Outlook

Dean Hai-Lung Dai reflects on the remarkable changes taking place at CST

Growing Excitement

Dean Hai-Lung Dai reflects on the remarkable changes taking place at CST
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Welcome to the Fall 2009 issue of Outlook. You will find in this issue a brief discussion of the college’s progress over the past three years and what we hope to accomplish in the near future, a summary of the exciting progress made in the Math Department, and research highlights of distinguished chemistry faculty member Frank Davis, who was recently named a Laura H. Carnell Professor.

I have encountered many questions regarding the fiscal health of the university over the past year. Mainly due to Temple’s reduced state appropriation, our college has had to reduce its operating budget by more than 7 percent since 2008.

Though we have been compelled to make some sacrifices and to become more efficient, the process of improving the quality of science research and education at Temple will continue and is even gaining momentum. Federally funded research has more than doubled over the past three years, and we are continuing the vital recruiting efforts that strengthen our small but productive faculty. The college is seeing more and better students enrolled in science/math majors and is offering more programs aimed at improving educational content. For example, the number of undergraduate students participating in research this year has increased by an order of magnitude. And at a time when most universities are dramatically raising tuition, Temple showed its commitment to providing access to excellence with the smallest tuition increase in 13 years.

Now more than ever, we are depending on our alumni and friends to lend their support so that we can continue to improve the quality of science education and research at Temple. Visit myowlspace.com to support the college or www.temple.edu/cst/feedback to let us know your thoughts on the college’s progress and future plans.

Sincerely,

Hai-Lung Dai
Dean and Laura H. Carnell Professor
Crossing an Ocean for Knowledge

Sergio Olmos was 17 years old, stood six feet, nine inches and had three options: a career, an education, or a long journey to a strange land to pursue both.

Universities in Spain, Olmos’ home country, do not have sports programs. He could have begun a professional basketball career or gone to college in Spain. But doing both, blending twice-daily practices and away games with homework, classes and tests, would have been practically impossible. Olmos wanted to continue to play the game he loved and earn the degree that was so important to him and to his parents. So despite speaking no English, he chose option three: basketball and a degree in the United States. He chose Temple.

“I talked to [former Owl] Pepe Sanchez, who was playing basketball in Spain,” Olmos says, “And he told me that Temple was a great school and that I would have four great years here.”

Soon Olmos was playing for Temple’s storied Division 1 basketball program and working toward his bachelor’s degree in mathematics. But he was a long way from home.

“I was lost the first months. I couldn’t understand conversations or watch TV. The first year, there were times when I said, ‘All right, tomorrow morning I’ll pack my bags and I’ll leave.’”

He persevered, and Temple’s Intensive English Language Program helped him become fluent in English. He did well in school, including in his favorite class, Differential Geometry with Associate Professor Bruce Conrad, and made friends both on and off the basketball team.

Olmos adjusted so well that basketball coach Fran Dunphy told the Philadelphia Daily News, “If you said to me I need to go to dinner with any one of our players tonight and break bread with them and have a conversation that would be mature, enlightening, profound, I would choose Sergio Olmos. I think he’s got a great way about him. He has a great sense of who he is, and I think that’s always a pleasure to watch and see in somebody his age.”

Dunphy began coaching the basketball team before Olmos’ sophomore year. The Owls struggled that season, but bounced back and won the Atlantic 10 tournament the following year with Olmos as their starting center. The tournament championship victory is Olmos’ favorite moment at Temple. In 2008-2009 they repeated as league champions.

On May 14, 2009, now seven feet tall, Olmos walked across the stage at the College of Science and Technology’s Graduation Ceremony to receive his bachelor’s degree in mathematics. He returned home to Spain a few months later to be closer to his family, signing a contract to play basketball with UB LaPalma in Spain’s top basketball league.

“I think coming to Temple was the right choice,” Olmos affirms. “I learned English, I got a mathematics degree and the experience of playing college basketball. It was a great experience.”
Three college professors won university wide awards in 2009: Biology Chair Shohreh Amini, Earth and Environmental Science Professor Jonathan Nyquist, and Computer and Information Sciences Professor and Director of the Center for Information Science and Technology Zoran Obradovic.

Amini received the Lindback Award for Distinguished Teaching, established by the Christian R. and Mary F. Lindback Foundation to recognize academic excellence and outstanding teaching.

“Teaching undergraduates is the best—it is the most rewarding,” Amini says. “I want them to interrupt me, ask me questions and challenge me. It is OK when students ask me a question and I don’t know the answer. Then I have to go find the answer and that makes me learn, too.”

Obradovic received the Faculty Research Award in recognition of the impact of his research.

“We collect large amounts of data to better understand why something is happening,” says Obradovic. “There could be something going on that is present in a number of different research studies, but is often overlooked because it isn’t relevant to what that particular researcher is looking for. Looking at a bigger picture across a large amount of data helps us recognize these trends.”

Nyquist received the inaugural Provost’s Award for Innovative Teaching in General Education, an award established to recognize creative approaches to engaging students in classes in the newly developed GenEd curriculum.

His GenEd class, Disasters: Geology vs. Hollywood, uses clips from Hollywood disaster movies to facilitate teaching geology to non-science students. “What I try to get across to my students is science doesn’t just pose questions, it can actually quantitatively try to answer them,” says Nyquist. In the class’ final project, students make a connection between the class and their major. He has had film majors make their own short movies, music majors write songs, an art student study the effect of acid rain on statues, and even a glassblowing major who created artwork using volcanic rock.

All three faculty members were honored at the Faculty Awards Convocation held April 28, 2009.

“My congratulations to Shohreh Amini, Zoran Obradovic and Jonathan Nyquist on winning 2008-09 faculty awards... These three dedicated professors represent what Temple is all about: commitment to students and to excellence and originality in teaching and research.”

— Provost and Executive Vice President for Academic Affairs Lisa Staiano-Coico
CST Job Fair Prepares Students for Careers

In today’s job market, being a prepared job seeker is an absolute necessity. At the college’s second Science and Technology Job Fair, held March 31, 2009, CST students and young alumni learned what makes an attractive candidate as they made connections with area employers.

Nearly 20 employers had recruiters at the Job Fair. The prospective employers spoke with students before the fair about what makes a job candidate, résumé, cover letter and interview stand out, and took part in an informal networking lunch with students. Professional career coaches from Temple University’s Career Center were on hand throughout the day to help students create optimal résumés.

The Job Fair is a new initiative of the college’s Career Services Office, which provides students with career advising, workshops and connections to job opportunities.

Two CST professors remembered

The College of Science and Technology community is saddened by the loss of two beloved professors over the last year.

A memorial service for Biology’s Thomas Punnett, who passed away July 4, 2008, was held November 9, 2008, on Main Campus. Family, students and colleagues gathered to celebrate the life of Punnett, of whom former PhD student William Hagar remembered: “To his students he was an innovator and raconteur par excellence with a wonderful sense of humor. He instilled the ability to see other sides of problems and ask the pertinent questions to solve them.” Hope Punnett has established the Thomas Punnett, PhD Memorial Scholarship Fund in memory of her husband, who taught at Temple for more than four decades. Friends of Punnett interested in contributing to the fund, which will provide summer financial support to outstanding graduate students studying biology or biochemistry, should contact the Dean’s Office at 215-204-2888.

