

THE MAGAZINE OF THE UNIVERSITY OF KENTUCKY COLLEGE OF ENGINEERING

# KENTUCKY

## ENGINEERING JOURNAL

*Fall 2013*

A man with short, light brown hair, wearing a dark blue pinstripe suit, a white shirt, and a blue patterned tie, is sitting on a stone wall. He is looking directly at the camera with a slight smile. His hands are clasped in his lap. The background shows a brick building with a balcony and some greenery.

# Michael Bowling

talks about his education at  
UK, his success at AT&T  
and the importance of  
thinking globally.





## Chemical engineering professor Christina Payne

joined the faculty of the Department of Chemical and Materials Engineering in 2012 after serving as a research scientist at the National Renewable Energy Laboratory in Golden, Colo. She has wasted no time making her mark, recently receiving publication in the September 3, 2013 issue of the prestigious journal *Proceedings of the National Academy of Sciences of the United States of America (PNAS)*.

The article, “Glycosylated linkers in multimodular lignocellulose-degrading enzymes dynamically bind to cellulose,” featured collaborators from the United States, Sweden and Belgium in a study that uncovered new functionality in an intrinsically disordered protein region. Earlier this year, Dr. Payne co-authored an article characterizing a salt-tolerant cellulose from a wood-boring crustacean that appeared in the June issue of *PNAS*.



# Message from the Dean



Welcome to the inaugural issue of *Kentucky Engineering Journal*. I am excited that the University of Kentucky College of Engineering is once again producing a bi-annual digital and print publication that showcases our outstanding research, faculty, students and alumni.

In this issue, we are featuring Dr. Sue Nokes' research team's efforts to engineer eco-friendly biofuels from corn stover, wheat straw and other crops—an ambitious project that is funded through a nearly \$7 million grant from the National Science Foundation (NSF). We are also happy to tell the story of graduate student and recent NSF research fellowship winner Anastasia Kruse, who serendipitously discovered the engineering education she sought in her own backyard. Additionally, in this issue we take a retrospective look at the career of retiring mining engineering professor Andrew Wala and we put our alumni spotlight on 1990 electrical engineering graduate Michael Bowling, who is now senior vice president of corporate strategy for AT&T. Finally, make sure you read the back page interview with stalwart civil engineering professor Hans Gesund, who just began his 56th year of teaching at UK. His wife has a philosophy about retirement worth remembering!

The college is buzzing with great stories and I am confident you will enjoy hearing about them in this and future issues of *Kentucky Engineering Journal*.

Sincerely,

John Y. Walz  
Dean

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## FRONT COVER

Former UK Student Activities Board president Michael Bowling (BSEE '90) is making the most of global opportunities and leading AT&T to new heights.

UNIVERSITY OF  
**KENTUCKY**  
College of Engineering



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# THE FARM OF THE FUTURE

*On paper, Dr. Sue Nokes' project is officially titled: "On-Farm Biomass Processing: Toward an Integrated High-Solids Transporting/Storing/Processing System."*

*Those in the know refer to it as "The farm of the future."*


Dr. Sue Nokes, chair of the Department of Biosystems and Agricultural Engineering at the University of Kentucky, is spearheading a multi-disciplinary, multi-institutional team of researchers that is investigating ways to produce environmentally-friendly biofuels from post-harvest leftovers like wheat straw and corn stover, as well as crops grown specifically for fuel processing, including indigenous switchgrass and miscanthus. The results of this project could play an important role in reducing the United States' dependence on foreign oil.

"That is the ultimate goal," confirms Dr. Nokes, "to replace a portion of petroleum-based fuels, and to bring some of the fuel profits back to the farm."

The four-year \$6.9 million federal grant was one of eight awarded nationally for research into biofuels, bioenergy and biobased products. The 21 member research







*“We have to make sure we don’t slow the farmer down just to get the lower-value biomass. Everything about this process has to work for them.”*

team includes faculty members from UK, North Carolina State University and the University of Wisconsin, as well as researchers from Oak Ridge National Laboratory and the Agricultural Research Service—not to mention several undergraduate and graduate students—representing the disciplines of biosystems engineering, chemical engineering, chemistry, microbiology, plant and soil

science and horticulture.

