College of Science and Technology graduates have worked hard to earn their success; now you can share what you have learned with the next generation.

A CST alumni mentor is a guide and a resource, someone who shares his or her professional experience with a current CST student.

In just a few meetings a semester, a mentor can help a student think about what they want to achieve in life, set goals and map out strategies for achieving their dreams.

To find out more about mentoring, go to www.temple.edu/cst/alumni or contact Matthew Montekio, Assistant Director of Development, at matthew.montekio@temple.edu or 215-204-8192.
The College of Science and Technology continues to move forward in 2013, our fifteenth anniversary year. Much has changed since the college was constituted in 1998, from the technology we use for research and teaching to the talents and expectations of our students to the speed at which we adapt and innovate.

This year, the college’s Science Education and Research Center (SERC) continues to rise at the heart of Main Campus. This innovative facility will dramatically expand interdisciplinary investigation and technology commercialization, the keys to both addressing today’s toughest scientific challenges and to securing additional funding for the research efforts of our faculty. Scheduled to open in early 2014, SERC will also provide our students with a world-class environment to learn, collaborate and explore. You can see photos, video and time-lapse photography of SERC at www.cst.temple.edu/serc.

While supporting current students and professors, SERC will play a major role in the college’s efforts to attract ambitious and talented students, both undergraduate and graduate, from around the world. SERC demonstrates CST’s commitment to groundbreaking science, which is already impacting our efforts to recruit faculty members, particularly experienced researchers, to the college. SERC will also offer more opportunities to partner with foundations and corporations and to welcome alumni back to campus.

One alumnus who recently returned to the college is Dace Viceps Madore (MS, ’71, PhD ’74, Bio). In this issue of Touchpoint you can read about her contributions to developing a vaccine for pneumococcal diseases, saving hundreds of thousands of lives worldwide. You can also meet two CST professors who are using the speed of the Owlsnest supercomputer to investigate protein folding and traffic jams.

CST’s impressive faculty are what make the college such an extraordinary place to learn, to develop new ideas and to bring those ideas to the marketplace and to our communities. Our students, too, push us forward every day. CST alumni also play an important role: Their success tangibly demonstrates the value of a CST education, and their commitment to CST means we can continue to set new standards in research, teaching and engagement with the world. Thank you for all that you do to support the College of Science and Technology.

Sincerely,

Michael L. Klein, FRS
Acting Dean
Laura H. Carnell Professor of Science
You would probably have a hard time perceiving similarities between the dynamics that ensnare you in a traffic jam and the ultra-fast folding that proteins undergo to create structures that help your body convert food into energy, regulate mood and fight disease.

But not Benjamin Seibold, an assistant professor of mathematics who researches traffic jams, and Vincent Voelz, an assistant professor of chemistry who investigates protein folding. They quickly perceived mathematical similarities in their research during last October’s first annual symposium on the benefits of Owlsnest, the supercomputer Temple launched two years ago.

Housed in two heavily air-conditioned rooms on the fourth floor of the university’s TECH Center, Owlsnest links together about 180 computer nodes or servers that collectively house about 2,200 central processing units (CPUs). Parallelized software and high-speed connections between servers allow researchers to split up their computational work among multiple CPUs simultaneously, according to Ershaad Basheer, a research assistant professor in the Mathematics Department who administers the system.

For example, Seibold’s research focuses on understanding phantom traffic jams, which occur without any actual highway obstructions. Since his post-doctoral fellowship at the Massachusetts Institute of Technology (MIT), he’s been part of a group studying the
phenomenon that includes researchers from MIT, Canada and Saudi Arabia.

Seibold and his colleagues have demonstrated that these phantom traffic jams grow from tiny perturbations that occur when drivers, moving at varying speeds, force some other drivers to brake slightly. The traffic jams then grow into traveling waves called “jamitons,” which propagate backward on the road and force motorists to brake heavily. (Mathematically, these waves are similar to detonation shock waves that occur when gases ignite in combustion engines.)

