school year, Eisgruber said he understands if they also might be grappling with the question, "What does it mean to be a college student when the course of human events seems so frenzied and tumultuous?"

For possible answers, Eisgruber turned to the Pre-read book he asked the incoming class to read, "Our Declaration: A Reading of the Declaration of Independence in the Defense of Equality," by Danielle Allen. A member of Princeton's Class of 1993, Allen is director of the Edmond J. Safra Center for Ethics and professor in the Department of Government and in the Graduate School of Education at Harvard University.

Continued on page 12

Cold War-era satellite dish, restored by Princeton scientists, becomes teaching tool

Catherine Zandonella

In its heyday, the towering metal satellite dish located about three miles from the Jersey Shore's boardwalks hosted its share of historical moments: It tracked the flights of some of America's first space launches, and in 1960 it collected the first images beamed to Earth from an orbiting weather satellite. The feat was considered so amazing that the photos were rushed to President Dwight D. Eisenhower, ushering in the era of modern weather forecasting.

After a decade of scanning the skies, however, the dish fell into disuse and became immobilized by rust while weeds grew up around the base and wasps nested in its crevices. There it sat until four years ago, when two Princeton University scientists set out to restore the dish as a way to bring students — both from the University and local communities — closer to outer space.

This spring, the now-functional satellite receiver hosted about 20 Princeton students from an undergraduate physics class who learned how to receive radio signals not just from orbiting satellites but also from astrophysical objects such as dying stars. The dish has also hosted scores of amateur radio enthusiasts and is open to the public each Wednesday and on weekends, when visitors can watch as the massive dish sweeps the sky.

"We didn't realize what we were getting into when we first decided to take on this project," said Daniel Marlow, Princeton's Evans Crawford 1911 Professor of Physics, who led the refurbishment effort with Senior Research Physicist Norman Jarosik. "Luckily we had a lot of cooperation from Princeton's Department of Physics and the University, along with terrific partners in the community."

Bringing a forsaken dish back to life

Built in 1958, the dish is 40 miles east of the Princeton campus and occupies the grounds of a former U.S. Army base known as Camp Evans in Wall Township, New Jersey. By the mid-1970s, the dish was considered obsolete and its use was discontinued. It might have been torn down if not for the efforts of radio enthusiasts and other volunteers from a grassroots museum in Wall called the Information Age Science History Museum and Learning Center, or InfoAge.

The quest to restore the dish originated from Marlow's desire to build a radio telescope that Princeton students could use to study objects in the universe. A typical home-use telescope works by collecting visible light into its lens, whereas the refurbished dish collects radio waves. Both visible light and radio signals are electromagnetic waves, but visible-light telescopes need good weather and dark conditions, whereas the longer wavelengths of radio waves can travel through clouds and be detected at any hour.

The idea to take on the refurbishing of the InfoAge dish — which spans 60 feet across and sits on a base that is 40 feet tall — came out of a chance conversation between Marlow and Jarosik.

Continued on page 12

Photo by Daniel Marlow

Princeton Senior Research Physicist Norman Jarosik (left) and engineer Geoffrey Gettelfinger view the satellite dish in Wall, New Jersey, shortly after its first change in elevation in more than 30 years.

What's inside?

Historian of religion Pagels awarded National Humanities Medal

Jamie Saxon

Princeton University faculty member Elaine Pagels, an authority on the religions of late antiquity and the author of "The Gnostic Gospels" and "Beyond Belief: The Secret Gospel of Thomas," has been named a recipient of the 2015 National Humanities Medal. The announcement was made Sept. 14 by the White House. The medal was conferred by President Barack Obama at a ceremony at the White House on Sept. 22.

The medal honors an individual or organization whose work has deepened the nation's understanding of the human experience, broadened citizens' engagement with history and literature, or helped preserve and expand Americans' access to cultural resources. Pagels was among 12 recipients of the award.

The official citation for the award honored Pagels "for her exploration of faith and its traditions. Through her study of ancient manuscripts and other scholarly work, she has generated new interest and dialogue about our contemporary search for knowledge and meaning."

In addition to Pagels, two other winners of this year's National Humanities Medal have Princeton ties. Isabel Wilkerson, an author and Pulitzer Prize-winning former national correspondent and Chicago bureau chief for The New York Times, was a Ferris Professor of Journalism in 1997-98. Louis Menand, a critic, cultural historian and staff writer for The New Yorker, was a Whitney J. Oates Fellow of the Council of the Humanities at Princeton and guest of the Department of English in 2008-09.

"Through path-breaking research and dedicated teaching, Elaine Pagels has enlivened the study of religion and helped to shed light on the development of Christianity and Gnosticism over many centuries," said Princeton President Christopher L. Eisgruber.

"A gifted writer, scholar and teacher, she has mentored students at all levels — from brand-new undergraduates in her freshman seminar to the most advanced graduate scholars. Elaine embodies many of the core values that define this University, and I am thrilled that she has been recognized with this well-deserved honor," Eisgruber said.

Pagels

Pagels, the Harrington Spear Paine Foundation Professor of Religion, joined the Princeton faculty in 1982, shortly after receiving a MacArthur Fellowship. Her books bring a fresh perspective to the history of Christianity. "Gnostic Gospels," an examination of the early Christian religious movement called Gnosticism, won the National Book Award and the National Book Critics Circle Award and was selected by the Modern Library as one of the best 100 English-language nonfiction books of the 20th century. "Beyond Belief: The Secret Gospel of Thomas" was a New York Times bestseller and examines the Gospel of Thomas, written around 100 C.E., which was discovered buried in a jar in Egypt in 1945 with other early Christian writings.

Her newest book, "Revelations: Visions, Prophecy and Politics in the Book of Revelation," explores the New Testament Book of Revelation and other Jewish, Christian and pagan books of Revelation written around the same time. Other books include "Reading Judas: The Gospel of Judas and the Shaping of Christianity," co-authored with Karen King, a professor of divinity at Harvard University; "The Origin of Satan"; and "Adam, Eve and the Serpent."

Last year, she taught the freshman seminar "Who Is — Or Was — Jesus?" and a graduate course "Studies in Greco-Roman Religions: Authority, Ritual and Politics in Early Christianity." She has also taught "Christianity: From Illegal Movement to World Religion," "Jesus of Nazareth: Ancient Controversies" and "From Jesus to Constantine," among many other courses.

Prior to coming to Princeton, Pagels was a professor and chair of the Department of Religion at Barnard College, and an associate professor at Columbia University.

Pagels earned her bachelor's in history and master's in classics from Stanford University and her Ph.D. in religion from Harvard. She received Princeton's Howard T. Behrman Award for Distinguished Achievement in the Humanities in 2012. Her other fellowships and awards include a Rockefeller Fellowship, Guggenheim Fellowship and the Centennial Medal for Outstanding Contributions to Society from Harvard.

The National Humanities Medal, inaugurated in 1997, is sponsored by the National Endowment for the Humanities.

Cox named director of Princeton's theater program

Steve Runk

Princeton University's Lewis Center for the Arts named award-winning lighting designer Jane Cox as the new director of the University's Program in Theater. Cox has been a member of the Program in Theater faculty since 2007 and was recently promoted to senior lecturer. Her appointment began July 1.

Cox has received numerous awards for her work as a lighting designer and recently received the Ruth Morley Design Award from the League of Professional Theatre Women. She also was nominated for a Drama Desk Award for Outstanding Lighting Design for a Musical for the current Broadway revival of "The Color Purple," directed by fellow Princeton faculty member John Doyle.

Cox

Other recent projects include the National Theatre's production of "Hamlet" with Benedict Cumberbatch in London, directed by Lyndsey Turner, for which she was awarded the 2016 Onstage Award; the new musical "Amelie," directed by Pam MacKinnon, being presented at the Ahmanson Theater in Los Angeles this season; "Noises Off" on Broadway, directed by Jeremy Herrin; and a new play about Roe v. Wade, directed by Bill Rauch, which will be presented at Arena Stage and Berkeley Rep this season.

"Jane Cox is a brilliant lighting designer, a gifted teacher and mentor, and a visionary, collaborative administrator," said Stacy Wolf, acting chair of the Lewis Center. "We're thrilled that she will lead the Program in Theater to our next stage, both figuratively and literally, when we relocate to the arts and transit neighborhood in fall 2017."

Originally from Dublin, Ireland, Cox has taught courses in theater design at New York University's Tisch School of the Arts graduate program, Vassar College, Sarah Lawrence College and University of Massachusetts Amherst, and she has led workshops at the Kennedy Center and universities nationwide.

Since joining the Princeton faculty, Cox has designed lighting for numerous University productions and has taught courses in lighting design and advanced theatrical design, as well as a freshman seminar, "The Role of Light in Creative Expression," and a "Transformations in Engineering and the Arts" course. This fall she is co-teaching a Princeton Atelier course, "Reinventing the Guided Tour," with collaborator Monica Bill Barnes, in which students will design and choreograph a live experience, giving audiences a fresh glimpse into a local Princeton location.

Cox succeeds Tim Vasen, who led the Program in Theater from 2012 until he passed away in December. Playwright and professor in the Program in Theater Robert N. Sandberg has served as acting director of the program over the past five months.

"I'm honored to be taking over the Program in Theater from the brilliant and generous Tim Vasen, and excited to continue to work with the gifted students, faculty, staff, artists and artisans at the Lewis Center for the Arts," said Cox. "I hope we'll expand on Tim's legacy, making inventive and student-driven theater and music theater with students of all backgrounds, academic interests, and levels of artistic skill. I hope we'll become even more interdisciplinary in approach, continuing to create work with music, language, art, writing and dance; and reaching out further to the STEM fields, to historians, social activists and architects. I hope we'll continue to expand our offerings of studios and seminars with world-renowned artists and academics, in order to enrich the lives of all students on our campus with ideas and creative practices from all over the country and the world."

More than 200 students enroll each year in the 30-plus courses offered by the Program in Theater in acting, directing, playwriting, design, dramaturgy, performance history, and criticism, which are taught by a distinguished faculty of working artists, critics and scholars. Among the graduates of the program are Broadway producer Jordan Roth ("The Book of Mormon," "A Gentleman's Guide to Love and Murder," "Kinky Boots," "Jersey Boys"); actors Mark Feuerstein ("Royal Pains"), Karron Graves ("Coram Boy on Broadway," 1996 film version "The Crucible"), and Ellie Kemper ("Unbreakable Kimmy Schmidt," "The Office"); acclaimed theater directors Lileana Blain-Cruz, Michelle Hensley and Davis McCallum; and award-winning playwrights Noah Haidle and Branden Jacobs-Jenkins.

PRINCETON UNIVERSITY BULLETIN

Managing editor
Susan Promislo

Lead designer
Maggie Westergaard

Contributing writers
Emily Aronson, Daniel Day, Adam Hadhazy, Michael Hotchkiss, Morgan Kelly, Gwen McNamara, Princeton Varsity Club, Min Pullan, Steve Runk, Jamie Saxon, Catherine Zandonella

Photographers
Denise Applewhite, Jeff Cable, Cody Chrusciel, David Kelly Crow, Nick Donnoli, Ed Hewitt, Sameer Khan, Daniel Marlow, Robert Raia, Frank Wojciechowski, Michael Yoon

Subscription manager
Elizabeth Patten

The Princeton University Bulletin (© 2016 The Trustees of Princeton University) is published bimonthly from October through June to coincide with the academic year. The Bulletin is published by the Office of Communications, 22 Chambers St., Suite 201, Princeton, NJ 08542. A total of five issues will be published between September 2016 and June 2017. A publication schedule can be found at www.princeton.edu/bulletin or by calling 609-258-3601. Permission is given to adapt, reprint or excerpt material from the Bulletin for use in other media. Application to mail the Bulletin (USPS-445-080) at Periodicals postage prices is pending at New York, N.Y., and additional mailing offices.