“The team we put together is first class. It is a lot of fun working with these people,” comments Dr. Nokes.

Because wheat straw and corn stover are composed of glucose and in abundant supply on a typical farm,

Dr. Nokes and her team have organized their research around a process that will utilize microorganisms to convert simple sugars to butanol. According to the “farm of the future” model, which is displayed on the first floor of the Charles E. Barnhart Building and also transported to various conventions and expos, 1,250 acres of wheat would likely yield 4,100 bales of wheat straw, 1,250

acres of corn would make approximately 1,900 bales of corn stover and 250 acres of switchgrass could produce 2,500 bales of switchgrass in one year. However, these are not the round bales normally associated with hay; instead, the bales in the team’s model are large, rectangular blocks that weigh close to 1,500 pounds. Producing such bales requires special machinery, which



is why biosystems and agricultural engineering professor Mike Montross has been working with CNH America, a leading manufacturer of agricultural and construction equipment, on designs for a new kind of baler that is pulled behind the combine so the farmer only has to go through the field once.

“We have to make sure we don’t slow the farmer down just to get the lower-value biomass,” says Dr. Nokes. “Everything about this process has to work for them.”

To streamline the process, rectangular-shaped bunker silos are used to house the bales. Because the treatments are flushed with water through specially designed overhead sprinklers, farmers can leave the bales tied—a time and energy-saving aspect built into the system to make the process as efficient as possible.

At this time, researchers on the team are working on both chemical and biological pre-treatments that can achieve the all-important first step in the process—removing unnecessary material. Plants contain a woody substance called lignin in addition to the cellulose needed for the microorganism to produce glucose. Because the microorganism used in the process cannot use lignin, one of the research areas involves how to effectively remove the unwanted parts of the energy crops so the microorganism can get to the cellulose unimpeded by what it cannot handle. Dr. Nokes explains that to maximize their resources, the team is looking at collecting the processing liquid and systematically recycling it through the sprinklers.

“Farmers have the time and space to let the agents work through the bale. Operators can regularly take off the product, separate what they want and send what isn’t needed back in for another round.”

But what remains once the pre-treatment and microorganism have done their work? Dr. Nokes says the resulting liquid is a mixture of several chemicals that needs to be separated from the water. This is where UK chemical engineering professors Barbara Knutson and Stephen Rankin lend their expertise to the project.

“Again the process has to be a low cost and low capital investment because it’s on the farm. At this point, we just want to remove the water and not try to separate the chemicals. They will have to be separated eventually, but if we can just send them off the farm we will have densified the energy,” Dr. Nokes clarifies.

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*“By the end of the project, we have to show that what we are proposing is 20% less detrimental to the environment than using petroleum.”*

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The end result is that four tractor trailer loads of baled energy crop are condensed into one tanker truck, minimizing the transportation costs off the farm. The chemicals will eventually be separated at a refinery. The crude butanol is kept and the leftover lignin and cellulose are discarded. But what happens to the solid refuse once the liquid is collected? Dr. Nokes says researchers are investigating several options,

among them combusting the biomass, recycling it onto the land and even feeding it to cattle.

“An important part of our research is the life cycle analysis. By the end of the project, we have to show that what we are proposing is 20% less detrimental to the environment than using petroleum.”

So how are farmers responding to this vision for the farm of the future?

“We have had farmers ask us if they should start building bunker silos and we’ve said, ‘Not just yet,’” Dr. Nokes laughs. “We have experienced success at the bench scale and now we’re working on a larger scale. Next we will try a 1,500 pound bale and keep scaling up. Our mandate is to discover what works and *then* optimize.”



This section of UK’s North Farm is devoted to alternating rows of miscanthus and switchgrass—energy crops grown for eventual conversion to biofuels.





