

Chemical & Biomolecular Engineering News

2013

Save the Date

Be sure to join us for our *Centennial Reunion*

September 19-21, 2014 *See page 4.*



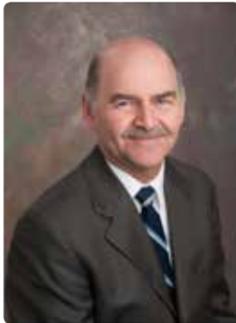
Jon Olson steps down as Alumni Coordinator.

See page 22.

The department welcomes new faculty member, **Bingjun Xu**. *See page 8.*



MESSAGE FROM THE CHAIR



This newest issue of our Alumni Newsletter marks another year in the life of our department and its people. It also marks the completion of my first year as chair. A true pleasure of the office is the opportunity to engage with alumni. People are our most important product and our alumni successes are a great source of pride to us. We congratulate the new graduates

who joined our list of distinguished alumni last year – please keep in touch and share your personal and career updates with us, they enrich of our magazine each year (see p. 29).

For more than a decade **JON OLSON** has served as the department's Alumni Coordinator and the main point of contact for many alumni. With an encyclopedic knowledge of many topics, but no regard for the word "retirement," he undertook the responsibility with the tenacity, interest and initiative that characterized his other roles in the department and the university. He previously was the linchpin in our undergraduate advising structure and was closely acquainted with the department's undergraduate students. We are enormously grateful for his service and wish him the very best on the road ahead.

We look forward to continued contact with alumni as we anticipate the centennial of chemical engineering at UD in 2014. The centerpiece of our celebrations will be a reunion weekend September 19-21, 2014, in Newark. We look forward to welcoming you back for these festivities, so save the date and encourage your classmates to do so as well! Look for more details in early 2014. Several local events are planned for cities around the US where we have large concentrations of alumni. If you are unable to attend the central reunion weekend in Newark, but would still like to participate, please let us celebrate your accomplishments by submitting a career summary at www.che.udel.edu/100/alumni_update.html.

The department's educational and research activities remain robust. Our undergraduate enrollment continues to grow and for the first time ever, our first-year graduate class is majority female – a milestone that demonstrates that diversity among students and faculty remains an important priority. Undergraduate and graduate student leadership has been invaluable in maintaining and enhancing our

programs. I have particularly enjoyed interacting with student leaders in the AIChE student chapter and the Colburn Club.

Among the faculty, it is a special pleasure to welcome **BINGJUN XU** as an assistant professor. He will help the department maintain its longstanding leadership in catalysis and energy research. We also congratulate **TUNDE OGUNNAIKE** on his appointment to a five-year term as Dean of the College of Engineering, and thank him for his leadership.

In 1954 UD President John A. Perkins congratulated Prof. **JACK GERSTER** on receiving an award, saying, "This sort of thing is becoming a happy habit with you people in Chemical Engineering." Today, this newsletter notes numerous awards to faculty, graduate and undergraduate students and alumni. Congratulations to all!

Innovations on campus take several forms. A visible presence is the Interdisciplinary Science and Engineering (ISE) Building, our new neighbor across the Academy Street/Lovett Avenue intersection. Several of our faculty and research groups – **MIKE KLEIN**, **DION VLACHOS** and **YUSHAN YAN** – and key core instrumentation facilities will be housed there, and we are grateful to our generous alumni, with **BOB GORE** in the vanguard, whose gifts made the building possible. In another area, we are seeking approval to launch a Master of Engineering degree in Particle Technology in fall 2014, a topic of enormous industrial significance that is appreciably underrepresented in academia.

As our first century draws to a close, the Delaware tradition of excellence remains a central focus of our mission in all our educational and scholarly activities. We thank you for your continued interest in the department and your support – both financial and in-kind.

Our principal goal during our centennial year is to touch base with as many alumni as possible. We encourage you to consider our Centennial Campaign for your 2014 gifts and an opportunity to map out major gifts for alumni seeking to endow specific programs or activities. Most especially, we look forward to seeing you at the reunion in September.

Best wishes,

Bramie Lenhoff

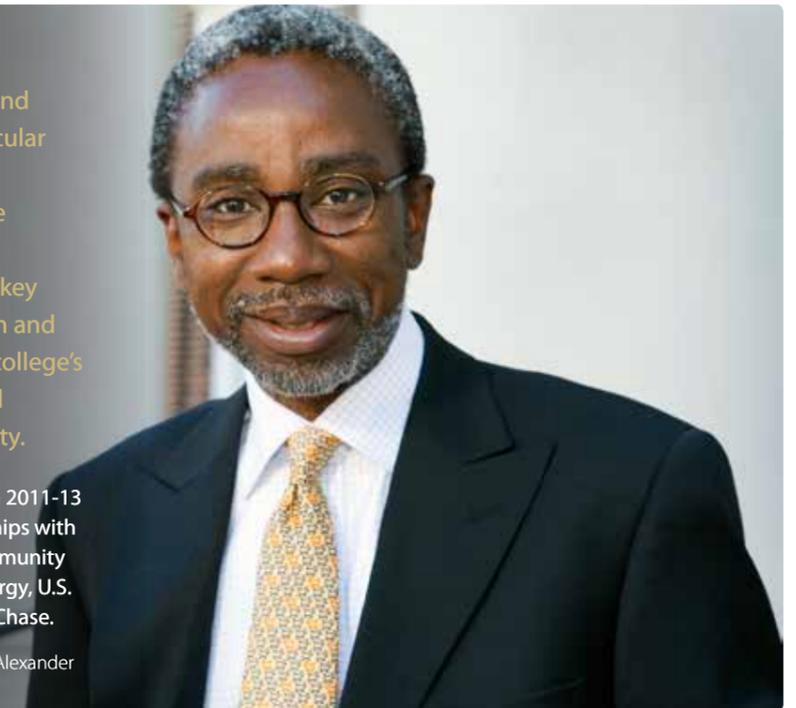
Allan P. Colburn Professor and Chair

New Leadership

BABATUNDE OGUNNAIKE, William L. Friend Chaired Professor of Chemical and Biomolecular Engineering, was officially named dean of the College of Engineering. His vision for the college includes a renewed commitment to excellence through strategic focus on three key engineering enterprises: research, education and entrepreneurship. He plans to increase the college's global reach, financial stability, diversity and engagement with alumni and the community.

Ogunnaike served the college as interim dean from 2011-13 and, during that time, worked to develop partnerships with other academic institutions and to strengthen community partnerships with such organizations as Bloom Energy, U.S. Army Research Laboratory, DuPont and JPMorgan Chase.

Adapted from article by Karen B. Roberts | Photo by Ambre Alexander



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Centennial Celebration

Save the Date

Be sure to join us for our *Centennial Reunion*

September 19-21, 2014



In 1914 the University of Delaware launched a new program in chemical engineering; Eugene Reynolds Manning was the first graduate. We will be celebrating the centennial of chemical engineering at Delaware throughout 2014, with the main activity being a Centennial Reunion to be held in Newark over the weekend of September 19-21, 2014. The weekend will

include social activities, historical reminiscences, a centennial banquet, and most importantly, an opportunity to see friends and celebrate the successes of the department and our alumni.

Please register at www.che.udel.edu/100/reunion to add your name to the mailing list for updates regarding the reunion. We especially encourage you to entrain your classmates and fellow alumni as well!

Centennial campaign The support of our alumni has always been critical to our successes, whether in the form of bricks and mortar, professorships, fellowship programs, scholarships or other programs. We enter our second century seeking to maintain and strengthen our programs through changes and innovations, and look forward to continued support via the Centennial Campaign. Three of our distinguished alumni are Honorary Co-Chairs of the Campaign; their agreement to serve in this role adds to their long-standing generosity, which has taken many forms. This includes major gifts to the department and the university as well as their time and wisdom as members of the department's Advisory Council. The remarkable careers and records of engagement of these three alumni are reviewed below. We are grateful for their generosity and their leadership.

THOMAS L. GUTSHALL, B1960, is co-founder and former chairman of Cepheid, a leading molecular diagnostics company. The company's easy-to-use molecular systems and tests are used in hospitals worldwide and by the U.S. Postal Service. In 2010, the company unveiled a test to rapidly diagnose tuberculosis that is endorsed by the World Health Organization. He remains a member of the company's board of directors.

Gutshall has more than 35 years of experience in specialty chemicals, pharmaceuticals and diagnostics. He served as a Consultant to CV Therapeutics Inc. from 1996 to 2002 and served as its president and chief operating officer from 1995 to 1996. Prior to that, Gutshall served in several executive level positions with Syntex Corporation.

A longstanding member of the Department of Chemical and Biomolecular Engineering Advisory Council, he and his wife, Kipp, are actively involved with the University and the department. In 2010, Gutshall co-chaired his 50th class reunion giving program, and in 2011, the couple endowed the University's first "career development" faculty chair to reward exceptional young faculty talent at the assistant or associate professor level. In 2012, Thomas H. Epps, III became the first professor named to the Thomas and Kipp Gutshall Career Development Chair.



ROBERT W. "BOB" GORE, B1959, was a UD sophomore studying chemical engineering when he first conceived the idea for an innovative multiconductor wiring strip called the MULTI-TET™ cable. Gore's invention became the first patent for W. L. Gore & Associates, the company founded by his parents in their Newark, Del. basement.

Gore worked alongside his parents to build W. L. Gore into a global business. In 1969, NASA utilized W. L. Gore-manufactured cables on the Apollo 11 lunar landing. That same year, Gore discovered that stretching PTFE expanded the polymer into a strong, highly porous, versatile material, a discovery that resulted in GORE-TEX® fabrics, GLIDE® Floss and other expanded PTFE products. Gore served as president of the company from 1976-2000, and is currently Chairman of the Board of Directors.

A legend in his field, Gore has been a National Academy of Engineering member since 1995, a recipient of the Chemists' Club Winthrop-Sears Medal from the Chemical Heritage Foundation and a recipient of the Society of Chemical Industry's Perkin Medal. He was inducted into the National Inventors Hall of Fame in 2006.

At UD, Gore sat on the Board of Trustees from 1992-2010, serving as vice chairman from 1999-2007 and currently serves on the department's Advisory Council. He received an honorary Doctor of Science degree from his alma mater in 2010. His philanthropic support can be seen throughout the UD campus. In the College of Engineering specifically, Gore has generously established a graduate fellowship, several named professorships, and supported the renovations to Colburn Lab. Most recently, he donated \$10 million to benefit the Interdisciplinary Science and Engineering Lab. The facility's research wing is named the "Bob and Jane Gore Research Laboratories" in his honor.

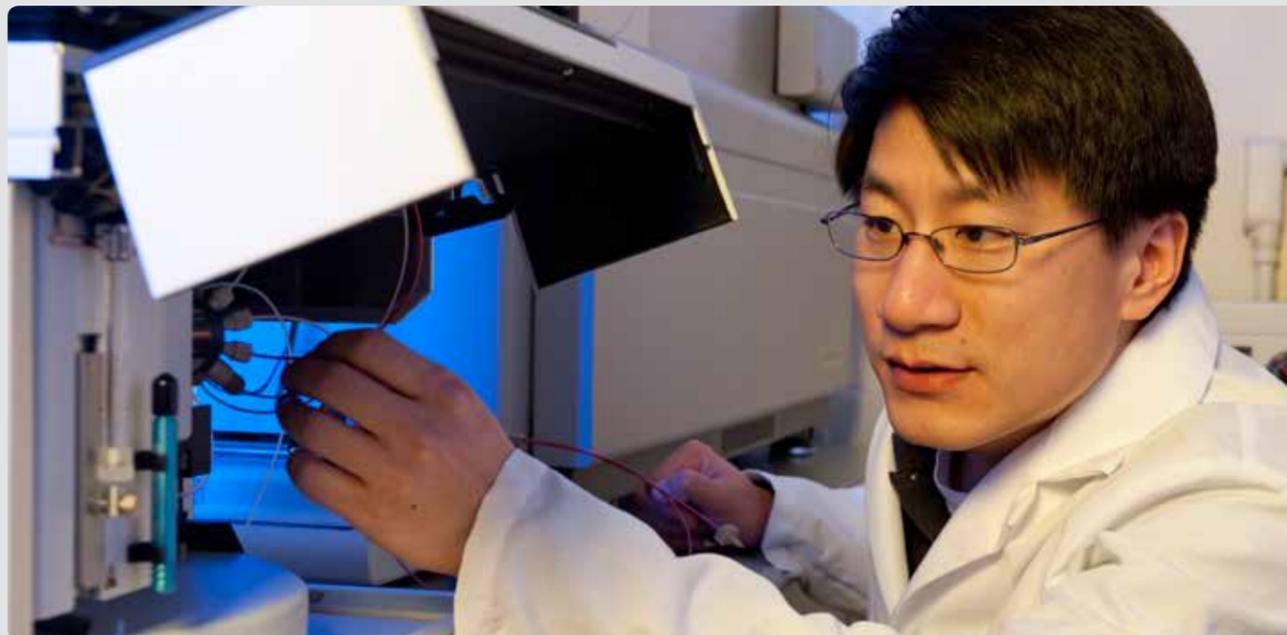
MORTON COLLINS, B1958, is a General Partner of Battelle Ventures and Innovation Valley Partners. He has spent more than four decades investing in the fields of life sciences, electronic materials, communications and software.