Postmaster: Send address changes to Princeton University Bulletin, Office of Communications, Princeton University, 22 Chambers St., Suite 201, Princeton, NJ 08542.

Subscriptions
The Bulletin is distributed free to faculty, staff and students. Others may subscribe to the Bulletin for $5 for the 2016-17 academic year. Send a check to Office of Communications, Princeton University, 22 Chambers St., Suite 201, Princeton, NJ 08542. Questions can be directed to 609-258-3601 or bulletin@princeton.edu.

The Princeton University Bulletin is printed on paper made with 30 percent post-consumer waste fiber.

Nondiscrimination statement
In compliance with Title IX of the Education Amendments of 1972, Section 504 of the Rehabilitation Act of 1973, Title VI of the Civil Rights Act of 1964, and other federal, state and local laws, Princeton University does not discriminate on the basis of age, race, color, sex, sexual orientation, gender identity, religion, national or ethnic origin, disability, or veteran status in any phase of its employment process, in any phase of its admission or financial aid programs, or other aspects of its educational programs or activities. The vice provost for institutional equity and diversity is the individual designated by the University to coordinate its efforts to comply with Title IX, Section 504 and other equal opportunity and affirmative action regulations and laws. Questions or concerns regarding Title IX, Section 504 or other aspects of Princeton's equal opportunity or affirmative action programs should be directed to the Office of the Vice Provost for Institutional Equity and Diversity, Princeton University, 205 Nassau Hall, Princeton, NJ 08544 or 609-258-6110.

Submitting news

The stories published in the Princeton University Bulletin are drawn from the University's main website. To suggest news items for coverage, visit our "Submit News" Web page at www.princeton.edu/main/news/share/submitnews.

Submitting events

To submit event notices for the Featured Events calendar on the main University website, visit www.princeton.edu/main/news/share/submitevents.

Princetonians earn three medals at Rio Olympics, including water polo gold

Three of the 13 Princeton students and alumni competing won medals at the 2016 Olympic Games that concluded Sunday, Aug. 21, in Rio de Janeiro.

Senior Ashleigh Johnson won a gold medal with the U.S. women's water polo team, Gevvie Stone of the Class of 2007 won a silver medal in women's individual rowing for Team USA, and Diana Matheson of the Class of 2008 won a bronze medal on the Canadian women's soccer team.

"As the 2016 Olympic Games come to an end, we are extremely proud of all of the Princetonians who represented their countries so admirably on and off the field of play," said Mollie Marcoux, the Ford Family Director of Athletics. "It was such a pleasure to watch them compete on the world's largest stage and pursue their athletic dreams at the highest level.

"We are proud to welcome current Princeton water polo player Ashleigh Johnson back to campus this fall after helping her team to a remarkable gold medal. She and the other Princeton Olympians have inspired all of us."

Johnson, the starting goalie, led the American women's water polo team through an unbeaten run to the finals, in which they defeated Italy 12-5 on Friday, Aug. 19.

On Aug. 13, Stone placed second in the women's single sculls behind Kimberley Brennan of Australia.

Matheson started and played most of the bronze medal soccer game as the Canadians defeated Brazil 2-1, on Aug. 19.

The other Princetonians who competed were:

- Kate Bertko, Class of 2006, lightweight double sculls;
- Donn Cabral, Class of 2012, steeplechase;
- Tyler Nase, Class of 2013, men's lightweight four rowing;
- Katharine Holmes, Class of 2017, fencing;
- Glen Ochal, Class of 2008, men's eight rowing;
- Robin Prendes, Class of 2011, men's lightweight four;
- Sisters Julia and Katie Reinprecht, Classes of 2014 and 2013, respectively, field hockey;
- Kathleen Sharkey, Class of 2013, field hockey; and
- Lauren Wilkinson of the Class of 2011, women's eight rowing.

All competed for the United States, except Wilkinson, who was on Team Canada.

Men's assistant cross-country coach Robby Andrews competed for the United States in the 1,500-meter race and women's track assistant coach Priscilla Frederick competed for Antigua and Barbuda in the high jump.

The Department of Athletics website has more detailed information on Princetonians who competed at the games, including an Olympics Central page (www.goprincetontigers.com/news/2016/7/20/olympics.aspx) with results and biographical information on each participant.

Photo by Ed Hewitt, Row2K.com

Gevvie Stone of the Class of 2007 shows off her silver medal and holds an American flag after the women's single-scull finals at the 2016 Olympic Games in Rio de Janeiro.

Photo by Jeff Cable, USA Water Polo

Ashleigh Johnson, a senior at Princeton, poses with the gold medal she won with the U.S. women's water polo team at the Olympic Games in Rio de Janeiro.

Photo by David Kelly Crow

The Princeton Writes program, established in 2013, offers a welcoming space for members of the University community to cultivate their inner writer. Under John Weeren's direction, it offers writing seminars, tutorials and other support for students and staff members looking to improve or enhance their writing skills. Four Princeton staff members were honored for their essays on diversity in the second annual Princeton Writes essay contest. Bryant Blount (second from right), winner of the second annual Princeton Writes writing competition, poses for a photo with (from left) John Weeren and contest honorable mention recipients Brian Mondschein, Violette Chamoun and April Armstrong.

More news on the Web

Visit the News at Princeton webpage at www.princeton.edu/main/news for recent stories, such as:

- **Bonnie Bassler**, Princeton University's Squibb Professor of Molecular Biology and department chair, is one of two recipients of the 2016 Max Planck Research Award. Bassler was recognized for her "major role in the discovery that Earth's most ancient unicellular organisms communicate with one another via chemical signalling molecules," a process known as quorum sensing. The award honors scientists for their pioneering research into the sensory perception of organisms, and provides winners with 750,000 euros to fund future projects with colleagues in Germany and abroad.

- **Frederick (Rick) Barton** and **Kathryn R. (Kit) Lunney** have been named co-directors of the Scholars in the Nation's Service Initiative (SINSI) at Princeton University's Woodrow Wilson School of Public and International Affairs. SINSI prepares the nation's top students to pursue careers in the U.S. government, both in international and domestic agencies, through integrating academic training and work experience in federal agencies.

- **Louis A. Simpson**, a 1960 alumnus of Princeton's Graduate School, and his wife, **Kimberly K. Querrey**, have given $20 million to fund the Louis A. Simpson International Building. Located at 20 Washington Road, the building was made possible through a major renovation of the former Frick Chemistry Laboratory and will house the University's many international initiatives.

- **Eric Gregory**, professor of religion, has been appointed chair of Princeton University's Council of the Humanities. As chair, Gregory will promote teaching and research in the humanities, overseeing a wide array of interdisciplinary programs that bring together faculty, students and distinguished visitors from many fields.

- Princeton University researchers developed a machine-learning program that scoured the human genome to identify 2,500 genes that may contribute to autism spectrum disorder. The results vastly expand on the 65 autism-risk genes currently known. Working with Simons Foundation researchers, the team published their findings in the journal Nature Neuroscience in August.

- **Angus Deaton** has been named a Knight Bachelor "for his services to research in economics and international affairs." The honor entitles him to be known as Sir Angus, or Sir Angus Deaton, and was announced as part of the Queen of England's official birthday honors list in June.

- Princeton University's 2015-16 Annual Giving campaign raised $59.3 million — the second highest total in Annual Giving history — with 58.4 percent of undergraduate alumni participating. The results are notable for their strength and breadth across all of Princeton's constituencies: undergraduate alumni, graduate alumni, parents and friends.

- **Mónica Ponce de León**, dean of the School of Architecture and professor of architecture, has been selected as a member of the National Academy Museum and School. Members are elected by their peers in recognition of their exceptional contributions to American art and architecture and ability to push creative boundaries.

- **Paul Chirik**, the Edwards S. Sanford Professor of Chemistry, was among five recipients nationwide of the 2016 Presidential Green Chemistry Challenge Awards presented by the U.S. Environmental Protection Agency. Chirik was recognized for discovering a new class of catalysts that are used to produce silicones without using hard-to-obtain platinum, which could dramatically reduce the mining of ore and reduce costs, greenhouse-gas emissions and waste.

- The following individuals were named to represent staff members on the Council of the Princeton University Community (CPUC) for 2016-17: **Khristina Gonzalez**, **Ellen DiPippo**, **Diane Cook**, **Kristy Seymour**, **Grzegorz (Greg) Nowak** and **Cynthia Keith**. CPUC serves as "a permanent conference of the representatives of all major groups of the University" where "they could each raise problems that concern them and ... be exposed to each other's views."

Teachers take on summer QUEST to improve science education

Michael Hotchkiss

Twenty years after she graduated from Princeton with a degree in ecology and evolutionary biology, Kate Heavers found herself back in class in a Guyot Hall laboratory.

Heavers, who teaches biology, anatomy and physiology a few miles from campus at West Windsor-Plainsboro High School South, joined more than 20 other New Jersey secondary school teachers for QUEST, a weeklong, hands-on summer program that helps teachers enhance their knowledge of science, math and technology.

The program, whose formal name is Questioning Underlies Effective Science Teaching, had two tracks — one focusing on life in extreme environments, led by Tullis Onstott, a professor of geosciences, and another focusing on weather and climate, led by Steven Carson, a middle school teacher and former researcher at the Geophysical Fluid Dynamics Laboratory in Princeton.

Teachers in both tracks learned about the work of researchers and how to translate it for their classrooms in line with the Next Generation Science Standards being implemented in New Jersey schools this fall. The standards, developed by states, set new expectations for what students should know and be able to do, and are designed to improve science education for all students.

On July 13, Heavers and other teachers learning about life in extreme conditions examined the skeletons of a wide range of animals — from a lobster to a sloth — to look for clues to their evolution. Later in the week, teachers tried their hand with current computer models that match the DNA sequencing of Onstott's samples with known organisms to more fully understand how life exists and evolves. Using that information, they revised the "Tree of Life" they had constructed earlier in the week, illustrating their thoughts about which animals share an evolutionary past.

"We're being enriched intellectually and challenged," Heavers said. "Then, we step back and talk about the practice, what we would do with students under the new science standards. So, it's a really nice combo of addressing our own pedagogical practices in teaching and our content knowledge at the same time."

Throughout the week, Heavers and other teachers examining extreme life further explored evolution, as well as how organisms survive in extreme environments such as thermal vents on the ocean floor, acid hot springs in Yellowstone Park, ice-covered lakes in Antarctica, and on the International Space Station.

Anne Catena, program associate and director of professional development initiatives in Princeton's Program in Teacher Preparation, which coordinates QUEST, said the program has an important impact on teachers and their students.

"It's very exciting for kids to know the applications of what they're learning in the classroom, and it's motivating for their teachers, too," Catena said. "We want to keep them motivated, keep them learning. That's the focus of QUEST."

Catena said the Next Gen science standards put an emphasis on similar experiences for students, with a focus on self-discovery.

