Research breakthroughs from CST's centers and institutes
The Undergraduate Research Program offers top students the opportunity to work alongside experienced researchers, from CST and across Temple University. Your gift provides the funding for more students to get that experience.

Out in the field, in the lab or at a powerful computer, students in URP learn what it takes to do advanced research: theoretical knowledge, technical skill, critical thinking and how to persevere through failure and build on success.

The experience is essential to being accepted into a top graduate and professional school or to landing a high-paying job in geology, biotechnology, information science and other growing sectors.

Most universities simply don’t offer such an extraordinary opportunity for their undergraduates. CST does. But we need your support to offer URP to more students.

Make your gift at giving.temple.edu/URP

To discuss giving options, contact John Walker, Associate Vice Dean, at 215-204-8176 or john.walker@temple.edu, or David Miller, Assistant Dean, at 215-204-4704 or dmiller@temple.edu.
News
Research, student achievement, awards and events from across the college

Research Awards
External research funding in each CST department

Healthier Chocolate
Using an electric field to reduce fat

Professional Development
Offering students skills for successful careers

Breaking Through
Promising research from CST’s centers and institutes

Alumni
Graduates in software development, wildlife conservation, community medicine and an acoustics pioneer

Highlighted Gifts and Honor Roll
Supporters of the College of Science and Technology

Class Notes
Keep up with friends and former classmates

CST in the Community
SeaPerch expands CST’s summer camp offerings
DEAN’S MESSAGE

At the College of Science and Technology, our progress—in advanced research, exceptional teaching and programs that bring science to local communities—is remarkable.

Over the past eight years, the college has hired 78 new tenure-track faculty members, including many world-class researchers and three members of the National Academy of Sciences. In addition, external research funding at the college (page 11) has increased by 35 percent over the past three years. New CST hires and their innovative research have helped propel Temple University to a worldwide ranking of 18th in total Google Scholar research citations and an R1/highest research activity designation by the Carnegie Classification of Institutions of Higher Education.

Much of the college’s advanced research springs from our centers and institutes. By bringing together multidisciplinary investigators, they are making real and measurable advances in energy, new materials, cancer care, drug delivery and environmental conservation (page 17).

The college is committed to providing our students with an outstanding educational experience. We now enroll more than 4,100 undergraduates and 400 graduate students, making CST the third largest school or college at Temple. We have introduced new Professional Science Master’s degree programs as well as a post-baccalaureate pre-health program (page 5).

The number of CST undergraduates engaged in advanced research, through initiatives such as our Undergraduate Research Program, has increased by tenfold since 2008. So that students gain the tangible skills for successful careers, the college has enhanced mentoring and professional development initiatives (page 13).

In the community, CST continues to expand its STEM education outreach through summer science camps (page 32), after-school programs, efforts to increase minority participation in research and T|Uteach, our successful teacher training collaboration with Temple’s College of Education.

Our research, teaching and engagement efforts are supported by a growing roster of alumni, friends, faculty/staff and corporate and foundation donors (page 25). I thank them deeply for their support. Their investments in the college enable us to foster scientific inquiry of the highest caliber and to inspire future generations of students and scientists to push the boundaries of discovery even further.

Sincerely,

Michael L. Klein, FRS
Dean and Laura H. Carnell Professor of Science
CHEMISTRY PIONEER SPEAKS AT SPRING GRADUATION

Madeleine M. Joullié, Class of 1970 Term Chair Professor of Chemistry at the University of Pennsylvania, was the featured speaker at the 2016 CST graduation ceremony on May 6 at Temple University’s McGonigle Hall. The ceremony honored more than 350 graduates of the college, earning bachelor’s, master’s, Profession Science Master’s and doctoral degrees.

Dr. Joullié, after earning a chemistry PhD in 1953 from Penn, joined its faculty and became one of the first female professors to earn tenure in chemistry at an Ivy League school. Her research interests are in the areas of heterocyclic, medicinal and natural products chemistry.

The ceremony’s student speaker was Jennifer Cho, a biology major, Temple Honors Program member and a participant in CST’s Undergraduate Research Program. She worked with Temple researchers on the link between human papilloma virus and focal cortical dysplasia cases.

Cho is now enrolled in the Medical University of South Carolina’s Medical Scientist Training Program, earning a dual MD/PhD. She hopes to focus her research on neurological disease in development, degeneration or addiction.
Research conducted by Assistant Professor Atsuhiro Muto will improve estimates of global sea level rise caused by ice melt.

**ANTARCTIC IMAGES REVEAL FOUR DECADES OF ICE LOSS**

Part of Antarctica has been losing ice to the ocean for far longer than had been expected, satellite pictures reveal. A study of images along 2000km of West Antarctica's coastline has shown the loss of about 1000km$^2$ of ice—an area equivalent to the city of Berlin—over the past 40 years.

Researchers from CST and the University of Edinburgh's School of GeoSciences were surprised to find that the region has been losing ice for such a length of time. Their findings will help improve estimates of global sea level rise caused by ice melt.

“We didn’t know the ice there has been retreating for nearly half a century,” said Atsuhiro Muto, assistant professor in the Department of Earth & Environmental Science. “We had seen similar trends around the coast of the Antarctic Peninsula to the east and the Amundsen Sea to the west, but this study showed that the long-term ice retreat in West Antarctica has been more widespread than we thought.”

The research team analyzed hundreds of satellite photographs of the ice margin captured by NASA, United States Geological Survey and European Space Agency. They found that ice has been retreating consistently along almost the entire coastline of Antarctica’s Bellingshausen Sea since satellite records began. The study was published in *Geophysical Research Letters*.

Professor Muto’s role in the project was to analyze and interpret the airborne gravity data, which revealed that the ice in some parts of the Bellingshausen Sea coast lie in a trough below sea level and deepen towards the center of the ice sheet. “Such a configuration makes the ice potentially unstable and the ice loss could accelerate in the future,” said Muto.

“We suspect the cause of widespread ice retreat is the warmer ocean waters reaching the West Antarctic coast and melting ice from the bottom,” said Muto. “We don’t know exactly how the ice sheet and the ocean interact and lead to ice loss. Monitoring of the West Antarctic coast using satellite data is important but at the same time we need to collect more data on the ground, cooperating with oceanographers.”

—Greg Fornia, SMC ’92
FIRST CLASSES ENROLL IN NEW POST-BACCALAUREATE PRE-HEALTH PROGRAM

The College of Science and Technology has introduced a post-baccalaureate program for students interested in pursuing a variety of professional health careers. The new program has attracted a diverse group of academically strong students with a passion for pursuing careers as doctors, dentists, veterinarians and more.

The college’s pre-health program includes two distinct tracks, basic core and advanced core. The basic track is for non-science majors making a career change and offers the required science courses for admission to medical, dental, veterinary and other professional schools. The advanced track is for students who have a strong background in the sciences, but want to enhance their academic credential in preparation for professional health careers. Students have access to the world-class faculty, customized courses and outstanding resources at both CST and Temple University’s Lewis Katz School of Medicine.

“Whether students are in the basic or advanced track, CST’s program has some clear advantages,” explains Grace Hershman, associate vice dean for postbaccalaureate programs in health science. “We offer small classes and personalized advising tailored to each student as well as formalized test prep for the appropriate entrance exam.”

The first class in the basic core, or career changer, track was admitted in June, and includes a software engineer, a chemical engineer, a financial analyst and a critical care flight paramedic. “The first class of advanced, or career enhancer, students came on board in August,” explained Hershman. “Their backgrounds are just as diverse, including an emergency medical technician and a research lab assistant.”

“All of our students are impressive, not only in their educational and career backgrounds but in their drive to pursue their dreams to become doctors and other healthcare professionals,” said Hershman.

More information on the pre-health program is available at cst.temple.edu/prehealth.

—Greg Fornia, SMC ’92

DEVELOPING THE NEXT GENERATION OF SOLAR CELLS AND LEDs

Four Chemistry Department researchers are engaged in a collaborative research project that has the potential to significantly enhance the efficiencies of both photovoltaic, dye-sensitized solar cells and optoelectronic, light-emitting diodes (LEDs).

The collaboration is bringing together the ultrafast photophysical measurement and evaluation capabilities of the laboratories of Hai-Lung Dai, Laura H. Carnell Professor of Chemistry, and Yi Rao, associate professor of chemistry (research), with the materials synthesis expertise of Professor Bradford Wayland and Graham Dobereiner, assistant professor of chemistry.

The group is concentrating on the charge transfer mechanisms involved with 2D layered and 3D halide perovskite materials.

“Our initial focus has been on utilizing ultrafast photophysical techniques to gain a better, fundamental understanding of how these energy conversions occur,” said Rao, the principal investigator on the project. To do so, the techniques the group is utilizing include transient absorption microscopy, luminescence lifetime and ultrafast interfacial spectroscopy—all of which build on the Dai group’s pioneering work on second harmonic generation (SHG) techniques.

Meanwhile, the Wayland and Dobereiner groups have been utilizing their materials expertise, which includes characterizing complex organic/inorganic substances and pursuing mechanistic understanding, including the kinetics and thermodynamics involved in electron transfers, to improve the perovskite materials.

“Our preliminary research has resulted in efficiency improvements of 14 percent,” said Rao, “and we believe there is a definite potential to enhance that. Our goal is to develop the next generation of photovoltaic and optoelectronic materials.”