In 1968, Collins founded Data Science Ventures (DSV), a pioneering venture-capital firm that specialized in early-stage financing of high-technology companies. For 30 years, Collins was a managing partner in four DSV partnerships. In 1997, he became a special limited partner of Cardinal Partners, the successor to the DSV series of partnerships.

For his visionary leadership, Collins was chosen to chair President Ronald Reagan's Task Force on Innovation and Entrepreneurship and to serve as technology policy advisor to President George H. W. Bush. Collins is also a member of the Research Roundtable of the National Academy of Sciences and a former president, director and chairman of the National Venture Capital Association.

Collins has generously given both his time and money to his alma mater over the years. For nearly 30 years, he has been a member of Department of Chemical and Biomolecular Engineering Advisory Council, serving as the council's chairperson from 1984 – 2010. He also serves as a member of the President's Leadership Council. Collins has pledged \$10 million for first-year graduate student fellowships in the College of Engineering and to support endeavors like the Class of 1958 Scholarship and the renovations to Colburn Lab. In recognition of his many achievements, Collins was awarded the 1989 University of Delaware Medal of Distinction.





Lee wins AIChE's Professional Progress Award

In 1948, Department of Chemical and Biomolecular Engineering patriarch Allan P. Colburn received the first Professional Progress Award from the American Institute of Chemical Engineers (AIChE).

Now, on the 75th anniversary of Colburn joining the University of Delaware faculty, **KELVIN H. LEE**, Gore Professor of Chemical and Biomolecular Engineering and director of the Delaware Biotechnology Institute (DBI), has been selected as AIChE's 2013 Professional Progress Award recipient.

The award is given annually to an individual, 45 years of age or younger, who has made outstanding contributions to the field of chemical engineering.

"The Professional Progress Award is one of the most competitive awards within the AIChE, and our department is fortunate to have outstanding faculty, such as Kelvin, continuing our tradition of excellence," said Abraham Lenhoff, Allan P. Colburn Professor of Chemical Engineering and department chair.

Lee's recent research focus has been on the diagnosis and treatment of Alzheimer's disease. His most notable discovery is a new diagnostic test that is able to diagnose Alzheimer's in living patients, something that previously could only be accomplished post-mortem.

He also helps organize an international, academic-industry-government effort in sequencing the genome of the cell type used to manufacture protein therapeutics, a \$60 billion per year industry.

Lee's career honors include Cornell's Menschel Award for Distinguished Scholarship (2004) and being named a fellow of the American Institute of Medical and Biological Engineers (2010) and the American Association for the Advancement of Science (2011).

He has also been instrumental in facilitating the efforts of DBI, where he has served as director since 2008. Lenhoff commented that while in this role, "Kelvin has brought excellent strategic judgment and leadership to the Delaware Biotechnology Institute, multiple professional organizations and the broader life sciences community in Delaware."

Other UD chemical engineers who have won the Professional Progress Award are Ken Bischoff, Morton Denn, Jack Gerster, Robert Pigford and Stanley Sandler.

Article by Gregory Holt | Photo by Evan Krape



This past spring, assistant professor **APRIL M. KLOXIN** won two of the most prestigious awards available to researchers in the early stages of their careers: a four year, \$500,000 National Science Foundation **FACULTY EARLY CAREER DEVELOPMENT AWARD**,

which supports integrated research and educational projects by outstanding teacher-scholars; and a **PEW SCHOLAR** in the Biomedical Sciences award, for which she will receive another \$240,000 in research funding from the Pew Charitable Trusts. Kloxin will use the funding to study the extracellular signals that regulate tissue stability, disease and repair in the body; and to investigate the progression of fibrosis, a condition that occurs when excess connective tissue builds up in the body, resulting in increased tissue stiffness, and ultimately, loss of function. In particular, she will explore the biology of lung fibrosis, a debilitating and sometimes fatal condition. She is the second UD professor to be named Pew Scholar.

Article by Karen Roberts | Photo by Evan Krape



MACIEK R. ANTONIEWICZ, DuPont Young Professor, received the 2012 Gerard J. Mangone Young Scholar Award from UD's Francis Alison Society. The University's highest faculty honor, this award is given annually to promising and accomplished young faculty selected by fellow award recipients.

Internationally recognized as an emerging leader in the area of metabolic engineering and biological systems, Antoniewicz was promoted to associate professor with tenure in May.

Article by Karen Roberts | Photo by Duane Perry



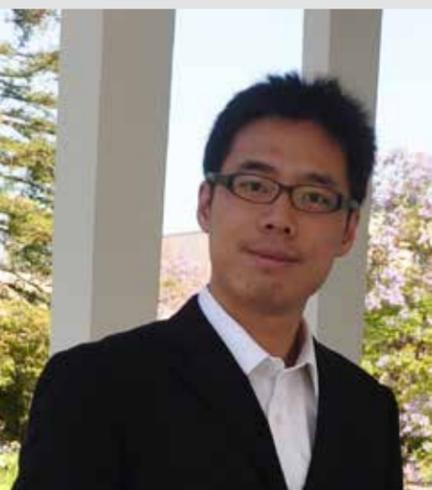
PRASAD DHURJATI, professor, is the appointed Secretary of the Faculty Senate for the 2013-14 academic year. The University Faculty Senate coordinates faculty governance and exercises faculty responsibility for the education and care of students.



THOMAS H. EPPS, III,

Thomas and Kipp Gutshall Chair of Chemical and Biomolecular Engineering, was one of six Martin Luther King, Jr., visiting professors/scholars selected last fall by the Massachusetts Institute of Technology (MIT). While at MIT, he conducted collaborative research with Timothy Swager, John D. MacArthur Professor of Chemistry on controlled nanoscale assembly processes for organic electronic applications. Epps earned both his bachelor's and master's degrees in chemical engineering from MIT.

Article by Jillian Allen | Photo by Ambre Alexander



New hire

We are delighted to welcome new faculty member **BINGJUN XU** to the department! Bingjun's primary research focus is to develop efficient surface-mediated processes for energy conversion and heterogeneous catalysis applications via a combination of mechanistic studies and materials design. He therefore adds to our already considerable expertise in catalysis and energy areas, and is associated with the Center for Catalytic Science and Technology. Bingjun received his bachelors and masters degrees in Chemistry from Fudan University in Shanghai and his PhD in Physical Chemistry from Harvard, working with Cynthia Friend. He joined the department in mid-2013 after a two-year postdoc with Mark Davis at Caltech. Welcome Bingjun!

Furst recognized

ERIC M. FURST, professor and director of the Center for Molecular & Engineering Thermodynamics, was selected for UD's 2013 Excellence in Advising and Mentoring Award. Recipients each receive \$2,500 and are honored with an inscribed brick in Mentors' Circle.

The advisor of more than 30 undergraduate research students says he was attracted to UD for its unparalleled tradition of mentorship. Having benefited from this tradition in his own professional development, he calls it a tremendous privilege to mentor future chemical engineers. He acknowledges that mentoring requires time and energy, but believes it is the most critical element of a student's education, and an investment that returns dividends far into the future to support our shared mission of education and research.

"Working closely with these exceptional students, and watching them develop their skills as independent researchers, is its own reward," says Furst. "What impresses me now is the prestige they continue to return to the department and university after they pass out of Colburn Lab's doors to rise in their own careers."

For his research on the physics and chemistry underlying the behavior of colloidal, polymeric, biomolecular and other "soft" materials, Furst was also selected for a 2013 Soft Matter Lectureship, an award that honors younger scientists making significant contributions in the field.

Article by Artika Casini | Photo by Kathy F. Atkinson



Associate professor **MILLICENT O. SULLIVAN** was among 23 young investigators nationwide to present at the 2013 Georgia Tech Frontiers in Bioengineering Workshop. Held in February, the workshop brought together the world's leading bioengineers to discuss cutting-edge research and identify critical long-term challenges

in bioimaging, biomaterials and cellular and molecular bioengineering. Sullivan's research addresses challenges in how medicines, including nucleic acid-based therapies and traditional small molecule drugs, reach and enter malfunctioning cells and tissues. She was promoted to associate professor with tenure in May.

RICHARD WOOL, professor and director of UD's Affordable Composites from Renewable Sources (ACRES) program, delivered keynote addresses this year at the American Chemical Society's Green Chemistry and Engineering Conference near Washington, D.C.; the 12th International Conference on Frontiers of Polymers and Advanced Materials in New Zealand; and the EcoChem International Conference in Basel, Switzerland. Locally, he was the inaugural speaker at Delaware State University's 2013 Sustainable Chemistry Seminar Series, and he captivated Newark, Del., Girl Scouts with his description of how chicken feathers can help clean up oil spills as part of UD's K-12 Engineering Outreach Family Friday series.

Article by Sarah E. Meadows | Photo by Kathy F. Atkinson



WILFRED CHEN, Gore Professor of Chemical and Biomolecular Engineering, received the 2012 Biotechnology Progress Award for Excellence in Biological Engineering Publication at the AIChE annual meeting in Pittsburgh last fall. He was selected for his foundational contributions to biomolecular and protein engineering,

particularly in the areas of bio-sensing and biofuel production.

"I am pleased and honored to receive this award as it recognizes not only my work, but the hard work of my many students, post-docs and collaborators," said Chen, who will have a review paper published in the AIChE publication Biotechnology Progress as part of the award.

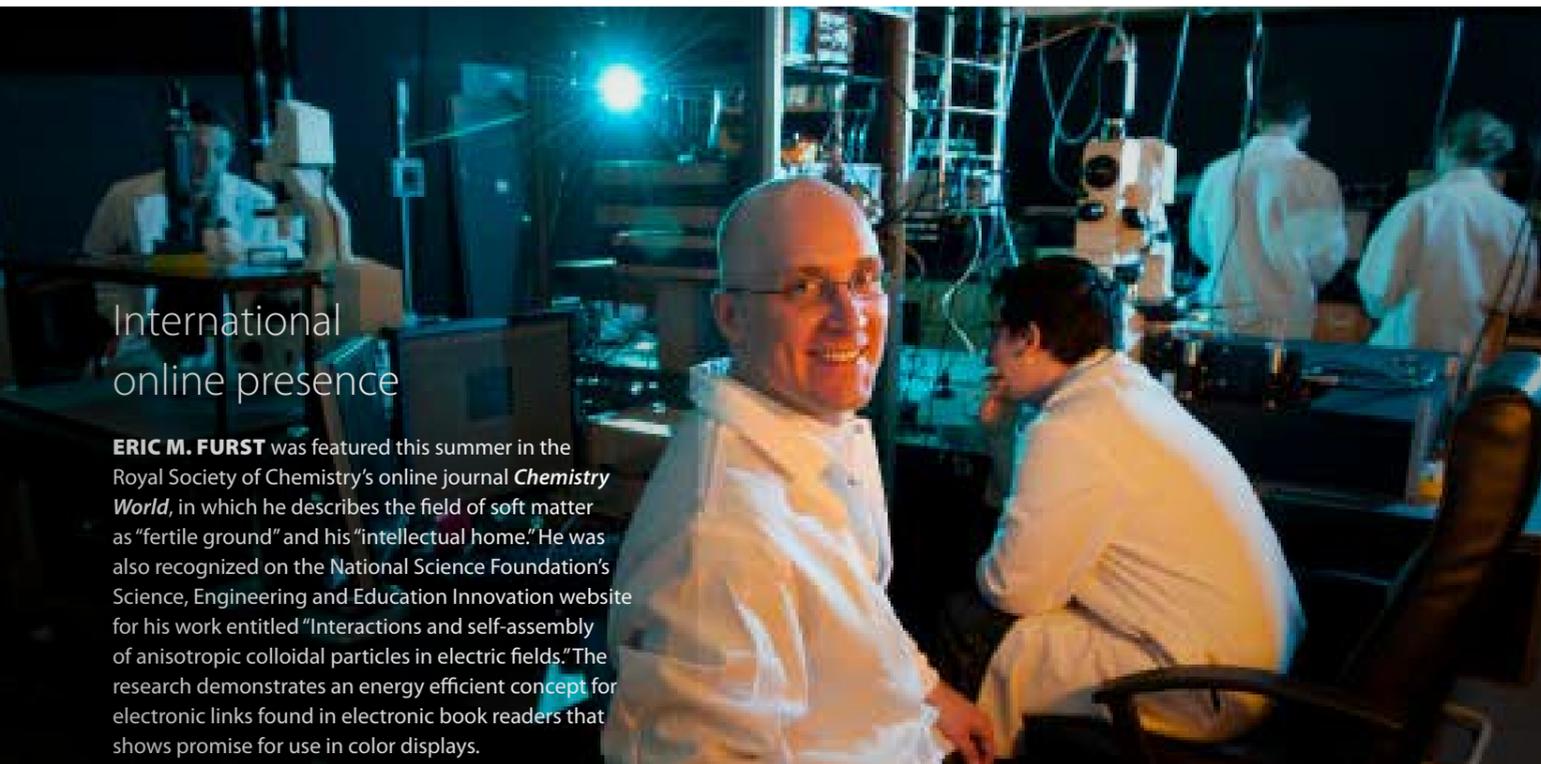
A fellow of the American Institute for Medical and Biological Engineering, Chen's research centers on developing biomolecular tools to address key global problems of viral infection, disease pathogenesis, biofuel production and separation of protein pharmaceuticals.