A memorial service for Chemistry’s Donald Titus, who passed away May 17, 2009, was held Tuesday, June 23. The Gloucester County Times obituary said: “Professor Titus influenced many tens of thousands of students during his over 35-year career at Temple University through his General Chemistry, Introductory Chemistry, and Inorganic Chemistry classes. Dr. Titus was a favorite teacher for freshman and seniors alike. His wit, wisdom and experience will be sorely missed.”
2009 New Faculty

This year’s nine new College of Science and Technology faculty members bring the three-year tenure-track hiring total to 26, nearly matching the college’s 2012 goal of 30 new research-active faculty. With appointments in all six departments, this year’s incoming faculty class is the most diverse to date. Most exciting for the college are the four new senior faculty. Professor and new Chair of the Computer and Information Sciences Department Jie Wu is an incredibly productive researcher who is committed to building the department into a center of research and academic excellence. Laura H. Carnell Professor of Science Michael Klein, a world leader in molecular modeling recently elected to the National Academy of Sciences, is forming the Institute for Computational Molecular Science here at the college. Laura H. Carnell Professor of Physics Xiaoxing Xi is an internationally recognized leader in superconductivity research who developed what is currently the most efficient method for producing superconductive films. Associate Professor of Biology Raymond Habas won the prestigious Presidential Early Career Award for Scientists and Engineers in 2007.

Ilya Buynevich
Assistant Professor of Earth and Environmental Science

Ilya Buynevich joins the college from Woods Hole Oceanographic Institution, where he was an assistant scientist. His research focuses on coastal barrier evolution and aeolian landscape dynamics, and combines geophysics and event sedimentology to reconstruct a long-term history of coastal hazards. Buynevich earned his PhD in geology from Boston University.

Xiaojiang (James) Du
Assistant Professor of Computer and Information Sciences

Xiaojiang Du joins the college from North Dakota State University, where he was an assistant professor of computer science. His research interests are wireless networks, security, computer networks and systems. Du earned his PhD in electrical and computer engineering from University of Maryland, College Park.

Amy Freestone
Assistant Professor of Biology

Amy Freestone joins the college from the Smithsonian Environmental Research Center, where she was a marine science network postdoctoral fellow. Her research interests include community ecology, invasion ecology, spatial ecology and biogeography, while her current research targets how ecological mechanisms reciprocally drive and are driven by the latitudinal diversity gradient. Freestone earned her PhD in ecology at University of California, Davis.

Raymond Habas
Associate Professor of Biology

Raymond Habas joins the college from the Robert Wood Johnson School of Medicine at the University of Medicine and Dentistry of New Jersey, where he was an associate professor in the department of biochemistry. His research focuses on understanding the Wnt signaling pathway, a complex signal transduction pathway that plays crucial roles during embryogenesis, and the deregulation of which is implicated in a host of human pathologies, including cancers. Habas earned his PhD in neurobiology and behavior from the State University of New York at Stony Brook.

Michael Klein
Laura H. Carnell Professor of Science; Founding Director of the Institute for Computational Molecular Science

Michael Klein joins the college from University of Pennsylvania, where he was Hepburn Professor of Physical Sciences and director of the Center for Molecular Modeling as well as the Laboratory for Research on the Structure of Matter. Emphasizing applications to realistic systems and the development of new simulation methodologies, his work uses quantum and classical computer simulation of condensed matter and biophysical systems at the atomic level to explore the relationship between intra- and inter-molecular interactions and physical properties. Klein earned his PhD in theoretical chemistry from the University of Bristol in the United Kingdom.

Benjamin Seibold
Assistant Professor of Mathematics

Benjamin Seibold joins the college from the Massachusetts Institute of Technology, where he was an instructor of applied mathematics. His research explores the development of better methods for simulating evolution processes with a current focus on meshfree and particle methods for flow modeling, level set methods, traffic modeling and optimal prediction. Seibold earned his PhD in applied mathematics at the University of Kaiserslautern in Germany.

Since January 2007, 26 new tenure-track faculty members have joined CST.
State-of-the-Art Beury Hall Renovations Completed

After five years and almost $25 million, the renovations of Beury Hall are complete. The departments of Chemistry and Earth and Environmental Science (EES) hosted a ribbon-cutting ceremony March 5, 2009, in celebration of the milestone.

Temple University President Ann Weaver Hart and Dean Hai-Lung Dai cut the ribbon following opening remarks from President Hart, Dean Dai, Chemistry Chair Robert Levis and EES Chair David Grandstaff. CST alumni, friends, faculty and students then enjoyed light refreshments and self-guided tours of the refurbished building.

“In a university, the most important resources are, of course, its people — students and faculty,” said Dai. “To support the people engaging in the university’s mission of discovery and dissemination of knowledge, we need good facilities.

“Beury Hall was built some 40 years ago to support this mission,” he said. “The College of Science and Technology is very grateful that the university recognized the need to modernize the laboratories for chemistry and earth and environmental science.”

The building is named in honor of Charles E. Beury, who served as a trustee of Temple from 1913 to 1952 and was the university’s second president from 1925 to 1941.

The project, led by CST Vice Dean George Palladino with Senior Manager of Operations Roger Cutitta, included complete renovations of the infrastructure of the building, installing wireless technology in classrooms and lecture halls, and new, cutting-edge facilities for research. Distinctive features include specialized instructional classrooms for physical geology students and a semi-smart microscope projection system in the EES labs. The renovations transformed about 107,250-square feet of the 174,700-square-foot building, which hosts approximately 3,000 students in class every day.
Focus on the X-factor

The hepatitis B virus (HBV) is among the most common infections in the world. Transmitted through bodily fluids, it has infected approximately 2 billion people—roughly one third of Earth’s population—mostly in developing countries in Asia and Africa. More than 330 million people are chronically infected, including about 110 million Chinese people, or 10 percent of the nation’s population.

Dr. Mark Feitelson, professor of biology and co-director of the Temple University Biotechnology Center, has dedicated his academic life to helping the hundreds of millions of chronic sufferers in developing countries like China.

Hepatitis B doesn’t appear on any list of the world’s deadliest diseases because the infection itself is rarely fatal. But long-term HBV and hepatitis C virus infections result in chronic liver disease (hepatitis), cirrhosis (end-stage liver disease) and liver cancer, the third most common cause of death from cancer worldwide.

Feitelson has been studying HBV since 1980, when as a postdoc at Stanford he began applying to the virus a new radiolabeling method he had developed to characterize proteins from viruses that did not grow in cultured cells. At Stanford he met Baruch Blumberg, the Nobel Prize–winner who discovered hepatitis B and subsequently developed the vaccine and the test for the virus used worldwide. Blumberg recruited Feitelson to Fox Chase Cancer Center in Philadelphia, and they worked together for nine years before Feitelson moved to Thomas Jefferson University in 1991. In 2007, Feitelson moved his lab to Temple University.

One product of the virus, known as the hepatitis B X antigen (HBxAg), plays a major role in the life cycle of HBV and is an important contributor to the development of liver cancer. HBxAg has been the focus of Feitelson’s research since 1983.