It would be prohibitively expensive to conduct physical experiments to determine how slight differences in initial driving behavior can affect traffic jams involving a varying number of cars and road lengths. Computer simulations allow such a study, but since each individual simulation takes an average of 24 hours, if Seibold just used one powerful computer it would take him years to simulate a full ensemble of thousands of individual computer experiments. Yet, thanks to Owlsnest, he has been able to conduct a full computational study within a few weeks.

“Owlsnest has really made it possible to conduct these simulations,” says Seibold. His ultimate goal: developing vehicular roadway technologies that could eventually eliminate phantom traffic jams.

Meanwhile, Voelz is using Owlsnest to simulate the rapid folding of proteins, which can occur in a little as a millisecond. The problem is that the calculations must be done in time intervals of a femtosecond: one millionth of a billionth of a second. “Over the past 20 years, it’s been really difficult to get computers up to these longer time scales, but computers like Owlsnest are getting faster and the algorithms are getting smarter, so we’re at the point where we can get to milliseconds,” says Voelz. “That’s critical because our lab wants to go from the point where we are confident we can predict what proteins are going to do in real life, and use that technology as a springboard to actually design proteins, or peptides as they are also called, from scratch.”

Eventually, Voelz hopes to design therapeutic peptides or synthetic peptoids, which mimic proteins but aren’t as readily rejected by the body, to treat patients suffering from diseases that result from protein misfolding. These diseases include Alzheimer’s, mad cow (BSE), Creutzfeldt-Jakobs, ALS, Huntington’s, Parkinson’s and many cancers.

The Owlsnest cluster is funded from multiple sources, including CST, National Science Foundation, Institute for Computational Molecular Science and Computer Services. Besides CST’s Seibold and Voelz, approximately 200 Temple professors, researchers and students are utilizing Owlsnest.

Owlsnest continues to foster cross-disciplinary knowledge and inquiry. “The more people communicate and talk about their work, the more similarities you find,” says Voelz. “New and interesting collaborations will continue to come out of this.”

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Student Success

CST Winter Graduation: Pride, “Pomp and Circumstance”

More than 100 students marched in the College of Science and Technology’s winter graduation ceremony on Feb. 8. The event was held in the historic Temple Performing Arts Center.

The featured speaker was Michelle Bessett (BA ’92, Bio). Bessett is senior regional medical scientist for Auxilium Pharmaceuticals Inc., where she is responsible for building relationships with key industry leaders, coordinating medical affairs staffing at national gatherings, and collaborating with sales and marketing to achieve business goals.

After graduating summa cum laude from Temple University, she earned a Doctor of Pharmacy in 1998 from the Philadelphia College of Pharmacy and Science. Bessett began her career working as both a clinical pharmacist and part-time retail pharmacist. From 2001
to 2005, she was medical scientific manager for Eastern Pennsylvania at Aventis Pharmaceuticals. Bessett is a member of the American Society of Consultant Pharmacists and a Certified Geriatric Pharmacist Professional.

The winter graduating class included more than 230 total students. Approximately 190 students earned bachelor’s degrees, with the most common majors being biology, biochemistry and chemistry. Thirteen students earned doctoral degrees and 19 students earned master’s degrees. Additional speakers for the ceremony included Dean Michael Klein, Alexander K. Gonzalez (BA ’12, Math) and Paul Curcillo (BA ’84, Bio), president of CST’s Alumni Board and a member of CST’s Board of Visitors.
If you have had a child or a grandchild born since the turn of the century, he or she most likely received a vaccine against invasive pneumococcal disease, originally developed by a team that included Dace Viceps Madore (MS ’71, PhD ’74, Bio).

And if you’re over 50, you might someday get a similar shot with a vaccine built upon pioneering work of Madore and her colleagues. Prevnar was the world’s first conjugate vaccine that targeted invasive pneumococcal disease in infants. Prior to its introduction in 2000, Streptococcus pneumoniae killed more than 800,000 young children worldwide each year. In the United States, it was a leading cause of childhood meningitis, bacteremia, pneumonia and acute ear infections. Within a year of the vaccine’s introduction, cases of the disease in children younger than 2 had declined 78 percent in the U.S.