"These new standards are very intent on helping students make sense of their world, understand the phenomena they see in their everyday lives and be able to ask questions about what they're seeing: 'Why does that happen? When did it start?'" Catena said. "In QUEST, teachers generate questions themselves but also think about how you get students to start asking questions."

Other experiments conducted by the teachers studying weather and climate focused on air pressure, temperature, the seasons, the greenhouse effect, humidity, clouds, wind and storms.

QUEST is made possible by funding from the National Science Foundation, Princeton University's Cooperative Institute for Climate Science Research and the Program in Teacher Preparation, as well as support from participating schools. The program drew teachers from eight school districts: Hillsborough, Lawrence Township, Montgomery, North Hanover, Northern Burlington, Somerset Hills, Trenton and West Windsor-Plainsboro, as well as from private, parochial and charter schools.

Carson, who has been helping to lead QUEST for nearly 20 years, said the program is one of the highlights of his year.

"I love the material. I love working with the teachers," he said. "This is a group that's coming in the summer to learn, and they're all focused and engaged and excited to be learning things. It's a very satisfying thing."

Quick, early test for Ebola could prevent epidemics

Adam Hadhazy

Researchers from Princeton University are joining with colleagues from U.S. government laboratories in an effort to dramatically improve the test for the Ebola virus. The goal is to offer a quick, accurate and inexpensive method to help contain future epidemics.

"We have had some very exciting initial results with this fast, low-cost platform for detecting infection with the Ebola virus," said Stephen Chou, the Joseph C. Elgin Professor of Engineering in the Department of Electrical Engineering at Princeton. "We believe it is now worthwhile to start up a much larger program to explore this emerging technology."

The test relies on technology developed at Princeton that uses nanoscale structures to significantly increase the detection of the Ebola virus in a sample of body fluid. Called the M-plate, the technology works in part by amplifying the light emitted in testing for the virus. The researchers believe the M-plate technology could provide hundreds of thousands, and possibly up to 10 million, times greater sensitivity compared to a standard test, called an immunoassay.

This improvement would allow health care workers to identify, quarantine and treat Ebola-infected people earlier than previously practical — possibly several days before they become contagious and begin to exhibit symptoms. The researchers expect the test results to be readable on a smartphone.

Chou and colleagues at the Food and Drug Administration (FDA) and the U.S. Army Medical Research Institute for Infectious Diseases (USAMRIID) recently received a $5.6 million grant to further develop the M-plate Ebola Virus Assay. The collaborators hope to develop a deployable version in about three years.

Princeton scientists including Chou and his key collaborator, Associate Research Scholar Liangcheng Zhou, have worked on the M-plate for six years. The M-plate's surface consists of a thin layer of gold studded by hundreds of glass pillars just 60 nanometers across — about a thousandth of the width of a human hair. Gold particles measuring about 10 to 15 nanometers dot the pillars, which also sport large gold caps, making them look somewhat like mushrooms.

This tiny, complex architecture captures and boosts light signals. In the M-plate Ebola Virus Assay, light is generated when viral proteins in a sample are captured by a specialized protein preloaded into the assay. The captured viral proteins are then tagged with an "optical label," which are molecules that glow, or fluoresce, when a beam of ultraviolet light shines on them. Thanks to the light-amplifying properties of the M-plate, the researchers anticipate that only a very small amount of viral protein need be in the bodily fluid sample to generate sufficient fluorescent light for positive identification.

A low threshold for detection is important because when a person first becomes infected with the Ebola virus, the amount of viral protein in their blood, urine and saliva starts off small. As the pathogen invades its human host's cells and replicates, viral levels rapidly escalate. Yet the virus' presence often remains undetectable by traditional immunoassays until after the initial symptoms of a fever, sore throat, headaches and muscle pain have already set in, anywhere from two to 21 days post-infection, by which time the disease can be spread to others and spur an epidemic.

Another test, known as real-time polymerase chain reaction (RT-PCR), can also provide early detection — sometimes a day before symptom onset — but has drawbacks, including cost and complexity.

The researchers believe it should be possible to use the M-plate technology to develop a test that is simpler and less expensive than the PCR version but also provides more lead time.

"Our grand goal is to have the M-plate Ebola Virus Assay make diagnoses before symptoms show up," said Chou.

"Better, rapid tests that can quickly tell us who is and who is not infected will greatly improve our ability to respond effectively to future outbreaks of Ebola or similar epidemics from infectious diseases," said Arthur Reingold, professor and head of epidemiology at the University of California Berkeley School of Public Health, who is not part of Chou's research effort.

While work on the M-plate sensor continues at Princeton, the FDA will contribute its expertise in the study of Ebola virus detection antibodies and USAMRIID will advance the testing through its program of Ebola virus prevention and treatment research on nonhuman primates in its biosafety level 4 laboratories, the highest level of biosafety precaution.

Although sporadic outbreaks of viruses such as Ebola that cause hemorrhagic fevers in humans have been documented since the late 1960s, the largest epidemic in history struck just three years ago. Largely contained now, the Ebola outbreak has killed more than 11,300 people, mainly in Liberia, Sierra Leone and Guinea. Due to drops in trade, foreign investment and tourism, the epidemic has had severe economic consequences throughout Western Africa.

Numerous treatments, such as vaccines, and better lab and field tests like the M-plate Ebola Virus Assay, are in the works. The hope is that when the next outbreak happens, the world will be far better prepared, said Chou. He envisions that his testing apparatus will also be further expanded to detect Ebola's deadly cousins such as Sudan virus, as well as the closely related Marburg virus and other deadly viruses.

"We want to do point-of-care as soon as possible," said Chou. "Early detection of the Ebola virus will give us tremendous advantages in halting would-be epidemics in their tracks."

Previous funding for the Chou Lab, the M-plate platform and the M-plate Ebola virus assay has come partly from the Defense Advanced Research Project Agency, Intelligence Advanced Research Projects Activity, Bill & Melinda Gates Foundation, Old School Fund, Helen Shipley Hunt Fund, and the Eric and Wendy Schmidt Transformative Technology Fund.

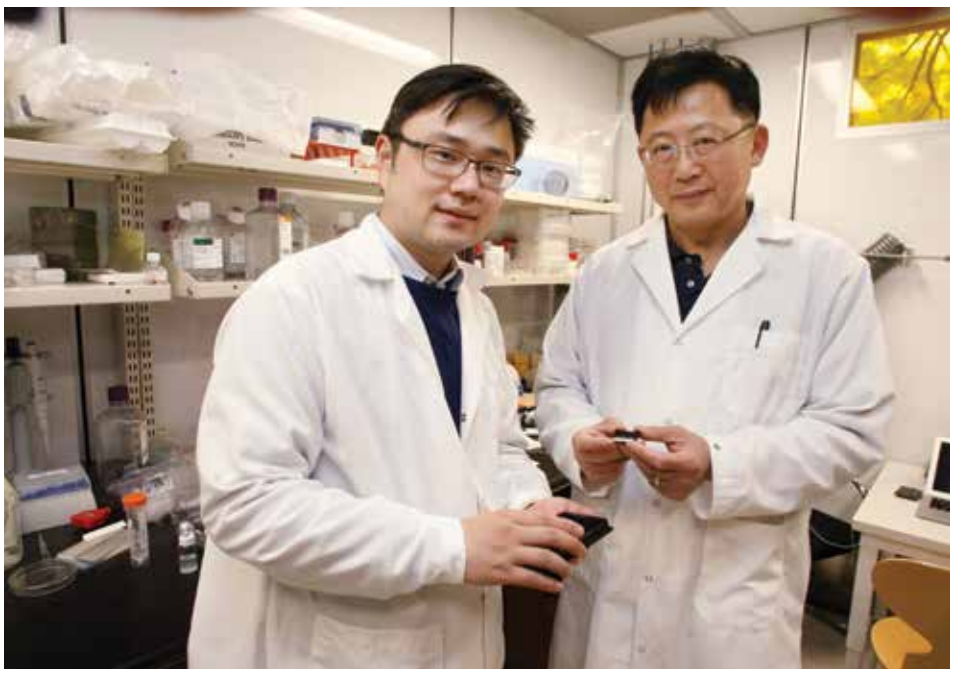


Photo by Frank Wojciechowski

From left, Princeton researchers Liangcheng Zhou, an associate research scholar, and Stephen Chou, the Joseph C. Elgin Professor of Engineering, are collaborating with U.S. government labs to develop a more rapid, accurate and inexpensive test for the Ebola virus, with the aim of identifying infections before carriers become symptomatic and contagious.

Community ties

This issue of the Princeton University Bulletin is being mailed to residents of the local community on behalf of the Office of Community and Regional Affairs.

Led by Kristin Appelget, director of community and regional affairs, and Erin Metro, associate director for community relations, the office serves as a bridge between the University and the community. Staff members work with county and municipal government officials, and with a wide variety of community organizations, to enhance the quality of life throughout the Princeton region.

The office manages University/community relationships in areas involving financial contributions, land use, affordable housing, transportation, environmental impact and local economic development.

Staff members also oversee a wide array of community relations initiatives, such as the Community Auditing Program and the Program in Continuing Education, the Surplus Equipment Donations Program, and the community use of University facilities. The office also assists in the coordination of the program in which Princeton University employees serve as volunteer firefighters with the Princeton Fire Department. In addition, the office participates in the organization of numerous arts and entertainment initiatives for the campus and the community, such as Community and Staff Day and the Communiversity spring festival.

For more information about the Office of Community and Regional Affairs, call 609-258-3204 or go online at www.princeton.edu/community.

This special section of the Bulletin showcases the many ways in which the University and organizations throughout Princeton and neighboring communities work together to make this region such a vibrant place in which to live, learn, work and play.

Tiger Challenge team tackles affordable housing in Princeton

Michael Hotchkiss

Improving access to affordable housing is a critical challenge around the country and across the globe. It's also an urgent concern just across Nassau Street from the University campus, in the municipality of Princeton.

That made it a perfect fit for the inaugural Tiger Challenge, a program designed to help Princeton students tackle complex, real-world problems by providing support and nurturing their curiosity, creativity, compassion and courage.

Photo by Sameer Khan/Fotobuddy

From left: OneRoof team members Edric Huang, Suzhen Jiang, Douglas Bastidas and Juliansito Perez tackled the challenge of affordable housing in Princeton

A team of four undergraduates spent part of the summer learning about affordable housing in Princeton through research and conversations with residents, municipal officials, affordable-housing experts and Tiger Challenge mentors.

In short, Princeton's supply of 1,024 affordable-housing units — subsidized or price-controlled housing available through an application process based on applicants' income and other factors — is dwarfed by demand. The waiting list to secure affordable housing through one of the five entities that administer the units is long.

With those facts in mind, the OneRoof team developed concepts for how they might make the application process more streamlined and user-friendly. They will continue their work throughout this academic year.

"Through around 40 interviews and other empathy-oriented research methods, we've gained the trust of government officials, the town's housing organizations, affordable-housing residents and hopefuls," said OneRoof team member Edric Huang, a junior anthropology major. "After analyzing all this raw data, we brainstormed where and how we could make an impact on this town and developed nine potential designs, which we intend to refine, narrow down and test in the real world."

Ideas include an improved online application, greater support for those on the waiting list and a schools-based community network — all designed to improve the lives of those seeking affordable housing.

"In the near future, we're looking to determine the desirability, feasibility and viability of these potential solutions and narrow them down to one approach or a combination of approaches," said team member Suzhen Jiang, a sophomore planning to major in computer science.