HBxAg stimulates the production of virus proteins that are involved in enlisting the cell to create more viruses. During chronic HBV infection, it also protects infected liver cells from destruction by the immune system. The immune system’s response to the virus, stymied by the actions of HBxAg, results in the development of inflammatory liver disease (chronic hepatitis) without eliminating the virus-infected cells.

Sustained virus replication and progressive chronic liver disease are major risk factors for the appearance of liver cancer. Over the years, the focus of Feitelson’s research has been how HBxAg promotes the survival of virus-infected cells which, like cancer cells, often survive despite the persistence of immune responses that would otherwise eliminate such cells. His lab has also identified events triggered by HBxAg that are important contributors to cancer development.

“HBxAg flips up switches that promote growth and flips down switches, at the same time, that prevent growth,” says Feitelson. “You put it into a liver cell culture and the cells go bursting out of the test tube.”
It is not a coincidence that HBxAg causes cell cultures to behave very much like cancer cells. “The virus makes these changes in order to replicate and survive. But when the virus promotes cell survival and cell growth so that the infected cells do not get eliminated, it simultaneously promotes the characteristics of tumor cells.” In effect, the hepatitis B and C viruses cause their host cells to acquire the quick growth and resistance to immune elimination characteristics of cancer cells in the course of promoting their own survival. Liver cancer itself often follows.

Presently, most HBV drugs in advanced clinical trials or approved by the FDA are aimed at inhibiting polymerase, a virus enzyme responsible for supporting virus replication. By binding to the polymerase and preventing it from helping the virus replicate, these drugs ideally halt the proliferation of the virus.

The problem with targeting a single aspect of the virus is, as Feitelson puts it, “polymerases do not have a proofreading function.” As the polymerase facilitates replication, it does not check for and excise mutations. It is common for mutated forms of the virus that do not possess a drug’s chemical target to appear. These forms are then free to repopulate the body. This fast-paced evolution is the basis for viral drug resistance, and also allows viruses to mutate around immune responses.

The current model for managing aggressively mutating viral infections is combination therapies, or “drug cocktails.” Highly successful in treatment of the human immunodeficiency virus (HIV), this approach uses drugs aimed at multiple chemical targets on the virus to suppress replication to such low levels for such a long time that the virus cannot reach the critical mass of mutated forms required to repopulate around the drugs. Feitelson thinks HBxAg might be a good additional target for HBV drugs.

Continuously funded by the National Institutes of Health since 1988, Feitelson recently received a grant to develop combination therapies for HBV. He is currently working on a total of three NIH-funded projects and has received funding from industry and foundations over the years for multiple translational and applied research projects.

One such industrial contract is from the Chinese company HEC, which has enlisted Feitelson to test a promising new HBV drug with a new target in his lab. HBV receives relatively little attention in the West due to the low infection rates in Europe and the Americas and the delayed impact of the virus on the health of infected people. But HBV-associated diseases are a national priority in China, and Feitelson has formed strong ties with the HBV research community there as he helps to fight these diseases. Many of his graduate students are from China and he often travels there for conferences and consultations. He has been a visiting professor at five different Chinese universities, including the elite Fudan University in Shanghai.

Feitelson has even formed a small company in China called Usino to aid in accomplishing one of his goals: helping China to develop their own drugs for HBV, which could then be made available at affordable prices. Usino is presently helping to standardize clinical testing throughout China, laying the groundwork for advanced drug development, but the company also facilitated the HEC contract.

For Feitelson, China offers a singular opportunity to pass on the torch that Blumberg handed him years ago. “I can publish all the papers I like,” he says, “but in China I’m making a difference with people who see the disease every day and who have committed their lives to doing research in this area.”

—I can publish all the papers I like. But in China I’m making a difference with people who see the disease every day and who have committed their lives to doing research in this area.”

— Feitelson

HBxAg, the liver cancer indicators β-catenin and ErbB-2, and preimmune (before reaction to HBV) liver samples.
It has been nearly three years since Hai-Lung Dai, the College of Science and Technology’s first permanent dean, took the helm of the college at a time of great flux in American science education. In the Summer 2007 issue of Outlook, Dr. Dai discussed the importance of science education and his goals for the college. In this issue, we check in with Dr. Dai on CST’s progress and the challenges still facing the college.
When you became dean, the College of Science and Technology had been in existence for seven years but had never had a long-term leader setting the course. What do you see as the college’s mission?

I think the college has a very important mission. The American math and science educational system is in trouble. Our test scores are rapidly falling behind our competitors’ scores. The U.S. manufacturing sector, driven by scientific discovery when I started working 25 years ago, accounted for nearly 20 percent of the U.S. economy. Now it accounts for less than 12 percent. In 2005, more than 41 percent of American graduate school science and engineering advanced degrees were granted to students of foreign origin.

At Temple, we are in a unique position to have a wide and direct impact on this growing science deficit. We have a very large and diverse student body of roughly 3,500 graduate and undergraduate students. We must educate our students well, show them the importance of science, prepare them for science careers, and inspire and encourage them to follow through with scientific careers. We have to support science education in the region by engaging with the Philadelphia community. And we have to discover valuable new knowledge through research.

What are the college’s strengths?

The most important part of any educational institution, and the greatest asset the college had when I arrived, is the people who work and study there. We have bright, accomplished faculty who genuinely care about passing on knowledge to students and gaining new knowledge through research. We have staff who are committed to making the college a great institution. Our students are dedicated to learning; many of them are here because they know we will provide them with the opportunity to learn as much as they can regardless of their background. Our alumni have been vital to the college’s growth, helping with efforts like the Distinguished Teaching Awards and scholarships that support great students, and we continue to rely on their support.

CST is the largest science and technology school or college in the Philadelphia region. What is the greatest challenge to educating so many students?

The total number of science faculty here at Temple is small compared to our number of students. University of Pennsylvania, for example, has more than 200 tenure-track faculty teaching a much smaller number of undergraduates. When I arrived at Temple, there were only about 105 tenure-track faculty members. Of the 105, fewer than 30 percent were receiving research funding from outside Temple.

That is why we have hired 26 tenure-track faculty over the past three years as of fall 2009. Our percentage of funded research-active faculty is now more than 50 percent because many of our new faculty have brought funding with them, and several faculty who were here before have acquired funding. (See page 6 for new 2009 faculty.)

Why is faculty research important?

Professors at research universities like Temple have two missions. One is the dissemination of knowledge — teaching. The other is the discovery of knowledge — research.

The two missions are connected. A good teacher who is engaged in research can present our body of knowledge as constantly evolving, not static, by talking about their own experiences. Research often means the rediscovery of the same theory or principle, but in different environments and systems. When you do research, you constantly force your mind to think about the meaning of a particular
principle or theory. So when you teach your students, you can always present new, live examples, not just the established facts that were put in textbooks.

The other part of teaching at a research university is leading graduate students. You help graduate students define research problems, you work with them designing experiments and interpreting data. You’re training the next generation of researchers, who will then go into industry or academia and develop new materials, applications, instruments and technologies.