—Bruce E. Beans

Assistant Professor of Chemistry Graham Dobereiner (left) and graduate student Evan Samples
More than 100 CST students earned scholarships and awards during the 2015/2016 academic year, and celebrated with family, faculty and friends at the Scholarships and Awards Luncheon in April.

CST scholarships and awards—for academic excellence, outstanding teaching and research and service to the college—are awarded to graduate and undergraduate students in CST’s six departments and the TUteach program.

New scholarships this year include the Petchon Family Computer and Information Sciences Endowed Scholarship Fund, established by Stephen Petchon, FOX ’80, and the Dr. Muriel Apfelberg Brownstein Science and Math Education Endowed Scholarship, honoring the legacy of a lifelong advocate for science education.

The luncheon attracted more than 170 people to the soaring lobby of the Science Education and Research Center (SERC) and several CST graduates, faculty and friends who have established scholarships and awards, including Angelo Armenti (BA ’70, Physics); Albert B. Brown (BA ’66, Chem) and Marie Koals (EDU ’63, ’68); Professor Theodore Burkhardt; Robert (BA ’66, Chem) and Bonnie Fineman; Professor Ralph Hillman; physics faculty member Mia Luehrmann; Rosemary Poole; Hope Punnett; Helene Stolker; and CST Board of Visitors member Seda Tarzian (BA ’48, Bio).

—Greg Fornia, SMC ’92
NEW MATHEMATICS DEPARTMENT CHAIR

Irina Mitrea is the new chair of CST’s Department of Mathematics. Professor Mitrea, a harmonic analyst, was a member of the Class of 2015 Fellows of the American Mathematical Society and recipient of the 2014 Von Neumann Fellowship at the Institute for Advanced Study.

There are also new chairs for the departments of Chemistry, Computer & Information Sciences and Physics. They are Professor Daniel Strongin, Associate Professor Slobodan Vucetic and Professor Jim Napolitano, respectively.

PHYSICS RESEARCHER EARNS PRESTIGIOUS YOUNG INVESTIGATOR AWARD

Alexander Gray, assistant professor of physics, received a prestigious Young Investigator Program award from the U.S. Army Research Office. Gray specializes in the development of new, ultrafast x-ray spectroscopic and imaging techniques. These techniques aim to understand how new phases of matter arise far from equilibrium and how ultrafast electric-field pulses can be used to separate and control fundamental physical interactions on the nanoscale.

EVOLUTIONARY PREDICTION OF THE HUMAN GENOME

CST researchers have developed a comprehensive human reference genome to help understand all of our individual differences and a clearer picture of health and disease.

Laura H. Carnell Professor of Genomic Medicine Sudhir Kumar and his colleagues at the Institute for Genomics and Evolutionary Medicine (iGEM) have provided an independent reference for the human variation by looking through the evolutionary lens of our nearest relatives.

“Our approach is to compile all genome data from other species and predict what the human sequence reference should be,” said Kumar, iGEM’s director. By observing evolution’s “greatest hits (and misses)” and the history of the major themes and patterns of genome conservation (and divergence) across many species, Kumar’s approach predicts probable mutations that will be found among people and the fate of human variation.

His team relied on an evolutionary tree that included 46 vertebrate species spanning over 500 million years of life on Earth to predict the evolutionary probability (EP) of each possibility at each position of our genome. They applied their new method on all protein-coding genes in the human genome. Consistent with the knowledge that most mutations are harmful, they found very low EPs (lower than 0.05) for a vast majority of potential mutations (94.4 percent).

Researchers produced a complete evolutionary catalog of all human protein variation, or evolutionary variome (eVar), that can be used to better understand human diseases and adaptations. Their eVar was also compared against available human sequence data from the 1000 Genomes Project to look at benign and disease mutations, and found that the use of EPs could correctly diagnose them. They also used a cancer benchmark dataset to show that EPs accurately predicted cancer-related mutations.

“Once we know what our ancient evolutionary history predicts our sequence to be, then we can compare this expectation to what we observe in human populations today,” said Kumar.

—Joseph Caspermeyer
Martha Constantinou
ASSISTANT PROFESSOR, PHYSICS

Martha Constantinou’s research interests are in lattice quantum chromodynamics, focusing on the topics of perturbation theory and hadron structure simulations. Dr. Constantinou received her bachelor’s and PhD in 2008 at the University of Cyprus. Before coming to CST, she was a research associate and then a postdoctoral fellow for the physics department at the University of Cyprus and the Computational Center of the Cyprus Institute. Since 2008, Dr. Constantinou has been a member of the European Twisted Mass Collaboration and in 2014 she became a country team leader for the Women in Physics Working Group of the International Union of Pure and Applied Physics.

Xubin He
PROFESSOR, COMPUTER & INFORMATION SCIENCES

Xubin He comes to Temple from Virginia Commonwealth University, where he was a professor and graduate program director in the Department of Electrical and Computer Engineering. His research interests include high-performance data storage and input/output systems, big-data management, reliable and high availability storage systems, cloud computing, storage cache and disk input/output and SSDs. He is also the current director of Storage Technology and Architecture Research (STAR) laboratory, and has been since the completion of his PhD in Electrical and Computer Engineering from the University of Rhode Island in 2002.

Matthew Helmus
ASSISTANT PROFESSOR, BIOLOGY

Matthew Helmus is an ecologist whose research interests lie with evolution, ecology and global-change science. Dr. Helmus earned his PhD in zoology from the University of Wisconsin in 2008 and he comes to Temple from his position as a postdoctoral fellow in the Amsterdam Global Change Institute at Vrije Universiteit, The Netherlands. He is co-PI of an international collaborative research grant focused on understanding the spread of exotic species in the Caribbean, particularly lizards. He develops novel statistical application with large data sets to understand human impacts on biodiversity.

Jamie Payton
ASSOCIATE PROFESSOR, COMPUTER & INFORMATION SCIENCES

Jamie Payton comes to Temple from the University of North Carolina at Charlotte, where she has been a member of the faculty since 2006 after earning her doctorate in computer science from Washington University in St. Louis. Dr. Payton is currently the director and PI of the Stars Computing Corps, which has been supported by more than $3.5 million in funding by the NSF. Overall, she has been awarded $8 million to support her research efforts in pervasive computing and broadening participation by the NSF and the Department of Homeland Security.

Joshua Schraiber
ASSISTANT PROFESSOR, BIOLOGY

Joshua Schraiber is a computational biologist with research interests focusing on population genetics and related problems in evolutionary biology, with the long-term goal of deciphering mechanisms that contribute to patterns of variations that occur in genomics and organisms. He received his PhD in integrative biology from the University of California, Berkley in 2014 and was then awarded an NSF postdoctoral fellowship to work in the Department of Genome Sciences at the University of Washington. Dr. Schraiber also has over a dozen publications in journals such as Nature and Theoretical Population Biology.

Richard Souvenir
ASSOCIATE PROFESSOR, COMPUTER & INFORMATION SCIENCES

Richard Souvenir comes to CST from the Department of Computer Science at the University of North Carolina at Charlotte where he was a faculty member.
member since 2006. His research involves application of machine learning methods to problems in computer vision, with a focus on providing intuitive methods for querying video data. This work has applications in biomedical image informatics and human activity understanding. Dr. Souvenir received his doctoral degree in computer science from Washington University and has published in Machine Vision and Applications, Medical Image Analysis and elsewhere. He has attracted more than $2 million in research funding from NSF, Google and others.

Rongsheng Wang
ASSISTANT PROFESSOR, CHEMISTRY

Rongsheng Wang earned his PhD in bioorganic chemistry at Washington University in 2010. He worked at Mediomics LLC in St. Louis as a research scientist for two years following his graduation, where he was tasked with the development of antibody/aptamer-based homogenous florescent sensors and the invention of the novel SELEX platform for selecting aptamers. Dr. Wang left this position in 2012 to start a postdoctoral fellowship at the Scripps Research Institute in San Diego. His work has been published in Angewandte Chemie International Edition and Journal of the American Chemical Society.

Qimin Yan
ASSISTANT PROFESSOR, PHYSICS

Qimin Yan obtained his PhD in materials in 2012 from the University of California, Santa Barbara. Since 2013, he has been a post-doctoral fellow at the Department of Physics, University of California, Berkeley and the Molecular Foundry, Lawrence Berkeley National Laboratory. Dr. Yan’s primary research interest is using combinations of first-principles computational methods and data-driven technologies to identify and exploit structure-property relationships in new and existing functional materials including energy, quantum and two-dimensional materials. His work has been published in a number of journals including Advanced Energy Materials, Physical Review Letters, Nano Letters and Applied Physics Letters.

TEAM CHARACTERIZES GENETIC MUTATIONS LINKED TO A FORM OF BLINDNESS

Achromatopsia is a rare, inherited vision disorder that affects the eye’s cone cells, resulting in problems with daytime vision, clarity and color perception. It often strikes people early in life, and currently there is no cure.

Scientists from CST and the University of Pennsylvania have identified two naturally occurring genetic mutations in dogs that result in achromatopsia. Having identified the mutations responsible, they used structural modeling and molecular dynamics on the Titan supercomputer at Oak Ridge National Laboratory and the Stampede supercomputer at the Texas Advanced Computing Center to simulate how the mutations would impact the resulting protein: the mutations destabilized a molecular channel essential to light signal transduction.

The findings provide new insights into the molecular cause of this form of blindness and also present new opportunities for conducting preclinical assessments of curative gene therapy for achromatopsia in dogs for eventual clinical applications in humans.

