Summer 2011 Moving research forward: Advanced new building and URP

Touchpoint

College of Science and Technology
Temple University

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The Undergraduate Research Program offers CST students the opportunity to work alongside Temple’s most experienced researchers. But many URP students have to work at jobs off campus, and that means less time in the lab working on today’s most difficult challenges.

Your gift to URP will provide students with hourly stipends for lab work. CST will then match your financial contribution—on a one-to-one basis—so that your gift will go twice as far.

Together, we can help URP students spend more time in the lab, earn money for living expenses and learn what it takes to excel in advanced research before they graduate.

To make a gift to the Undergraduate Research Program, use the enclosed envelope or go to myowlspace.com/giving.

Excellence must be an aspiration for today’s young people. In the College of Science and Technology, excellence begins with faculty members who inspire and challenge every student. CST professors create an environment that encourages inquiry and rewards hard work. Students gain new insights by working with investigators on some of the most important but difficult questions of our time.

Over the past three years, 32 new faculty members—talented teachers and experienced researchers from around the world—have joined CST. New and seasoned faculty members have helped propel CST forward in many ways, including more than doubling the amount of sponsored research since 2007.

CST faculty members are also providing significant undergraduate research opportunities for students through our Undergraduate Research Program (URP). Early research opportunities are essential to educating outstanding students who go on to the most selective graduate and professional programs and to employment with leading corporations and promising startups. As a relatively new program, and during this challenging time of reduced Commonwealth support for the university, increased external funding for URP is critical.

URP is designed to pull students out of working in restaurants or retail and get them working in the lab. To support these students, we need your help. CST will match all financial contributions to URP on a one-to-one basis from CST’s general operating budget. The funds raised will go to pay URP students a stipend for lab work. By supporting aspiring student researchers you will help them earn much-needed money for living expenses, learn what it takes to excel in research, spend more time on academics and graduate. You will learn more about URP in this issue of Touchpoint.

In this issue you also will read about the new Science Education and Research Building. This advanced facility will soon break ground, providing more space and state-of-the-art technology for faculty and students. The building is part of Temple 20/20, the university's framework for transforming Main Campus. I look forward to the many scientific breakthroughs we will achieve in this new facility in the years ahead.

CST’s extraordinary achievements are made possible by the continued—and growing—involvegment of alumni and friends. Your support means the college will continue to move forward and set new standards in research, teaching and engagement with the world.

Sincerely,

Hai-Lung Dai
Dean and Laura H. Carnell Professor

College of Science and Technology
TEMPLE UNIVERSITY
Science Education and Research Building: A new home for discovery

Temple 20/20, an ambitious framework for transforming Main Campus into a 21st-century environment that supports the goals of the university’s Academic Strategic Compass, is well underway. Central to Temple 20/20 is an advanced new science education and research facility that will fully support the extraordinary faculty and talented students of the College of Science and Technology.

Many of the Temple 20/20 components are already underway. The renovation and expansion of the 1960s-era Pearson and McGonigle Halls is scheduled for completion this fall. A new residence, dining and retail complex is rising at the corner of Cecil B. Moore Avenue and Broad Street. With housing for approximately 1,500 students, campus dining options and street-level retail space, the complex—including its 24-story tower—will give Main Campus a dramatic new southern gateway.

In less than a decade, the combined projects of Temple 20/20 will have transformed Main Campus, revitalized North Broad Street and secured the university’s place as a destination for intellectual stimulation and an international resource for expertise and innovative research.

The Science Education and Research Building will be constructed on Polett Walk adjacent to Gladfelter Hall and connected to the Engineering Building. The facility will contain laboratory and classroom space to attract talented scholars to CST’s already outstanding research community and provide CST students with abundant opportunities for exploration and investigation. The building, financed by a Commonwealth of Pennsylvania capital grant, is scheduled to break ground before the end of this year.