HENRY C. "HANK" FOLEY, who served on UD's chemical engineering faculty for 14 years, has been named executive vice president for academic affairs for the University of Missouri System.

Prior to joining University of Missouri, he served as vice president for research and dean of the graduate school at Penn State.

Photo by Penn State News



International online presence

ERIC M. FURST was featured this summer in the Royal Society of Chemistry's online journal *Chemistry World*, in which he describes the field of soft matter as "fertile ground" and his "intellectual home." He was also recognized on the National Science Foundation's Science, Engineering and Education Innovation website for his work entitled "Interactions and self-assembly of anisotropic colloidal particles in electric fields." The research demonstrates an energy efficient concept for electronic links found in electronic book readers that shows promise for use in color displays.

Smart fluids milestones featured in PNAS

Furst also featured by *Chemistry World* and NSF's SEE Innovation

ERIC M. FURST, professor, and postdoctoral researchers **JAMES SWAN** and **PAULA VASQUEZ**, along with colleagues at NASA, the European Space Agency, Zin Technologies and Lehigh University, reported milestones in using nanoparticles as building blocks in functional materials in a Sept. 2012 article in the Proceedings of the *National Academies of Science* online edition.

The article is entitled "Multi-scale kinetics of a field-directed colloidal phase transition." It details the research team's exploration of colloids - microscopic

particles that are mere hundredths the diameter of a human hair - to better understand how nano-"building blocks" can be directed to "self-assemble" into specific structures.

The team studied paramagnetic colloids while periodically applying an external magnetic field at different intervals. With just the right frequency and field strength, the team was able to watch the particles transition from a random, solid like material into highly organized crystalline structures or lattices.

According to Furst, no one before has ever witnessed this guided "phase separation" of particles.

"This development is exciting because it provides insight into how researchers can build organized structures, crystals of particles, using directing fields and it may prompt new discoveries into how we can get materials to organize themselves," he said.

The work could potentially prove important in manufacturing, where the ability to pre-program and direct the self-assembly of functional materials is highly desired.

"This is the first time we've presented the relationship between an initially disordered structure and a highly organized one and at least one of the paths between the two," said Furst. "We're excited because we believe the concept of directed self-assembly will enable a scalable form of nanotechnology."

For his research on the physics and chemistry underlying the behavior of colloidal, polymeric, biomolecular and other "soft" materials, Furst was also selected for a 2013 Soft Matter Lectureship, an award that honors younger scientists making significant contributions in the field.

Article by Karen B. Roberts | Photo by Kathy F. Atkinson

Engineering and autism



Professor **PRASAD S. DHURJATI** has been investigating autism spectrum disorders, neurodevelopmental disorders characterized by cognitive, behavioral and social impairments.

Autism, he said, has been cited as being linked to gastrointestinal symptoms and is thought to be caused by a combination of genetic predisposition and other environmental factors.

After analyzing the available literature, Dhurjati, whose background includes systems engineering, biotechnology and artificial intelligence, realized that researchers often studied the digestive bacteria and other causes of autism separately. He wondered if a systems biology approach—focusing on how the parts connect to the whole system—could be used to model the connectivity of key contributors to the development of autism spectrum disorders.

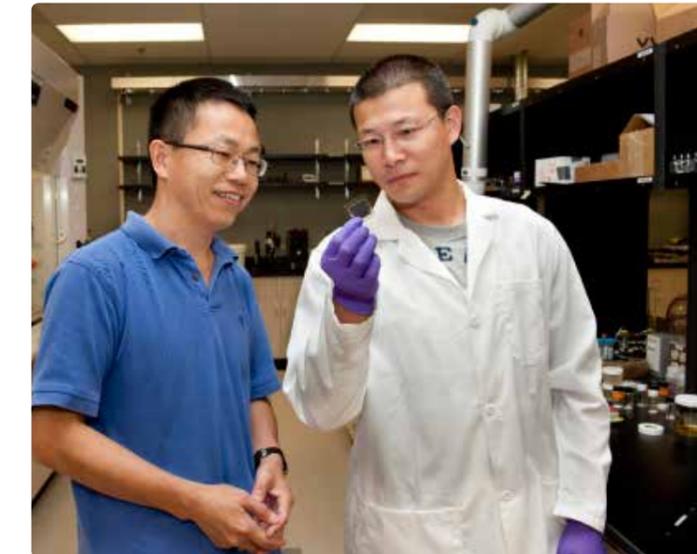
"Chemical engineers build reactors to convert chemical molecules into useful products, but when you think about it, one of the best reactors is what I call the human body's gut reactor — the digestive system," Dhurjati said. "It contains thousands of bacterial microbes and cells; it derives energy and nutrients from food and excretes waste. But what happens if one or more of the hierarchical connections in this complex ecosystem breaks or becomes damaged? How does that affect the disease process?"

Dhurjati is working to map out these connections with **MYRON SASSER**, a former UD professor of plant pathology who founded Microbial Identification Incorporated, a Newark, Del.-based biotechnology company that has developed a database of more than 5,000 unique fatty acids signatures to identify microorganisms. The researchers, along with **COLIN A. HEBERLING**, published an article detailing their work in the March 2013 issue of the *Journal of Medical Hypotheses*, a publication of Elsevier.

In a recent interview about the research on WDDE, Delaware's National Public Radio station, Martha Hebert, a pediatric neuroscientist at Massachusetts General Hospital, assistant professor of neurology at Harvard Medical School and author of *The Autism Revolution* (2012), called Dhurjati's paper "a vital stepping-stone in the long path from research to treatment for autism."

Adapted from article by Karen B. Roberts

Platinum-free fuel cells or Pushing Boundaries



The Yan research group, led by **YUSHAN YAN**, Distinguished Professor of Engineering, is known for pioneering a new class of fuel cell membranes called hydroxide exchange membranes (HEMs). When used in fuel cells, HEMs enable non-platinum-group metals such as nickel and silver to replace expensive platinum catalysts. **SHUANG GU**, a research assistant professor in Yan's group, recently reported further progress toward eliminating precious metals, particularly platinum, from fuel cells in the Jan. 7 issue of *Chemical Communications*, a journal of the Royal Society of Chemistry.

Photo by Kathy F. Atkinson



Master teacher training participants at work in the teaching lab at Cornell.

Future of bioenergy

Delaware Biotechnology Institute partners in biofuel project

As part of a five-year, \$50,000 grant supporting state greenhouse gas reduction projects, the Delaware Biotechnology Institute (DBI) is partnering with the Delaware Department of Natural Resources and Environmental Control in response to the need for 36 billion gallons of petroleum-based fuel to be replaced by biofuels by 2022, according to the Renewable Fuel Standard of 2007.

The Framework for Minimizing Energy Input and Environmental Impact in Delaware grant is a joint effort between DBI and Delaware State University (DSU) to create an education and outreach pipeline, as well as training, for the next generation of scientists and Delawareans as part of a sustainable agriculturally based industrial ecology.

“Given the First State’s rich history in agriculture and plant-based resources, we believe that Delaware is well-positioned to establish infrastructure, education and technology development programs that will allow us to be a national leader in the biofuel challenge,” said **KELVIN H. LEE**, principal investigator on the grant, and DBI director and Gore Professor of Chemical and Biomolecular Engineering.

With specific goals to educate teachers about alternative energy technologies and foster student interest in science, technology engineering and mathematics (STEM) careers, DBI and DSU developed an education framework to help Delaware in the biofuel challenge. This framework is also being leveraged against a large-scale multi-institutional grant from the U.S. Department of Agriculture’s Agriculture and Food Research Initiative project led by Cornell University.

The goal is to not only ignite student interest while bettering STEM education, but also to bring societal awareness, disseminate technological understanding and create a skilled future workforce that can address the technological barriers to the renewable energy challenges their generation will face.

According to **DIANE WUEST**, UD doctoral candidate and outreach coordinator for DBI, who became a master teacher trainer through the program in summer 2012, fieldtrips were highlights of the three-week training. “Experiencing a sustainable village first hand, and touring a 4,000-head dairy farm that implemented an anaerobic digester to power the entire farm, was impressive,” she said. “This is the future of bioenergy.”

Article by Laura Crozier



CCEI’s p-xylene technology licensed by major green petrochemicals producer

Anellotech Inc, which produces petrochemicals from renewable non-food biomass, has licensed the p-xylene technology known as catalytic fast pyrolysis (CFP).

The new way to make plastic bottles from biomass rather than petroleum was discovered by a team of chemical engineers from the University of Delaware and the University of Massachusetts Amherst, partners in the Catalysis Center for Energy Innovation (CCEI), a Department of Energy-funded Energy Frontier Research Center directed by UD professor **DION G. VLACHOS**.

The discovery demonstrates an efficient, renewable way to produce the chemical p-xylene, necessary in creating certain plastic containers. Xylene chemicals are used to produce PET (polyethylene terephthalate), which is currently used in many products including soda bottles, food packaging, synthetic fibers for clothing and even automotive parts.

Bioscience CAT grants help faculty close innovation gap; promote economic development

Professors **MILLICENT O. SULLIVAN** and **E. TERRY PAPOUTSAKIS** are among a select group of researchers to earn a Delaware Bioscience Center for Advanced Technology (Bioscience CAT) grants from The Delaware Biotechnology Institute and the Delaware Economic Development Office.

The grants synergize efforts among the academic and industrial community to address the technology innovation gap and promote economic development in Delaware. Projects involve partnerships with investigators at Delaware academic or research institutions linked to scientists in Delaware businesses.

Sullivan, an associate professor, was awarded in 2013 for her work, “Assembly of Novel Controlled Release Polyplexes for Efficient mRNA Delivery,” in partnership with Fraunhofer Center for Molecular Biotechnology.

Papoutsakis, Eugene du Pont Chair of Chemical and Biomolecular Engineering, and postdoctoral researcher, **NICHOLAS SANDOVAL**, continue their work with Dynasep and Elcriton Inc. on “Improving Clostridial Fermentations of Glycerol, and Integrating with ChemX Technology to Demonstrate Lowest Cost Butanol Production,” through the funding that began in 2012 and is well underway, showing the impact Delaware research has on problems of global significance.



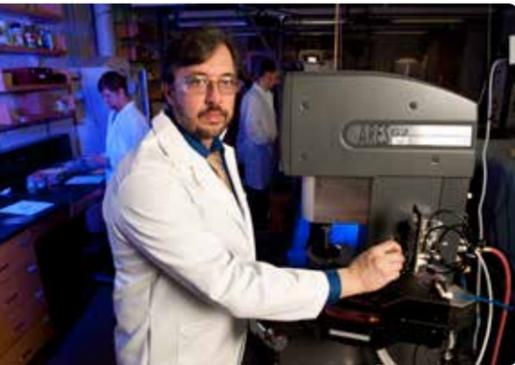
The Delaware Biotechnology Institute and the Delaware Economic Development Office have announced grant funding through the Delaware Bioscience Center for Advanced Technology.