“The computational approach allows us to model, right down to the atomic level, how small changes in protein sequence can have a major impact on signaling,” said Dean Michael L. Klein, FRS, director of CST’s Institute for Computational Molecular Science. “We can then use these insights to help us understand and refine our experimental and clinical work.”

The study was published in the journal PLOS ONE by researchers from Penn Vet, Temple and the United Kingdom. In additional to Klein, CST coauthors include Professor Jacqueline C. Tanaka and CST postdoctoral researchers Lucie Delemotte and Naoto Tanaka and researcher Christopher MacDermaid.

“Everything we found suggests that gene therapy will be the best approach to treating this disease, and we are looking forward to taking that next step,” said Karina Guziewicz, senior author on the study and a senior research investigator at Penn’s School of Veterinary Medicine.

—Bruce E. Beans
NEW DIAGNOSTIC TOOLS AND TREATMENTS FOR MESOTHELIOMA

Despite federal regulations that led to the partial ban of asbestos-containing materials in the 1970s and 1980s, more than 3,000 Americans annually are still diagnosed with mesothelioma—a particularly aggressive type of lung cancer linked to the inhalation of fine asbestos fibers for which there is no cure. Professor Antonio Giordano, director of CST’s Sbarro Institute for Cancer Research and Molecular Medicine, has identified two different genes/proteins that could play a significant role in both the diagnosis and treatment of the fatal disease—as well as two promising experimental drugs.

The two genes, RB2/p130 and p53, are tumor suppressor genes that, in patients with mesothelioma, show evidence of being damaged or blocked. "Both of the genes are very important for maintaining normal cell order," said Giordano. "When their functions are interrupted their ability to act as a brake on cell proliferation and cells start to grow uncontrollably."

Targeting potential immunotherapy drug treatments, the institute’s researchers have utilized in vitro laboratory experiments to identify an experimental drug that reactivates the tumor-suppressing p53 protein. This enables the body’s immune system to cause apoptosis—a programmed cell death within the tumor. According to Giordano, that drug and another experimental drug that appears to inhibit a protein that encourages cancer cell proliferation both could have a positive, synergetic effect with cisplatin, a standard chemotherapy drug used to treat mesothelioma.

Since mesothelioma typically has a decades-long latency period following exposure to asbestos, Sbarro Institute researchers are studying the possibility of developing a diagnostic test that could be administered to populations at high risk for mesothelioma and other lung diseases, such as asbestos workers and long-time tobacco smokers. "With such monitoring, we could possibly identify genetic changes indicative of these diseases before symptoms appear, when it is often too late,” said Giordano.

—Bruce E. Beans
RESEARCH
Jody Hey
Raymond Habas
Vincenzo Carnevale
TO JUNE 30, 2016
Cancer Biomarkers, Analysis, Diseases Using Sequence Medical Sciences (NIGMS)
Evolutionary Analysis, Divergence, Neural Tube Closure, Vertebrate Gastrulation and and Cell Motility, Scientific Research Center Research and Control, University Epidemiology for Malaria

ON RESEARCH
Funded
NEW EXTERNAL GRANTS: JULY 1, 2015 TO JUNE 30, 2016

Biology
Vincenzo Carnevale
• Ion Channels Response in Physiological Conditions: Toward a Computational Framework For Noception, NSF
• Structure-Based Design of Xe-129 NMR Biosensors for Multiplexed Cancer Detection, NIH

Frank Chang
• Development of New Pancreatic Cancer Biomarkers, Schweitzer Biotech Company, Ltd.

Ananias Escalante
• Landscape Molecular Epidemiology for Malaria Elimination, Arizona State University
• Latin American Center For Malaria Research and Control, Causeco Scientific Research Center

Raymond Habas
• Non-Canonical Wnt Signaling and Cell Motility, NIH
• The Role of Srgap2 in Vertebrate Gastrulation and Neural Tube Closure, NIH
• Understand the Role of Custos in Canonical Wnt Signaling, NIH

Jody Hey
• The Population Genetics of Divergence, NIH

Sergei Pond
• HyPhy: Comprehensive, Fast, and User-Friendly Software for Evolutionary Analysis, NIH/ National Institute of General Medical Sciences (NIGMS)
• Modeling Epidemic Infectious Diseases Using Sequence Analysis, NIH/NIGMS

Chemistry
Eric Bogquet
• Design, Synthesis and Characterization of Hybrid Stratified MOF-Plasmonic Nanoparticle Materials for Detection and Destruction of Chemical Agents, Defense Threat Reduction Agency
• Electrical Properties of Single Molecules; from Switches towards Devices, NSF

Hai-Lung Dai
• Characterizing Interactions at Interfaces Critical to the Functions of Ionic Liquids and Solar Cells, Air Force Office of Scientific Research
• Nonlinear Light Scattering Spectroscopy and Microscopy of Molecular Interactions at Biological Surfaces, NSF
• Photoactivator Chemistry in Atmospheric Aerosols, NSF
• Reactive Chemical Systems-Enhancing Interfacial Charge Carrier Injection in Semiconductor Nanostructures, Army Research Office

Graham Dobereiner
• Incorporating Lewis-Acid Anion CO-Catalysts into Homogeneous Transition-Metal Systems for Carbon-Carbon Bond Formation, American Chemical Society Petroleum Research Fund
• Tandem Catalytic Process in Flow, American Chemical Society Green Chemistry Institute

Robert Levis
• Detection of Explosive Signature Molecules Using Rotational Raman Spectroscopy, Office of Naval Research

Ronald Levy
• Computer Cluster for Computational Biology and Biology and Biophysics-funded, NIH
• Computer Simulations of Protein Structure and Dynamics, NIH

Yugang Sun
• Microfluidic Synthesis of VO2 Nanocrystals, Argonne National Laboratory

Katherine Willets
• Plasmon-Mediated Electrochemical Reactions, US Department of Energy

Michael Zdilla
• Exploration of Energetic Manganese Metal–Nitrogen–Oxygen Complexes and Clusters, Office of Naval Research

Computer & Information Sciences
Krishna Kant
• Enabling Multi-Party Collaborative Data Access, NSF
• Exploiting Cross-Disciplinary Synergies for Efficient Perishable Commodity and Information Distribution, NSF

Zoran Obradovic
• Structured Regression in Complex Networks by Fusion of Qualitative Knowledge and Big Data, Office of Naval Research

Slobodan Vucetic
• Deep Learning for Representation of Codes Used for SEER-Medicare Claims Research, NIH
• Incorporating Residential Histories into Space-Time Models for Health Geographic Analysis, NSF

Pei Wang
• AUDREY: A Distributed Intelligence and Situational Awareness System for Next Generation First Responders, NASA Jet Propulsion Laboratory

Dean’s Office
Susan A. Varnum
• 2015 Navy GPSY AY Programming, McKean Defense Group
• 2016 ExxonMobil Bernard Harris Summer Science Camp, Harris Foundation
• Frances Velay Women’s Science Research Fellowship Program, Panphil Foundation

Earth & Environmental Science
Ilya Buynevich
• Geophysical Characterization of Biogenic Structures in Siliclastic and Carbonate Media, American Chemical Society

NSF FUNDING RESEARCH INTO DATA-MINING OF SOCIAL MEDIA

Researchers at CST have been awarded a $1.08 million National Science Foundation grant to study the targeted monitoring of social media to understand users’ opinions about products and brands, election preferences, or recent world events; aggregate data about such topics as reviews of products and services; mine data for early crisis detection and response; mine data to fight crime; and mine data to enhance national security and combat terrorism.

“From a computer’s point of view, the contents of social media are simply streams of data,” says Eduard Dragut, assistant professor in the Department of Computer & Information Sciences (CIS) and one of the principal investigators. “We have to develop an algorithm that will enable computers to identify specific entities within the text of a message, such as Coca-Cola, President Obama, Temple University or Boko Haram.”

Challenges to that task include the massive volume of messages posted daily on such social media platforms as Twitter, Facebook, and Instagram; the speed at which they are posted; their free-form language; lack of context; and the use of multiple languages. Ultimately, the goal is to detect, in near real-time, pieces of text that reference specific entities, and then to link such entity references to both other social media platforms and to web pages that mention and define these persons, groups and products.

“One interesting facet of this project is that, despite the fact that such microblogs such as Twitter are so short, through the identification and aggregation of specific entities mentioned we can extract a lot of information,” says Yuhong Guo, associate professor in CIS and the project’s other lead investigator.

—Bruce E. Beans
**Mathematics**

Shiferaw Berhanu  
- The Regularity of Cauchy-Riemann Mappings and Solutions of Systems of Nonlinear Partial Differential Equations, NSF

Vasily Dolgushev  
- Questions on Algebraic Operads and Related Structures, NSF

David Futer  
- Graduate Student Conference in Algebra, Geometry and Topology, NSF

Isaac Klapper  
- Connecting Omics to Physical and Chemical Environment in Community Microbial Ecology, NSF

Brian Rider  
- Thematic Semester on Probabilistic Methods in Geometry, Topology and Mathematical Physics, NSF

**Physics**

Ke Chen  
- Magnesium Diboride Dc and Data Cables For Digital-Rf Systems, Hypres, Inc.