In 2010, Pfizer introduced Prevnar’s successor, Prevnar 13. Together, these pneumococcal vaccines have been approved for use in infants and young children in 120 countries, for children and adolescents through 17 years in the E.U., and for adults 50 years of age and older in the U.S. and more than 80 other countries. Analysts expect the vaccine will generate nearly $6 billion by 2015 and eclipse the now patentless Lipitor, the world’s best-selling drug ever, as Pfizer’s top revenue producer.

Prevnar and its team of developers have been recognized with numerous awards. In 2005, Madore was one of the recipients of both the National Medal of Technology team award and the PhRMA Discoverers Award. “The awards were just icing on the cake,” says Madore. “The greatest success is when you get regulatory approval and the vaccine starts to be used and shows effectiveness—that’s what we rejoice about.”

Born in what was then West Germany after her parents fled Soviet-controlled Latvia after World War II, Madore was 3 years old when she and her family immigrated to upstate New York in 1950. Inspired as a ninth-grader by an after-school biology program, she earned a B.A. in biology at the University of Rochester.

She came to Temple to research intracellular changes in bacteria associated with antibiotic dependency. She joined the biology lab of Professor Barbara Brownstein, who encouraged Madore to pursue her doctorate and mentored her through her dissertation, which explored how the E. coli bacterium adapts and becomes resistant to streptomycin, a commonly prescribed antibiotic.

“Those experiences reinforced my love for asking questions about the mechanisms of biology and realizing that one could design experiments that answer those questions,” says Madore. “You discover there is much that is not known and that you have the opportunity to participate in finding answers.”

After earning her doctorate, she held research positions at the Wistar Institute and Fox Chase Cancer Center; she then worked at Yale University and the University of Vermont. When her husband took a position at the University of Rochester, she joined Praxis Biologics, a biotech start-up committed to developing novel pediatric vaccines.

Pioneering new serological technologies to assess antibody immune responses in human
blood, the Praxis team first tackled *Haemophilus influenzae* type B, the No. 1 cause of infant mortality. Once they began perfecting that approach—within a year of its approval in 1990 the HibTITER vaccine was proving more than 90 percent effective—Madore and her colleagues turned their attention to another high cause of infant mortality, *Streptococcus pneumoniae*.

While there are about 90 different strains of *S. pneumoniae* worldwide, Prevnar was designed to target the seven most common strains responsible for 80 percent of the infant disease in the U.S. The team spent 15 years developing seven conjugates—linking strain-specific polysaccharides to a protein carrier—which were ultimately combined into one vaccine. While the chemists developed each vaccine component, Madore supervised the evaluation of their effectiveness both in animal studies and clinical trials. Vaccines are tested extensively in human volunteers of all ages and at multiple doses and immunization schedules in order to define their optimal performance. The resulting vaccine, Prevnar, not only stamped out diseases in children but reduced overall disease rates because the protected children were no longer infecting adults and others around them.

By the time she retired in 2004, Madore and her team had developed a total of five first-class vaccines. “All of us loved working in the vaccine business because we knew that we were preventing disease and saving lives,” she says. “You always had this feel-good sensation because you knew you were making a difference.”

In October 2012, Dr. Madore was inducted into the Temple University League for Entrepreneurial Women Hall of Fame.

The College of Science and Technology (CST) was formed in 1998 when the College of Arts and Sciences split into two colleges. Today, there are more than 11,000 CST alumni, including those science majors who graduated before that year. We are diverse, having studied biology, geology, mathematics and more. Our membership includes world-class entrepreneurs, physicians, dentists, veterinarians, researchers and corporate leaders. We are global, living and working from Philadelphia to Pakistan and many points in between.