“We’re very excited to see the progress that has been made by the Bioscience CAT and the launch of several new projects that will solve problems in agriculture, the environment, and human health,” said **KELVIN H. LEE**, DBI director and Gore Professor of Chemical and Biomolecular Engineering. “The partnerships that have been catalyzed between academic and industrial scientists are the foundation upon which these new discoveries are being made.”

Bioscience CAT was launched in January 2012 with the goal of investing in the bioscience community to ensure Delaware competes on the world stage in biotechnology innovation.

Leading the way

NIST awards UD \$7 million for continued neutron scattering research



The National Institute of Standards and Technology (NIST) has awarded the University of Delaware's Center for Neutron Science \$7 million for continued neutron scattering research.

Neutron scattering is a nanoscale measurement technique similar to X-ray and light scattering used to examine a material's structure at the molecular, nano- and meso-scales. The technique is useful in engineering new nanomaterials for grand-challenge problems ranging from energy storage to biomaterials for improving human health.

The project is a collaborative effort between UD and NIST's National Center for Neutron Research (NCNR) to develop new methods to investigate nanoscale materials – work that builds upon a five year relationship between the two entities.

"UD's extensive track record of collaborative research, publication and joint teaching with NCNR exemplifies our leading role as the premier group using neutron scattering methods to investigate nanoscale materials," said **NORMAN J. WAGNER**, Alvin B. and Julia O. Stiles Professor of Chemical and Biomolecular Engineering and director of UD's Center for Neutron Science, and principal investigator on the project.

Co-principal investigators are **RAUL F. LOBO**, professor of chemical and biomolecular engineering and director of the Center for Catalytic Science and Technology; **DARRIN Pochan**, professor of materials science and engineering; **THOMAS H. EPPS, III**, Thomas and Kipp Gutshall Chair of Chemical and Biomolecular Engineering; and **CHRISTOPHER J. ROBERTS**, associate professor of chemical and biomolecular engineering.

UD researchers will develop new and novel sample environments for examining materials under applied fields, along with advanced theoretical methods to analyze experimental results. Research will focus on condensed matter physics, colloid and polymer science, and proteins and nanoparticles.

In particular at UD, the Pochan group will investigate biomaterials for controlled drug release. The Epps research group will study block copolymer thin films for membranes, optoelectronics and self-cleaning coatings, while the Roberts research group will explore the stability of proteins and protein aggregation related to biopharmaceuticals. Additionally, the Lobo research group will explore nanostructured materials for carbon sequestration and hydrogen storage, with applications in energy, and the Wagner group will develop new instrumentation for exploring complex fluids under flow to aid in the rational design of nanomaterials.

Working in concert with NCNR, UD's computer engineering staff has already made significant contributions to the NCNR's data acquisition software and will continue this work to develop next generation software under the five-year renewal. Select UD students, postdoctoral researchers and faculty will work on-site at NCNR during the project and will provide education and support to U.S. researchers using NCNR facilities.

Article by Karen B. Roberts | Photo by Evan Krape

UD-developed instrument enables advanced study of a fluid's microstructure

Protein Researchers from UD's Center for Neutron Science and two of the world's premier neutron scattering facilities—the National Center for Neutron Research at the National Institute of Standards and Technology (NIST) in Gaithersburg, Md., and the Institut Laue-Langevin in Grenoble, France—have developed a new scientific instrument capable of studying the microstructure of complex fluids, polymers, nanomaterials and surfactant solutions using neutron scattering techniques.

The advance adds the ability to study time-dependent deformations, instances where fluids or solutions distort or change shape over time, providing researchers new ways to understand materials. It is also a valuable tool for studying how nanomaterials can be self-assembled into useful and highly organized structures.

"The instrument can be used to develop structure-property relationships for a broad range of materials useful for foods, consumer products such as sunscreens, shampoos, detergents, as well as creating new, highly ordered nanocomposites and complex fluids of critical importance for natural gas and oil production," said **NORM WAGNER**, Alvin B. and Julia O. Stiles Professor and center director. "It will also help us unlock the underlying principles of non-equilibrium thermodynamics of flowing systems, a topic of considerable scientific challenge over the past century."

UD Energy Institute bridges disciplines to advance energy research

In the face of sequestration, it is a fact that funding sources for research are dwindling. Yet research is still needed to address the world's global energy challenges.

According to **MICHAEL T. KLEIN**, director of the University of Delaware Energy Institute (UDEI), biomass, wind, solar, fuel cells, etc., all have a part to play in future energy solutions. UDEI's role is to bridge the various academic disciplines that support these energy areas and get people working together.

"The energy landscape is supported by energy researchers with wide-ranging, often non-overlapping backgrounds. There is no single science base to energy," Klein said, "but to develop energy solutions we need coherent, functional teams. So in the UDEI, we are trying to catalyze the development of inter-departmental, inter-institutional teams that can compete for multi-year, high dollar grants that really will make a difference."

This is one of the reasons UDEI established its annual energy symposium, now in its sixth year. The event, held May 15 on UD's Newark campus, included a half-day conference detailing advances in energy conversion, catalytic science, carbon-free power and fuel cells, among other things, followed by a focused workshop on next generation photovoltaics.

"You can't propose to form a team after receiving a major grant. The team needs to be in place to secure funding in the first place," said Klein. "We're getting the broad energy solutions-oriented teams ready, with some demonstrated results, so that when proposal opportunities arise, we can say 'here is our track record of success.'"

In 2012, UDEI began offering topical workshops to connect people within their various specialties — inside and outside the University. Workshops focusing on wind and fuel cells have already taken place. Future workshops include topics in solar, biomass and unconventional carbon based resources.



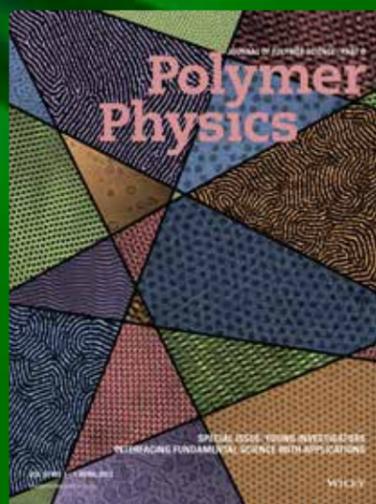
UDEI is also working to identify knowledge gaps and provide resources to fund faculty, largely at UD, to study these deficiencies. The institute is building community partnerships that will strengthen and prepare teams to address these issues, too.

According to Klein, UD's new 194,000-square-foot Interdisciplinary Science and Engineering Laboratory (ISE Lab) will improve UDEI's ability to connect teams of researchers.

"There are 250 people across campus engaged in energy research, many of whom do not know one another. ISE Lab will change that in a meaningful way. The stronger these future intercampus connections, the stronger our connections to the outside world will become," he said.

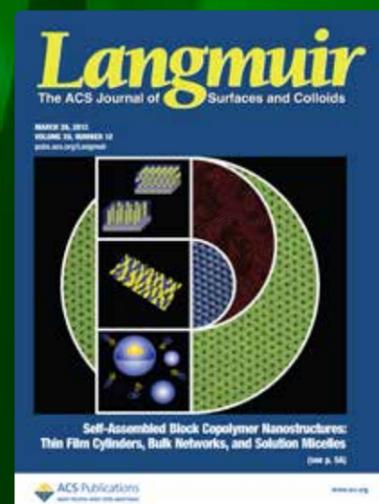
Adapted from an article by Karen B. Roberts | Photo by Kathy F. Atkinson

Journal Covers



“From fundamental science to advanced technologies”

Thomas H. Epps, III, Mahesh K. Mahanthappa



“Interfacial manipulations: controlling nanoscale assembly in bulk, thin film, and solution block copolymer systems”

Sarah Mastroianni, Thomas H. Epps, III



“The genomic sequence of the chinese hamster ovary (cho)-k1 cell line”

Xun Xu, Harish Nagarajan, Nathan E. Lewis, Shengkai Pan, Zhiming Cai, Xin Liu, Wenbin Chen, Min Xie, Wenliang Wang, Stephanie Hammond, Mikael R. Andersen, Norma Neff, Benedetto Passarelli, Winston Koh, H. Christina Fan, Jianbin Wang, Yaoting Gui, Kelvin H. Lee, Michael J Betenbaugh, Stephen R. Quake, Iman Famili, Bernhard O. Palsson, Jun Wang



“Exploring the capabilities of the geobiosphere’s microbial genome”

Eleftherios T. Papoutsakis



“Three-stage ex vivo expansion of high-ploidy megakaryocytic cells: toward large-scale platelet production”

Swapna Panuganti, Alaina C. Schlinker, Paul F. Lindholm, Eleftherios T. Papoutsakis, William M. Miller



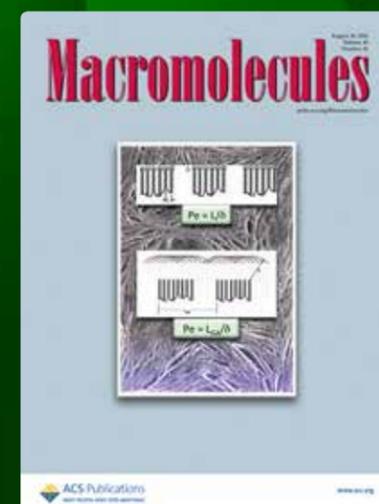
“Three-stage ex vivo expansion of high-ploidy megakaryocytic cells: toward large-scale platelet production”

Swapna Panuganti, Alaina C. Schlinker, Paul F. Lindholm, Eleftherios T. Papoutsakis, William M. Miller



“Chinese hamster genome database: An online resource for the CHO community at www.CHOgenome.org”

Stephanie Hammond, Mihailo Kaplarevic, Nicole Borth, Michael J. Betenbaugh, Kelvin H. Lee



“Self-generated fields and polymer crystallization”

Jerold M. Schultz



“Spontaneous thermoreversible formation of cationic vesicles in a protic ionic liquid”

Carlos R. López-Barrón, Dongcui Li, Leo DeRita, Madivala G. Basavaraj, Norman J. Wagner

Chemical engineering students among winning team in Innovation Rotation

SBE2 grant and Fraunhofer partnership provide students opportunity to address real-world industry problems

Doctoral students **LISA SAWICKI** and **AMALIE TUERK** were among a team of four IGERT Fellows that won the spring 2013 Innovation Rotation – a competition sponsored by the National Science Foundation Integrative Graduate Education and Research Traineeship (NSF IGERT) in which students propose solutions to real-world problems posed by industry.

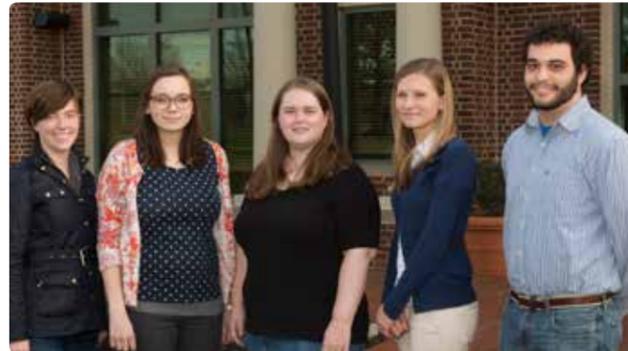
The Innovation Rotation is part of the University of Delaware course “Ethics, Business, and Communication for Life Scientists and Engineers,” which offers theoretical and practical knowledge of ethics and business skills related to the bioscience industry. A centerpiece of the course is a team-based, problem-solving exercise that requires students to develop solutions to and present a business plan around a technical challenge, in this case posed by scientists at the Fraunhofer Center for Molecular Biotechnology.

“The course provided an excellent opportunity for graduate students to come up with novel potential solutions to a real life technical problem faced by our scientists,” said **STEPHEN STREATFIELD**, director of scientific affairs for Fraunhofer. “Students had the opportunity to interact directly with Fraunhofer scientific staff and discuss both economic and technical aspects of the business. The exchange was very useful for both sides.”

The activity was supported by the NSF IGERT grant titled Systems Biology of Cells in Engineered Environments (SBE2), an interdisciplinary doctoral traineeship program involving faculty from five colleges with expertise in complementary research areas that intersect with the theme of systems biology in engineering environments. Awarded in 2012 to **KELVIN LEE**, Gore Professor and director of the Delaware Biotechnology Institute, the five-year, \$3 million grant enables IGERT Scholars to learn critical skills related to science and engineering, as well as bioethics, research ethics, business innovation, communications and outreach.