The Science Education and Research Building will rise at the heart of campus. While the exterior details are still being finalized, the structure is slated to be seven stories tall and contain more than 200,000 square feet of space. The building will contain the latest communications, safety, HVAC and other technologies needed for advanced scientific research, including biosafety level 3 and level 4 laboratories.

The building’s first floor, with dramatic 20-foot ceilings, will feature two large lecture halls as well as exhibition spaces and lounge areas. The second floor will house teaching labs, storage and support areas, and seminar and conference rooms. The building’s interior configuration, which will include space for the departments of Physics, Computer & Information Sciences and other offices, is still in the planning stages. You can learn more about Temple 20/20 at www.temple.edu/2020. Look for more information about the Science Education and Research Building in the next issue of Outlook magazine.
Undergraduate Research Program: Getting CST students into the lab

Begin in the summer of 2009, the Undergraduate Research Program’s goals were straightforward: Get CST students into the laboratory with world-class Temple researchers and remove those obstacles that keep students from participating in advanced research projects as undergraduates.

Today, thanks to the coordinated efforts of many CST faculty and staff as well as researchers from across the university, 220 students have participated in research. URP projects have included testing an intelligent reasoning system, analyzing human tissue with laser electrospray mass spectrometry and studying the effects of ocean acidification on cold-water coral.

During the spring 2011 semester, 72 students participated in the program, URP’s largest cohort to date. In addition, faculty participation—within CST and across the university—has grown by 50 percent since the program began. Recent URP students have excelled in the lab. Levi Mulladzhanov, a biology major working with Professor Evgeny Krynetskiy in the School of Pharmacy, won third place in the School of Pharmacy Research Day. Cui Chen, also a biology major, is co-author with Professor Marion Chan of the School of Medicine of a paper submitted for publication.

“Temple and CST are moving toward a stronger, more focused research enterprise,” explains Rose McGinnis, director of Career Services & Undergraduate Research Program. “We want to give undergraduates all the benefits of a top-notch research institution. That means working directly with experienced researchers.”

In such a competitive market—for jobs as well as for spots in top graduate programs—advanced research experience provides URP students with an edge. “URP is highly competitive,” says McGinnis. “To expand the amount of funds available for research stipends and provide more opportunities for students to gain undergraduate research experience, CST will match—one-to-one—any financial contribution to URP made by alumni and friends.”

Molly Mitchell, a neuroscience major working with Toby Ferguson, an assistant professor of neurology in the School of Medicine, understands the importance of undergraduate research and the value of a stipend. “Research is amazingly important both for knowing if you have the temperament for the work and for preparing for medical school,” says Mitchell, who has been investigating the role of cell adhesion molecules in nerve regeneration. “Last summer I worked as a waitress and during the graveyard shift at Walmart. I’d rather do research.”

“One of the highlights of the matching process between students and their potential faculty researchers is the URP Speed Match event. Akin to speed dating, participants whirl around a room looking for Mr. or Ms. Right, the event offers students exposure to multiple faculty members and gives researchers the chance to interview several candidates.”

“I am looking for a student who is motivated, hardworking and responsible,” says Jorune Ferguson, an assistant professor in the Department of Biology whose work focuses on examining the molecular and cellular bases of nicotine addiction. “It doesn’t matter if you are going to be a science teacher or a medical doctor, it is extremely important to know how research is done and what it means to analyze data, draw conclusions based on evidence and what your conclusion ultimately means. It short, it’s good for students to cook a little bit in the research kitchen.”

Students who are matched with a faculty member register for a research course or independent study within their major to receive academic credit. Students can earn a $9 per hour stipend for work performed in the lab in excess of the required research course or independent study lab requirements. “The stipend really helps students focus on getting as much research experience as possible,” says McGinnis. “To expand the amount of funds available for research stipends and provide more opportunities for students to gain undergraduate research experience, CST will match—one-to-one—any financial contribution to URP made by alumni and friends.”