Christy Peacock, one of the team's mentors and the municipality's affordable housing coordinator, said team members immersed themselves in the issues that people seeking affordable housing face.

"The team was engagingly enthusiastic, eager, sensitive to socioeconomic and political undercurrents, and compellingly interested in the processes that could benefit and impact the Princeton Affordable Programs," Peacock said.

Their work can also benefit many vulnerable Princeton residents, said another OneRoof mentor, David Kinsey, a University alumnus and planning consultant who specializes in affordable-housing planning.

"The team's effort to simplify and humanize the often bewildering and frustrating process of accessing affordable housing will hopefully help many who are less privileged," Kinsey said.

Rafe Steinhauer, entrepreneurial program manager at the Keller Center who oversees the Tiger Challenge, said the OneRoof team's focus on an issue that is "locally accessible but globally applicable" has helped shape the Tiger Challenge itself in the program's first year.

"Affordable housing is a hugely important part of our community here in Princeton," Steinhauer said. "It is also a hugely important part of almost every community in the United States. So while the students are focused on delivering things that will help our Princeton community, they are learning about this ecosystem of affordable housing that could be their life's work if they choose."

The University has for decades been a part of efforts to expand affordable-housing opportunities in Princeton, said Kristin Appelget, director of community and regional affairs at the University. It has provided more than $4 million to support a range of affordable housing initiatives in Princeton over the last 10 years.

"I am proud of the work that the OneRoof team is completing, as their suggestions for streamlining and humanizing the affordable housing application process are yet another way that the University, this time through student research, can have a positive impact on access to affordable housing in Princeton," Appelget said.

OneRoof is one of five teams participating in the first Tiger Challenge, Steinhauer said. All have utilized an innovation process known as "design thinking," which puts the people most affected at the heart of innovation. Members of each team received a stipend for their work over their summer, along with on-campus housing, and will continue to receive financial support over the coming school year.

Other teams worked on topics including how to make long-distance research collaboration easier and how to develop a safer alternative to the long spine board that emergency medical technicians, the military and sports trainers use to transport injured patients.

OneRoof team members say the Tiger Challenge has combined a learning experience with the opportunity to give back to the community they call home, at least for their four years at the University.

"For Princeton students like myself, it's only too easy to get caught up in all the opportunities we have on campus and our various curricular and extracurricular pursuits," Jiang said. "Involvement in this project is a way to give back — because we should want Princeton to be the healthiest and happiest place it can be, the same way we'd want the best for our communities at home."

Photo by Denise Applewhite

Princeton University has donated $500,000 to help fund construction of a new headquarters building for the Princeton First Aid and Rescue Squad (PFARS). The nonprofit, volunteer-led organization provides emergency medical and rescue services to the Princeton community. PFARS has been operating out of the same building on North Harrison Street since 1963 and is working toward building a new headquarters at the corner of Route 206 and Valley Road. In addition to the University's support for PFARS, Princeton students, faculty, staff and alumni serve as fully trained volunteer emergency medical technicians each year with the squad. From left: Princeton University's Director of Community and Regional Affairs Kristin Appelget and Associate Director for Community Relations Erin Metro present a donation check to PFARS President Mark Freda, PFARS Treasurer Peter Simon and Princeton municipal administrator Marc Dashield.

Community ties

University offers family and children programs throughout the year

Min Pullan

Princeton University is pleased to again offer this year a wide variety of programs for families and children in local communities, many of which are free and open to the public. Ranging from science lectures to exploring green spaces on campus, there is plenty to choose from.

Information about the year-round programs is provided through the "YouthCampus" initiative established by the University's Office of Community and Regional Affairs. The site (community.princeton.edu/programs-youth) lists all the programs online and sends email alerts about upcoming programs to subscribers.

"We designed the site so that all the information is easy to access," said Erin Metro, associate director of commu-nity relations. "From art to athletics, families can find a program that suits them."

A sampling of the programs follows.

Art Museum

The Princeton University Art Museum hosts a number of family-oriented programs, such as Art for Families, which involves a gallery activity and related art project; Art-ful Adventures, a series of self-guided tours and activities; Family Days, which are full-day programs held each October and May; and Homeschool Week, which offers tours and projects during the second week of January. Throughout the year, families and school groups can visit the museum; admission is free.

Athletics

Princeton offers a number of youth sports clinics and camps. The Campus Recreation department offers a summer day camp for children in first through eighth grades, and the Department of Athletics offers around 70 summer camps and clinics directed by varsity coaches. In addition, the University's Community and Staff Day in the fall includes a youth sports clinic, while the National Girls and Women in Sports Day features an interactive sports fair for girls ages 7 to 14.

Internships

Every summer, Princeton hosts a diverse group of high school students to conduct research under the mentorship of Princeton faculty, staff and students. Students receive firsthand education in independent research in the fields of engineering and natural sciences. The typical number of opportunities varies from 20 to 40 each year.

Literacy

Community House and the Cotsen Children's Library are the two primary groups offering literacy programming for youth. Community House's programs are aimed at strengthening the academic skills of students who are underrepresented minorities or the first in their families to pursue postsecondary education. Community House also offers an SAT preparation program for underrepresented high school students.

Cotsen Children's Library hosts a reading gallery for children and activities include story times, writing contests, book discussion groups, guest speakers and craft activities. The gallery is open to the public and free of charge.

Music

Princeton University Concerts often includes family concerts in its programming each season. This year, the concert series includes "Baby Got Bach: Principally Percussion," an interactive concert on Nov. 5, and "Meet The Music: Albert & Wolfgang," on March 11.

Science

Annual events such as the Holiday Science Lecture, New Jersey Science Bowl and Young Women's Conference in Science, Technology, Engineering and Mathematics complement regular programs around the University. Princeton holds a monthly open house at the Peyton Observatory for viewing the night sky; bimonthly public tours of the Princeton Plasma Physics Laboratory (PPPL); and Science on Saturdays lectures throughout the winter at PPPL. Material Science NanoDay and the Stars of Material Science lecture will take place in the spring.

Sustainability

To learn more about Princeton's efforts to make the University more environmentally sustainable, school groups can take campus Green Tours, highlighting features such as green roofs, garden projects and a stream restoration project. The Princeton Garden Project is a student-run organic garden where visitors can learn about organic gardening practices.

Theater

This year, Princeton Summer Theater continued to offer a children's production. Next year, it hopes to offer a six-week series of young artists' workshops for children ages 6 to 12, focusing on fundamentals of theater.

Enjoying the campus

Princeton's campus is always open to families who want to stroll through the gardens, view the outdoor sculpture collection, visit a Gothic courtyard, or greet the tigers guarding Nassau Hall. In addition to an interactive map, self-guided tours are available online.

Community Action 2016: Service shows its many stripes

Gwen McNamara

What is service? Is it helping others, making a difference, giving back? Yes, but it can also be so much more. On Community Action (CA), more than 525 first-year students at Princeton University learned how service is about listening, learning and understanding as much as it is about doing.

As part of Orientation to the University, CA helps connect first-year students with their new Princeton family, discover new places and act through meaningful service projects. From environmental sustainability and youth empowerment, to nourishing families and urban arts, CA groups team up with community organizations tackling a wide array of social issues and causes throughout New Jersey and Pennsylvania. From Sept. 5 through Sept. 9, the students lived and served together out in the community.

"It's been really eye-opening to understand the different dynamics of service," said Catherine Powell, a first-year student from Chicago. "I've learned that service doesn't always have to be about you, or even where you play a dominant role." As part of the Arts Trenton: Empowering Youth through Circus Arts CA group, she worked with the Trenton Circus Squad, which uses circus skills as a vehicle to bring youth together to cooperate, challenge themselves and serve their community through performing and teaching.

"We're all beginners here and it's the kids who are teaching us," Powell added. "At first I thought, well I'm not really doing anything except maybe getting in the way, but by giving [the local youth] the opportunity to teach us and share their skills, it's boosting their confidence, it's empowering. They are giving to us, and being open to receiving, that is service too."

At the Pocono Environmental Education Center (PEEC), students explored how engaging in the process of sustainability is service with the help of the Office of Sustainability.

"For PEEC, I think it's a lot different because our work is less directly impacted toward people and different communities," said Tony Chen, a first-year student serving with PEEC. "The service that we're doing is toward the environment and to the Earth in general. It's a different perspective on community service because it's different from what people normally associate with volunteering work."

From rebuilding along the Jersey Shore, to picking produce in central New Jersey, to feeding families in Philadelphia, students learned about the challenges and opportunities facing the many communities in and around Princeton.

"We want students taking part in CA to end their week with a greater understanding of the many forms and facets of service at Princeton and beyond," said Kimberly de los Santos, the John C. Bogle '51 and Burton G. Malkiel *64 Executive Director of the Pace Center. "We hope everyone on CA returns to campus inspired to engage in service in their own way and ready to take the next step to learn how to live a life of service and realize the University's motto, to be 'In the nation's service and the service of humanity.'"

In addition to meeting their new classmates and getting the inside scoop on all things Princeton from the more than 115 sophomore, junior and senior student leaders, CA participants also had the opportunity to interact with staff and faculty. About 35 staff and faculty members took part in service with CA students during the day on Wednesday, Sept. 7, and participated in evening dinner discussions about the University's Pre-read, "Our Declaration," by Danielle Allen.

"CA is a wonderful opportunity to learn more about our communities and connect with the incoming class of first-year students through meaningful work," said Michael Caddell, senior associate director of strategic communications and marketing with Career Services, who served at Cradles to Crayons in West Conshohocken, Pennsylvania with the Community Development Philly: Empowering Youth CA group. "It's great to meet members of the Class of 2020 at the very beginning of their year and to help welcome them to the Princeton University community."

CA groups returned to campus on Friday, Sept. 9, and ended their experience together with a closing program in the evening.

"This experience has set an amazing foundation for life at Princeton," added Jane Blaugrund, a first-year student serving with the Arts Philly: Urban Arts group. "I never thought that in just three days I would be laughing, working and sharing parts of my life with people who were complete strangers before. I am so excited to start school knowing that I have 13 other amazing and intelligent people in my environment who I have already bonded with and created beautiful and impactful changes with."

Photo by Nick Donnoli

First-year student Mona Clappier (left) and group leader Jessica Li, a junior (right), join Alison Peebles and Charles Madden in a drum circle at the Princeton Senior Resource Center in the town of Princeton.

Community ties

Community and Staff Day

Community and Staff Day, held Sept. 17, featured a Princeton football game, fireworks, a youth sports clinic led by student-athletes, and an activities fair featuring University and community organizations.

Photos by Denise Applewhite

1 Charlotte Reedy places a hand on a static electricity demonstration ball at the Princeton Plasma Physics Laboratory's table, sending her hair high up the air. **2** Vanessa Smith, a senior on Princeton's women's basketball team (left), helps out at the face painting table with two participants in HomeFront's Joy, Hopes and Dreams Program. **3** William Sun, 4, gets some lacrosse tips at the youth sports clinic from Phillip Robertson, a first-year student on the lacrosse team. **4** Puneet Maken (left), her husband, Daljeet Maken, and son, Nirbaan Maken, enjoy the Princeton-Lafayette football game, which was followed by a fireworks display.

Merwick Stanworth expands affordable housing in Princeton

Emily Aronson

Princeton University will complete the redevelopment of the Merwick Stanworth property this October that added a total of 65 units of affordable housing available to local residents.