James Napolitano  
- Precision Møller Polarimetry for Electroweak Scattering

Experiments in Hall A at Jefferson Lab, NSF

John Perdew  
- Density Functional Theory of Electronic Structure, NSF

Peter Riseborough  
- Workshop on Experiment and Theory of the Electronic Structure of Correlated F-Electron Materials, NSF

Adrienn Ruzsinszky  
- Electron Correlation and Optical Spectra with a Nonlocal Energy-Optimized (NEO) Kernel, NSF CAREER

Nikolaos Sparveris  
- Equipment for and Running of the PSI MUSE Experiment, NSF

Jianmin Tao  
- Nonlocal Density Functional Theory of Molecules and Solids, NSF

Rongjia Tao  
- Magneto-Optical Materials Characterization, Naval Research Laboratory

Xifan Wu  
- To understand fundamental physical, chemical and life-related processes in liquid water at the level of quantum mechanics, NSF CAREER

**FIRST SCIENCE SCHOLARS GRADUATE**

In 2012, CST introduced the Science Scholars Program to support high-achieving students with personal and professional development programs and $4,000 in funding to complete summer research projects at the college, within Temple or at other institutions. Today, there are approximately 50 Science Scholars. Pictured are members of the first class of scholars (l to r) Louis Graup, (BS ’16, Math); Clair Burns-Lynch (BS ’16, Chem); Katey Steinberg, (BS ’16, Bio); and Mark Gleason (BS ’16, Bio).

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**ELECTRIC FIELD REDUCES FAT IN CHOCOLATE**

CST scientists have found a way to use an electric field to reduce fat in liquid chocolate during the manufacturing process. The findings are published in the *Proceedings of the National Academy of Sciences*, “Electrorheology leads to healthier and tastier chocolate.”

Chocolate not only delights the taste buds, it also boasts numerous health benefits. At issue though is high levels of fat, typically from 40-60 percent. Chocolate makers and scientists have been searching for a way to lower the fat for decades with little success. Lead study author, Rongjia Tao, professor of physics, explains the problem can be traced to chocolate in its liquid state, the form at which all manufacturing is done.

When fat is removed from liquid chocolate, its viscosity, or consistency, changes and the chocolate jams the pipeline as it travels through the manufacturing process. Tao and his team, innovators in applying electric fields to liquids to bring about improvements, theorized that by applying an electric field they could accomplish two things: reduce the viscosity enough to reduce the fat, but also increase the density of the particles to maintain proper flow of chocolate through the manufacturing process.

Their key was applying the electric field in the same direction as the flow of the chocolate. Traditionally, electrorheology (ER), the practice of using electric fields on liquids, works perpendicularly to the liquid flow direction. Tao’s team believes this method could be applicable to any liquid for which there is a need to reduce viscosity. In previous research, Tao has used an electric field to thin fuel to improve the transportation of crude oil via pipeline and improve gas efficiency in the engine and a magnetic field to thin blood to help prevent heart attacks.

Electrorheology works by changing the alignment of the particles in a liquid using electric fields. In the current study, ER aggregated the cocoa solid particles into short chains, which allowed the scientists to reduce the viscosity and reduce the fat but maintain the flow.

For precision, Tao and his team invented their own device to test their theory. They were able to reduce the fat on several different brands of chocolate by 20 percent, better than they anticipated.

“The treated chocolate has wonderful taste,” said Tao. “Some people even claim that the ER-treated chocolate has a slightly stronger cocoa flavor, better than the original chocolate.”

—Eryn Jelesiewicz
CST’s professional development initiatives offer students invaluable real-world experience.
Through an array of initiatives, CST students can access thoughtful advising and real-world experiences that inform their career decision-making while at the college and well after they’ve left campus.

“Professional development for science and technology majors is a little different than it is for other majors,” says Rose McGinnis, director of Student Professional Development and the Undergraduate Research Program. “We want to make sure students have all of the resources they need in order to be successful, whether their goal is to get into graduate school and pursue a career in academia, or to work in a laboratory conducting research for a pharmaceutical company or to join the tech industry. The key is that it’s not a one-size-fits-all approach.”

**PICKING A PATH**

McGinnis’ office typically engages with students early in their time at CST, usually by the end of freshman year or beginning of sophomore year. Helping students think about their goals from the outset ensures that they can stay on track to graduate in four years. It also may open them up to possibilities they hadn’t yet considered.

“A perfect example is a student I met with a couple years ago who had a 3.89 GPA in chemistry,” she says. “When I asked what he’d do next he said he planned to go to graduate school to continue his studies but didn’t sound very happy about it. We explored his other options. He went on to get a master’s in computer science and now happily works for a large pharmaceutical company, which is a better fit for him. Sometimes students just need a little help to think outside the box.”

For those who already have a goal in mind, Professional Development staff will identify the types of working experiences needed to round out classroom education and improve résumés. The office maintains a list of internships and research vacancies both on and off campus and staff members help students develop the right networking skills and professional communication to lock down those opportunities.

“We might assist a student in drafting an introductory email or we’ll conduct mock interviews to help them brush up on their presentation skills,” McGinnis says. “We want them to feel confident and ready to take on the job.”

**CONNECTING WITH EMPLOYERS**

McGinnis’ office is responsible for organizing the Science and Technology Job Fair twice annually, in spring and fall. Some 350-400 students register to attend and the fair hosts approximately 75 employers specifically looking for science and tech majors. The list includes Dow Chemical, Merck & Co., GlaxoSmithKline, Cigna, TD Bank, J.P. Morgan & Co. and Aramark, among many others.

“Sometimes companies fight over students, and some take 10 to 20 students every year straight from Temple,” McGinnis says, adding that employers are not always looking for the most obvious candidates. “Often tech employers will talk to biology and chemistry majors because they recognize that these students have the problem-solving skills that are easily transferable.”

It’s not uncommon for alumni who have been hired during job fairs to return to campus and recruit the next generation for their company. “Our students understand that it’s about giving back and making opportunities for others,” McGinnis says.

**NURTURING TALENT**

Another initiative, CST’s Science Scholars Program, identifies high-achieving students and helps prepare them for graduate school, scholarships and academic careers. The program was introduced four years ago and the first class graduated in spring 2016.

“We look at talented students and the potential roadblocks that might interfere with their success,” McGinnis says. “Then we figure out ways to get them beyond those hurdles.”

Promising students interested in research careers are identified early on and invited to apply for the program, which offers regular mentorship and academic guidance. Students must maintain a 3.65 GPA to stay eligible.

The program’s first graduating class includes a chemistry major who will go on to pursue a fully funded PhD at the University of Michigan. Three other students will be conducting research abroad in their chosen subject areas over the summer. Currently, there are about 50 Science Scholars students.
TOMORROW’S TEACHERS

CST students can pursue a career in science education through T’Uteach, offered by CST in conjunction with the College of Education and encompassing eight majors, including biology, chemistry, mathematics, mathematics and computer science and physics, and a strong foundation in pedagogical practices.

“Typically students would have to major in education to gain the needed teaching credentials for a job. This program allows them to focus on a math or science major while taking part in specially designed internships and field experiences that prepare them to teach,” says Susan Jansen Varnum, associate dean for science education.

Students can join T’Uteach through multiple entry points, whether they are a self-directed incoming freshman or a junior with a change of plans or a transfer student. Though some students may need to take summer courses, they can still graduate on time with a bachelor’s degree and eligibility for state-recognized credentials for a career in education. “Even for students who don’t necessarily want to teach, the program provides important skills like public speaking and communication that can be valuable in any career,” Varnum explains.

Dylan Peay (BS ’16, Bio/Teaching) joined the program as a transfer student in his second semester. The biology major especially liked the idea of getting field experience. “T’Uteach students enter the classroom as primary instructors from freshman year and continue to teach throughout the program,” he says. “T’Uteach students get a more personal advising experience and the degree requirements provide extra incentive to achieve good grades. A large university can be overwhelming but T’Uteach helped me find opportunities to carve my own path.”

Varnum also oversees the community STEM education initiative, which covers 27 different programs run with the help of CST students, volunteers and dedicated staff. Through programs like after-school classes in a community center, college preparatory sessions, a residential science camp at Temple or a science and literacy program in an underperforming school, students can gain informal teaching experience and in many cases, be paid for their work.

The community education program reaches hundreds of young people every year. Temple students report that the experience is not only valuable from a professional standpoint but they feel they are making a difference in kids’ lives, engaging them in science education and inspiring them to continue to pursue their own goals.

Peay graduated in May and has found that T’Uteach and his work in the community education initiative has been extremely helpful in the job interviewing process. “As I talk to prospective employers, they often comment on how impressed they are that I was able to amass so much experience while still excelling academically. T’Uteach has definitely given me a leg up.”

REAL MENTORSHIP

Even the most career-driven students need help navigating the professional world. The Owl to Owl Mentor Program, started by the CST Alumni Board, connects students with alumni already out in the work world. The program mostly targets sophomores and juniors. Once students apply, they are selected by a committee and matched to appropriate mentors.

“The mentors offer their most valuable resource—time—because they really want to help students. They attend campus events, connect with students by phone and email and stay in touch over the course of the year,” says program chair Sina Adibi (BA ’84, CIS; FOX ’86) senior technology product and services executive at Artezio.

Owl to Owl publishes a handbook that covers the expectations of the program and includes practical advice on résumé writing and interviewing. Through at least four meetings a year, mentors listen to students, help them think through career goals and map out effective strategies for achieving those goals. They advise students on communication skills, connect their classroom learning to job possibilities and assist them in building a professional network. They might also help in other ways, such as giving a student a tour of their own place of employment or offering to make a call on their behalf.