The commencement of the IGERT program in 2012 also corresponded with the launch of a new Ph.D. program in bioinformatics and systems biology. Sawicki, a doctoral student in chemical engineering, now has the opportunity to implement her solution at Fraunhofer through one extra semester of support from the SBE2 IGERT program.

Adapted from an article by Laura Crozier



Doctoral student participates in 63rd Lindau Nobel Laureate Meeting

ELIZABETH KELLEY, a doctoral student in the department, shared her research on targeted drug delivery—specifically the development of novel polymeric materials that can be used to package and deliver medicine— at the 63rd Lindau Nobel Laureate Meeting held in Lindau, Germany.

Kelley’s selection to the annual international meeting, which focuses on promoting the global spread of knowledge in the areas of chemistry, physics and physiology, afforded the 2010 National Defense Science and Engineering Graduate Fellowship recipient the prestigious opportunity to discuss research with 35 Nobel Laureates and 625 other young researchers in an open conference setting.

Kelley’s research involves developing novel nanoscale structures to encapsulate medicines and enable therapeutic molecules to be released within cells in diseased tissues, approaches that are especially beneficial for drugs such as chemotherapies, which have serious side effects if released within the wrong cells or tissues.

“Her natural curiosity about how things work, paired with a research process that is far more mature than her actual years of experience, made Liz an outstanding candidate for the 2013 Lindau Meeting,” said associate professor **MILLICENT O. SULLIVAN**, who co-advises Kelley with **THOMAS H. EPPS, III**, Thomas and Kipp Gutshall Professor of Chemical and Biomolecular Engineering.

Article by Sarah E. Meadows | Photo by Ambre Alexander



Peter Attia named Goldwater Scholar

Senior chemical engineering major Peter Attia is one of two University of Delaware students named a **GOLDWATER SCHOLAR** in 2013.

The scholarship program, which honors the late U.S. senator from Arizona, aims to inspire outstanding science, technology, engineering and mathematics (STEM) students to pursue STEM-related careers. The award provides recipients up to \$7,500 per year toward tuition, fees, books and room and board costs; 271 Goldwater Scholars were selected this year from 177 institutions nationwide.

Attia, a Hockessin, Del., native, said the scholarship is a reminder of how blessed his

life has been and the obligation he has to help others in return.

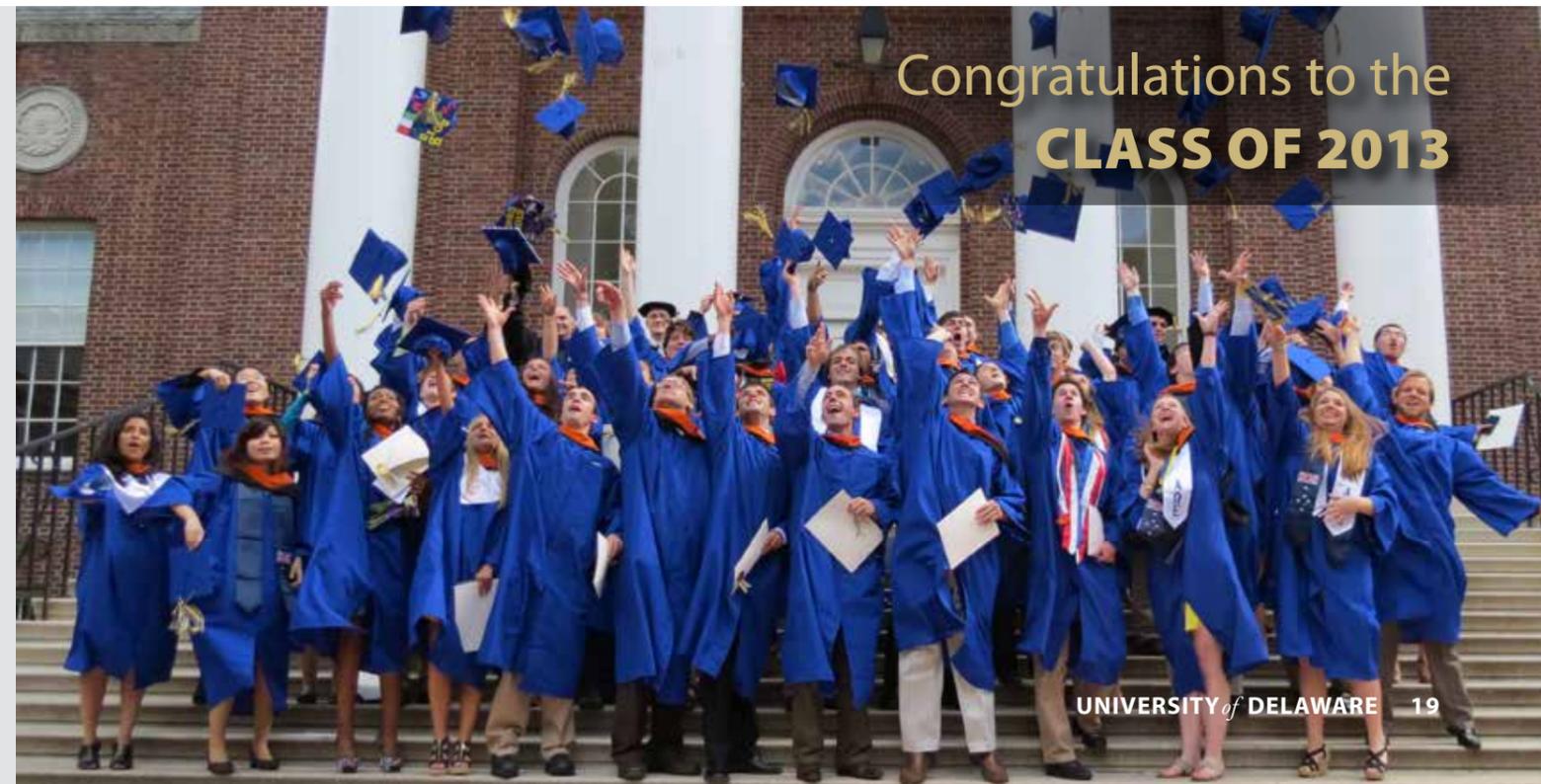
“I am grateful for my family, friends, health, safety, education and the opportunity to make the world a better place,” said the Honors Program student, who is considering graduate school in materials science or chemical engineering.

Attia researches novel applications for thermoelectric materials with Joshua Zide, assistant professor of materials science and engineering. Long term, he aspires to develop materials for water purification and energy.

Recent chemical engineering alumna Alexandra Bayles, B2013, was a Goldwater recipient in 2012.

Adapted from an article by Ann Manser and Karen Roberts | Photo by Ambre Alexander

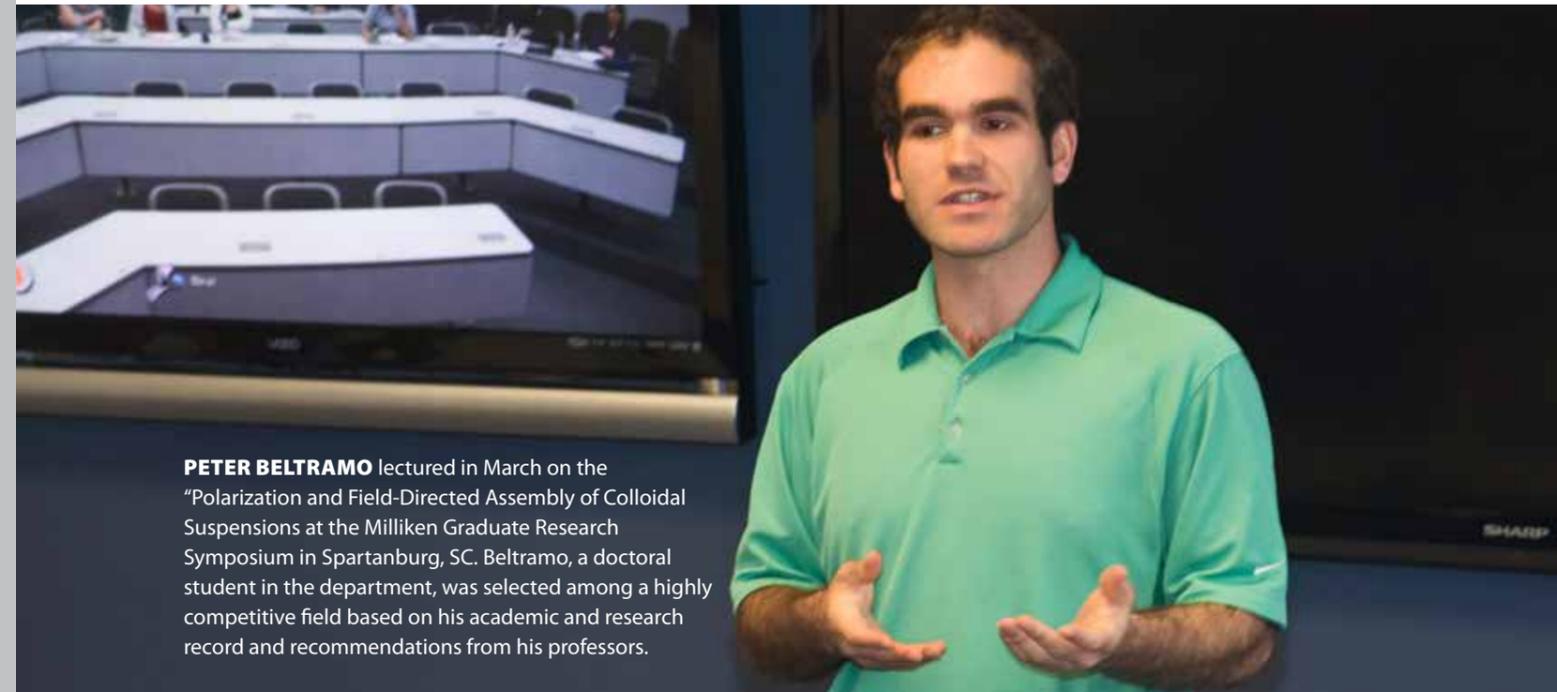
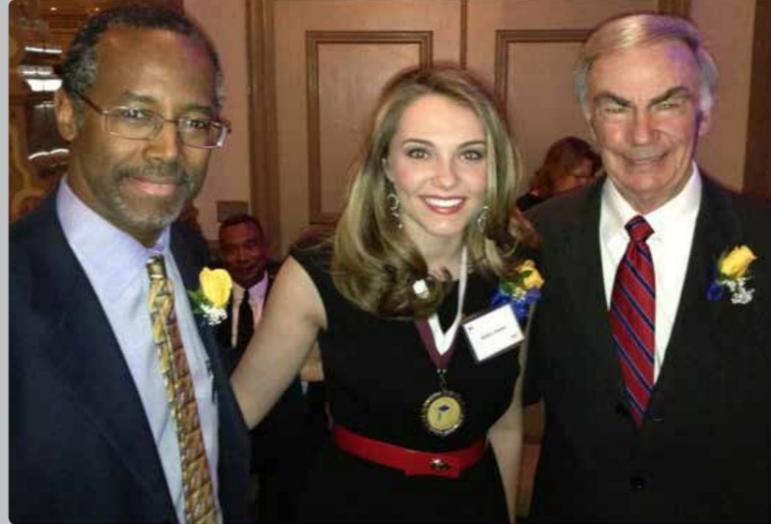
Congratulations to the CLASS OF 2013



Honors, awards, presentations

Inspiring others

Junior **HAILEY CRAMER** began creating gold nanoparticles—particles a thousand times smaller than the thickness of a human hair—as a high school junior and intern with the Army Research Laboratory at Aberdeen Proving Ground in Maryland. Last spring, she talked about her internship work and her path to engineering with more than 1,000 attendees at the 2013 Carson Scholars banquet. The Carson Scholars Fund—created by noted neurosurgeon Ben Carson, whose journey from poverty to success inspired Cramer’s lifelong love of learning—provides scholarships to high school students who excel in academics and community service, and funds school reading rooms to encourage literacy among young people. “Each of you has unique skills — you are amazing students; talented musicians, athletes or dancers; environmental advocates; aspiring teachers, scientists and doctors,” Cramer told the students. “Together you are the next generation of leaders, and that gives me confidence that our future will be in good hands.” A two-time Carson Scholar herself, Cramer is an Honors Program member, co-chairs UD’s Sustainability Day and continues to intern with the Army Research Laboratory, while also conducting undergraduate research on polymer solar cells with Professor **ISMAT SHAH** of the Department of Materials Science and Engineering.