The site north of campus along Route 206/Bayard Lane has been redeveloped into a residential community for University faculty, staff and their families, as well as residents of low-to-moderate incomes who do not have to be affiliated with the University.

The development is part of the University's ongoing efforts to augment housing programs for faculty, staff and graduate students, as well as expand access to affordable housing in Princeton.

"The project represents the University's longtime commitment to affordable housing in the community," said Kristin Appelget, the University's director of community and regional affairs. "We are proud to include affordable housing for local residents at Merwick Stanworth. We think the residential community is an excellent addition to the historic neighborhood in which this development is situated."

Merwick Stanworth features a mix of one-, two- and three-bedroom apartments and townhouses. The first phase of 128 units, including 16 affordable housing units for local residents, opened in fall 2014. The second and final phase of 198 units, including 40 affordable housing residences, should be completed by the end of October. An additional nine units of affordable housing adjacent to the site on Leigh Avenue were built and occupied prior to the start of the Merwick Stanworth construction.

The University partnered with the nonprofit Princeton Community Housing (PCH) to manage the rental process for the 65 affordable community units through PCH's application and lottery system. (The application process is now complete.) Princeton University was a founding member of PCH nearly 50 years ago.

"The 56 affordable rental apartments on the Merwick Stanworth site and the nine units on Leigh Avenue are a meaningful contribution toward meeting the town's need for affordable housing and to expanding the range of housing opportunities in Princeton," PCH Executive Director Edward Truscelli said. "The project provides residents with a safe home in a neighborhood setting, access to transportation, walkability to town and, perhaps most importantly, the opportunity for residents to positively affect the course of their lives."

The new residential community sits on the former site of the Merwick Care Center rehabilitation facility and the former Stanworth Apartments for University faculty and staff. The development adds a significant number of housing units, modernizes amenities, incorporates sustainable design features, preserves the landscape and reflects the surrounding historic neighborhood.

"Merwick Stanworth is a premium, in-town site that is near public schools, the University campus and downtown Princeton," said Jennifer Ealy, director for housing real estate services in the University's Department of Housing and Real Estate Services. "This community is a very attractive place for University faculty and staff and local residents to live."

Photo by Michael Yoon

The Merwick Stanworth residential community adds additional units to the town of Princeton's affordable housing inventory.

Community ties

University expands on alternative transportation modes to boost local sustainability

Morgan Kelly

Princeton University continues to expand on its commitment to providing convenient and sustainable transportation options, helping to reduce the University's and regional community members' collective carbon footprint.

The University's bike-share program stands as the most recent and fastest-growing success, said Kim Jackson, director of Princeton's Transportation and Parking Services (TPS). The University launched a pilot program in November 2014 with 10 bikes available at Princeton Station then expanded it to eight more locations in March.

Currently, 70 white, 8-speed Breezer city bikes are available at nine campus locations: Princeton Station; Firestone Library; the Friend Center; Forbes College; the Frist Campus Center; the Lakeside and Lawrence Apartments; Alexander Hall; and the Forrestal Campus in Plainsboro.

As of Sept. 14, nearly 800 faculty, staff, students, visitors and community members had taken 11,382 bike rides, with an average of 120 rides per week. Ride times average 14 minutes. The vast majority of those rides — 10,581 — had occurred since the March 14 launch of the expanded bike-share program, Jackson said.

This fall, TPS plans to add bike-share stations at the Graduate College, Jadwin Gym and other undergraduate residences, with more locations being considered for the spring, Jackson said. In addition, the Institute for Advanced Study has added a rack of rental bikes. The Princeton Shopping Center on Harrison Road is considering providing bikes, which would be the first location in the municipality of Princeton.

"It's a hugely successful program," Jackson said. "Slowly but surely we're expanding on the existing bike culture."

The bikes are available through the bike-share service Zagster. Riders — who must be at least 18 years old — rent a bike by creating a Zagster account online or via the Zagster mobile app. Riders pay a one-time fee of $20 that allows bike rentals for up to two hours for free, with additional hours costing $2 per hour. The membership is good at any Zagster station, not just on Princeton's campus. Riders simply log in to their account and enter the unique ID number of the bike they wish to use.

The University also has added new routes to the Tiger Transit bus system, which is free to the public. Following the cancelation of New Jersey Transit's 655 bus, the Tiger Transit route serving the Princeton Plasma Physics Laboratory and Forrestal Campus picked up stops that connect the University Medical Center of Princeton at Plainsboro with Palmer Square in downtown Princeton. The intent was to provide people in the Princeton community with access to the hospital, either for work or medical care, Jackson said.

On Sept. 18, Tiger Transit began a Sunday shopper route modeled after the popular Saturday shopper line. From noon to 5 p.m., the bus runs from the graduate-student residences to Princeton Station, the Lakeside and Lawrence Apartments, Whole Foods Market on U.S. Rte. 1 South, Wegmans on Nassau Park Boulevard and Trader Joe's on Meadow Road before returning to campus.

In another expansion of service, the line that served the Princeton Theological Seminary (PTS) and the Engineering Quadrangle, or EQuad, was split into two routes. The PTS/West line will travel between the seminary in Princeton and seminary housing in West Windsor with stops at Princeton Station and Market Fair on Canal Point Boulevard. The EQuad line will run from Forbes and the Graduate College to the School of Engineering and Applied Science and Robertson Hall.

The Free B service operated by the municipality of Princeton also continues to serve as a free commuter bus between various stops in Princeton and Princeton Station on weekdays from 5:30-9 a.m., and 5-8:30 p.m. It serves as a community shopping bus from 9:30 a.m. to 4 p.m., Jackson said. In 2014, the University committed $90,000 for the purchase of a new Free B vehicle, which began serving the municipality this summer.

TPS also has stepped up its promotion of ride-share programs such as carpools and vanpools, as well as for the incentives the University provides to participants, Jackson said. For employees who carpool, the University provides a $50 gas card every three months for each person registered as being in a carpool or vanpool. In addition, designated van drivers don't pay for gas.

Sustainable Princeton's Energy Director Christine Symington attests to the importance of these efforts for the region. "It's great to see Princeton University working to provide options to get around that are less polluting and that are available to the broader Princeton community," Symington said. "Reducing our dependence on vehicles powered by fossil fuels is one of the most important things we can do to reduce greenhouse gas emissions in Princeton."

The University's aim is to help conserve the environment and the historic, small-town character of the town and campus, Jackson said.

"The driving force is that by promoting these programs, we're reducing the need to build more parking, so we're being better stewards of our land," Jackson said.

"As an institution, the Princeton community has really embraced alternative transportation and done it for the overall good," she said. "People who have participated should be proud of the contributions they've made."

Photo by Denise Applewhite

Princeton town officials cut the ribbon to unveil the new Free B community shuttle bus during a ceremony at Hinds Plaza on Thursday, June 16. Princeton University provided funds for the town to purchase the new 21-passenger bus.

Tigers read at Princeton, Trenton elementary schools

Princeton Varsity Club

For a trip to Littlebrook Elementary School in Princeton last spring, Princeton University's student-athletes swapped their textbooks for storybooks on potatoes, sharks and trains.

For more than a decade, the Princeton Varsity Club has helped to bring Princeton varsity student-athletes, representing a variety of sports, to local elementary schools as part of Reading with the Tigers. With multiple school visits a year, Tiger student-athletes read to school children ranging in grade level from kindergarten through fifth grade.

As part of the program, the Princeton Varsity Club has formed partnerships with elementary schools in Princeton and in Trenton, including, most recently, the Christopher Columbus Elementary School. During the 2015-16 academic year, Reading with the Tigers expanded its programming through a partnership with the University's Office of Community and Regional Affairs, and Tiger student-athletes visited five schools.

"Our athletic program aims to complement and enhance the educational mission of the University and aims to provide our student-athletes with the opportunity to achieve, to serve and to lead," noted Ford Family Director of Athletics Mollie Marcoux, a member of the Class of 1991. "The Reading with the Tigers program is an extension of our belief in the value of education through athletics and a wonderful opportunity to connect with the surrounding community."

Video still from Cody Chrusciel

For over a decade, Princeton student-athletes have gone to local elementary schools as part of Reading with the Tigers, a Princeton Varsity Club initiative.

The University's student-athletes not only read to the children, but also answer questions about what it means to play a varsity sport at Princeton, touching on topics such as good sportsmanship, proper nutrition and how to be a great teammate.

Mallory Remick, a swimmer who graduated in June 2016, said, "It was a really cool experience to see how excited the kids were to read the stories." She added, "Princeton has given athletes so much, and it's a great opportunity for us to serve the community and give back, and take a little time out of our day just to be here."

People

Terry Brog joined the Princeton Plasma Physics Laboratory (PPPL) June 20 as its new deputy director for operations and chief operating officer, overseeing eight departments. He brings with him decades of experience in senior leadership, most recently as manager of the Strategic Projects Division within the Facilities and Operations division at Pacific Northwest National Laboratory (PNNL) in Richland, Washington.


Brog

Brog comes to PPPL seeking a new challenge and is passionate about its mission. "The ultimate vision of this laboratory is someday developing fusion energy," Brog said. "Imagine if we had that capability right now. We'd be out of business but the world would be so much better off."

He joins Michael Zarnstorff, deputy director for research, as deputy to PPPL Director Stewart Prager. Princeton University manages the Laboratory for the U.S. Department of Energy (DOE).

"It's fantastic that Terry has joined us," Prager said. "The experience and perspective that he brings from his work at PNNL will be of tremendous benefit to us."

Prager said the laboratory was "extraordinarily fortunate" to have John DeLooper, head of Best Practices and Outreach, serve as interim deputy director for operations for seven months. DeLooper filled the vacancy created by the resignation of Adam Cohen, who left PPPL in November to become deputy undersecretary for science and energy of the DOE. "We all owe John DeLooper a big debt of gratitude for his tour de force effort during this time," Prager said.

Brog has held positions in operations, project development, research and development management, and fiscal management in several companies. He became the chief operations officer for PNNL's Energy and Environment Directorate in 2008 and was responsible for operational oversight of this directorate with a staff of 900 people and a budget of $235 million before becoming manager of the Strategic Projects division. In addition to his PNNL duties, Brog was also chair of the Operations Committee for Brookhaven National Laboratory and a Battelle/Stony Brook board member.

Brog graduated from Kenyon College with a bachelor's degree in physics. He pursued graduate studies at the University of Michigan, receiving dual master's degrees in metallurgical engineering and nuclear engineering in 1982 and a doctorate in metallurgical engineering in 1986.

John Cramer, a veteran journalist and university spokesperson who has been associate director of media relations at Dartmouth College since 2012, joined Princeton University in July as director of media relations.

"John Cramer brings a dynamic combination of news and public relations experience to Princeton, and we're pleased to have him join our team," said Daniel Day, assistant vice president for communications. "John will aim to strengthen our relations with the media as well as serve as a trusted adviser on communication and media strategy, working closely with our campus partners."


Cramer

"I'm excited to be joining Princeton's wonderful communications team," Cramer said. "I look forward to working with the entire campus and to sharing with a global audience the innovative teaching, research and scholarship that's happening across the Princeton community."

Prior to working at Dartmouth, Cramer served as director of media relations at Vermont Law School and as senior media relations representative at the Johns Hopkins University School of Medicine and Johns Hopkins Hospital in Baltimore.