# AT THE **TOP** OF HIS **GAME**

*Mining engineering professor Andrew Wala is calling it a career in December; his current research output suggests otherwise.*

In December 1956, a young skier from the mountainous region of Beskidy, Poland named Andrzej (Andrew) Wala was on the verge of realizing one of his deepest aspirations: becoming a competitive skier. A successful junior national skier, Wala was days away from traveling to France where he would make his debut on the Polish national team.

But the day before he was scheduled to depart, the 18 year old Wala fell during a training session and broke his leg, effectively ending his skiing career before it had a chance to begin. After the accident, Wala's skiing coach offered not only words of consolation, but also wise words of direction.

"He told me, 'Andrzej, now it's time to go to college,' he recalls with a grin. "So I started studying for the entrance exam."

Thus, a fruitful career in mining engineering and education was born out of personal disappointment and a radical change in plans. Wala enrolled at the University of Mining and Metallurgy in Krakow and majored in electrical engineering. Five years later, he joined the Strata Mechanics Research Institute at the Polish Academy of Sciences as a research engineer in the Mine Ventilation Group. The group's goal was to perform innovative research dedicated to monitoring and automating the ventilation systems of Polish coal mines. There, Wala

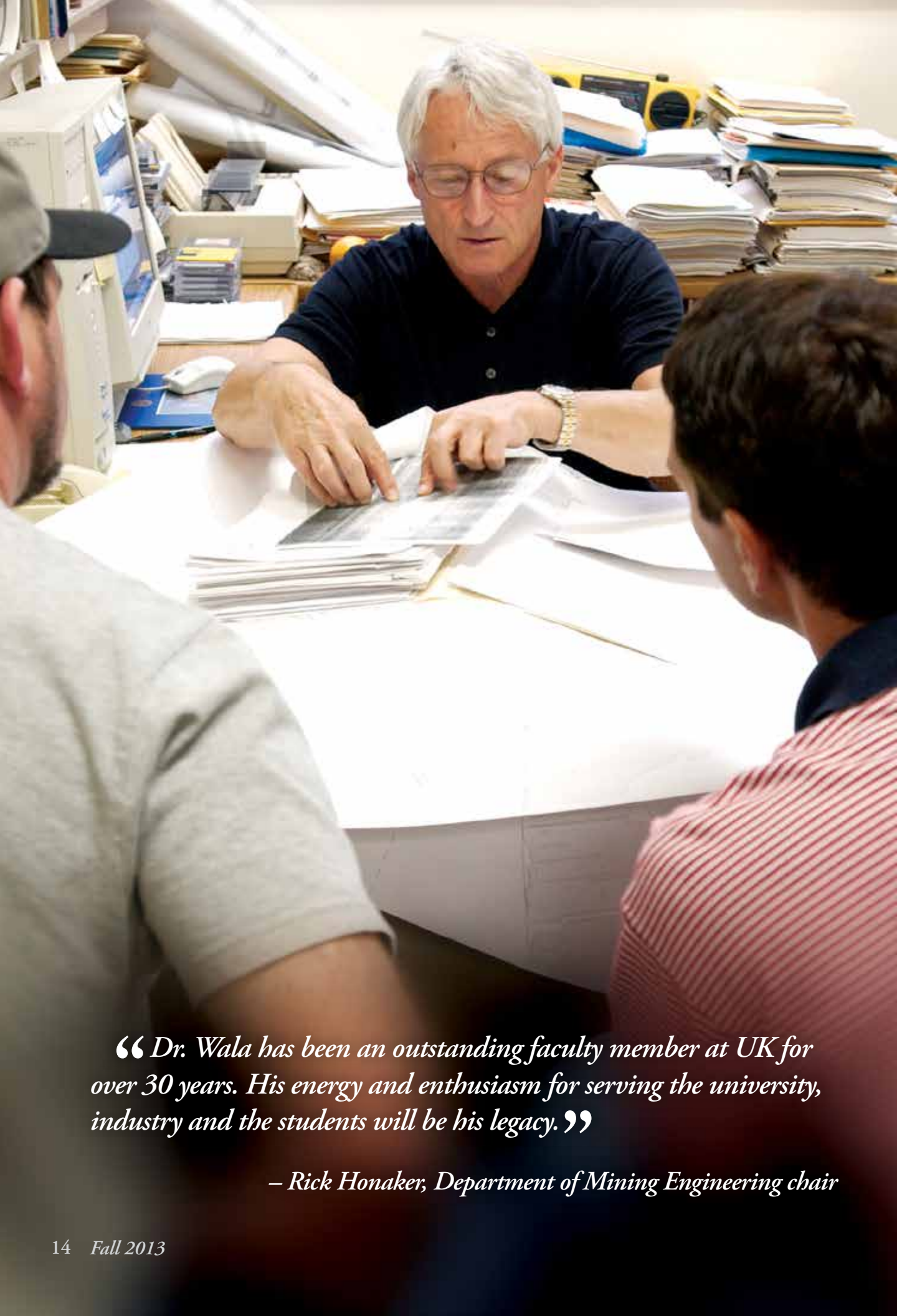
found the niche where he would invest the rest of his career—mine ventilation.