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Insertional mutagenesis: Switching zebrafish genes off and on to understand the cardiovascular system

As a pet, zebrafish may lack the charms of a cocker spaniel, a house cat or even an iguana. But as a model organism, Danio rerio is ideal for understanding the genetic control of development and, ultimately, human disease.

“Zebrafish combine the advantages of a classical genetic model system, such as the common fruit fly, with a vertebrate biology, relatively inexpensive maintenance, a sturdy disposition and fecundity,” explains Darius Balciunas, an assistant professor in the Department of Biology. “A pair of zebrafish can lay a large number of eggs, which develop externally and are transparent enough that you can watch their development directly under the microscope.”

In addition to the fruit fly, many developmental biology experiments had traditionally been conducted with chicks or frogs. “Researchers could cut the chick eggs open, manipulate the developing embryo and see what happened,” says Balciunas, “but it is much more difficult to study gene function in chicks and frogs.”

In the late 1970s, researchers at the University of Oregon turned their attention to the zebrafish. Their work inspired others, particularly the Nobel Laureate Christiane Nuslein-Volhard, to isolate a very large number of mutants affecting various aspects of embryogenesis. “The next step is to identify the exact mutation, usually a single nucleotide substitution, that is causing the developmental abnormality,” explains Balciunas. “Not a trivial task when the genome is about 1.5 giga, or billion, nucleotides in size.”

Balciunas has been working with the zebrafish species for more than a decade, first during his postdoctoral days at the University of Minnesota and, since 2007, here at Temple University. His current research, funded by a five-year National Institutes of Health Research Grant, focuses on developing better insertional mutagenesis methods to analyze the role different genes play in the embryonic and postembryonic development of zebrafish.

Insertional mutagenesis begins by inserting a transposon—a piece of DNA that is able to skip across the genome—into a zebrafish embryo. “Our transposons integrate into the genome and then mutate the genes into which they integrate,” says Balciunas. “And, with the help of a fluorescent reporter, tell us where a particular gene is expressed, whether it is in the nervous system, pancreas, or, my interest, the heart. We can then use the integrated transposon DNA as a molecular tag to readily identify the mutated gene.”

The most advanced vectors Balciunas and his students are currently testing should enable turning the mutated gene on and off in specific tissues. “The fish have the ability to regenerate body parts, such as a fin or heart, without any scarring,” says Balciunas. “The ability to turn genes on and off at will makes it possible to study the genes required to grow back a fin or mend a heart and look at the effect of gene mutation not only on development but also on regeneration.”

The insertional mutagenesis is carried out in collaboration with several other investigators in the Department of Biology and Sbarro Institute of Cancer Research and Molecular Medicine who are interested in understanding the development of the pancreas and the nervous system as well as behavior. One zebrafish mutant Balciunas’ lab has isolated causes a complete lack of pectoral fins and severe heart abnormalities leading to very low survival rates. In humans, this same gene plays a role in a condition known as Holt-Oram Syndrome, which causes very short arms as well as different cardiac defects, most prominently a defect in the muscular walls that separate the right and left sides of the heart.

“What is interesting about Holt-Oram is that not every person born with the genetic mutation has the same physical abnormality, either in the length of the affected limbs or in the degree of cardiac defect,” says Balciunas. “Why are some people more affected than others? Are there additional gene interactions taking place that are responsible for making Holt-Oram more or less severe? We just don’t know yet, but we hope to find out using a zebrafish model of the disease.”

For Balciunas insertional mutagenesis is “expanding the genetic tool box used to study gene function. Ultimately, we work with zebrafish with the idea that the findings we make are going to be directly or indirectly applicable to understanding human physiology and human disease.”
Haley Gilles: Scholarships help take her research to the next level

Imagine you are Haley Gilles, a biology major from Pawcatuck, Conn., and you have always loved animals. As a kid you would snuggle with your cat, Stripes. Now imagine you are Gilles working to protect cheetahs in Africa. How might that make you feel?