As a journalist, Cramer was an editor and senior writer at several newspapers, including The Roanoke (Virginia) Times and The Fresno (California) Bee. He also was a foreign correspondent whose coverage of military and civilian conflicts and other issues in Asia, the former Soviet Union, Latin America and Europe appeared in The Washington Post, Los Angeles Times and other news outlets.

A native of Michigan, Cramer has a Master of Science in journalism from Ohio University and a Bachelor of Arts in English from Denison University.

Cramer succeeds Martin Mbugua, who became assistant vice president for communications at Carnegie Mellon University in February.

Rebecca Graves-Bayazitoglu has been appointed director of Princeton University's McGraw Center for Teaching and Learning and associate dean of the college. She began her new position July 18.

Graves-Bayazitoglu has worked at Princeton since 2003, most recently as dean of Whitman College for nearly a decade. As director of the McGraw Center, she will support faculty members who seek to enrich their courses with new materials, methods or technologies. She also will oversee the center's many programs and services in support of student learning and academic success — including tutoring, study halls and academic skills workshops.


Graves-Bayazitoglu

"We are thrilled that Rebecca has accepted this position," said Dean of the College Jill Dolan. "Her exciting vision for the future, her talent to inspire colleagues, and her history of accomplishments as a campus leader and residential college dean make her the perfect choice to lead the McGraw Center. Rebecca will enhance McGraw's engagement with faculty and with students; she'll innovate our inclusive classrooms program; and she'll ensure that McGraw continues to be a vital resource across campus."

Graves-Bayazitoglu said she is honored to lead the McGraw Center.

An experienced academic adviser who has worked closely with undergraduates at all stages of their Princeton career, Graves-Bayazitoglu said she is "especially excited to create a forum in the McGraw Center for cross-departmental and cross-constituency conversations about inclusive teaching practices, and to work with a broad range of campus partners to reflect on how service learning, international experiences and entrepreneurship are broadening and deepening the Princeton experience."

A graduate of Middlebury College, Graves-Bayazitoglu was selected for a Fulbright Teaching Assistantship in France prior to joining Princeton's Department of French and Italian as a doctoral candidate. She received her Ph.D. from Princeton in 2002. Graves-Bayazitoglu taught literature, language and film at the University of Michigan-Ann Arbor and at Haverford College. She returned to Princeton in 2003 to join the residential college staff of Rockefeller College.

Graves-Bayazitoglu succeeds Lisa Herschbach, who is now head of the upper school division for a new independent school opening in Bentonville, Arkansas.

Barbara Hampton, a seasoned career services professional, joined Princeton University's Woodrow Wilson School of Public and International Affairs as director of graduate career services and alumni relations on Aug. 15.

"We are thrilled that Barbara will be joining the Woodrow Wilson School," Dean Cecilia Rouse said. "I am confident that, given her impressive background — having advised hundreds of students at the University of Virginia — we will have a relatively seamless transition for the School's Graduate Career Services office. We are eager for Barbara to transition from a 'Hoo to a Woo."


Hampton

Hampton, who has a longstanding passion for helping students attain internships and jobs, began her career at the University of Virginia (UVA) in 2003 as an extern coordinator. Between 2003 and 2013, she served in a number of roles including career counselor for experiential learning, assistant and associate director of employer services, and director of employer services.

In 2013, Hampton was named director of career services at UVA's Frank Batten School of Leadership and Public Policy. There, she directed the School's Career Services office, providing career guidance to policy students and leading workshops on careers in government, policy research and social innovation.

Hampton succeeds Ann Corwin, who joined the Wilson School in 1974. During her four-decade tenure, Corwin helped thousands of Wilson School graduate students secure internships and jobs, and also provided the school with a keen personal and institutional memory of both placement and alumni contacts.

"I am delighted to be joining the Woodrow Wilson School this summer and am eager to begin working with students and alumni to ensure that they achieve their employment goals," Hampton said. "I feel very fortunate to have the opportunity to build upon the extensive career resources that Ann Corwin established during her tenure at Princeton. I am also looking forward to collaborating closely with employers, faculty and staff on programming efforts that will support students' career development."

Hampton earned a Bachelor of Arts in psychology and Spanish and a Master of Education in counselor education, both from the University of Virginia. She is actively involved in professional associations including the Virginia Association of Colleges and Employers, where she served on the board of directors for five years and as the organization's president from 2011 to 2012.

Rudresh Mahanthappa, saxophonist and composer, has been appointed director of jazz and Anthony H.P. Lee '79 Senior Lecturer in Jazz Studies, starting this fall. He succeeds Program in Jazz Studies founder Dr. Anthony D.J. Branker.

Mahanthappa comes to Princeton bearing not only his extensive and celebrated background in jazz performance, but also a unique voice intent on transcending cultural divides by melding progressive jazz and non-Western musical traditions.


Mahanthappa

Program in Musical Performance Director Michael Pratt said he is "nothing less than an already internationally acclaimed artist. His grounding in traditional jazz language and style is deep, and he also has proven himself to be an important explorer. He has taken new looks at past masters, and his work in incorporating world musics (such as that of the South Indian Carnatic classical tradition) into contemporary jazz has created a real 'buzz' in world jazz circles."

"Joining the Princeton University music department as director of jazz is an honor and a tremendous opportunity to influence and shape the future of jazz as a contemporary American art form," said Mahanthappa. "Music at Princeton continues to put forth a forward-thinking energy with regard to performance, composition and musicology. I am truly excited to join this amazing group of faculty."

Most recently, both Downbeat and NPR Music's Jazz Critics Poll hailed Mahanthappa's project "Bird Calls" as the Best Album of 2015. He has been named a United States Artists Fellow in addition to receiving a Guggenheim Fellowship, two New York Foundation for the Arts Fellowships and the Doris Duke Performing Artist Award. He is a longstanding recipient of the "Alto Saxophonist of the Year" title by Downbeat Magazine's International Critics Polls and Jazz Journalists' Association.

Employee obituaries

The following is an updated list of University employee obituaries.

Current employees

June 2016: **Thomas McNeil**, 64 (2000-2016, Building Services); **Joan Ockay**, 62 (2008-2016, University Library).

August 2016: **Robert Woolley**, 69 (1976-2016, Princeton Plasma Physics Laboratory).

Retired employees

May 2016: **Eleanor Edinger**, 84 (1963-1993, Athletics).

June 2016: **James Barbour Sr.**, 95 (1957-1985, Princeton Plasma Physics Laboratory); **Martha Cella**, 94 (1963-1987, Office of the Dean of the College); **Gillett Griffin**, 87 (1967-2004, Art Museum); **Caroline Moseley**, 80 (1986-2000, Communications); **Zelda Spero**, 95 (1960-1988, Economics).

July 2016: **Samuel Davis Sr.**, 88 (1968-1990, Building Services); **Arlester Fleming**, 63 (1983-2016, Mason Shop); **Juke Macoon**, 71 (1985-2013, Building Services); **Harry Maselli Jr.**, 79 (1987-1999, Building Services); **Angelo Mendola**, 93 (1980-1991, Building Services); **Julia Miller**, 91 (1984-1992, Art Museum); **Naomi Ricks**, 85 (1961-1996, Dining Services).

August 2016: **Thaddeus Golian**, 85 (1980-1995, Princeton Plasma Physics Laboratory); **Krystyna Podraza**, 75 (1979-2009, University Library).

Faculty obituaries

Elaine Fantham, the Giger Professor of Latin, Emeritus, and professor of classics, emeritus, who was known and admired for her outstanding scholarship and warm friendship, died July 11 of natural causes in Toronto. She was 83.

Fantham joined the Princeton faculty in 1986 and retired in 1999. Her main interests were Roman comedy and rhetoric, Latin epic from Virgil to Statius, Roman religion and the social history of Roman women. She served as chair of the Department of Classics from 1989-93, and from 1996-98 she directed graduate studies as well as the Program in the Ancient World.

Fantham

"She was one of the most remarkable Latinists of her generation, with an unmatched range of expertise, and had an enormous impact through her scholarship, teaching and friendship," said Andrew Feldherr, professor of classics and chair of the Department of Classics.

"Elaine seemed to have had at her instant command everything that could be known about any aspect of Latin literature or Roman life, and an inexhaustible energy for translating that knowledge into scholarship that was as engaging and original as it was authoritative. From her early work on Plautus, she re-drew the map of Latin studies," Feldherr said.

"She was a pioneer both as a scholar of Roman women and as a woman scholar at times and places where women were scarcely represented in our field," he said, noting that many students had their first introduction to the lived experience of Roman women through the chapters she wrote for "Women in the Classical World: Image and Text" (Oxford University Press, 1994).

Calling Fantham "forthright and wonderfully entertaining," Feldherr said that she became a popular commentator for National Public Radio's "Weekend Edition," drawing parallels between the ancient and contemporary worlds.

Robert Kaster, the Kennedy Foundation Professor of Latin Language and Literature and professor of classics, said: "Perhaps the most striking thing about Elaine is that she seemed to know everything about classical Latin literature: I couldn't count the number of times that she produced the most arcane fact or unexpected comparison in a casual conversation, not remotely by way of showing off, but naturally, as though, of course, this was the sort of thing anyone could be expected to know or understand.

"She was also unfailingly kind to friends and always interested in their news or news of their families — she loved the relationships she formed and found in them one of the sources of her remarkable energy," Kaster said.

Fantham was born in Liverpool, England, in 1933, and lived through the bombing raids of 1939-42 during World War II. She earned her bachelor's and master's degrees at Oxford University and her Ph.D. at the University of Liverpool in 1962. Before coming to Princeton, she taught for two years at the University of Indiana, then moved to Canada, where she was a member of the faculty at the University of Toronto from 1968 to 1986.

Her publications include "Roman Literary Culture: From Cicero to Apuleius" (1996), "Women in the Classical World: Image and Text" (1994, with H. Foley et al.) and "Studies in Republican Latin Imagery (1972)," as well as commentaries on Seneca's "Troades," Lucan's "Civil War" and Ovid's "Fasti." She was co-editor and translator of "Erasmus: The Educational and Literary Works" (1989) and served as associate editor-in-chief of the seven-volume Oxford Encyclopedia of Ancient Greece and Rome (2010).

At Princeton, she taught a wide range of courses, including graduate courses on Roman epic, undergraduate courses on the Aeneid and seminars on a range of topics including Roman religion. Many of her advisees have gone on to become leaders in the field, Feldherr said.

Stephen Wheeler, an associate professor of classics at Penn State University, earned his Ph.D. in classics at Princeton in 1992 and often visited Fantham in Toronto after she retired.

"What I have always valued in Elaine was her brilliant command of Latin texts and her sound opinion about them," Wheeler said. "The range of her knowledge on all things classical was immense and could be intimidating to students, but she was able to put us at ease and win our love with her earthy wit and unfailing generosity."

A former trustee of the American Academy in Rome, Fantham served as vice president of the Classical Association of Canada (CAC) from 1982-84 and, after her retirement, as honorary president from 2001-06. She received the CAC Award of Merit in 2015. Fantham was president of the American Philological Association in 2004, which awarded her a Distinguished Service Medal in 2009.

She was married to Peter Fantham, a mathematician, now deceased, and is survived by their daughter, Julia, and son, Roy, and their families.

Christodoulos "Chris" Floudas, a Princeton University emeritus professor who applied the disciplines of mathematics and chemical engineering to complex systems that include protein folding and fuel refining, died Aug. 14 while vacationing with his family in Greece. He was 56.