Professors who are known for their research are also one of the best ways to improve our position in many rankings. Great faculty attract great students, do cutting-edge research and improve our reputation among their colleagues. The changes we’ve made should be reflected in our rankings in a few years.

Many new science and technology disciplines have evolved in recent years. Has the college’s curriculum changed? How does the college help students integrate with our rapidly changing world?

More than 20 proposals on revising academic programs were sent to the Board of Trustees in 2008. We created new degrees, dropped outdated degrees and modernized existing programs. We introduced a full-fledged environmental science degree, a mathematics and computer science BS, six undergraduate degrees with a teaching component in conjunction with the TUteach program, and a new neuroscience track in the Biology Department. We are working on a PhD degree in environmental science. We have a new PhD in geosciences and a new MS in information science and technology.

We’ve also built new services for undergraduate students, like the Career Services Office and the Job Fair. We have formal study abroad arrangements with many foreign institutions so that our students can go abroad for a semester as exchange students. We’ve made it a priority to encourage undergraduate research through programs like the Undergraduate Research Program and mandated that students graduating with honors have some research experience.

What are the college’s plans for facilities?

Unfortunately, many of our facilities are outdated. Most of the buildings the college occupies were built in the 1960s, which is okay as long as you continue to renovate. Our president and provost recognize this and, in recent years, an effort has started in response to our need for updates. The Chemistry and EES departments recently completed a $25 million renovation of Beury Hall, updating the ventilation, water supply, electricity and other infrastructure, as well as things like laboratory benches, hoods and ceiling tiles. (See page 7.)

In the Biology-Life Sciences Building (BioLife), we are renovating on a laboratory-by-laboratory basis. The Provost’s Office and the President’s Office have worked closely with us to support these renovations.

BioLife and Beury are the two buildings that have the ability to support wet lab operations—labs that require handling chemicals and biological species. Then we have dry lab space for departments like Physics, Computer and Information Sciences, Mathematics and the theoretical part of Chemistry, and office and classroom space for all departments, for which the space has not been updated recently.

When I arrived, with the support of the president, the Board of Trustees approved a plan to build a new science building. A portion of the money was allocated then. Though there is no timetable yet, we have been authorized to proceed with an architectural plan. I think the college
is showing momentum. We have demonstrated success in our goals and that we are in an expansion-and-building mode. A new building will improve the working environment for a good portion of CST and will help us attract top scholars and students to Temple.

What are CST’s goals for the future?

We must continue to build our college by bringing in excellent research-active faculty, improving student educational opportunities and services, and developing modern facilities to meet our needs. I believe CST can be a top-tier college in both research and education and that we can make a difference in the lives of our students and in the future of Philadelphia and the nation. We have made a lot of progress, but there is still much to be done.

HOW ARE WE DOING?

Your opinion is important! To give us feedback, make suggestions, or just tell us what you remember most about Temple, visit www.temple.edu/cst/feedback. We look forward to hearing from you!

NEW RESEARCH AND EDUCATION PROGRAMS AT CST

TUteach

The TUteach program is a fundamentally new approach to education that will educate more and better content-prepared science and mathematics teachers. In TUteach, science and mathematics majors get early and intensive preservice teaching experience, the latest pedagogical tools, and extensive mentoring and support as they become effective, state-certified teachers whose passion for their subject is passed on to their students. Temple’s College of Science and Technology and College of Education are partners with the School District of Philadelphia in helping to address the nation’s shortage of science and mathematics teachers through the TUteach program.

ExxonMobil Bernard Harris Summer Science Camp

The ExxonMobil Bernard Harris Summer Science Camp is a free, overnight, two-week academic camp for middle school students that emphasizes increasing mathematics/science skills and stimulating interest in science as a potential career path. Each year, up to 50 students stay at Temple’s Ambler campus and participate in activities including classroom study, experiments, individual and group projects, weekly field excursions and motivational guest speakers.

Undergraduate Research Program

A new CST initiative, the Undergraduate Research Program encourages undergraduate research by matching faculty grant funding used for student stipends. At the researcher-student Match Day, March 31, more than 150 students interviewed with 21 Temple faculty from the College of Science and Technology, School of Medicine, and College of Engineering. Roughly 50 students were hired for fund-matched research positions and all the students at the Match Day gained valuable experience interacting with researchers, as well as insight into the requirements of a research position.

MARC

The College of Science and Technology has received a $2.3 million, five-year grant from the National Institutes of Health to begin the Minority Access to Research Careers (MARC) program. Up to 16 underrepresented minority students with financial need will receive financial and programmatic support for summer research internships at Temple and an outside institution.

Scientists as Teachers; Teachers as Scientists

Scientists as Teachers; Teachers as Scientists is a new project that received roughly $2.5 million in funding over five years from the National Science Foundation. The project will fund eight graduate fellows in science, technology, engineering and mathematics. The fellows will work with 16 local science and math teachers to infuse the latest scientific methods and technologies into lesson plans, and interact about pedagogy, science content and laboratory research at a new summer institute. Fellows will also take part in a professional development program and a required science ethics course, both of which will eventually be incorporated college-wide.
Laura H. Carnell Professor of Chemistry Franklin Davis has made revolutionary contributions to the field of asymmetric synthesis.
Place your hands together, palm to palm. Note that each finger is touching its counterpart. Next, find a mirror and place one of your hands on it. Each finger is again touching its opposite, reflected counterpart — your hands are mirror images of each other. Now place one hand palm down on a surface. Place the other hand palm down on top of it with your wrists aligned. The thumb of your top hand is touching the little finger of your bottom hand and vice versa, with only your middle finger touching its opposite number.

Your hands, like bananas, most letters of the alphabet, cars and many other everyday things, are chiral objects: objects the mirror images of which cannot be superposed on the original. With the right equipment, you could see that many parts of your body much smaller than your hands are also right- or left-handed.

“DNA, enzymes, sugars... many things in our bodies are chiral,” says Laura H. Carnell Professor of Chemistry Franklin Davis, who has been a leader in the study of chiral molecules, or stereochemistry, for more than three decades.

While stereochemistry is a growing part of organic chemistry as a whole, it is the importance of chirality in medicinal chemistry, the subdiscipline in which Davis performs his research, that is driving the field’s growth. Just like your right hand won’t fit into a left-handed glove, a right-handed compound might not fit into the left-handed DNA in your body. Today, more than 50 percent of commercially available pharmaceutical compounds are chiral.

Molecules are more like incredibly complex machines than the Tinkertoys® their models resemble. Making functional molecules by attaching certain pieces to specific places is a difficult endeavor, and attaching certain pieces to specific places with a certain chiral orientation, a process known as asymmetric synthesis, is even more difficult. Just as the advent of space flight necessitated the development of new devices, like the zero-reaction wrench that allows astronauts to work in space without torquing their whole bodies around a loose bolt, the growth of stereochemistry necessitated the development of new tools for creating chiral molecules.

Davis created some of the most useful tools in the field of asymmetric synthesis, tools that are now in wide use around the world. He invented two classes of molecules — sulfinimines and N-sulfonyloxaziridines — that help make a wide range of important chiral molecules, including the amino acids that comprise proteins. Simple to make, efficient and stable, these compounds, now known as Davis reagents, were a major innovation in asymmetric synthesis.
Synthesize, analyze

Davis was born in Des Moines, Iowa, and grew up in Washington, D.C., and Hastings-on-Hudson outside of New York City. In high school, he discovered an affinity for organic chemistry, a discipline of flames and fumes and residues in which researchers must get up close and personal with their work.