Karen Gomez, Class of 2017, applied to the program as a biochemistry major with an eye toward a career as a physician scientist working in biomedical research. “My mentor, Jim Guare (BA ’77, MA ’83, Chem) introduced me to the cardiologist I shadowed for a day. I learned more about his work and gained valuable exposure to the healthcare field,” she says.

For his part, Adibi was inspired to get involved in the program because an informal mentorship while he was a student at Temple set the stage for his own career in technology. “We want to give students access to resources they might otherwise not have,” Adibi says. “In my experience as a mentor, I’m helping shepherd students to the right opportunities. One student I worked with got an internship at Apple; unusual because Apple doesn’t recruit on campus. It’s very gratifying to help students whenever we can.”

URP MEANS REAL-WORLD RESEARCH

One goal of CST’s Student Professional Development office is to get students opportunities that might result in publication or the chance to present research at a conference. To that end, the Undergraduate Research Program provides funding for students to spend two semesters in a lab setting, working with world-class researchers.

The program, which began in 2009, has supported over 850 students. To be eligible, students must be high achievers and their application must be approved by the CST Dean’s office. Accepted students select a research project from a posted list. In the fall and spring semesters, students receive credit for their work; in summer, it’s a paid position. Some labs also offer stipends for work that goes beyond the research requirements. Students can then present their work at the URP Research Symposium, which offers cash awards for top projects.

—Elisa Ludwig
RESEARCH THAT BREAKS THROUGH

PROMISING EXPLORATIONS AND DISCOVERIES FROM CST’S CENTERS AND INSTITUTES

Professor S. Blair Hedges in Haiti
S purring on by today's challenges in health, technology, energy and communications and supported by increased outside funding, the College of Science and Technology's 11 research centers and institutes are pursuing scientific breakthroughs and innovations that will have real-world applicability and worldwide impact.

Healthwise, they are tackling HIV/AIDS, sepsis and ovarian and oral cancers. Questions being explored include: Can laser-activated gold nanoparticles treat diseases? What's the next generation of bioinformatics tools needed to fuel the revolution in computational biology and genomics?

Cutting edge investigations are also occurring in materials research and wireless technologies. Temple researchers are saving endangered species and helping create national parks in Haiti.

CST researchers played a pivotal role in the Carnegie Commission on Higher Education's reclassification of Temple into the top four percent of American universities. A new ranking of Google Scholar citations from universities worldwide placed Temple at No. 18, ahead of Princeton University (19) and the University of Pennsylvania (44). In fact, four CST faculty members have authored five of the most-cited research papers of all time.

"Some of the most highly cited scholars on the planet are CST faculty," says Michael L. Klein, FRS, dean and director of the Institute for Computational Molecular Science. "CST researchers within the college's institutes and centers are doing innovative and influential work."

**USING GOLD NANOPARTICLES TO TACKLE DISEASE**

In plasmonics, free electrons in a metal can begin to oscillate when they are excited by the electric component of light.

"In medicine," says Johanan Odhner, a research assistant professor with the Center for Advanced Photonics Research (CAPR), "plasmonic materials are gaining traction as a way of selectively treating diseases, such as removing cancerous tumors without damaging surrounding tissue."

CAPR researchers have developed a plasmonic synthesis method that could have both therapeutic and sensing applications. "Our synthesis method uses just a laser focused on gold salt in water to produce a chemical reaction resulting in nanoparticle formation," says Odhner. "What is important about this development is that noble metals, such as gold, are biological friendly."

"Patients can safely be given a dose of these nanoparticles and, when a laser is shone on them, the nanoparticles could either quickly heat up and cause cancer cell death or a therapeutic drug tethered to the surface of the nanoparticles could be released."

**DISCOVERING BIODIVERSITY HOTSPOTS IN HAITI**

The cutting of more than 99 percent of Haiti's original forests has resulted in fatal floods, compromised water quality and tremendous threats to biodiversity.

S. Blair Hedges, Laura H. Carnell Professor of Biodiversity and director of the Center for Biodiversity, is surveying the last remaining forests, primarily on mountaintops, for native species. Ferried by helicopter, he spends one to two weeks each summer identifying species, gathering DNA samples and collecting living cells—which are frozen in liquid nitrogen so that the species might be cloned in the future if they go extinct.

Although some species have disappeared, the biodiversity hot spots that remain have surprised Hedges. He has discovered more than 50 new frog and lizard species—at least 25 percent of all such known species in Haiti—and has collaborated with the Philadelphia Zoo to keep alive and/or captivebreed 10 of the most endangered frogs.

In the past two years, Hedges’ work has led Haiti to increase its number of national parks from two to five. "For three national parks to be established based on our work has been very gratifying," says Hedges, "and there are more to come."

**SCREENING MILLIONS OF COMPOUNDS TO FIGHT HIV/AIDS**

While HIV/AIDS is now primarily a chronic condition rather than a fatal one, it has continued to develop resistance to the most commonly used drugs.

To counter that, the Center for Biophysics & Computational Biology (CB2) directed by Ronald M. Levy, Laura H. Carnell Professor of Biophysics and Computational Biology, is engaged in a longtime collaboration with the Scripps Research Institute. The result: the world’s largest HIV virtual screening effort.

The effort relies upon IBM’s World Community Grid, a distributed volunteer computing grid, in a program called FightAIDS@Home. During the program's first phase, millions of compounds were screened against HIV-related protein targets and thousands of potential drug candidate compounds were identified. A year ago Temple and Scripps researchers launched the project’s second phase to significantly winnow the list of candidates for actual laboratory testing.

To do so they run massive simulations that incorporate computational molecular docking software developed at Scripps, with a Binding Energy Distribution Analysis Method that is built upon IMPACT, the Levy lab’s molecular dynamics engine.

**“CST RESEARCHERS WITHIN THE COLLEGE’S CENTERS AND INSTITUTES ARE DOING INNOVATIVE AND INFLUENTIAL WORK.”**

- Dean Michael L. Klein, FRS
For the first time, however, a team of Temple geneticists, genomics and epidemiologists from the Center for Computational Genetics and Genomics (CCGG) and Fox Chase Cancer Center have identified significant racial genetic differences among laryngeal cancer patients.

Relying upon unprecedented sequence-based datasets from three big science initiatives, the 1000 Genomes Project, Cancer Genome Atlas and the ENCODE project, the Temple researchers generated ancestry-informed markers for both African- and European Americans, enabling them to identify genes that could drive cancer disparities.

“We are beginning to find key cancer targets present only among African Americans that will be useful in identifying population-specific genetic predispositions and, eventually, targeted cancer therapeutics,” says Rob Kulathinal, assistant professor of biology and CCGG founding member.

SEPSIS STUDY COULD ‘CHANGE THE WORLD’

Sepsis, a catastrophic overreaction by the immune system to large-scale blood-borne bacterial infection, afflicts 18 million people a year worldwide and kills 30 to 50 percent of them—including military personnel with combat injuries.

To dramatically enhance sepsis treatment success, the Center for Data Analytics and Biomedical Informatics (CDABI) is engaged in a research project that the funding agency, the federal Defense Advanced Research Projects Agency, calls one of the top 10 investigations that could change the world.

CDABI researchers and their worldwide collaborators used a mathematical model of sepsis to simulate more than 2,200 configurations of single- and multiple-intervention therapies on 5,000 virtual rats.

Looking beyond the current standard anti-microbial drug treatment, the simulations included both pathogen reduction and hemoadsorption, or blood purification. A combination of the two therapies rescued a stunning 97 percent of the virtual subjects.

“It’s really promising,” says CDABI Director Zoran Obradovic, Laura H. Carnell Professor of Data Analytics. “If it translates to humans, we could save almost everyone.”

NOVEL TECHNOLOGIES TO ADDRESS WIRELESS OVERLOAD

As billions of new wireless devices, such as smartphones and tablets, are introduced each year, wireless spectrums are becoming saturated. That is true for the unlicensed 2.4 GHz wireless band spectrum and, increasingly so, even for the newer 5 GHz wireless band. For the 5 GHz band, there is growing competition between short-range Wi-Fi and long-range, unlicensed LTE (LTE-U), which sends 4G cellular traffic over channels also used by Wi-Fi. Dedicated Short-Range Communications (DSRC) is also expected to soon add to the overload. DSRC is a wireless technology that cars will utilize to communicate with each other in order to, for example, avoid accidents.
Funded by NSF, researchers at the Center for Networked Computing (CNC)—along with University of Arizona and Virginia Tech collaborators—are developing technologies to address these increasing 5 GHz demands.

“Our approach involves creating novel technologies that minimize potential conflicts so that these different uses can coexist on the same band without much performance degradation,” says Jie Wu, CNC director and Laura H. Carnell Professor of Computer Engineering.

OUTER SKIN KEY TO NEW WAYS OF DELIVERING DRUGS

How, and how effectively, certain drugs pass through the skin into the body is not completely understood. However, the Institute for Computational Molecular Science (ICMS) has developed large-scale simulations that are capable of modeling—in detail never seen before—both how the outer skin layer is constructed and how chemicals permeate it.

The focus is on the stratum corneum, the 20-micrometer thick “horned layer” of dead skin cells that form the outer skin layer. The cells are stacked like bricks held together by mortar comprised of a mixture of lipids such as wax, cholesterol and free fatty acids.