“Incredible,” says Gilles, who spent last summer interning at Cheetah Outreach, an education and outreach program in South Africa that raises awareness of cheetah conservation issues. “I loved it.”

The cheetah, which once roamed across all of Africa and a large swath of Asia, is now limited to parts of Southern and Eastern Africa. The International Union for Conservation of Nature lists the species as “vulnerable,” with perhaps 7,500 remaining in the wild. The decline is primarily due to habitat loss, as well as killing and capture of cheetahs as livestock predators.

Gilles’s duties included caring for, cleaning and feeding 13 cheetahs. “At Cheetah Outreach, the orphan cubs are hand raised,” says Gilles, who notes their favorite food was a frozen blood and meat concoction called “bloodicle.”

“There is a lot of enrichment for the animals—they don’t just sit in cages,” says Gilles, who lived with 10 other interns from around the world during her stay. “Tourists can visit to learn more about the animals and help support cheetahs in the wild. School children and future farmers learn about loss of habitat and human-cheetah conflict.”

When her internship ended, Gilles spent five days traveling South Africa’s Garden Route along the southern coast. “We saw penguins,” she says, “and right whales breaching in False Bay 50 feet from the shore.”

After returning from South Africa, Gilles interned at the Philadelphia Zoo. While there, she worked on a project that tracked the number of birds colliding into local building windows. More birds die because of collisions with glass than any other human-related activity. Accurate numbers are elusive, but the US Fish and Wildlife Service estimates that between 100 million and 1 billion birds are killed by window strikes in the United States each year.

To find out more about the bird collision problem on Main Campus, Gilles applied for and received a grant from Temple’s Creative Arts, Research and Scholarship Program (CARS). CARS provides students with up to $3,000 to engage in scholarly, creative and research projects that contribute to advancing their field of study.

“I’ve been working with the Temple grounds crew to track where and when birds crash into windows,” says Gilles. “I’m testing different types of film on glass in Beury Hall to determine which are the most effective at mitigating bird strikes. Hopefully, the university can then install them in other locations across campus.”

In 2010, Gilles earned a Dr. Lorraine H. Kligman (BA ’66, Bio; CLA ’74) Endowment Fund scholarship for biology students. “The Kligman scholarship was an amazing opportunity,” says Gilles. “It helped defray the cost of my out-of-state tuition. I also attended the college’s Distinguished Faculty and Students Dinner. Many of the students there had already worked on research projects, and it inspired me to find my own.”

Gilles has her sights set on graduate study in zoology or wildlife conservation. “I enjoyed going out into the field, interacting with people and studying the impact of humans on habitat,” she says. “I don’t want to be stuck in an office.”

STUDENT SCHOLARSHIPS, PRIZES AND AWARDS
HELP SUPPORT TODAY’S TALENTED CST STUDENTS.

They also play an important role in motivating and inspiring students to reach for even greater achievements. Below is a partial list of endowed funds, established since 2008, which support today’s students.

Florence R. Berg (BA ’49, Chem) Endowed Scholarship Fund
Established in 2008 by Florence R. Berg to provide scholarships for students enrolled in the College of Science and Technology who either are conducting summer research or who have financial need.

Morna Brennen Memorial Scholarship Fund
Established in 2008 by Kenneth R. Brennen (BA ’62, MA ’66, Phys) in memory of his daughter, provides scholarships for students who plan to pursue a degree in math and/or science teaching certification through TUteach or another program.

Albert B. Brown (BA ’84, Chem) Chemistry Scholarship Fund
Established in 2010 by Albert B. Brown, provides scholarships for undergraduate students majoring in Chemistry who demonstrate high academic achievement and financial need with strong preference given to United States citizens and permanent resident students who plan to pursue industrial chemistry as a profession.

Paul G. Curcillo II, MD (BA ’84, Bio) Biology Award Fund
Established in 2008 by Paul G. Curcillo II, provides annual awards to seniors majoring in Biology with demonstrated excellent academic performance.