Floudas, the Stephen C. Macaleer '63 Professor in Engineering and Applied Science, Emeritus, and professor of chemical and biological engineering, emeritus, joined the Princeton faculty in 1986 and served as a professor for 29 years before moving to Texas A&M University in February 2015. He was director of the Texas A&M Energy Institute and the Erle Nye '59 Chair Professor for Engineering Excellence.

"Princeton Engineering mourns the far-too-early passing of Chris Floudas — an immense loss for the global chemical engineering community," said Dean of Engineering Emily Carter, the Gerhard R. Andlinger Professor in Energy and the Environment, and professor of mechanical and aerospace engineering and applied and computational mathematics.

Floudas

"His exceptional intellectual contributions to chemical engineering will live on through the many students he educated and trained and his written words," Carter said. "What I will remember most is his extraordinary enthusiasm for his research and his always-ready smile."

As a researcher, Floudas employed the discipline of optimization, in which mathematicians find the best solutions among an often-complex array of alternatives to grapple with a wide range of problems. He wrote key papers on the structure of proteins and the behavior of protein fragments called peptides.

In 2012, his research played a key role in a white paper from the American Institute of Chemical Engineers that proposed a method to form a national system to create synthetic fuels. He was the author of two graduate textbooks and co-editor of the 4,600-page Encyclopedia of Optimization. During his career, Floudas was an author of more than 300 scholarly articles. The scientific publisher Thomson Reuters said in multiple years that Floudas' papers ranked in the top 1 percent of those cited in their research fields.

"Chris really was a pioneer of global optimization, which he applied not only to chemical-process systems — such as the optimal design of chemical plants — but also a wide variety of topics such as protein folding and peptide docking," said Richard Register, the Eugene Higgins Professor of Chemical and Biological Engineering. "In doing so, he substantially advanced every one of them."

For decades, Floudas taught the University's chemical-process design class, a capstone course for chemical engineering students. Known to be rigorous, the class required teams of students to apply their knowledge to the design of a realistic chemical process.

Register, who was chair of chemical and biological engineering during Floudas' most recent years at Princeton, said that Floudas always developed a new and innovative project for the students rather than relying on older examples. His last class at Princeton developed plans for a refinery to transform a mixture of coal, natural gas and biomass into a liquid transport fuel. "Chris wanted the students to feel that what they were doing was relevant to the future," Register said.

Pablo Debenedetti, Princeton's dean for research, said Floudas was an indisputable leader in the theory and numerical methods of global optimization, and their application to chemical-process systems engineering, computational biology and energy-systems optimization. He described Floudas' exceptional scholarly work and ability to train numerous superb students as "a unique intellectual gift."

"He was an extraordinary person and his untimely death is a tragedy that leaves an enormous void in the chemical engineering profession at large, and in the lives of all of us who were privileged to know him well," said Debenedetti, the Class of 1950 Professor in Engineering and Applied Science and professor of chemical and biological engineering.

At Texas A&M, Floudas was instrumental in the growth of the Energy Institute. During his tenure, Texas A&M reported, the university assumed a prominent position in U.S. Department of Energy initiatives in refining and manufacturing.

"He was an amazing scholar who demonstrated leadership in discovery, in innovative teaching and practice, and in serving his discipline and all of society," Texas A&M University President Michael Young said in a statement.

Floudas was born in Ioannina, Greece, in 1959. He earned an undergraduate degree in chemical engineering from the University of Thessaloniki in 1982, and a Ph.D. in chemical engineering from Carnegie Mellon University in 1986. His research accomplishments earned him numerous awards and honors, including election to the U.S. National Academy of Engineering in 2011, the Academy of Athens in 2015, and the U.S. National Academy of Inventors in 2015. He was a fellow of the American Institute of Chemical Engineers and the Society for Industrial and Applied Mathematics.

Floudas is survived by his wife, Fotini, and their daughter, Ismini.

Employee retirements

Effective June 1: in the carpenter shop, carpenter **Daniel Reffner**, after 33 years.

Effective July 1: in the Office of Information Technology, senior accountant and budget analyst **Marcia Adelman**, after 20 years; in the Department of Music, Anthony H.P. Lee Senior Lecturer in Jazz Studies **Anthony Branker**, after 19 years; in the Department of Slavic Languages and Literatures, undergraduate coordinator **Frances Carrol**, after 20 years; on the staff of Princeton Alumni Weekly, class notes and reunions guide editor **Frances Hulette**, after 12 years; in the University Library, special collections assistant V **Hsing-feng Liu**, after 46 years; in Building Services, data management specialist **Susan Lyszczak**, after 22 years; in the Office of Finance and Treasury, director of mortgage services **Lorrie McGough**, after 24 years; in the Princeton Plasma Physics Laboratory, principal research physicist **Sidney Medley**, after 38 years.

Effective Aug. 1: in the School of Engineering and Applied Science, mailroom coordinator/receiving **Thomas Cervone**, after 17 years; in the Woodrow Wilson School, director of graduate career services and alumni relations **Ann Corwin**, after 42 years; in the Office of the President, assistant to the president **Mary DeLorenzo**, after 16 years; in the University Library, special collections assistant V **Phulandaye Doobrajh**, after 39 years; in Career Services, communication and marketing assistant **Dorothy Farina**, after 17 years; in the Princeton Plasma Physics Laboratory, experimental technician II **Eugene Kearns IV**, after 36 years; in the Program in Latin American Studies, program manager **Rosalia Rivera**, after 44 years; in development, department office support III **Carol Wall**, after 31 years; in the Office of Design and Construction, senior project manager **William Zahn**, after 11 years.

Effective Sept. 1: in the University Library, librarian **William Robert Black**, after 30 years; in the Princeton Plasma Physics Laboratory, janitor **Antonio Morgado**, after 37 years; in the Council of Ivy Group Presidents, administrative assistant **Robin Patsey**, after 21 years.

Effective Oct. 1: in the Office of Information Technology, electronics specialist II **Robert Mills**, after 24 years; in Public Safety, dispatcher **Michael Riley**, after 6 years.

Wang looks for order in chaos — in neuroscience, political polling and redistricting

Michael Hotchkiss

Sam Wang — explorer of the brain and wrangler of political polls — made a prediction in 2012 that turned out to be wrong.

A professor of molecular biology and the Princeton Neuroscience Institute, Wang wanted to know why. His pursuit of the answer led him to dive into a new area of inquiry — political redistricting. Four years later, he has published an article in July in The Stanford Law Review detailing a relatively simple way for judges to identify when a set of districts has been unfairly drawn to benefit a given political party.

Wang

Not bad for a self-described political hobbyist.

But whether he is working in his lab on campus to better understand the brain region known as the cerebellum, crunching numbers on dozens of polls to present a clear picture of the presidential race or hunting for evidence of partisan intent in redistricting, Wang says he is always looking to find order in the chaos of large amounts of data.

"When faced with complex data, the difficulty is to extract an understandable simple meaning from a large data set," Wang said. "My general approach to data analysis, to the extent possible in neuroscience, is to take all the observations we make in the lab and try to come up with some relatively simple fact that can be stated about the data. The thing that's in common in these other areas is that I'm just using tools that I use in the course of my research."

Wang's ability to turn a jumble of individual polls into meaningful insights about political races has gained him a loyal group of readers at his Princeton Election Consortium website (election.princeton.edu) since 2004. But that was also the source of his incorrect 2012 prediction. He rightly predicted that Democratic candidates would get more votes than Republican candidates in House races across the country. He also foretold that Democrats would regain control of the House. That's where he was wrong.

"The incorrect prediction bothered me," Wang said. "I wanted to figure out why I was wrong. My readers — whom I rely on a lot — pointed out that partisan redistricting had been pretty intense in 2010 and I discovered it had been asymmetric, benefiting Republican candidates."

The search for a standard

While the Supreme Court has held that partisan gerrymandering — constructing a set of districts to benefit one party over another — is subject to court action, Wang said no standard has been adopted to identify whether it has taken place. Because of that, Wang said, court cases about redistricting often feature parades of expert witnesses and countless electoral maps. He wanted to suggest an alternative approach.

"My goal was to come up with something simple enough that a judge could jot it down on a piece of paper or do it in an Excel spreadsheet," he said. "I think it would be nice to come up with something the judge could use, and there wouldn't be a need for experts."

One part of Wang's three-part test relies on a computer simulation to estimate appropriate levels of representation for a given level of popular vote and provides a way to measure the effects of gerrymandering.

The other two parts, which can be used to help evaluate the intent of redistricting, rely on well-established statistical principles and can be carried out on a calculator. Those tests identify whether the redistricting has been designed to pack one party's voters into as few districts as possible, giving them big wins but minimizing their impact overall, while geographically spreading the other party's voters so the gerrymandering party is able to win a larger number of districts, though by a smaller margin.

And to make the task even easier, Wang has created tools to carry out the tests on a new website (gerrymander.princeton.edu).

Wang's hope is that not only will the standard be used in court, but that he won't even need to be there as an expert witness.

"I don't need to be go to court because it's clear enough that I don't need to be there," Wang said. "I can stay here and do my neuroscience research."

In the lab

Right now, that research entails working to understand how the cerebellum, which is important to movement, affects cognitive function. The cerebellum is the most commonly aberrant brain region in people with autism, Wang said, though the reason remains unclear. His lab is exploring the theory that the cerebellum plays a teaching role during sensitive periods of development and plays an important role in organizing the rest of the brain. In experiments using mice, Wang and his colleagues deactivate parts of the cerebellum during parts of development and measure the impact on the brain.

"We want to know what patterns of inactivation of the cerebellum are linked with social deficits," Wang said. "That requires analytical techniques for dealing with large amounts of data. If our hypothesis is true, it will show how the cerebellum contributes to emotional and cognitive maturation, and it will show one way by which brains can become autistic. It could also make some contribution to understanding where autism comes from generally."

Poll wrangler

As for his polling website, it's largely on autopilot these days. He posts updates on the presidential campaign and polling issues, but the aggregation of state-level polls into what he calls the "meta-margin" now happens automatically. Updated four times daily and placed prominently at the top of the site, the meta-margin gives a sense of how far ahead one candidate is in the presidential race. Put another way, it measures the amount of opinion swing needed to result in an Electoral College tie.

Wang is also sharing his insights in a new forum, the "Politics & Polls" podcast, which he co-hosts weekly through the Nov. 8 general election with Julian Zelizer, the Malcolm Stevenson Forbes, Class of 1941 Professor of History and Public Affairs.

"Sam is a very original voice in the world of political analysis," Zelizer said. "He manages to take substantial amounts of quantitative data and connect that information to the debates that are shaping politics. We are excited about our new podcast, which aims to bring our two intellectual worlds together."

So is Wang paying close attention to this year's presidential race?

"Well, kind of, as much as anyone is," he said. "But if I want to know what's happening in the race, I do what my readers do, which is I log on to my website and look at the top number."

University updates town residents, officials on 2026 Campus Plan

Daniel Day

Representatives of Princeton University gave a status report Monday, Sept. 19, to town of Princeton residents, council members and planning committee members on the 2026 Campus Plan that is being developed.

The new plan, which will succeed the University's 2016 Campus Plan coming to a close, will establish a framework to guide the evolution of the campus through 2026 and beyond.