“It’s very hands-on. Using the reagents, weighing things out, measuring things, analyzing the samples,” Davis says. “You have to have a feel for the chemical reactions; why you run something at a certain temperature, why you do it under anhydrous conditions or inert atmosphere conditions.”

In college, Professor Peter Wharton hired Davis to make chemicals for his graduate students at University of Wisconsin-Madison and, noting his aptitude in the lab, encouraged him to go to graduate school. Davis worked with sulfur while earning his PhD at Syracuse University and continued the work that eventually led to the Davis reagents as a Welsh Postdoctoral Fellow at The University of Texas at Austin.

When he moved to Drexel University to start his own research in 1968, Davis focused his lab on synthesizing new molecules with sulfur-nitrogen bonds. In 1974 he published a paper describing the invention of sulfinimines (modelled below), which would be used three years later to create the first N-sulfonyloxaziridines. Then came the hard part: puzzling out what the new compounds did.

“When you make a class of compounds that no one has ever made before, you try to see what they’re good for, what sort of properties they have,” Davis says. “It’s a very creative sort of challenge to synthesize something novel and you learn a lot by doing it. You just hope it’s of interest and useful.”

Davis and his collaborators quickly discovered the new molecules were good for attaching oxygen and nitrogen to other molecules. Then they began testing the chirality of the new molecules, and the true utility of the Davis reagents became apparent. “We recognized that these reagents could be used for asymmetric synthesis. They can chirally insert oxygen or nitrogen atoms into various molecules.”

“Frank Davis is widely appreciated for being a master toolmaker. To get certain processes done, one uses Davis chemistry.”

— Chemistry Professor David Dalton
The right fit

The over-the-counter drug Aleve® provides a striking example of the importance of chirality in the human body. The effective painkilling compound in your local drugstore is left-handed and comprised entirely of that version, or enantiomer, of the molecule. The right-handed enantiomer of the molecule provides no pain relief, but causes liver poisoning.

“Most natural amino acids are left-handed enantiomers, which means our DNA and enzymes and other proteins are the same chirality,” Davis says. “They may interact with only one enantiomer of a chiral compound and sometimes the other enantiomer will be extremely toxic. So when you’re testing a compound, you need to prepare both and evaluate their biological activity.”

Differing effects between enantiomers are the primary reason that drugs known as enantiomerically pure, which means they are composed of only one enantiomer like Aleve, are becoming increasingly common. Albuterol, for example, which as a combined right- and left-handed compound was the leading drug for asthma inhalers, has been superseded by the enantiomerically pure levalbuterol, which eliminates the side effects of the absent enantiomer. Enantiomerically pure drugs can also be more potent and simpler to test. More than a third of all drugs sold today are enantiomerically pure, including top sellers like Lipitor® and Zocor®, and the Food and Drug Administration now requires that all new approval applications for drugs that are not enantiomerically pure include explanations of the quality, safety and efficacy of both enantiomers.

The Davis reagents — effective, easily made in most labs and even available for purchase — are widely-used tools for creating the enantiomerically pure compounds that are becoming the norm in the pharmaceutical industry. Davis’ research has been cited nearly 10,000 times and his publications have averaged more than 500 citations per year since 2005. Chemotherapeutic agents, which often block the enzymes that control the growth of cancer cells and must therefore be of the correct chirality, are a common product of the Davis reagents. In his own lab, Davis has used his reagents to enantioselectively synthesize several homoisoflavones and anthracyclics, both of which have shown signs of slowing tumor growth.

Funded Research at CST

External funding for the faculty’s cutting-edge research is growing throughout the college. Following is a partial list of some of the recent externally funded research performed in each department.

**Biology**
- Amini, Shereen; Hillman, Nina; Borguet, Eric; Stull, Judith, Scientists as Teachers, National Science Foundation
- Chang, Frank N., K12 Expression: Common Type Epithelial Differentiation, National Science Foundation (University of Cincinnati)
- Cordero, Erik, Exploration and Research of Northern Gulf of Mexico Deepwater Natural and Artificial Hard Bottom Habitats with Emphasis on Coral Communities, Reefs, Rigs & Wrecks, Department of the Interior and NOAA Office of Ocean Exploration and Research
- Feltkow, Mark, Beta-Catenin Signaling in HBxAg Mediated HCC, National Institutes of Health

**Chemistry**
- Borguet, Eric, Array piezoelectric nanocantilever sensors to detect immune responses to therapeutic monoclonal antibodies and breast cancer markers, The Nanotechnology Institute
- Borguet, Eric, Nanoscale Cellular Probes, The Nanotechnology Institute
- Borguet, Eric, Acid-base chemistry at the aqueous-mineral interface, American Chemical Society-Petroleum Research Fund
- Borguet, Eric, CRC, Long-Range Electron Transfer in Hybrid Inorganic-Peptide Nucleic Acid Nanoscale Assemblies, National Science Foundation
- Borguet, Eric, A Molecular Resolution Investigation of Electron Transfer at Electrochemical Interfaces, National Science Foundation
- Borguet, Eric, Passive Wireless SAW Humidity Sensors, National Aeronautics and Space Administration
- Dai, Hai-Lung, Nonlinear Optical Probe of Absorption and Structure of Molecules on Nanometer and Micron Size Colloidal Particles, National Science Foundation
- Dai, Hai-Lung, Structure and Spectroscopy of Bared Interfaces in Organic Thin Film and Colloids, Air Force Office of Scientific Research
- Davis, Franklin, Synthesis of Amino Acids and Amino Phosphonic Acids, National Institutes of Health
- Jansen-Varnum, Susan, Nitromethane Impurity Analysis for the Gravity and Extreme Magnetism SMEX, National Aeronautics and Space Administration
- Jansen-Varnum, Susan, Science in the City, National Science Foundation
- Jansen-Varnum, Susan; Schiller, John J., TU-SMART, National Science Foundation
- Levis, Robert J., Romanov, Dmitri, Shaped Intense Laser Detection and Surveillance, (SHIELDS), Department of Energy, Army Research Office
- Levis, Robert J., Strong Field Chemistry, National Science Foundation
- Matsika, Spiridoula, Combining High Level Ab Initio Calculations with Laser Control of Molecular Dynamics, Department of Energy
A master toolmaker

“Most chirality takes place around carbons, with the four different groups attached to it creating a non-superposable tetrahedron,” Davis explains. “Nature usually creates one enantiomer to the exclusion of the other. Cholesterol, for example, has eight chiral centers at carbons, which means there are 256 possible pairs of enantiomers and 512 total possible configurations. But only one cholesterol enantiomer appears in nature.”

“Sulfinimines and N-sulfonyloxaziridines have two centers of chirality. Both the carbon and the nitrogen atom in the oxiziridine are chiral centers, as is the sulfur in the sulfinimine.” With two chiral centers apiece, the Davis reagents each have two pairs of enantiomers and four total possible configurations, and can therefore chirally attach either nitrogen or oxygen in two different orientations to different places on the molecules with which they react.