We have much in common, too, including a dedication to innovation and discovery. As Alumni Board president, I routinely meet fellow graduates who share an appreciation for the exceptional education we earned at Temple and a commitment to CST’s success.

Recently, the Alumni Board has been expanded and strengthened with new members. There is a renewed dedication to offering alumni more opportunities to experience today’s college. Our Owl to Owl Mentor Program offers CST graduates the chance to guide a student through the challenging job market. Events, such as the recent TEDxTempleU, bring CST graduates back to a vastly improved campus. More alumni are joining our Facebook and LinkedIn communities, as well as making financial contributions toward student scholarships.

To build an even stronger Alumni Association, I want to hear your ideas. How can we help you support today’s students and faculty, build a professional network to get ahead in your career, and stay connected to today’s CST? Email me at cstalumni@temple.edu.

This is a time of rebirth for the Alumni Association. As graduates, much of our success can be traced to CST. Now we have the responsibility to reconnect with today’s college so that today’s students can match—and exceed—our success.

Paul G. Curcillo II, MD (BA ’84, Bio)
Talented people

2012 Distinguished Faculty and Student Awards

CST’s Distinguished Faculty and Student Awards recognize tenure-track and non-tenure-track faculty as well as accomplished undergraduate and graduate students. To see the complete list of award winners, go to www.temple.edu/cst.

FACULTY AWARDS

The Italia-Eire Foundation Distinguished Teacher of the Year Award
Matthew Mackie, Assistant Professor (Teaching/Instructional), Department of Physics

The Steven Petchon Distinguished Excellence in Teaching Award
Alexander Yates, Assistant Professor, Department of Computer & Information Sciences

The William Caldwell Memorial Distinguished Teaching Award
Richard Waring, Associate Professor, Department of Biology
Nahed Hamid, Instructor, Department of Mathematics

The Dean’s Distinguished Excellence in Mentoring Award
Eric Borguet, Professor, Department of Chemistry

The Dean’s Distinguished Award for Excellence in Research
Igor Rivin, Professor, Department of Mathematics

GRADUATE STUDENT AWARDS AND SCHOLARSHIPS

Der-Min Fan Chemistry Graduate Student Scholarship Fund
Zilun Hu, Chemistry

Peter Havas Humanitarian Scholarship for Outstanding Physics Graduate Students
Christina Martin-Love, Physics

Stanislav Kotsev Memorial Award Fund
David Flay, Physics
Matthew Posik, Physics

UNDERGRADUATE STUDENT AWARDS AND SCHOLARSHIPS

Abraham and Ruth Clearfield Scholarship
Amanda Suffian, Biology

Albert B. Brown Chemistry Scholarship Fund
Ashley Truxal, Chemistry

Dr. Lorraine H. Kligman Endowment Fund
Saliya Badalbaeva, Biology

Edward and Francis Fineman Scholarship in Chemistry
Emily Mattes, Biochemistry

Francis James Sholomskas Progress to Excellence Scholarship
Sarah Shimkus, Mathematics

Henry A. Sloviter Student Research Award in Chemistry
Zachary Haukeman, Biochemistry
Milan Patel, Chemistry

J. A. Poole Award for Exceptional Department Service by an Undergraduate
Rebecca Barnard, Biology

John T. Petrick Physics Scholarship Award
Jake Roemer, Mathematics/Physics

Mark Berger Prize
Vincent Tu, Biochemistry

Morna Brennen Memorial Scholarship Fund
Amy Gutekunst, Chemistry with Teaching

Paul and Beatrice Zacker Physics Term Scholarship
Eric Hunter, Physics

Shirley and Bernard Brown Scholarship in Chemistry
Khristina Pavelenko, Chemistry
Joseph Trout, Chemistry

For information about establishing a named scholarship or contributing to an existing scholarship fund, please contact:
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Talented students matched with exceptional researchers.
Advanced theory matched to hands-on experience.
Your contribution matched by our commitment.

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 giving.temple.edu.