Previous skin permeation models have postulated, but never proven, small pockets or pores of water within the fatty layers. ICMS’ model, however, accurately predicts the presence of these water reservoirs and, as a result, the permeability of small drug-like molecules through the skin.

“Our research has applicability for drugs that could be administered dermally,” says Giacomo Fiorin, ICMS research associate professor, “including nicotine patches, pain killers and certain anticancer drugs. Such a delivery system has also been proposed to treat neurogenerative diseases such as Alzheimer’s and Parkinson’s.”

NEXT-GEN BIOINFORMATICS TOOLS DRIVE GENOME SCIENCE

Tracing the origins and modeling the spread of viral outbreaks, understanding how genetics make us more or less susceptible to diseases and creating personalized therapies for cancer and other diseases are now possible thanks to the genomic revolution.

But these breakthroughs depend upon analyzing increasingly massive and complex genomic data sets—analyses that are only possible thanks to the kind of next-generation bioinformatics tools continually under development by the Institute for Genomics and Evolutionary Medicine (iGEM).

“The more data you have, the more complicated models you can create, but computationally it gets much harder,” says Sergei Pond, iGEM member and professor of biology. “iGEM is one of the few organizations within higher education where enhancing computational biology is our primary goal, not just a byproduct of biomedical research.”

Adds Sudhir Kumar, iGEM’s director and Laura H. Carnell Professor: “Our software tools, such as MEGA and HyPhy, are being used by tens of thousands of researchers worldwide to trace the origin and spread of pathogens and how they change over time, and to predict disease-causing mutations.”

TRACING METABOLIC LINK TO CANCER

For the past 50 years, mortality rates for ovarian cancer, the deadliest gynecological cancer, have remained high.

Researchers from the Sbarro Institute for Cancer Research and Molecular Medicine, the Regina Elena National Cancer Institute (RENCI) in Rome and the University of Sienna have published research in the *Journal of Cancer* that concluded there could be a metabolic link. In a study of 147 women treated for epithelial ovarian cancer at RENCI, those with the lowest fasting glucose levels were significantly more likely to have an advanced stage of the cancer.

“This novel research is the first to provide evidence of the association between fasting glucose levels and the staging of the disease,” says Professor Antonio Giordano, Sbarro Institute director.

In order to better understand the molecular processes and confirm their results, the researchers will next study both ovarian tissue and blood samples from a larger patient cohort. “This could ultimately enhance diagnosis, guide more accurate risk assessments and help better predict treatment outcomes,” adds Fatima Morales, a Sbarro postdoctoral fellow.

X-RAY TECHNIQUES UPEND UNDERSTANDING OF MAGNETISM

Advanced X-ray spectroscopic and imaging techniques utilized by researchers at the Temple Materials Institute (TMI) are rewriting the world’s understanding of magnetism. TMI’s Alexander Gray, assistant professor of physics, is collaborating with Harsh Chopra, chair of Temple’s Department of Mechanical Engineering.

In the 1840s physicist James Prescott Joule discovered that iron-based magnetic materials change their shape, but not their volume, when placed in a magnetic field. Last year, Chopra and a colleague discovered a new class of “non-Julian magnets” that, in the presence of a magnetic field, show a large volume change and remarkable ability to harvest or convert energy with minimal heat loss.

Potential applications include new sensors and actuators; efficient energy harvesting devices; compact micro-actuators for aerospace, automobile, biomedical, space and robotics applications; and ultra-low thermal signature actuators for sonar and defense applications.

“Advanced X-ray spectroscopic and imaging techniques are giving us fundamental insight into the nanoscale magnetic and electronic structure of these new materials,” says Gray. “They are complex, beautiful and highly tunable for a wide variety of technological applications.”

—Bruce E. Beans
**Message from the CST Alumni Board president**

It’s been 30 years since I graduated. Then, Temple was a place for hardworking students looking for cost-effective education. Campus life was...sparse. Five years ago, Alumni Board past presidents Jim Guare and Paul Curcillo invited me back to campus. I saw a different university. New buildings were rising. Accomplished research faculty and talented students doing remarkable work were everywhere. Throughout my career, I have hired Temple graduates because of their strong work ethic and creativity. When I joined the Alumni Board, I made sure the companies I work with knew about our outstanding students.

CST’s Owl to Owl Mentor Program is another way alumni can help prepare today’s students for a competitive job market. The program matches the experience of alumni mentors with the career goals of students, whether it’s biomedical research or cloud computing. I am proud of our mentors who have made Owl to Owl a mentorship model for other Temple schools and colleges.

Last year, we had the highest number of mentors ever but we could not accommodate all students who applied. Being a mentor is one of the most rewarding things I have ever done as a Temple alumnus. I want more alumni to experience helping a student set goals and achieve success. One thing that never changes about CST graduates is their willingness to give back to Temple and to help the next generation of Owls succeed. I am thrilled to work with many outstanding new and returning members (listed on page 31) of the CST Alumni Board. I invite you to learn more about the Owl to Owl Mentor Program at cst.temple.edu/owl2owl.

Sincerely,

Sina Adibi (BA ’84, CIS; FOX ’86)

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**Kim Reuter (PhD ’15, Bio): Using science to drive conservation in Africa**

When it comes to conservation biology, Kim Reuter is a double threat. The Conservation International (CI) biologist has garnered worldwide media coverage for her research of the world’s most endangered group of primates, the lemurs of Madagascar—a continuation of her Temple doctoral research. As CI’s director for natural capital accounting, the Nairobi-based scientist also shows African nations how to accurately account for, and to enhance, the true value of their natural assets.

Born in Germany, raised in England and then in Florida, Reuter earned a BS in biology from Florida State University in 2009. Subsequently, her first field research job involved trekking through the rain forests of Equatorial Guinea to study the impact of illegal hunting and trade of monkeys. “I realized then that I wanted to work at the nexus of conservation and human livelihoods,” she says.

Awarded a National Science Foundation fellowship, she came to CST’s Biology Department to pursue her doctorate in 2009. “I was surrounded by people who were thinking big about big problems, and you don’t get that at every school,” says Reuter, who continues to publish joint research with two of her Temple advisors, Associate Professor Eric Cordes and Assistant Professor Brent Sewall. Her Temple experience, she adds, convinced her that, “Science has to inform the work of conservation and for that reason, scientists have to work in conservation organizations.”

Supported in part by the National Geographic Society, her groundbreaking lemur research in Madagascar has concluded that over a three-year period about 28,000 lemurs are held captive as pets and hotel attractions. Some lemurs and other mammals are also consumed as bushmeat, even in restaurants where Reuters has, unknowingly, dined.

“The extremely varied work invigorates her. “I’m 28 years old and I have to pinch myself sometimes when I think about the things I do every day,” she says. “For example, I’m currently organizing a workshop here in Nairobi on natural capital accounting for delegations from 12 African nations, from Liberia to eastern Africa and South Africa. If we’re successful, it could have important implications for years to come.”

— Bruce E. Beans
Panagis Galiatsatos (BS ’06, Bio): Returning home to make a difference

Dr. Panagis Galiatsatos is proof that—despite novelist Thomas Wolfe’s adage—you can go home again, and make a big difference doing so.

After earning his MD at the University of Maryland, the son of Greek immigrants returned to the Greektown neighborhood in Baltimore where he was raised, this time as an internal medicine resident at the nearby Johns Hopkins Bayview Medical Center.

An encounter he then had with a local church’s parishioners inspired him to co-found Medicine for the Greater Good (MGG), a program highlighted in the New England Journal of Medicine. It teaches medical residents to better understand the social determinants of health—such as income level and ethnicity—and to partner with communities to improve health equity.

“I went to a Greek church to discuss cancer and was struck by the disconnect between what health providers know and what community members know about prevention,” recalls Galiatsatos, now a pulmonary and critical care fellow at Johns Hopkins Hospital and National Institutes of Health.

Since its 2013 launch, MGG has become an elective course for Hopkins medical residents. The university’s medicine, nursing, music and business school students are also now involved in creating hundreds of holistic health projects—caregiver support, controlling children’s asthma—that have so far reached more than 1,000 Baltimore residents.

“Providers must have the right medical education, where social justice, socioeconomic barriers of health and an understanding of health literacy are emphasized as much as pathology and physiology,” he recently wrote in a Baltimore Sun op-ed piece. “We should know the science but also know our patients and what barriers keep them from caring for themselves.”

Galiatsatos believes the CST faculty prepared him to handle the challenges of medical school and a medical career. “It was hard to understand how the science would tie into something meaningful,” he says, “but my professors, including Jacqueline Tanaka in biology, made me realize there is humanity in science.”

—Bruce E. Beans

Kathryn Knauth (BS ’12, Math/Comp Sci): Developing Amazon’s streaming software

If you stream any of the thousands of movies and TV shows Amazon makes available to its customers, you might want to thank Kathryn Knauth. Since graduating four years ago, she has been a software development engineer for Amazon—first in Orange County, California, and for the past year in London.

She helps develop software that streamlines the experience Amazon customers have when accessing movie or TV videos. “Working with the website’s servers, we have to think a lot about the scale of the operation,” she says. “When you have millions of customers trying to do something at the same time, you have to think a lot about how to handle that kind of volume in order to make things work seamlessly and really fast all the time.”

Knauth originally came to Temple as a linguistics major. But the memory of a computer programming course she had taken at the Community College of Philadelphia before transferring to Temple inspired her ultimately to change her major.