PETER BELTRAMO lectured in March on the “Polarization and Field-Directed Assembly of Colloidal Suspensions at the Milliken Graduate Research Symposium in Spartanburg, SC. Beltramo, a doctoral student in the department, was selected among a highly competitive field based on his academic and research record and recommendations from his professors.



Doctoral student **COLIN CWALINA** was selected for a Delaware Space Grant Graduate Fellowship for the 2013-14 academic year..

Doctoral students **ANGELA HOLMBERG** and **KALEIGH RENO** received Green Chemistry travel awards from the National Science Foundation to attend the 17th Annual Green Chemistry & Engineering Conference near Washington, D.C., in June. While at the conference, Reno was selected as a student poster award winner for her poster entitled “Getting a handle on vanillin: Green modifications.”

STUDENT BRIEFS

Real world experience

ANDREW BITNER, B2013, turned his passion for fixing computers and other electronics into a real-world work opportunity with Elcriton Inc., a company founded by professor **E. TERRY PAPOUTSAKIS** that is devoted to creating biochemical catalysts and other technologies to convert nonrenewable biomass into biofuels.

The New Castle, Del.-based company’s work shows potential to reduce greenhouse gases and emissions and to accelerate the expansion of clean-tech industries. Elcriton is particularly focused on generating DNA for work in different strains of *Clostridium* that can be used to produce butanol fuel, a direct substitute for gasoline.

During his 2012 internship, Bitner, who graduated in May, helped create DNA mutations, develop procedures for creating media and testing, and even built an apparatus for future laboratory work. He learned many techniques, including how to transform and prepare DNA samples, and gained valuable mentoring often unavailable in large organizations. The experience was funded in part through the T.W. Fraser Russell Undergraduate Enrichment Fund, which commemorates the career of **T.W. FRASER RUSSELL**, Allan P. Colburn Professor Emeritus of Chemical Engineering.

“We hope to provide more real-world experiences like this in the future as a means to help students become workforce-ready when they graduate,” said Russell.

Article by Megan Marshall | Photo by Carrie Qualls



Jon Olson



This issue of Chemical & Biomolecular Engineering News is dedicated to our friend, colleague and mentor **JON H. OLSON**, who formally retired from UD in 2002, and stepped down as the department's Alumni Coordinator earlier this year.

We are deeply indebted to Jon for all he has done to keep alumni relations alive and well in our department.

According to **MARK BARTEAU**, former department chair and 30-year member of the chemical engineering faculty, as well as former senior vice provost for research, "The inspiring and sometimes lengthy letters that Jon elicits from alumni have made the Alumni Notes a treat to read by all the department's friends and extended family. If "Dear Abby" can be continued by a second generation, perhaps "Dear Professor Olson" can be, too, even if the original can't be matched!"

From favorite undergraduate advisor, to professor emeritus, to self-appointed keeper of the alumni flame, Jon has kept generations of students on track and continues to keep alumni in touch.

Jon, hats off to you for your outstanding work and tireless devotion to CBE. Readers, enjoy the wealth of information about the lives and careers of our alumni beginning on page 29.

Faculty, alumni share how Jon Olson instills "perfection, purpose and pride" in chemical engineering.

"Because of his great knowledge on all subjects in our department, he not only acts as an advisor but also a window to understanding the different branches in chemical engineering. He cares about every single student and enjoys helping them out; especially the different issues experienced by international students."

—Mengguang Wang (alum)

"In September 1964, I enrolled in ChEG835 with Jon. It was a wonderful course and I subsequently took several more courses from him, including one in which I was the only student! I also had the privilege of teaching ChEG835 for several years with Jon. I've always attributed to Jon a great deal of whatever success I have attained in my professional life." —Thomas Keane

"Jon is not only a trusted advisor to all chemical engineering undergraduates, but an institution in himself. As an adviser he always maintained a calm, cheerful demeanor, even when delivering a very serious message about academics and course selection. He possessed a unique ability to combine a gentle tone with honest, hard-hitting advice. He did not always tell us what we wanted to hear, but he always told us what we needed to hear. His door was always open. And, he had the uncanny memory of the entire CHEG undergraduate curriculum. He clearly applied the principles of process engineering to academic advising; he was effective, efficient and artful in every single advising session.

"Dr. Olson instilled students with a sense of direction, purpose and pride in chemical engineering, as well as a moral compass for life. He inspires me to be a better chemical engineer, and a better person." —Sujata Bhatia (alum)

"Jon Olson is a central figure in my chemical engineering career. I first met him when I was a master's student in the 1970s. I really got to know him in the 1980s in his role as academic consultant to DuPont's TiO₂ business. Our many stimulating discussions helped me to develop deeper growth in aerosol reactors, which I later applied to important innovations. But his biggest impact so far came in the 1990s as my doctoral dissertation advisor. Our intellectual journey together through the field of population balance modeling is one of the highlights of my professional life. I continue to benefit from Jon's mentorship." —Bert Diemer, alum and adjunct professor

Degnan elected to NAE



THOMAS F. DEGNAN JR., PhD1977, noted for his contributions to novel catalytic processes for improved lubricant, fuel and petrochemical production, has been elected to the prestigious National Academy of Engineering (NAE).

Degnan, who chairs the department's Advisory Council, has spent most of his career in exploratory process development, catalysis, catalyst development and research management for Mobil, and now ExxonMobil Research and Engineering Company. He currently manages breakthrough and leads generation.

STANLEY S. SANDLER, H.B. du Pont Chair of Chemical and Biomolecular Engineering, who is also an NAE member, nominated Degnan for NAE membership, remembering him as an excellent graduate student who went on to great success at ExxonMobil.

"He has been an extremely pleasant person to interact with, and he continues to contribute to the University and our department, especially now in his role as head of our external Advisory Council," said Sandler.

Degnan joins Sandler and three other faculty and emeritus faculty from the Department of Chemical and Biomolecular Engineering in NAE membership, including: **BABATUNDE A. OGUNNAIKE**, dean and William L. Friend Chair of Chemical and Biomolecular Engineering (2012); **MARK A. BARTEAU**, Robert L. Pigford Professor Emeritus of Chemical and Biomolecular Engineering (2006); and **T.W. FRASER RUSSELL**, Allan P. Colburn Professor Emeritus of Chemical and Biomolecular Engineering (1990).

Article by Karen B. Roberts

Incisive polymeric gel research earns one of India's highest awards

ASHISH LELE, PhD1993, a scientist from the National Chemical Laboratory in Pune, India, has been honored with the Infosys Prize 2012 for his incisive work in polymeric gels. The prize, bestowed by the Infosys Science Foundation, ranks among India's highest awards recognizing scientific research.

Lele is a fellow of the Indian National Academy of Engineering and the Indian Academy of Science. He is president of the Indian Society of Rheology and is a member of the editorial board of the prestigious journal *Rheologica Acta*.

An excerpt on the award from *The Times of India, Pune*, reads, "Lele's novel and impactful contributions to polymer science and engineering include molecular tailoring of stimuli responsive smart hydrogels, new insights into the anomalous rheological behavior of complex fluids and the coupling of macromolecular dynamics and polymer processing."

In its citation, the Infosys Science Foundation jury said, "He has many firsts to his credit. The experimental discovery of novel macroscopic self-organisation in stimuli responsive gels and the discovery of self-healing gels were important breakthroughs. His theoretical firsts include laying the foundations of a mean field theoretical framework of specific weak molecular interactions in gels."

Lele received the award in January in New Delhi, where he was congratulated by Gro Harlem Brundtland, the former prime minister of Norway and former director general of the World Health Organization.



University of Delaware students who received NSF fellowships:

- **ALEXANDRA BAYLES**
(undergraduate, now at UC Santa Barbara)
- **EYAS MAHMOUD** (graduate)
- **DARIUSZ MURAKOWSKI**
life sciences-evolutionary biology, MIT
- **CARA TOURETZKY**
chemical engineering, University of Texas at Austin

Incoming graduate students who received national fellowships:

- **RU CHEN** (NSF Fellowship)
- **TRISHELLE COPELAND-JOHNSON** (NASA Fellowship)

UD Chemical & Biomolecular Engineering men's and women's color blocked polo shirt.

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Sponsored by the student AIChE chapter.



Sujata Bhatia receives McDonald Award

SUJATA BHATIA, who earned bachelor's degrees in biology, biochemistry and chemical engineering and a master's degree in chemical engineering at the University of Delaware all in 1999, is the 2013 winner of the Capers and Marion McDonald Award in Mentoring and Advising at Harvard University.

A physician, bioengineer and professionally licensed chemical engineer, Bhatia is a member of the teaching faculty of biomedical engineering at Harvard. She is also the assistant director for undergraduate studies in biomedical engineering, the assistant dean of the Harvard Summer School, and an associate of the Harvard Kennedy School of Government. Before joining the Harvard faculty in 2011, she was a principal investigator with the DuPont Company.

The letter Bhatia penned to her younger self appeared earlier this year in the *Huffington Post*.



Before They Were Scientists: A Letter To My Younger Self

Dear little Suji,

At this time, you have no idea what an amazing life you will live. You are just a child in Delaware, and all you know is that you love your parents, your sisters and brother, and your teddy bears. You are doing your best in school, but you are a perfectionist, and you already worry about being a good student. You enjoy learning and you love books, but school makes you nervous. You struggle to believe in yourself. You have no idea what life has in store for you.

One day you will be a faculty member in biomedical engineering at the best university in the world. You will be working alongside brilliant scientists and engineers, as well as scholars in the humanities and social sciences, whom you idolize. You will be teaching the most talented, passionate, energetic students on the planet. Harvard faculty members whom you watched on television will now be your colleagues. Places that you saw in the movies will now be everyday sights. You will wake up each morning and look out onto Harvard Yard.

But right now you don't believe me. Right now you are simply hoping to get through each school day, then go home and play with your teddy bears.

Your mother will be central to your success. She will teach you to read using the grocery ads, because she knows that you enjoy grocery shopping. Then she will buy you a book called "The Value of Believing in Yourself: The Story of Louis Pasteur." The book will not only help with your confidence, but will also spark an interest in medical research. You will then read about Edward Jenner and the invention of the smallpox vaccine. Your parents will fill the house with science and engineering textbooks from used bookstores and send you to public schools; it will be one of the best decisions they ever made. In high school, you will meet an influential biology teacher, Mr. Harry Dillner, who will further build your confidence and inspire your love for biomedical science.

As you progress through college at the University of Delaware, you will find that you love learning everything about biology, chemistry, engineering and medicine. You will be very lucky and gain admission to the MD/PhD program at the University of Pennsylvania, where

you will meet some of the world's best physicians. You'll move on to DuPont, where you will invent new medical devices, and you will spend your spare time teaching chemical engineering at the University of Delaware. Then you'll receive an offer to join the faculty of biomedical engineering at Harvard University. You will love it so much that it will not feel like work anymore.

What advice can I give you, little Suji? First and foremost, trust in yourself and especially trust in your instincts. Follow your heart. If you keep doing work that you love, your career will work itself out naturally. Your heart will tell you that you enjoy being immersed in the university atmosphere, and that you want to live a life of the mind, and that you love spending time with college students. As you follow your instincts, you will forge a path that is vastly different from those of your wonderful friends from high school, college, graduate school, medical school, industry, and academia. At many points in your career, you will take the road less traveled, until your decisions lead you to a faculty position at Harvard. Always do the right thing for you, and be true to yourself. You will learn that helping students to build confidence, and watching them achieve their dreams, is the best feeling in the world.

Life will throw you some curve balls. Your parents will become ill when you finish graduate school, and you will see them through. They will together survive cancer and heart disease, and the experience will shape you for the better. Remember the value of family. When you are in crisis, your parents and siblings will be the ones who have your back. You should never feel alone.

As you navigate through life, remember to count your blessings. Lou Gehrig considered himself the luckiest man on the face of the earth, despite his challenges, because he was surrounded by adoring fans. You will realize that you are the luckiest woman on the face of the earth, because you are surrounded by a loving family, supportive colleagues, and adoring students, all of whom you count as friends.

Have as much fun as possible with engineering, and don't forget the childlike wonder that attracted you to this field in the first place. Your future students, and your joy for your work, will keep you forever young. You will live a life that is beyond your wildest dreams.

Love, Sujata

Honors & Awards

RAKESH AGRAWAL, M1977, the Winthrop E. Stone Distinguished Professor in Purdue University's School of Chemical Engineering, has been elected to the American Academy of Arts and Sciences. Agrawal, who holds 118 U.S. patents and nearly 500 non U.S. patents, received the 2011 National Medal of Technology and Innovation from President **BARACK OBAMA**. He is a member of the National Academy of Engineering and served on the National Research Council's Board on Energy and Environmental Systems.