In 1980, Dr. Wala was invited by University of Kentucky professor and former countryman Kot Unrug to teach a mine ventilation course at UK as a visiting professor. At that time, mining engineering was an area of concentrated study within the Department of Civil Engineering and there was no mining ventilation lab. However, while in Poland, Dr. Wala and his team had gained experience designing and building measuring and control instruments; he was well-prepared for the task of founding a lab at UK. When it opened, the lab had no peer among the other mining engineering schools in the United States.

"When I look back on my career, setting up the mine ventilation lab at UK from scratch is the achievement of which I am most proud," smiles Dr. Wala. Eventually, he would consult and help create similar labs at the University of Nevada, Reno and the University of West Virginia.

Dr. Wala's passion for safe mine ventilation systems is why he is still fully engaged in research and product development, despite entering "phased retirement" in 2009. That was the year Dr. Wala was awarded a five-year grant worth \$1.2 million from the National Institute for Occupational Safety and Health (NIOSH) to improve air





*“Dr. Wala has been an outstanding faculty member at UK for over 30 years. His energy and enthusiasm for serving the university, industry and the students will be his legacy.”*

*— Rick Honaker, Department of Mining Engineering chair*

flow in underground coal mines. Those acquainted with his research say that while he is formally retiring from UK in December, they have seen little evidence of Dr. Wala slowing down. The result is that he and two of his Ph.D. students have invented truly breakthrough mine ventilation software.

“The safety and the health of miners working in underground mines is the most important concern in mining,” he insists. “No underground mine can function safely without a properly operating and managed ventilation system.”

In 2010, Dr. Wala was awarded the Howard L. Hartman Award, which recognizes distinguished contributions in practice, teaching or research in the field of underground ventilation engineering. Not surprisingly, Dr. Wala’s devotion to miner safety has endeared him to industry leaders such as Patriot Coal executive vice president Mike Day.

“Dr. Wala is an exceptional educator and outstanding leader in the mining industry. He has provided instruction, guidance and friendship to mining engineers for over five decades and laid a foundation of learning that has positively influenced many careers in the mining field,” said Day when asked about the professor’s impact.

Once retired, Dr. Wala plans to enjoy traveling with his wife, Elzbieta (Elizabeth). He is currently eyeing the South American countries of Argentina, Brazil and Chile as their first stops. However, officially retired or not, in all likelihood he will continue monitoring changes in the mining industry.

“Because of our computer-dependent society, in 10-15 years I suspect there will be no miners underground performing actual mining operations and mining will be done completely by remote control,” speculates Dr. Wala. “This will bring a new world of challenges for future generations of mining engineers to control and solve.”

Let’s hope those future engineers are as talented, resourceful and passionate as the man whose abbreviated skiing career led to innumerable contributions to the safety of miners worldwide.