“Across the board my professors were awesome,” recalls Knauth. “They were very supportive and gave practical career advice, including recommending internships” — such as her summer PNC Bank internship.

As an undergraduate research assistant under Li Bai, now the chair of Temple’s Electrical and Computer Engineering Department, Knauth worked on an augmented reality project in collaboration with Temple dance students. As a Diamond Research Scholar, advised by Associate Professor Rolf Lakaemper, she worked on a software project involving Microsoft Kinect and computer-generated avatars whose possible applications include therapy for children on the autism spectrum. For her senior capstone project, she helped develop an Android app for SEPTA commuters.

Finally, her attendance at the Grace Hopper Celebration of Women in Computing conference in fall 2011 led to her current Amazon job. Knauth’s ultimate goal? “I want to change the way that people interact with technology in order to make it a more seamless part of our lives.”

—Bruce E. Beans
Kyle Knouse (BS ’16, Chem):
Next stop Scripps Research Institute

Before he even headed west to pursue a doctorate in organic chemistry at the highly ranked Scripps Research Institute in La Jolla, California, Kyle Knouse already had authored a list of published, peer-reviewed papers that would be the envy of most doctoral students.

He is the lead author, along with co-author William Wuest, an assistant professor and Knouse’s research advisor, of a paper published earlier this year in the Journal of Antibiotics. He also co-authored, with Wuest and other Temple researchers, two papers published in the Journal of the American Chemical Society (JACS); and one or two more future papers. In addition, his medicinal chemistry internship with Teva Pharmaceutical Industries in West Chester, Pa., resulted in another submitted paper.

His Journal of Antibiotics paper, and the two Temple JACS papers, focus on a potential new antibiotic, Promysalin, a compound produced by bacteria found in the root system of a Sri Lankan rice plant. “To survive, the bacteria produce compounds like Promysalin to fight off and hinder the growth of other bacteria, a very specific, targeted activity that you often don’t find in other antibiotics,” Knouse explains.

The New Oxford, Pa. native gravitated to chemistry his sophomore year when, Knouse says, “I couldn’t get enough of organic chemistry, which everyone else was struggling with and hating.” Once he started working in Wuest’s lab, he says, “I fell in love with it and decided this is what I want to do for the rest of my life.”

Of his acceptance to Scripps, the country’s 6th ranked organic chemistry PhD program, Knouse says, “I am blown away by the opportunity.” Whether his graduate work leads to an academic or industrial career, Knouse adds, “I want to pursue research that benefits human health.”

—Bruce E. Beans
James E. West (AS ’56, Physics) named to Temple’s Gallery of Success

James E. West, a pioneer in acoustics, has been named to the Temple Gallery of Success, a collaboration of the Office of Alumni Relations and Career Center that highlights the inspiring success of alumni.

West is currently professor at Johns Hopkins University in the departments of Electrical and Computer Engineering and Mechanical Engineering. He was formally a Bell Laboratories Fellow at Lucent Technologies.

His work at Bell in the early 1960s on charge storage and transport in polymers led to the development of electret transducers for sound recording and voice communication. This simple but rugged transducer is the heart of most new telephones and is found in microphone applications from toys to professional equipment. Almost 90 percent of all microphones built today are based on his pioneering research.

West holds more than 250 U.S. and foreign patents. He was inducted into the National Inventors Hall of Fame in 1999. He is a member of the National Academy of Engineering; Fellow and past President of the Executive Council of Acoustical Society of America, and a Fellow of the Institute of Electrical and Electronics Engineers.

West served on the Board of Directors of the National Inventors Hall of Fame and on the National Academy of Engineering’s Committee on Diversity in the Engineering Workforce. He is a board member of Ingenuity Program for advanced STEM education in the Baltimore Public Schools.

West’s numerous awards include the Franklin Medal in Engineering. He also holds six honorary degrees, including one from Temple. Originally a pre-med student at another university, West says “Temple was a real transition point for me. It is where I began to do what I really loved.”

Gifts from CST Graduates, Faculty and Friends Name Spaces in SERC

The Science Education and Research Center (SERC), helping to attract top students and faculty to the college since opening in 2014, is also inspiring the investment and generosity of CST’s donors. In spring 2016, 10 SERC spaces were named, funding a variety of college initiatives.

Angelo Armenti (MA ’65, PhD ’70, Physics), who earlier established the Peter Havas Humanitarian Scholarship for Outstanding Physics Graduate Students, made a gift to name a physics office. Lynne and Franklin Davis, Laura H. Carnell Professor of Chemistry, named a conference room. Their gift supports the Dean’s Faculty Endowment Fund and chemistry scholarships.

Terry and Lydia Dougherty, both 1974 chemistry graduates, named the office of Professor Justin Shi in honor of Terry’s parents. An investment from Robert (BA ’66, Chem) and Bonnie Fineman named a student conference room and established the Edward and Francis Fineman Scholarship, named in memory of Robert’s parents, to provide scholarships for chemistry students with financial need and academic achievement.

A gift from George and Marion Evans, both chemistry graduates from 1950, is funding chemistry scholarships and naming an office within the college’s Institute for Genomics and Evolutionary Medicine. Ralph Hillman, professor emeritus of biology, named a SERC collaboratory, an open space that invites interaction and discussion. Herman (MA ’55, PhD ’58, Chem) and Pauline (BA ’52, Chem) Levin supported another collaboratory. Physics professor Marjatta Lyry’s gift named a conference room in honor of her mentor Albin Lagerqvist, a molecular spectroscopy pioneer at Stockholm University.

Another conference room was named for Steven Petchon (FOX ’80), who established two funds to support Department of Computer & Information Sciences students. Physics professor Rongjia Tao is supporting post-doctoral fellows through a gift that also named an office on SERC’s fourth floor. A gift from John and Brooke Walker also named a SERC collaboratory and a gift from Barton (BA ’56, MA ’60, Math) and Lyanne Wassermann named a faculty office on SERC’s fourth floor.
Message from the Associate Vice Dean

This has been an extraordinary year for the College of Science and Technology and Temple University. Based on Google Scholar, Temple is now ranked 18th in the country for scholarly citations, ahead of institutions like Princeton University (19), New York University (25) and the University of Pennsylvania (44). Temple also reached the top research tier of the Carnegie Classification of Institutions of Higher Education. CST plays a major role in Temple’s rise to research excellence, with four of our faculty having authored five of the top-100 most-cited research papers of all time.

CST’s excellence in the laboratory is matched by our commitment to undergraduate education. Students work directly with senior faculty, and we offer supportive academic advising and professional development to prepare them for successful careers. By investing in the college, CST donors have helped build an extraordinary learning environment. Thanks in part to donor support, we introduced the Undergraduate Research Program, where students work directly with world-class researchers, and the Science Scholars Program, offering additional academic supports for top students.

CST donors are now establishing ‘top-up’ funds to boost the amount of financial support we provide to attract the best doctoral students. By working together, CST and its supporters have given our students a distinctive edge in a very competitive job market and in admission to graduate or professional school.

We still have challenges ahead. Over the past several years we have hired top researchers, such as John Perdew and Sudhir Kumar. To continue to attract and retain top faculty, CST needs additional financial resources to support advanced research and to create endowed term professorships. I hope that you will chose to partner with us and support this and other crucial initiatives, as those listed in this Honor Roll of Donors have last year.

Regards,

John R. Walker, CLA ’87, LAW ’03, ’06
Associate Vice Dean
jrwalker@temple.edu

GIFTS HONOR PROFESSORS CALDWELL, NATHANSON, SWERN, TOMLINSON AND ULMER

Board of Visitors member Seda Tarzian, (BA ’48, Bio) is the most recent donor to establish a fund that honors a former faculty member and supports today’s professors and students.

Tarzian, a female pioneer in pharmaceuticals, endowed the William T. Caldwell Memorial Distinguished Teaching Award. The annual award recognizes a faculty member who demonstrates teaching excellence. Impressed by the dedication of her Temple faculty, Tarzian’s gift honors Dean Caldwell, long-time professor and college dean from 1942 to 1961.

Other CST donors have established funds honoring the legacies of Mark Nathanson, inspiring biology professor; Daniel Swern, professor who discovered the Swern oxidation reaction; Hazel Tomlinson, chemistry faculty legend; and Gene Ulmer, EES professor known for his commitment to students. The funds support, respectively, an award for academic excellence, graduate fellowships, faculty endowment and geology field camp. To learn how you can honor a CST professor, contact John Walker, Associate Dean, at jrwalker@temple.edu or 215-204-8176.
HONOR ROLL OF DONORS

The College of Science and Technology extends its deep appreciation to the alumni, friends, faculty, staff, parents, students, corporations and foundations that made generous contributions between July 1, 2015 and June 30, 2016. Their generosity means CST can continue to set new standards in research, teaching and engagement with the world.

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Named for Temple University’s founder and first president, the Conwell Society celebrates those who sustain Temple’s educational enterprise through annual leadership gifts of $1,000 or more. The following donors gave at the Conwell Society level for fiscal year 2016:

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FIRST-EVER FACULTY AND STAFF CAMPAIGN A SUCCESS

CST embarked on its first comprehensive college faculty and staff giving campaign in fiscal year 2016. Led by Joseph Allegra (BA ’70, Bio), chair of the CST Board of Visitors, the campaign attracted gifts totaling $65,000. Among the funds college faculty and staff chose to support are undergraduate research and endowed professorships as well as funds that honor Dr. Ralph Jenkins, long-time senior associate dean, and Dr. Gene Ulmer, Department of Earth & Environmental Science, who both passed away in 2015. The following faculty and staff, from both CST and Temple University, generously made contributions in fiscal year 2016 to support the college.