JED JOHNHOPE, B2003, an MBA student at Northwestern University's Kellogg School of Business and an Evanston, Ill., entrepreneur, created "Mercy Card," a prepaid gift card that allows donors to provide meals for the homeless at participating restaurants that take major credit cards. According to a January 2013 article in the *Chicago Sun Times*, JohnHope also continues to work on a system to let homeless people buy transit cards or fill prescriptions with a prepaid smart card. Before entering graduate school, JohnHope worked for the multinational engineering consulting firm Arcadis.

JEFF B. KLAUDA, PhD2003, assistant professor at University of Maryland, received a five-year NSF **CAREER** award for his research on a new hybrid simulation for determining protein structure and transport mechanisms. He also received a three-year NSF grant for his development and application of graphical user interfaces for system building and analysis of membrane simulations.

J. GARY MCDANIEL, B2003, has been appointed CEO of Catacel Corporation. Before joining Catacel's board of directors and then rising to CEO, McDaniel was a three-time CEO of start-up and early stage companies in the catalyst and alternative energy markets. He also lent detailed business and industry insights to venture capital firms and corporate boards seeking to develop and commercialize new technologies for the chemical catalyst, petroleum refining, biofuels, emissions control and solar photovoltaic markets. His CV includes leadership positions with Tricat Industries, Honeywell/UOP, W.R. Grace & Company and Akzo Nobel.

MICHELLE A. O'MALLEY, PhD2009, an assistant professor in UC Santa Barbara's Department of Chemical Engineering, and **WILLIAM A. TISDALE III** (HB2005), the Charles and Hilda Roddey Career Development Assistant Professor of Chemical Engineering at MIT, have each received a 2013 **Early Career** award by the U.S. Department of Energy's Office of Science. O'Malley researches biofuels, presenting a new way of harnessing fuel from non-food plants and agricultural waste, while addressing concerns over the financial costs in biofuel production. Tisdale is developing a novel ultrafast microscopy technique for visualizing electronic processes at interfaces in next-generation solar cells.

JAMES J. OWENS, B1986, has been appointed to the Board of Directors of Donaldson Company, Inc. Owens is president and CEO of St. Paul, Minnesota-based H.B. Fuller Company, a leading global provider of adhesives, sealants and other specialty chemical products.

BRIAN ROSEN (HB2008), won a postdoctoral research fellowship from the J. William Fulbright Scholar Program and will work at Tel Aviv University on a joint project with the U.S. Air Force and the Israeli Air Force to investigate new materials to help prevent corrosion in military jet engines.

THOMAS F. SCHERR, B2008, received Louisiana State University College of Engineering's 2011-12 Clayton Engineering Excellence Award for Outstanding Graduate Student. While at UD, Scherr researched block copolymer thin films with **THOMAS H. EPPS, III**, Thomas and Kipp Gutshall Chair of Chemical and Biomolecular Engineering, before studying solute transport in arthritic knee joints as a research technician with **LIYUN WANG**, associate professor in UD's Center for Biomedical Research. His research at LSU focuses on modeling the flow of biological samples in microfluidic devices.

notes

ALUMNI

EDWARD F. COLBURN, B1963, started his career with Pratt & Whitney followed by a stint at Douglas Aircraft, then seven years at Thiokol building booster rockets for satellite launch rockets. He joined Aberdeen Proving Grounds' Army Toxic Materials Agency in 1974 and beginning in 1992, served as the Army's Executive Agent for Chemical Treaty Compliance. In this role, he traveled worldwide to verify treaties on the destruction of chemical weapons, retiring in 2003. At his 55th high school reunion, he met **JACK L. MESSMAN**, B1962, who had a successful career as a venture investor. Ed and Carolyn Workinger Colburn have one daughter, Kristen Colburn Farmer, who is a nurse at Johns Hopkins. Ed enjoys volunteering with the local maritime school, scuba diving and his grandchildren.

DENNIS CONLAN, B1963, spent most of his career with Leeds and Northrup in process controls, beginning with the instrumentation of laboratories, expanding into larger systems, and then developing a system to measure and record urban area air pollution in the 1970s. He retired from L&N as a manager in 1996 to join Max Control Systems, where he worked until 2010 and retired as vice president. Consulting followed with M3I, a Canadian firm with an emphasis on power distribution systems and power analysis. He and Merideth have four children: three sons—an architectural engineer, an Apple employee and a contractor—and one daughter who does art restoration. Dennis is recovering from a recent heart attack in Plymouth Meeting, Pa.

DONALD A. CORKRAN, B1963, lives with his wife, Susan, in Chadds Ford, Pa. Donald graduated UD with both chemical engineering and business administration degrees, and spent nearly all his 30-year career with Wilmington Trust. He says the chemical engineering curriculum provided a familiarity with computers that allowed him to develop and use automated analytical tools in the analysis of investments. This led him to develop a fully automated, real-time accounting system for the Trust Department. Named a member of the Bank's Senior Management Committee

in 1980, a senior vice president of the Trust Department in 1985 (at that time the sixth largest in the country), he retired in 1993. An outdoorsman, he enjoys caring for his property, hunting and trout fishing. The Corkran's summer on a mountain lake in Maine with their three grown children and grandchildren. Donald writes: "It's been 50 years since I graduated, and I cannot help but reflect on the benefits I derived from my college experience. It provided me, in addition to an understanding of computers, with a sound basis in mathematics, chemistry and physics, a strong discipline in testing and analysis, and even valuable experience in leadership, all of which contributed importantly to my professional success. I am grateful."

HANK DUUZ, B1963, started college in 1957 and, after early academic difficulty and Jack Gerster's help in preventing his being drafted, graduated in 1963. Following graduation, Hank worked for Budd Polychem, leading on to VP for operation of Keene Laminates and divisional president of Arlon Silicon Technologies. At age 55, he began a second career in construction management on the Jersey Shore, while also pursuing business ventures such as partner in a Hockessin, Del. bar, boat dealer in Margate, NJ, and owner of a bait and tackle shop in Brigantine, NJ. Hank remains a larger than life character who, in a telephone conversation touched on, among other things, the methane hydrates in the Atlantic and his desire to become an artist.

JOHN M. FLETCHER, B1963, (known as "Miff"), lettered on the UD golf team and was captain his last year. His dedication to golf cost him an additional year at UD. He married **ANNE MARIE TAZANI**, AS1964, and his career in the Army, 1963-67, took him to Germany. He then worked for B.F. Goodrich for more than 30 years, initially in Ohio manufacturing vinyl chloride but mainly in New Jersey at the Pedricktown plant manufacturing polyvinyl chloride. He retired in 2005 after four year as a consultant. He and Anne have four children; sons, **JOHN, III** (BME1989), David, Steven and daughter, Anne.

G. BRINTON INGRAM, B1963, feels more connected to the 1962 class. His extra year came about from a senior project with Len Skolnick on the thermodynamic properties of lead telluride (PbTe). He spent the 1962 year building a furnace that could reach 1000 °C and the extra year making the "easy" experimental measurement. After a decompressing trip through Europe, he started with Rohm and Haas; he then moved to Celanese in 1970 to work on the production of cellulose acetate films. He then joined Polaroid, where his technical skills in film manufacture were critical. He retired in 1998, at which time he had a real estate license. He is currently listed as the owner of Stamps and Related Collectables. He and Lynne have two children, Eric and Sharon.

RALPH KURLAND, B1963, spent the majority of his career with Gulf Oil. In 1988 he was assigned to the UK for a year where he was a director of projects. He transferred to Chevron in '92, first in Pascagoula, Miss., and later in Kingwood, Texas, as a project general manager. He remained with Chevron-Phillips until 2009. He currently lives in Kingwood with his wife Deborah. They have three children.

ROBERT SEYMOUR, B1963, started his career with B.F. Goodrich and has since been employed by a number of chemical companies. In 1977 he participated in the construction of an alkyl benzene plant in Baltimore for Conoco/Vista, and in the 1980s built a vinyl chloride plant for Sasol in Lake Charles, La., where he subsequently served as plant manager. His last responsibilities before retiring were as plant manager of the Vista Chemical/Conoco plant. He and his wife, Kathleen, live in Aberdeen, Miss., a small town of about 6,000 residents, where he devotes about 20 hours a week to maintaining the town's movie theater on a non-profit basis, including via fundraising activities. Robert and Kathleen have two sons, Donald and Michael.

Continued on next page.

ZENaida OTERO GEPHARDT (M1979, PhD1983), associate professor of chemical engineering at Rowan University, who helped establish that university's College of Engineering and served as its assistant dean, received the YWCA Delaware Advancement of Women Award. Gephardt previously worked as a research engineer at the DuPont Company and was a visiting professor at Universidad de La Serena and La Universidad Catolica del Norte Sede Coquimbo, both in Chile. She served as president of the Delaware chapter of the National Organization for Women; president of Girls Inc. of Delaware; was a member of the Delaware Governor's Public Integrity Commission; and was president of the Delaware Valley section of the American Institute of Chemical Engineers.

ADRIEN G. SALOMON (HB2003) has been promoted to production manager of Gelest, Inc., in Morrisville, Pa. Salomon manages day-to-day production activities and staff for the materials science and technology leader. He joined Gelest in 2004 as a chemist and rose to process engineer and process and development engineer prior to this appointment.

DON WHEATCRAFT, B1963, who also earned a bachelor of arts degree, recalls the effective teaching of Jack Gerster, Art Metzner and Bob Pigford, which he says aided his TA responsibilities in his post-UD master's degree studies at Rochester. Don spent his career with DuPont. He started out in explosives and moved to polymer intermediates. His job titles include senior cost analyst, senior chemical engineer and technical associate (1996-2007). He and his wife, Jane, have a daughter and a son, who earned a bachelor's in chemical engineering before becoming a patent attorney for Gore. Grandson Robbie plans to study chemical engineering.

DICK CONSTABLE, B1983, wrote: "Following graduation, I worked as a chemical engineer for Sunoco for 27 years in the U.S. and Canada, with an emphasis on environmental management. I consulted on environment, health & safety

issues for international clients for six years before returning to private industry as director of Environmental Engineering for Wyeth Pharmaceuticals. The best part of attending UD: the lifelong friends that I met and continue to see over the years." Dick retired from Wyeth in 2010 and now splits time between playing golf and surf fishing in Brigantine, NJ. He and his wife, Helen Pell, reside in Gradyville, Pa., and have two children and four grandchildren.

DAVID ADAMS, B1988, writes that he vividly remembers Art Metzner's chuckle, Jon Olson advising him to remember the "KISS" principle ("when I was all thrust and no vector"), the smell of Roy McCullough's pipe tobacco, talking A-10 aircraft with Mike Paulaitis, and the encouraging words of Bramie Lenhoff that got David to med school. Now a dermatologist in the Florida panhandle, he teases patients who are chemical engineers that all he uses his hard-earned knowledge for these days is unclogging a plugged toilet. He says that UD ChE prepared him well for many things, especially public speaking, which got him into medical school; then orthopaedics; the US Air Force; the Thunderbirds; and dermatology, which he truly enjoys. He welcomes his 1988 classmates to Destin, Fla., "if travel brings you there."

CYNTHIA JACKSON-ELMOORE, B1988, recalls her fervent support for Fightin' Blue Hens basketball and football, but notes that she now has traded the Hens for ancient Greek warriors, namely USC Trojans and Michigan State University Spartans. After graduating UD, she was a process engineer in a hot glass plant with Corning Glass Works, later called CorningAsahi. She recalled Art Metzner's surprise when she asked for a letter of recommendation for graduate programs in public administration, and how he gladly obliged and never questioned her decision, a skill she tries to remember when speaking with students whose paths are not obvious to others. After finishing her doctorate at USC, Cynthia joined the faculty in the Department of Political Science at Michigan

State University, where she studies city politics and state policy processes. She has taught courses on public policy, evaluation, nonprofit organizations and urban politics. Now dean of MSU's Honors College, she says the change from chemical engineering to public policy and political science isn't as big as one might think. Engineers are problem solvers who craft strategies and systems to avoid potential problems, solve pressing problems and innovate in anticipation of future problems. That's what being engaged in policy is all about. Cynthia thinks of her college friends, who are still her friends today: "Life has been kind to us and hopefully we have been correspondingly kind to others."