Chandrakant “Chuck” Gupta (MA ’88, Chem) International Student Emergency Award Fund
Established in 2008 by Chandrakant Gupta, provides emergency financial support to international students on a one-time basis, with preference given to students from India, to help prevent interruption in student studies due to an unforeseen financial or personal emergency.

Stanislav Kotsev Memorial Award Fund
Established in 2010 to provide an award for a student of exceptional character who is making excellent progress in the Physics graduate program at Temple University.

Helen Leshock Molnar and Jeffrey G. Molnar (BA ’76, EES) Award Fund
Established in 2008 by Jessie L. Smith to provide an award to an outstanding graduating senior who majored in either Chemistry or Geology, with preference given to female students.

Natan Luehrmann-Cowen Award Fund
Established in 2010 to provide an award to an outstanding junior or senior in the College of Science and Technology who demonstrates academic excellence with preference for students who have demonstrated achievement in one or more of the following: chess, bridge or playing a musical instrument.

John A. Poole Memorial Scholarship
Established in 2011 by Rosemary Poole in honor of her husband, a faculty member in the Department of Chemistry, the John A. Poole Memorial Scholarship honors a hardworking and exceptional student in Chemistry, Physics, Mathematics or Biology.

For information about establishing a named scholarship or contributing to an existing scholarship fund, please contact:

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Terry Dougherty: Supporting the next generation of CST students

Terence Dougherty (BA ’74 Chem; SBM ‘86) was impressed. The newest member of the CST Alumni Board was working the room—meeting students, chatting up employers, stopping by the snack table—at the college’s annual spring job fair. “There were a lot of research-focused students at the event,” says Dougherty. “CST students are so smart, but sometimes they might be too focused on their studies and not on the skills one needs to land a job in a tough, competitive market. I really enjoyed talking to them about the interviewing process and my work in the field.”

With Merck & Co., Inc. for more than 30 years, Dougherty has worked mainly in the quality control and production areas helping to manufacture, test and ensure the safety of scores of specific drugs. “Working in pharmaceutical production may not be as glamorous as advanced research, but it is so vital to the industry,” says Dougherty. “I’m glad I had the opportunity to talk about my career with today’s students. It’s good for students to meet someone in industry who can tell them what the real world is like.”

Dougherty remembers being one of only nine chemistry majors to graduate in his class, which meant there weren’t many opportunities to find a mentor. “I went to an advisor and asked what I could do with a chemistry degree,” Dougherty remembers. “He told me I could work at the water department and that’s it. Even with that advice, I stayed with it. Chemistry really fits me.”

Even with a small department, Dougherty knows the education he received at Temple was first rate. “I learned my craft at Temple and I knew my stuff,” he says. “I could hold my own with anybody from any school.”

Like many alumni of his generation, Dougherty says he chose Temple because it was “cheap and you could get there by bus.” Says Dougherty, “I knew I got the best bargain of my life and that’s why I want to support today’s students.”

About six years ago Dougherty and his wife, Lydia, (BA ’74, Chem), became more involved in alumni activities. He joined the Alumni Board in early 2011. “We want to help the next generation of students,” says Dougherty. “Ninety-nine percent of today’s students are just like we were, hardworking and hungry to get ahead.”

With more areas of study in science and technology, Temple has changed a lot since Dougherty graduated. “It’s amazing the number of students who are on campus now,” he says, “but I walked into Beury Hall recently and do you know what? It still smells the same.”

College of Science and Technology Alumni Board

Paul Curcillo II (BA ’84, Bio) (President)

Paul Curcillo is associate professor of surgery and director, Minimally Invasive Surgical Initiatives and Development at the Fox Chase Cancer Center. He holds appointments as associate professor of surgery and associate professor of obstetrics and gynecology. Curcillo is a leader in the field of laparoscopy, performing the world’s first single port access gallbladder surgery. He lectures internationally on improving minimal access surgery for patients, and has developed a personalized approach to breast cancer management. He was inducted into Temple’s 2009-2010 Gallery of Success and currently serves on CST’s Board of Visitors.