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The university hosted its second Temple Toast on February 15, 2016, a celebration of Temple founder and first president Russell H. Conwell. Celebrating Dr. Conwell’s birthday, the day’s events — on campus and online — encouraged giving to the annual fund at each Temple school and college. More than 130 individuals made contributions to the college that day, giving CST the fourth highest total of any Temple school or college. CST also had the highest total during one of the hourly challenges, earning the college an additional $5,000 toward its annual fund, which supports students, faculty and research. The following individuals made a gift to CST during Temple Toast.

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DONORS USE OWLCROWD TOOL TO SUPPORT STUDENTS

CST successfully hosted three OwlCrowd campaigns during fiscal year 2016. The campaigns focused on helping students in the Department of Computer & Information Sciences attend the Grace Hopper Celebration of Women in Computing Conference in Houston; providing support for geology students embarking on their summer field camp experience, an essential part of their education; and providing funds for members of the Temple University Chemical Society to take part in the 2015 American Chemical Society National Meeting. Each campaign surpassed its goal, with CST supporters contributing more than $11,000 toward all three initiatives.

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Sritha Devathala, CST ’89
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Ramona, CST ’63, and Santo M., EDU ’60, Diano
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Danny Do, CST ’02
Kathryn Donze
Sara Dombilaser
Jasmine Dsouza and Merwyn Madtha
Zhidong Duan, CST ’98
Anetta Dubinchik, CST ’14
Kathleen Duffy
Lori Duke and T. Scott Roberts
Jingqi Duo, CST ’01
Michelle Dutton, CHPSW ’91
Aileen Edathil, CST ’99, and John Biju, CST ’99, MED ’06
Nina Edelman
John Edwardson, CST ’14
Jeff Ellenberg
David Epstein, CST ’96
Nana Essuman, CST ’12
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Mark and Rene Feitelson
Chung Feng, CST ’57
Todd Ferrara
Herbert Fichman, CST ’58
Richard Finelli, EDU ’04
Catherine Fiorello
SYMPOSIUM HONORS MEMORY OF PROFESSOR GRANT KROW

More than 80 alumni, researchers, professors and students gathered for the Dr. Grant R. Krow Symposium to honor the memory and career of the long-time chemistry professor who died last year at the age of 73.

Sponsored by the Department of Chemistry and CST, the symposium featured remarks and presentations by professors from Temple, Yale University, the University of Wisconsin-Madison and Penn State-Abington. A professor of organic chemistry at Temple for 42 years, Krow taught and mentored hundreds of students, authored more than 110 scientific papers and won numerous awards.

Prior to the symposium, Seth Herzon (BS ’02, Chem), a former student of Krow’s who earned his PhD from Harvard University in 2006 and has been a professor of chemistry at Yale University since 2008, spoke about how influential Krow was in his eventual career path. “I spent hours in his office discussing material I had questions about,” Herzon says. “That availability, which was really kind of special, coupled with his intellectual capabilities, which were outstanding, made him a very effective and influential mentor.”


Victoria Poltavskiy, CST ’14, EDU ’14 Diana Post, CST ’67 Michael Power, CST ’11 Pricewaterhouse Coopers LLP Alberta Pukavage Allison Pymer, CST ’08 Hui Qu, CST ’09, CST ’12 Jaiveersinh Raj, CST ’10, PHR ’15 Charmy Rajdev, CST ’14 Michael Ramirez, CST ’11 Marlene Ratner, CST ’63 Danae Richardson, CST ’14 Forrest Ridgway, CST ’12, PHR ’16 Shane Riggins, CST ’14 Per Rikvold, CST ’84 Samuel Rizer William Rizzi, CST ’96 Kristin Roantree, CST ’07
Nancy HO (MA ’60, Chem)
For unlocking the biofuel potential of everything from grass to wood, Nancy Ho was awarded a 2015 National Medal of Technology and Innovation by President Barack Obama. Ho, a Purdue University research professor emerita, spent years determining how to modify yeast—the same yeast used to make wine and bread—so it could more effectively convert plants into transportation fuels. After 13 years, in 1993 Ho proved that, by cloning modified yeast genes, xylose sugars could be fermented along with glucose sugars.

Saul A. Rappaport (BA ’63, Physics), professor emeritus at the Massachusetts Institute of Technology, delivered a CST Dean’s Distinguished Lecture on “Planetary and Stellar Science from the Kepler Mission” in 2015.

Samuel Strauss (BA ’67, Sci) retired from the NASA Johnson Space Center. He was a flight surgeon who supported astronaut spacewalk training and operational zero-gravity research and training flights. In addition, he was appointed associate professor of medicine at Texas A&M College of Medicine and is teaching a senior elective in aerospace medicine.

IN MEMORIAM

Samuel J. Paul (BA ’42, Phys; DEN ’51)
Joseph W. Nemec (BA ’43, Chem)
Isadore Swerlick (BA ’43, Chem)
Mayer S. Reich (BA ’48, Sci)
Dorris S. Iszard (BA ’49, Bio)
Ella Mae H. Levan (BA ’49, Math)
Robert C. Pfeilsticker (BA ’49, MA ’51, Math)
Richard Sasin (MA ’49, PhD ’54, Chem)
Stanley Snyder (BA ’49, Sci; MED ’53)
Leonard J. Zubravski (BA ’53, PhD ’58, Bio)
Perry C. Fennell Jr. (BA ’54, Bio; DEN ’59)
Mary L. Klaas (BA ’55, Math)
James R. Miller (BA ’61, Chem)
B. Sidney Zeff (BA ’61, MA ’63, Math)
Joan F. Homer (BA ’63, Sci)
Steven L. Lefrak (BA ’64, Bio)
Armin Wolle (BA ’66, Chem)
Carl L. Jolley (BA ’67, Bio)
Shirley D. Evans (BA ’68, Phys)
Lucille J. Heckman (BA ’68, Chem)
Richard K. Porter (BA ’68, Sci; CLA ’71)
Harrison T. Pannella (BA ’72, Chem)
Ernest Perry (BA ’72, Sci; MA ’87, CIS)
Steven Clevenger (BA ’73, Math)
John J. Friel (MA ’73, Geo)
Ayoub Barsoum Ayoub (MA ’77, PhD ’80, Math)
Jefferson M. Sims (BA ’77, Bio)
Lacie D. Reichardt (BS ’11, Bio)

Gerald Levitt (BA ’71, Sci; POD ’77) recently published two books, The True Origins of Chess: Ancient Greece—Yes, India—No and Shooting Star, Inverted Hearts and Other Short Stories. His book The Turk, Chess Automaton was named one of the 10 best chess history books of all time.

Mike Gagliano (BS ’04, Math; MS ’10, EES) is a senior geologist with the New Jersey Geological Survey, with primary responsibility for marine seismic surveys to identify offshore sand resources for beach restoration.

Eric Recktenwald (BS ’09, PhD ’14, Bio) earned a tenure-track teaching position at Alvernia University in Reading, Pa., where he will continue his research on the frog’s visual system.

Franklin Erkes (BS ’12, Chem) earned a doctor of physical therapy degree from New York University in 2015.

Stephen Lengyel (PSM ’14, Biotech) is a contract scientist for Janssen, providing bioinformatics support for the molecular biology division.

Keith Rafferty (PSM ’14, Biotech) is currently with GlaxoSmithKline in the Target and Pathway Validation Group.

Richard Armitage (BS ’16, CIS) was part of the team that won first prize undergraduate division at Temple’s Be Your Own Boss Bowl. The team’s business plan is Parking Bee, an app that enables people to rent out their parking spaces.

Jennifer Cho (BS ’16, Bio) is enrolled in the Medical University of South Carolina’s Medical Scientist Training Program, earning a dual MD/PhD.

Keep CST up to date! Email CSTalum@temple.edu to share your recent news and accomplishments.

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CST HOSTS SEAPERCH ROBOTICS CAMP

As part of its growing initiative to bring science and technology educational programs to the community, the College of Science and Technology hosted the SeaPerch robotics camp. Part of the Office of Naval Research’s initiative, Recruiting the Next Generation of Naval Architects, this program teaches students how to build an underwater remotely operated vehicle (ROV), how to build a propulsion system, how to develop a controller and how to investigate weight and buoyancy. Hundreds of students from middle schools and high schools across the Greater Philadelphia region participated, working with CST students to build an ROV and learn about engineering, science and mathematics.
HELP SUPPORT OUR AMAZING STUDENTS.

College of Science and Technology students are extraordinary: eager to learn, skilled in the lab and willing to work hard to make an impact.

Gifts to the CST Annual Fund help keep our students on top. Annual Fund gifts support every aspect of an exceptional education: undergraduate research, hands-on teaching, scholarships/awards and student services that support bright minds every step of the way.

Do your own good work. Make your gift to the CST Annual Fund at giving.temple.edu/givetoCST.

To discuss Annual Fund giving options, contact David Miller, Assistant Dean for Institutional Advancement and Alumni Affairs, at dmiller@temple.edu or 215-204-4704.
The College of Science and Technology will host reunions, presentations, gatherings and opportunities to reconnect with classmates, celebrate long-time faculty, meet fellow alumni and today's students and learn more about advanced science.

Look for details in early 2017 at cst.temple.edu