Creation of one of the four Davis reagent enantiomers is a simple and efficient process: the phrases “one-pot” and “high yield” are common in explanations of the procedure. The base substance is camphorsulfonic acid derived from the naturally enantiomerically pure substance camphor, which has been extracted from the tree *Cinnamomum camphora* for centuries. Both the right-handed version of camphorsulfonic acid, used to make right-handed Davis reagents, and the left-handed version, for left-handed Davis reagents, are commercially available, cost-effective and easy to make.

Davis continues to perfect the asymmetric synthesis tools that have won him so many accolades. Recently, with the support of the National Institutes of Health, he has been focusing on creating easy-to-make, efficient, multifunctional, enantiomerically pure building blocks for compounds including amino acids, the major components of all proteins. His lab recently used their sulfinimine and N-sulfonyloxaziridine building blocks to asymmetrically synthesize the anti-tumor compounds (+)-preussin, a substance that occurs naturally in the mold *Aspergillus ochraceus*, and (+)-agelastatin A, produced by the brown tube sponge, *Agelas conifer*.
Davis’ work with sulfinimines and N-sulfonyloxaziridines has led to many honors, including the American Chemical Society Philadelphia Section Award in 1982 and chairmanship of the American Chemical Society Division of Organic Chemistry in 1994. He has also received the Temple University Research Award in 2000, the prestigious Arthur C. Cope Scholar Award from the American Chemical Society in 1994. He has also received the Temple University Section Award in 1982 and chairmanhips of the American Chemical Society Division of Organic Chemistry and the American Chemical Society Division of Medicinal Chemistry.

The recognition is well-deserved, explains longtime colleague David Dalton, a fellow professor of chemistry at Temple. “In order for any work to be done on a project, one must have the right tools,” Dalton says. “Frank Davis is widely appreciated for being a master toolmaker. To get certain processes done, one uses Davis chemistry.”
Top: The row homes adjacent to the Baptist Temple (left) that housed the Mathematics Department until it moved into the new building on the same spot in 1976 (right). The new building was called the Computer Activities building because it was home to the university’s only computer, until it became Wachman Hall in 1995 in honor of former Temple president, Marvin Wachman.

Bottom: Professor Emil Grosswald, a world-renowned mathematician after whom the department’s annual Grosswald Lecture Series is named, taught and researched at Temple throughout the 1970s.
Mathematics is a discipline in touch with itself and its history. Ask a mathematician to explain what he or she does and you’ll quite possibly be whisked back through the centuries to meet the ancient originator of the problems and theorems that underpin their work.

A web site called the Mathematics Genealogy Project seeks to connect every mathematics doctoral recipient throughout history with every other mathematician. And a playful concept called the Erdös number is a measure of collaborative connection to Paul Erdös, one of the most prolific mathematicians of the 20th century. The lower the number, the more closely a mathematician is collaboratively connected to Erdös, whose Erdös number is, fittingly, zero.

So it should come as no surprise that Temple’s Department of Mathematics has a strong grasp on its identity.

“We have been a very close-knit department over the years,” says Associate Professor David Zitarelli, who earned his BA in 1963 and his MA in 1965 at Temple before becoming a faculty member in 1970.

Zitarelli was one of several current faculty members who joined the department between 1968 and 1972. Orin Chein, Raymond Coughlin, Bruce Conrad, Janos Galambos, David Hill, John Allen Paulos, K. Raghunandan, Louis Raymon and Daniel Reich were also all hired within a few years of 1970, and all still remain with the department. With so many eager young scholars, the department, then located where Wachman Hall currently stands in a series of row houses on Broad Street, was a lively place.

In 1976, Donald Newman, known for winning the Putnam intercollegiate problem-solving competition his freshman, sophomore and junior years, arrived as a professor, joining Emil Grosswald, who had come from University of Pennsylvania in 1968, giving the department two world-famous mathematicians. Both professors attracted top graduate students, including current president of the Mathematical Association of America David Bressoud, who came to Temple to work with Grosswald. Newman was also instrumental in recruiting another internationally recognized mathematician, Leon Ehrenpreis, who arrived in 1984. Current department chair Omar Hijab arrived the same year in a deep hiring wave that provided most of the current faculty.
Maureen Moore, second from left, in the Math Club in 1975. Moore worked for IBM for many years after she graduated.

Right: Zitarelli with May 2009 graduates Lauren Averbuch, Summer Hammoudeh and Elisheva Niedelman.

“At Temple at that time, nearly everyone was a commuter. Dr. Zitarelli wanted to create an on-campus community where students could feel comfortable.”

— Maureen Moore (BA ’75, Math), on the origins of the Math Club

Today, math at Temple is beginning another infusion of fresh talent, says Hijab, who became chair in 2004. “The department is really growing and renewing itself,” he says. “The next five to 10 years are going to be very exciting. The goal is to continue steady hiring of first rate people like new assistant professors David Futer and Benjamin Seibold, who was an instructor at MIT before he came here.”

“We have six research postdoctoral fellows this fall for the first time in years. Four of them are in the geometry/topology research group with Futer and Igor Rivin, and two of them are in the applied mathematics research group with Seibold and Daniel Szyld.”

The new faculty and postdoctoral fellows are a major boost to the department’s research activities, particularly the geometry/topology and applied mathematics groups. The departments’ aptitude in these two fields evolved from an emphasis on approximation theory and classical analysis as led by Grossman, Newman and Ehrenpreis.

Like math departments around the world, however, Temple math must balance the importance of research with other goals. “We have three missions,” says Hijab. “One is research, buttressed by the graduate program. There’s also teaching our undergraduates in support of the sciences and engineering, because math is used everywhere in those disciplines. The third mission is exposing the general student body to mathematics as it is used today, and that is mainly through our GenEd courses, where we have some very talented people teaching.”

The great teachers in the department make strong connections with students, even those outside their discipline. Zitarelli, Hill, Coughlin and Chein have won Temple University Great Teacher Awards, and Zitarelli also received a
Lindback Award for Distinguished Teaching. Paulos teaches a GenEd course called Mathematical Patterns that helps non-science majors relate math to everyday life through things like news stories and puzzles.

Zitarelli recounts that a former honors student majoring in sociology who he hadn’t seen in 25 years invited him to a class reunion in 2002. “I had no idea I’d influenced her,” Zitarelli says. “But I think the faculty being close in our department also translates with the students. I would say I’m still in touch with more than 100, and I know other members of the department stay in touch with many of their students too.”

As the new generation of faculty arrives, some professors for whom the Math Department was home for decades are moving on. Chein and Raymon, after nearly four decades spent in the company of their colleagues and students, are retiring after Spring 2009.

“Orin and Lou were instrumental in hiring the vast majority of my generation,” Hijab remembers. “We’re grateful for everything they’ve done for the department. They’ll be missed, but we wish them well in their next steps.”

From left: Zitarelli, Chein, Coughlin, Hill and Reich, all of whom have been with the Math Department for more than 35 years, in 2008.
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As assistant dean of Development and External Affairs, I have had the distinct privilege of getting to know many of you, the valued alumni who support our college. Many of you have shared that Temple helped shape your success and was there for you when you needed it the most.