John Campolongo (BS ’92, CIS)

After earning his Temple degree, John Campolongo joined SEI, a global provider of outsourced investment business solutions for banks, trust companies and investment managers. He currently serves as the global wealth platform business migration leader for SEI’s U.S. Advisor Network. During his career at SEI, he has developed or managed many of the products that SEI offers to its U.S. Private Banks, Advisor Network Clients and Wealth Management groups. He also serves as president-elect for the Temple University Alumni Association.

George Dimitoglou (BS ’95, CIS)

George Dimitoglou is an associate professor in the Department of Computer Science at Hood College in Maryland. He also spent more than a decade working in industry and government in the areas of information systems, telecommunications, data archiving and space science. His research interests span the range from algorithms and distributed systems to simulations and very large databases. Dimitoglou is the recipient of a Mission Contribution Award from the European Space Agency and a NASA Goddard Space Flight Center National Resource Award.

Christian Obasi (MS ’08, EES)

Christian Obasi earned his BS in geology from the University of Nigeria, Nsukka. While at Temple, he represented CST at the 2008 Northeastern Geological Society of America conference, receiving an honorable mention award for his research on measuring sedimentation rates. Obasi is currently a well placement engineer/geologist in the Data and Consulting Services division of Schlumberger Technology Corporation. Obasi is currently pursuing his PhD in geology at the University of Oklahoma, where his research focuses on pellet-generated tight gas plays.

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During a science and technology job fair that brought together employers and CST students, members of the CST Alumni Board were on hand to offer advice on interviewing. They were, from left to right, Sina Adibi (BA ’84, CIS; SBM ’86), Paul Curcillo II (BA ’84, Bio), James Guare (BA ’77, MA ’83, Chem), and Terrence Dougherty (BA ’74, Chem; SBM ’86).
TUteach: Tomorrow’s great math and science teachers

With the United States facing an increasingly serious science and math educational deficiency, skilled teachers—with a deep knowledge of biology, chemistry, physics, math and other subjects—are needed more than ever. A typical urban middle school might have one teacher certified in science.

TUteach, a collaboration of the College of Science and Technology and the College of Education and funded by a grant of up to $2.4 million by the National Math and Science Initiative, continues its impressive growth in training the next generation of great math and science teachers.

This past May, four students composed TUteach’s inaugural class of graduates. Beyond the growth in enrollment over the past three years and a projected increase in the number of TUteach graduates who will go on to teaching careers, Temple students in the TUteach programs are making a significant impact on the lives of students and families.

For example, 15 TUteach students organized a Saturday morning program to teach math and robotics to fifth and sixth graders and their parents. In addition, several TUteach students participate in the Philadelphia Math & Science Coalition, an initiative to enhance the quality of math and science teaching in the Philadelphia public schools that includes representatives from corporations, universities, nonprofit organizations and the school district. TUteach students also mentor students at the Student Success Center at Benjamin Franklin High School and serve as math tutors at a local middle school.

On campus, the TUteach Club formed to expand opportunities for both paid and unpaid internships and mentor opportunities and to spread the word on campus and in the community of TUteach’s ongoing success.

TUteach is an innovative program that will train a new generation of content-prepared science and math teachers. College of Science and Technology students will become tomorrow’s leading teachers. Students can get a BS degree, a teaching certificate and extensive real classroom experience in just four years.

Partner with Us

The National Math and Science Initiative is offering a $1 million gift match challenge. Help our students fix the nation’s math and science education deficit with your gift today.

For more information, visit www.temple.edu/cst/tuteach or contact Brooke Walker at 215-204-4776 or brooke.walker@temple.edu.

“There is nothing which can better deserve our patronage than the promotion of science and literature. Knowledge is in every country the surest basis of public happiness.”

—George Washington, address to Congress, January 8, 1790