The plan will encompass most of the land the University owns and will consider two planning horizons: a 10-year horizon to provide detailed guidance on near-term growth and change, and a 30-year horizon to establish a broader strategy for development of campus over the next generation.

"The University and the town share a unique relationship," said Cyndi Rottenberg-Walker, a partner in the Toronto-based firm Urban Strategies Inc., the University's lead consultant on the 2026 plan. In the town council chambers, Rottenberg-Walker gave on an on-screen presentation outlining major objectives of the plan for the Princeton campus.

She enumerated the plan's principles, which are to:

- Provide an integrated environment for teaching, living, learning and research;
- Enhance the campus's distinctive sense of place;
- Foster a setting that is welcoming and supportive and encourages positive interaction and exchange;
- Create a climate that encourages thoughtful and creative approaches to sustainability; and
- Serve communities that extend beyond the campus.

Joining Rottenberg-Walker in explaining the campus plan were University Architect Ron McCoy and Bob Durkee, University vice president and secretary. The speakers noted the ties between the 2026 Campus Plan and the University's Strategic Planning Framework that was adopted last year.

Key projects for the campus plan identified in the strategic plan include new facilities for the School of Engineering and Applied Science and for environmental studies, as well as facilities to complement the University's existing innovation ecosystem; housing for undergraduate students, graduate students and postdoctoral staff; and initiatives to promote sustainability.

The University speakers noted that while the 2016 Campus Plan focused on the central University campus between Nassau Street and Lake Carnegie, the 2026 plan will also study University-owned land beyond Princeton in West Windsor and its campus lands in Plainsboro.

Noting the planners' "early thinking," Rottenberg-Walker showed a map with a potential grid of pathways laid out across the West Windsor lands connecting to the central campus across Lake Carnegie. The map showed two potential bridges crossing the lake for pedestrians and cyclists, providing greater access to the parklands along the lake and future development in West Windsor.

Durkee, McCoy and Rottenberg-Walker mentioned the University's efforts in recent years to enable the community to reach and navigate campus on foot, on bicycles and public transit, and to reduce the number of single-occupancy vehicles coming to campus. That effort will continue and expand in the 2026 plan, and McCoy noted national demographic trends showing automobile use on the decline. "The future is changing for the good," he said.

A planning committee member asked about the future of Springdale golf course. Rottenberg-Walker noted that the golf club's lease runs for about 10 more years, but said the long-term use of the land will be to support the University's educational mission. Planners have not talked specifically about future uses of that property, but any use of the land would include restoring Springdale Creek that runs through the property and would take into account the interests of its neighbors and the property's history.

Several questions focused on housing as the University looks to expand its undergraduate population by 10 percent in the coming years. The University will build a new residential college, and also expects to construct additional housing for graduate students, postdocs, faculty and staff. Durkee stressed that even with the expansion of the student body, the University will continue to keep its focus as a residential learning community.

Asked about plans for the Butler Tract, where old graduate student residences were recently torn down, Durkee said it would be used for housing, but not for undergraduates. "What housing will be there and when is undetermined," he said. McCoy added that development there would fit with the neighborhood.

The University representatives said the 2026 Campus Plan should be completed near the end of summer in 2017. Anyone interested in learning more about it and wishing to comment is encouraged to visit the Princeton Campus Plan Blog online at (princetoncampusplanblog.com).

Opening Exercises

Continued from page 1

"[Allen] offers you wisdom relevant to the question that I just posed, about what it means to be a college student — or, for that matter, a decent and conscientious person of any kind — in moments that are difficult and unsettled," Eisgruber said.

Focusing on the phrase "the course of human events" in the first line of the Declaration of Independence, Eisgruber noted Allen's observation that course is another word for river.

"Right now the course of human events pulls hard upon us, sweeping us along on treacherous tides. It sometimes feels like we're working hard just to come up for air and grab a breath," he said.

To navigate the turbulent stream of life, Eisgruber encouraged students to consider that "we're all in it together."

"Professor Allen reminds us that the people who wrote the Declaration of Independence shared an identity, too. They claimed to be one people," he said. "They did not all agree with or like one another. … But being a people meant that they were in it together, they were in a deep sense stuck with one another, or, to put it in loftier terms, they shared a common destiny."

And in a very different time and place, students in the Class of 2020 similarly share a common bond.

"Those of us who gather in this chapel today will, for the next few years at least, move through the course of human events together," Eisgruber said. "We can learn from one another, if we listen. We will do better if we look out for one another — if we remember, in other words, that even if things seem to be going fine for us personally, they may be going badly for someone else near to us — and, if so, we owe that person our help and support."

He added: "We can also make a greater difference beyond our campus, and do more to help communities less fortunate than our own, if we work together. That is what I mean when I say that we are a community, and that we navigate this river, this course of human events, collectively."

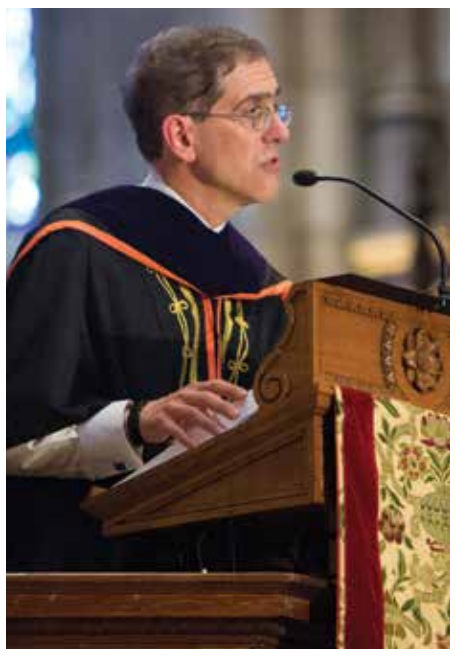
To help them along as they navigate, Eisgruber advised students to learn about the past and to explore new terrain.

"To discern the shape of a river, it helps to know something about where it comes from — which means knowing something about the course of human history," Eisgruber said. "Giving you this knowledge and capacity, this sense of the human, this perspective and vision, is the most fundamental purpose of liberal arts education in general, and of your Princeton education in particular."

At the same time, students should have the freedom during their time at Princeton to grow and develop and to encounter different perspectives and enjoy new experiences, he added.

Eisgruber concluded: "You owe that freedom to yourself, because you need to prepare for the journey to come. … We need you to fortify your mind and your character now so that you can help us to confront what the world will throw at us in the future, for we are all, and we will all remain, in this together."

Following the ceremony, first-year students exited the chapel and participated in the "Pre-rade," a parade through FitzRandolph Gate at the front of campus, where they were cheered on by other students, alumni, faculty and staff. In the evening, students attended the freshman assembly to further discuss the Pre-read book with the author. Eisgruber also will lead small group conversations about the book with students throughout the academic year.



Photos by Denise Applewhite

LEFT: President Christopher L. Eisgruber welcomed the Class of 2020 to the University during Opening Exercises. RIGHT: First-year students seated in the balcony look out on the University Chapel during Opening Exercises.

Satellite

Continued from page 1

"Dan told me he wanted to build a radio telescope on campus," Jarosik said. "I told him that there was already a large radio dish sitting idle down by the Shore. We decided to go take a look at it."

From the outside, the dish didn't look too bad. Thanks to funding secured by InfoAge, the structure had been painted in 2005. But the museum, which survives on donations and volunteer work, didn't have the resources to do much more.

Upon inspection, Jarosik and Marlow found that rust had jammed the motor and drivetrain that tilt the dish vertically. The motor would have to be taken down from the top of the tower and repaired.

To fund the repairs, Jarosik and Marlow received grants from Princeton's 250th Anniversary Fund for Innovation in Undergraduate Education and from the University's Council on Science and Technology, both of which provide resources for the development of new courses. "Our idea was that non-science majors as well as physics majors would be able to use a working radio telescope," Marlow said. Additional support came from Wall Township and the Ocean-Monmouth Amateur Radio Club.

Marlow and Jarosik engaged the help of engineer Geoffrey Gettelfinger, the department manager in physics, as well as department technicians Stanley Chidzik, James Kukon and Richard Soden to help with the task. Princeton undergraduates Nathan Agmon, Class of 2017, and Joshua Wang, Class of 2018, spent a summer developing software to read and display data from the dish.

Just to get the motor down off the tower was a challenge. The Princeton engineers designed a special crane to lower the one-ton motor. The crane had to be lifted piece by piece and assembled in place at the top of the dish pedestal. After locating a company that could fix the motor package, the team eventually was able to restore full movement of the dish.

The dish works!

Finally, in the winter of 2015, the researchers were ready to try out the dish to see if it could intercept radio signals from space. They turned the knobs that control the dish and steered it so that it looked up at a region of the Milky Way. There they detected radio-wave signals at a frequency of 1420.4 MHz and a wavelength of 21 centimeters, a well-known signal of hydrogen gas in the Milky Way and a sure sign that the dish was operating properly.

Soon they were able to intercept information streaming from weather satellites operated by the National Oceanic and Atmospheric Administration. The researchers could also detect pulsars, dying stars that give off regular repeating bursts of radio waves as they rotate. The team beamed radio signals to the moon and intercepted them as they came back to Earth.

On January 10, 2016, radio enthusiasts — along with InfoAge supporters, Jarosik and Marlow, who himself is an amateur radio operator — gathered at the dish to commemorate the first such "moon bounce," which took place in 1946 on the site of the current dish and at the time was important proof of principle that radio waves could be harnessed for satellite communications.

The dish site has had many brushes with history. In 1914, the Marconi Company — founded by Italian inventor and pioneer of wireless communication Guglielmo Marconi — set up a station for sending transatlantic wireless telegraph messages to a receiving station in Wales.

The U.S. Navy took over the site in 1917 and used it for wartime radio transmissions, and it was transferred to the U.S. Army in 1941. The military decommissioned the facility in 1993 and in 2012 the National Park Service made it a National Historic Landmark. The dish site is now owned by Wall Township and leased to InfoAge.

A very large learning tool

The restored dish will now be used regularly to teach a new generation of students to use radio telescopes to learn about space. During the spring semester, Princeton students visited the dish as a learning exercise for the course "Experimental Physics" that Marlow teaches for physics majors. Marlow also is designing a course for use with non-majors that will be offered in 2017.

"Princeton is now one of the few universities in the world where undergraduates can operate a 60-foot radio telescope," Marlow said.

There is no actual need to go to the satellite dish — it can be operated remotely from a room in Princeton's Jadwin Hall. Still, most students take advantage of field trips to the dish where they can experience the scale of the device.

"It is amazing to think that as a junior in college you can do experiments with equipment that has been at the forefront of science," said Daniel Gift, a Class of 2017 physics major who made the trip to the dish. "The ability to control a huge radio telescope to obtain data for a class assignment is something that is really unique."

Marlow hopes to be able to bring more students from local high schools to the dish to inspire them to study science and engineering.

"Part of my motivation for wanting to study physics and astronomy is that, when I was a kid, seeing the Milky Way inspired me," Marlow said. "The refurbishing of this satellite dish provides students with a similar opportunity. This is the sort of thing that a great university can do."

Photo courtesy of Robert Raia Photography

The refurbished dish was activated in the winter of 2015 and steered so that it looked up at a region of the Milky Way. It detected a well-known signal of hydrogen gas in the Milky Way, and soon it was able to intercept information streaming from weather satellites. It also has detected radio waves from dying stars, and the researchers have beamed radio signals to the moon and intercepted them as they came back to Earth.