KEVIN KEYSER, B1988, works for Shell Oil in Houston, Texas, in a variety of roles. Early in his career he was involved in R&D work aimed at developing a fundamental understanding of refining conversion processes, particularly hydrocracking. He spent several years in refinery logistics and optimization, developing methods to maximize the profitability of multi-refinery networks, after which he developed rigorous kinetic models for various refinery processes including hydrocracking, catalytic reforming, isomerization and alkylation. He is currently part of a global team providing technical advice and engineering support to Shell refineries, joint ventures and several 3rd party refining companies worldwide.

MICHAEL SMITH, B1988, earned his PhD in 1992 from The University of Michigan with **PHIL SAVAGE** (also a UD alum) as his advisor. He spent a rewarding 20+ year career with Dow Chemical working in and leading a number of organizations with an emphasis on process R&D, new product implementation or reaction engineering. He recently moved to Momentive Specialty Chemicals to build a new process R&D organization, a challenging position that provides a shorter commute and more time with his wife Deborah and two-year old son, Andrew. Michael recalled Jon Olson marking up his beautiful 50+ page junior lab report that provided a

distillation column design with a brilliant derivation starting from the first law of thermodynamics. On 47 pages, Jon slashed a red line across the page and wrote "BS, more BS, even more BS, etc." Throughout his career in reviewing reports, Michael has used this story to make a point to young industrial researchers.

LEATA DAMOUTH MULLEN, B1998, worked for Gore in R&D after graduation and later switched to new product development in the electronics division. In 2001 she joined Applied Control Engineering, an independent controls integrator. At ACE she had been a project engineer, project manager, proposal manager, team leader and now quality manager, also earning her PE in controls engineering. **MIKE HAWRYLO**, B1998, and **JAMES JARIWALA**, B1998, are at ACE, too. Leata married Casey Mullen in 2007 and they have 2 1/2 year-old twins.

EVELINE W. TSENG, B2000, returned to campus in Sept. 2012 to give an undergraduate information session on job opportunities in the State Department. Eveline demonstrated that State is more complex than conventional diplomacy, and that there are openings for which a degree in chemical engineering is appropriate. As a foreign affairs officer, she currently is in China on a three-year assignment, which could lead to other opportunities and broadening responsibilities.

MARTIN CONVEY, B2003, earned his masters in environmental sciences at the University of Tübingen near Stuttgart, Germany. Since 2006, he has worked as a process engineer in R&D for Continental Tires in Hannover, Germany, focusing on mixing and extrusion. He says that the tire manufacturing process became more complex about 20 years ago, with the mixers serving as reactors, greatly altering the viscoelastic behavior of the uncured rubber, and that his internships with Norm Wagner using rheometers have proven

invaluable. His work is especially rewarding since it allows him to apply his interest in languages through Continental's plants outside of Germany. He is moderately proficient in several European languages, taking evening courses and then practicing on plant visits, whether discussing new rheological techniques in the plant lab or issuing basic work instructions ("I thought I told you not to smoke right next to the peroxide storage bunker?"). Martin lives with his wife and 4-year-old son on the outskirts of Hannover.

EVERTON HENRIQUES, B2003, earned a master's degree in ceramic engineering at Alfred University, then joined AVX Corp. in Myrtle Beach, SC, as a senior engineer in product development. While at Alfred he was a teaching assistant for Mud Lab and joined Science on Wheels, Alfred's team of scientists that promote science, technology, engineering and mathematics (STEM) through experiments, demonstrations and laboratory activities. Unexpectedly inspired to pursue a career in education, Everton worked first remotely, then at SUNY New Paltz, earning the MAT degree in adolescent chemistry. He now lives in Poughkeepsie, NY, with his wife and teaches high school engineering in the Hendrick Hudson School District. There he has introduced three different engineering courses and serves as the science teacher for the school's Alternative Academy, an intervention program for at-risk and/or disenfranchised students. He credits UD chemical engineering with teaching him how to think and reason efficiently, and importantly, to encourage students to a high level of performance.

RYAN KENALEY, B2008, is a new product design engineer with W.L. Gore and Associates in the Industrial Products Division in Elkton, Md. He previously spent four years at Axens NA in New Jersey. He enjoys the Gore culture and is thriving professionally with his many Blue Hen colleagues. In his spare time,

he runs a business designing and marketing aftermarket upgrade parts for paintball guns. He is particularly proud of the Shocker Eigenbolt, which serves to chamber a round and then release a metered amount of compressed gas to achieve a fixed velocity of 300 feet/sec. Ryan's UD tutelage is on full display within this single part, including the material choice, the dynamics of the valving (feedback control) and the flow path of the valve ports (optimized using CFD). Ryan stays in touch with **JOSH STOTTMANN**, **DARREN WAPPES**, **GREG DUFFY** and **MICHAEL DIGNAN**, all class of 2008. Greg Duffy is still at BioChem and has developed into an impressive controls engineer. This fall he will marry a fine girl he met at UD. Mike Dignan joined a few other '08 CHEG at the USPTO, to apply his Columbia law degree.

SARAH BANNISTER, B1995, writes that she has become an academic. "I moved to Eugene, Oregon, to become the associate director of Alternative and Public Interest Careers at the University of Oregon School of Law. I enjoyed my time in law practice at Covington & Burling LLP, and I was ready to work with students as they seek to navigate the challenging and dynamic legal education and employment landscape."

BRIAN WALCK, B2008, has been a patent examiner at the USPTO since graduation. He reports that the Uebler course, CHEG 595, was helpful in guiding his career, but that he selected it because it met at night; "I'm not a morning person." The clincher for his job selection was the job fair where two representatives from USPTO, one a UD grad, described the opportunities. There are 5000 examiners at the Alexandria site, and Brian has 10 topics in which he evaluates applications. Ironically, he reads those in materials science whereas a materials science grad reads those in chemical engineering. He lives in the Washington, DC area.

Giving back

Thank you to the many friends and alumni who have made generous contributions over the past year. Your gifts are used for many worthwhile purposes, including support of our research and educational programs.

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In Memoriam

James R. Katzer

November 2012

JAMES R. KATZER, founder of UD's Center for Catalytic Science & Technology, which attracted \$800,000 in new research funding in its first year, died Nov. 2, 2012 at age 71. Katzer joined UD in 1969 as an assistant professor and was promoted to full professor by 1978. He served as an affiliate professor and Technical Advisory Council member at the Department of Chemical and Biological Engineering at Iowa State University. He also was a director on the Technical Advisory Board at the China National Institute for Clean and Low Carbon Fuels. Katzer worked at Mobil Oil Corporation, and later ExxonMobil Corporation, in research science, retiring in 2003. He held memberships in the National Academy of Engineering, the Cosmos Club of Washington D.C. and the Blue Hill, Maine Garden Club. He was born in Grundy County, Iowa, received an undergraduate degree in chemical engineering from Iowa State University and then a Doctor of Philosophy degree from the Massachusetts Institute of Technology. Katzer is survived by his wife, Isabelle Katzer; mother Velma Sheller; son Dr. Robert James Katzer; daughter Anne Louise Katzer; brothers Wayne and Ken Katzer; and sister JoAnn Katzer.

Courtesy of Legacy.com

Charles S. Joanedis, B1950

September 2012

CHARLES S. JOANEDIS, B1950, age 85, died Sept. 19, 2012 at his home in West Grove, Pa. Born in New York City, Joanedis served in the Navy in WWII before earning a chemical engineering degree from UD in 1950. After six years in the chemical industry, he joined Getty Oil Co. at its Delaware City refinery. During his 28-year career, he held positions in Delaware, New York City and Tulsa, Okla., before retiring in 1984 as vice president of product supply and distribution. He was a member of the American Petroleum Institute and a registered professional engineer. In 1988, he endowed a UD scholarship for chemical engineering students and helped establish the Chemical Engineering Class of 1950 Scholarship Fund. He was elected to UD's Alumni Wall of Fame in 1988, and awarded the Outstanding Alumnus of 1991 and UD's Medal of Distinction in 1998. He received the National Society of Fund Raising Executives' Philanthropy Day Award in 1997. A devoted Blue Hen and sports booster club member, he held football season tickets for over 40 years, frequently following the team to away games. As a final demonstration of his love for the university, he bequeathed his body to its Anatomical Gift Program to assist students training to become health professionals.

Courtesy of Legacy.com

Samuel P. LaPenta, B1942

October 2012

SAMUEL P. LAPENTA, B1942, formerly of Alton, N.H., died on Oct. 7, 2012 at age 94. Born and raised in Wilmington, Del., he later resided in Richmond, Va., Schenectady, N.Y. and Aiken, S.C., before moving to Alton in 1994. During World War II, LaPenta served as a captain in the U.S. Army, mostly in the Pacific Theatre. He met his wife, who served in the Navy, during his service. LaPenta worked for DuPont as a chemical engineer for many years and retired in 1980. A family man, he enjoyed gardening, bird watching, photography and his dog, Lucky. He is survived by his wife Josephine LaPenta; six children: Dr. Michael J. LaPenta, Mary E. Bohm, Peter J. LaPenta, Dr. John J. LaPenta, Patricia L. Tully, and Anne L. Measell; 16 grandchildren; 6 great grandchildren; a sister, Louise Matteoli; and brother, Carmen LaPenta.

Courtesy of Legacy.com

Judith Katherine Sandler

August 2013



JUDITH KATHERINE SANDLER, wife of Stanley I. Sandler, H.B. duPont Chair of Chemical and Biomolecular Engineering, passed away Aug. 2, 2013 at the age of 71 after a courageous battle with cholangiocarcinoma. The daughter of Hungarian immigrants, Judith was born in The Bronx, New York City. She studied at Hunter College (NYC), the University of Minnesota and

the University of California at Berkeley before graduating from the University of Delaware with a bachelor's degree in education. She spent 15 years designing a wide range of computer-based instructional materials for the University's Plato Project, that became the Office of Computer Based Instruction, before retiring. Judith enjoyed lunching with good friends, dinner with family, biking with her husband and going to museums with her sister. She was fond of Winterthur and Longwood Gardens, attending her three books clubs, photography and making travel books, and crossword puzzles and Scrabble. She is survived by her husband; children Catherine Julietta, Michael Howard, Joel Abraham and his wife Patricia; and sister Martha Levites.



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Centennial

We will be celebrating the centennial of chemical engineering at Delaware throughout 2014, with the main activity being a Centennial Reunion to be held in Newark over the weekend of September 19-21, 2014. The weekend will include social activities, historical reminiscences, a centennial banquet, and most importantly, an opportunity to see friends and celebrate the successes of the department and our alumni.

Please register at www.che.udel.edu/100/reunion to add your name to the mailing list for updates regarding the reunion. We especially encourage you to entrain your classmates and fellow alumni as well!

Celebration

AN EQUAL OPPORTUNITY EMPLOYER—The University of Delaware does not discriminate on the basis of race, color, national origin, sex, disability, religion, age, veteran status, gender identity or expression, or sexual orientation in its programs and activities as required by Title IX of the Educational Amendments of 1972, the Americans with Disabilities Act of 1990, Section 504 of the Rehabilitation Act of 1973, Title VII of the Civil Rights Act of 1964, and other applicable statutes and University policies. The following person has been designated to handle inquiries regarding the Americans with Disabilities Act, the Rehabilitation Act, and related statutes and regulations: Tom Webb, Director, Office of Disabilities Support Services, 240 Academy Street, Alison Hall Suite 119, University of Delaware, Newark, DE 19716, 302-831-4643. The following person has been designated to handle inquiries regarding the non-discrimination policies and to serve as the overall campus coordinator for purposes of Title IX compliance: Bindu Kolli, Chief Policy Advisor, Office of Equity and Inclusion, 305 HULLIHEN HALL, University of Delaware, Newark, DE 19716, 302-831-8063. The following individuals have been designated as deputy Title IX coordinators: for Athletics, Jennifer W. Davis, Vice President for Finance and Administration, 220 HULLIHEN HALL, University of Delaware, Newark, DE 19716, 302-831-2769; and for Student Life, Dawn Thompson, Dean of Students/AVP for Student Life, 101 HULLIHEN HALL, University of Delaware, Newark, DE 19716, 302-831-8939. Inquiries concerning the application of anti-discrimination laws may be referred to the Title IX coordinators or to the Office for Civil Rights, United States Department of Education. For further information on notice of nondiscrimination, visit <http://wdcrobcolp01.ed.gov/CFAPPS/OCR/contactus.cfm> for the address and phone number of the U.S. Department of Education office that serves your area, or call 1-800-421-3481. 12/2013.