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Love at First Site

The Spring 2009 issue of Temple Review included a feature titled “Love at First Site,” in which Owls reminisce about where their on-campus love blossomed. There are dozens more love stories that begin at Temple. This is just one of them.

As a student at Temple, Ellwood Kauffman (BA ’52, Math) met his future wife while a sophomore at Temple’s Cedarbrook Unit, a separate Temple facility that generally served the university’s freshman population. During a transportation strike, Ellwood coordinated Cedarbrook carpools. When Shirley M. Rosengarten (CLA ’53) walked in looking for a ride home, Ellwood quickly volunteered himself for the job. “I was smitten by her,” he says. “I saw her and said, ‘Wow, there’s my girl.’ And she didn’t quite feel that way yet, but eventually, she got there.”

They married 14 months after they met, in September 1950. One of a handful of married Temple undergraduates, the Kauffmans lived in an apartment at 1915 Park Ave., now part of Liacouras Walk on Main Campus. Ellwood’s job as the student host of Mitten Hall provided free dinners and financial support for the newlyweds.

Ellwood remembers spending their first New Year’s Eve as a married couple on Broad Street. “We had enough to go to the Uptown Theater,” Ellwood says, “which was called the ‘scratch house’ because it was so filthy. It was a few blocks north of Temple. It was a poor life, but a good life.”

After graduation, Ellwood began his 50-year career in the computing industry at Eckert-Mauchly Computer Corp., the company responsible for the first commercial computer, the UNIVAC (Universal Automatic Computer). And, according to Ellwood, Shirley studied under famed acting teacher Stella Adler in New York City. The two eventually settled in Princeton, N.J., and had four children.

Ellwood and Shirley were married for nearly 58 years at the time of Shirley’s passing in 2008. In the photo of her that appeared on the program for her memorial service, she wore a Temple sweatshirt.

Do you have a Temple story you’d like to share?
Call 215-204-8281 or e-mail alumni.cst@temple.edu and we’ll include your story in the next issue of Outlook!

Class Notes

1940s
Abraham Clearfield, PhD (BA ’48, MA ’51, Chem) received the American Chemical Society Northeast Region Award for Achievements in the Chemical Sciences for his contribution to chemical research. Dr. Clearfield has published more than 540 publications, has edited three books and holds 15 patents. His current research interests are structures of coordination compounds, layered compounds, phosphonic acids and phosphonates, crystallography and porous materials. He is currently a distinguished professor and associate dean of the College of Science at Texas A&M University.

1950s
David Kuhl, MD (BA ’51, Phys) recently received Japan’s top science and technology award, the Japan Prize, which was presented by the emperor. David was recognized in the field of technological integration of medical science and engineering.

1960s
Carol Segal Bredt (BA ’60, Phys) was director of software engineering at MICOM Systems before the company was absorbed by Nortel, its parent company, in 2001. She had also been a computer programmer at the Burroughs Corporation.

Romona Cohen Flitter (BA ’60, Phys) retired from teaching mathematics and computer science at George Washington Carver High School of Engineering and Science in 1999. From 1960 to 1968 she was a computer scientist at the General Electric Missile and Space Sciences Center.

Robert Rosenfeld (BA ’60, Math) recently retired from the faculty of Nassau Community College in New York after 30 years, during which time he also co-authored seven textbooks in mathematics and statistics. He is currently co-director for statistics and school-based research at the Vermont Mathematics Initiative.

Ronald Rosenthal, MD (BA ’60, Bio) was chief of the division of urology at Abington Memorial Hospital from 1983 to 2005 and clinical professor of urology at Temple’s School of Medicine from 1985 until his retirement in 2007. He was president of the Philadelphia Urologic Society in 1986, president of the medical staff at Abington Memorial in 1989, and an active member of the Abington Urologic Specialists from 1971 to 2007. He and his wife Barbara have four children and six grandchildren.

1980s
David Horvath (BA ’85, CIS) and his wife, Mary Geno-Horvath, received the Youth Aid Panelist of the Year Award from the Center for Resolutions located in Media, Pa. In addition to serving as secretary of the panel, David is active within the organization providing IT support. He is also active in the ICCP Certification Council and occasionally teaches courses for the Pa. Game Commission, Brookhaven Borough Advanced Citizens Police Academy, and part-time at the college/university level. Earlier this year, he received his FAA Private Pilot (airplane, single engine, land based) license, which took him more than two years to achieve. He has also passed both the technician and general levels of the FCC Amateur Radio License exams. David and his wife recently celebrated their 20th wedding anniversary with a trip to Egypt, England and Wales.
Betty Gottlieb, PhD (BA ’47, Bio)

Betty Gottlieb’s passion for science began in high school. As a young girl growing up in South Philadelphia in the 1940s, science wasn’t a typical field for a woman of her age. “My high school chemistry teacher Mrs. Booth was the first person who sparked my interest in science,” says Gottlieb, “after that, pursuing a science degree at Temple just seemed like a wise choice.”

Arriving at Temple at age 16, Gottlieb explored the many opportunities that were available in Philadelphia at the time. While a student at Temple, David did his residency in neurosurgery at Temple and continued on to a fellowship in pediatric neurosurgery at Albert Einstein College of Medicine, N.Y. In addition to his role as professor and chair, he is also the residency program director in the neurosurgery department at UT Health Science Center.

Ellen Ross (BA ’85, Math) is the current vice president of systems at ACE group, one of the world’s leading global commercial property and casualty insurance and reinsurance organizations. ACE has operations in more than 50 countries and conducts business with clients from more than 140 countries.

1990s
Paul C. Pasles, PhD (MA ’94, PhD ’97, Math) has published Benjamin Franklin’s Numbers, a historically themed book aimed at a general audience. He is an associate professor of mathematical sciences at Villanova University.

2000s
Christina Tucker, DPT (BA ’01, Bio) was awarded APTA board certification as an orthopaedic clinical specialist in physical therapy. This certification acknowledges advanced knowledge and skills in the area of orthopaedic physical therapy. She is currently practicing as the site coordinator of Mercy Suburban Hospital Rehabilitation and Sports Medicine in Lansdale, Pa.

Russell Hendershot, DO (BA ’88, Bio) has been named chair of family medicine at the Edward Via Virginia College of Osteopathic Medicine in Blacksburg, Va. He lives with his wife Jill Bloom, CHP ’91, and three children: Leah, Erin and Luke.

David Jimenez, MD (BA ’85, Bio) is currently professor and chair of the neurosurgery department at The University of Texas Health Science Center at San Antonio. After attending Temple, David did his residency in neurosurgery at Temple and continued on to a fellowship in pediatric neurosurgery at Albert Einstein College of Medicine, N.Y. In addition to his role as professor and chair, he is also the residency program director in the neurosurgery department at UT Health Science Center.

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Temple Alumni Celebrate at Annual Founder’s Celebration

Temple University welcomed alumni and friends for a weekend of lectures, events and tours to celebrate 125 years of Access to Excellence and honor some of the university’s most distinguished graduates. Alumni Weekend showcased the talent and diversity of the Temple community with student film festivals, faculty lectures, tours of campus and open houses.

The annual 25- and 50-year reunions were held at the Founder’s Celebration and honored classmates from 1959 and 1984 with special class receptions, reunion medallions and a landmark tour of campus followed by a talk from distinguished historian and author James Hilty, discussing the highlights of the university’s rich history.

CST Class of ’84 graduate Sina Adibi was just one of the many alumni who came back to Temple to celebrate the 25-year class reunion. “It was great to reconnect with many of my former classmates and friends to share our memories of Temple. After seeing the great developments at Temple’s Main Campus and the most impressive faculty and technology facilities that CST continues to provide its students, I was reassured that it will continue to produce very qualified and competent graduates who will be successful in the workforce.”

The College of Science and Technology was proud to honor the achievements of Certificate of Honor Awardee Barry Arkles, PhD (BA ’70, PhD ’76 Chem) at the Temple University Founder’s Celebration. Arkles earned his BS and PhD in chemistry from Temple and was honored for his groundbreaking achievements in chemistry.

Barry Arkles is the president and founder of Gelest, Inc., an industrial inorganic chemical manufacturer with an international client base. The company produces the most comprehensive selection of silane and silicone materials in the world. Prior to the founding of Gelest Inc., Arkles was a co-founder of Petrarch Systems, Inc., the predecessor company of Sivento America. He has more than 30 years of experience as an organometallic chemist and materials scientist and has published nearly 200 technical articles and been awarded more than 50 patents. His research has influenced the development of oxygen-permeable contact lenses, special implantable medical devices such as aortic assist devices, the environmentally safe, low hazard production of fiberglass sizings, and most recently, surface treatments that increase the functionality of microelectronics, nano-featured devices and quantum dots. Arkles is a member of the American Chemical Society, the Materials Research Society, the Society of Biomaterials, the Society of Plastics Engineers, and Sigma Xi. He was a co-recipient of the R&D 100 Award for one of the top 100 technical achievements of 2001, received the Diamond Achievement Award in Natural Sciences from Temple in 1993 for contributions to the science and technology of chemistry, and was awarded the American Chemical Society Leo Friend Award for contributions to Industrial Chemistry in 1983.

Arkles was joined at the Founder’s Celebration by his family and former Temple professors including his advisor, William Brinigar. He has maintained an active involvement with Temple and currently lends his experience and knowledge to the university through his service on the College of Science and Technology Board of Visitors. He and his wife Janine live in Dresher, Pa.

Sina Adibi (BA ’84, CIS) with wife Bernadette

Certificate of Honor Awardee Barry Arkles, center, with Dean Hai-Lung Dai, left, and President of the CST Alumni Association Paul Curcillo, MD (BA ’84, Bio), right.
Natarajan Ranganathan, PhD (PhD ’76, Chem)

“I believe entrepreneurialism is not a goal, it’s a destination, it’s a journey” says Natarajan Ranganathan, interim CEO and senior vice president of research and development at Kibow Biotech, Inc, a biotechnology company in Newtown Square, Pa. Ranganathan has had quite a journey, working for the past 28 years to build his company Kibow, which is his third venture. That venture is built on developing and perfecting a probiotic to improve the health of chronic kidney patients.

Born in India, Ranganathan earned a dual master’s degree in biochemistry and organic chemistry from the University of Poona, India, before coming to Temple in 1971 to pursue his PhD in bioorganic chemistry. At Temple, he was able to script his own degree by taking a unique blend of organic chemistry and biochemistry courses. It was also at Temple that he realized he wanted to eventually own his own business. “There were very few entrepreneurs in chemistry at the time. Most of the students weren’t interested in going into business.”

After continuing on to his postdoctoral work at University of Pennsylvania, Ranganathan worked at Hahnemann Medical College and Johns Hopkins Medical Institutions. It was then that he began his career as an entrepreneur, establishing a specialized chemical firm for the synthesis of chemical precursors for radio labeling and concurrent use in nuclear medicine. This was followed by an independent consultant career, which lasted almost 10 years in the American and Indian chemical-medical-related businesses. This consulting work led him to identify methodologies for removal of uremic toxins for kidney failure applications. Through extensive research, Ranganathan, along with his friend and colleague Jack Dickstein, founded Kibow Biotech, Inc. on the concept of utilizing a combination of three different microbes that have the ability to remove toxins from the colon, therefore improving the function of the kidney.

Much like the benefits you can receive from the probiotic bacteria in yogurt in some of today’s products, Kibow Biotics® is a patented, proprietary product that uses these carefully screened bacterial microbes to metabolize nitrogenous waste that has diffused from the bloodstream into the bowel, reducing the strain on your kidneys. For those patients who suffer from kidney failure, this new development can provide much needed relief from processes such as hemodialysis or peritoneal dialysis.

Now, more than 12 years from the birth of Kibow Biotech, Ranganathan has accomplished what he set out to do so many years ago. “I believe success is a matter of one’s passion, belief and knowledge” says Ranganathan. “The knowledge I gained while at Temple, through the courses I was allowed to take and the support of my professors, allowed me to begin to build the academic foundation of my success.”

Currently a member of the College of Science and Technology’s Board of Visitors, Ranganathan feels it’s important to give back in various ways to all the academic institutions that have helped him and exposed him to science and scientific discovery. “I hope I’ll be able to help out others the way my Temple professors have helped me.”
The TUteach program, which provides science and math majors with extensive practice teaching experience and the latest pedagogical tools to train the next generation of superlative teachers, is in great shape as it begins its second year! The program currently has 54 Mentor Teachers at 14 Philadelphia School District schools, many of whom are reporting that the TUteach students are highly successful in their practice teaching assignments.

**TUteach** BY THE NUMBERS

<table>
<thead>
<tr>
<th>COURSE ENROLLMENT*</th>
<th>AVERAGE SAT MATH SCORES**</th>
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<tr>
<td>STEP 1 – 26</td>
<td>TUteach – 582</td>
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<tr>
<td>STEP 2 – 22</td>
<td>TEMPLE – 539</td>
</tr>
<tr>
<td>Knowing &amp; Learning (COURSE 3) – 23</td>
<td>NATIONAL AVERAGE – 515</td>
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* 16 students are currently enrolled in both Step 2 (the second course in the TUteach curriculum) and Knowing and Learning (the third course), for a total of 55 TUteach students.

** Temple scores are from 2006, national scores are from 2008.
“It’s a whole new way of approaching the teaching and training of teachers… I wanted to help get the program started.”

– Kenneth Brennen, PhD (BA ’62, MA ’66, Phys), established the Morna Brennen Memorial Scholarship to benefit TUteach students

TUteach
Give the Gift of Knowledge

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

Partner with us

The National Math and Science Initiative will match all gifts up to a total of $1 million. Help our students fix the nation’s math and science education deficit with your gift today.

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

TUteach is a partnership between the College of Science and Technology and the College of Education.
Become part of the equation

Partner with us to support the future leaders of science and technology by making a gift to the Dean’s Scholarship Fund.

Donors to the Fund will receive a report on the 2010 scholarship recipients.

To make a gift to the Fund, call Brooke Walker at 215-204-2888.