## What Does Dr. Wala’s Software Do?

“We are developing two unique software products. One student is working on software that will allow for a ventilation network analysis of a 1-dimensional flow combined with a 3-dimensional flow through part of the ventilation system using computational fluid dynamics (CFD). Combining these two dynamic models into one hybrid model is unprecedented. The other student is developing industry-oriented CFD simulation software for the design and analysis of face ventilation systems. Both of these software programs will help us simulate the ventilation scenarios in underground mines and solve complex problems, such as diluting methane to avoid explosions and removing harmful dust from around machine operators. Whereas before we could only show the patterns of air flow 1-dimensionally, we now have the software to see how air is behaving dynamically in 3-dimensions as it flows through the mine. Obviously, the spaces the coal miners inhabit are 3-dimensional and we need to understand these as such.”

*— Dr. Andrew Wala*







# UPWARD MOBILITY

*Electrical engineering alumnus Michael Bowling  
is rising through the ranks at AT&T  
one zip code at a time.*

It's not easy keeping up with Michael Bowling.

In August, we talked with the AT&T chief marketing officer for business solutions about his areas of responsibility: network sourcing, hosting, cloud and application services, mobility and IP networking. He shared what it was like to lead an organization of 4,000 people that accounts for around half of AT&T's revenue.

Then, on September 1, Michael was appointed senior vice president of corporate strategy—his 13th position with the company he joined after graduating from the University of Kentucky in 1990. As a result, he is handing over his chief marketing officer responsibilities and integrating himself into a new position with new opportunities.

“We won't be moving this time, however,” he laughs.

That this change will not require the Bowlings to move from their residence in Dallas is no small thing; the global opportunities that have come Michael's way through AT&T have taken him to Chile, Brazil, Venezuela, Peru and Mexico. Each move has advanced Michael further in a career that has coincided with our world's increasing demand for total connectivity.

But Michael's progress at AT&T is probably no surprise to those who knew him during his undergraduate years at the University of Kentucky. The two-term president of the Student Activities Board and president of Kappa Sigma who was named the Otis A. Singletary Outstanding Senior Male has always been interested in pushing himself.





"A lot of what I learned in those organizations prepared me for life and work," Michael recalls. "I enjoyed playing a bigger role on the UK campus and broadening my horizons beyond academics."

Hired by BellSouth as a technical specialist upon graduating with a bachelor's degree in electrical engineering, Michael began eyeing global openings within the company (BellSouth was purchased by AT&T in 2006). After earning an MBA from Vanderbilt University in 1997, he began working in an internal group that specialized in consulting and business development abroad. His first taste of international operations came in 2000 as product marketing director for BellSouth International. In that role, Michael led projects in Guatemala, Venezuela and Chile—experiences that have convinced Michael that today's engineering student must avail him or herself to international opportunities.

"The amazing benefit of working abroad is that you get a much broader perspective on what you do," he reasons. "You see new ideas that expand your creativity and it helps you better interface with other cultures. It changed my perspective on the way we do business. Also, if you look at the trend, it's not just big companies who are thinking globally, but smaller ones who are experiencing international growth as well. Students would certainly be served by taking a more global view."

Michael's success in South America opened the way for

him to become chief marketing officer for BellSouth's wireless group in Lima, Peru. He considers a business turnaround he facilitated there to be one of his top career achievements.

With international business comes the necessity of living abroad, and the Bowlings have proven they are an adaptable family. When Michael served as president of AT&T Mexico from 2009-2012, his wife, Nicole and three young children, Isabella, Mark and Webb, acclimated themselves to the culture. When a promotion

returned the family to Dallas, the children were disappointed to leave their friends and life in Mexico.

"I believe that if I were asked to work in China or Latin America, our kids would jump at the chance. In fact, one of them recently asked, 'Where we are going to move this year?'" shares Michael.

Perhaps such a move will come in time, but for now Michael is embracing his new role in corporate strategy and working alongside AT&T's senior management and leadership. As he speculates about the future, he speaks with the

palpable enthusiasm of one who has an enviable birds-eye view of the telecommunications industry.

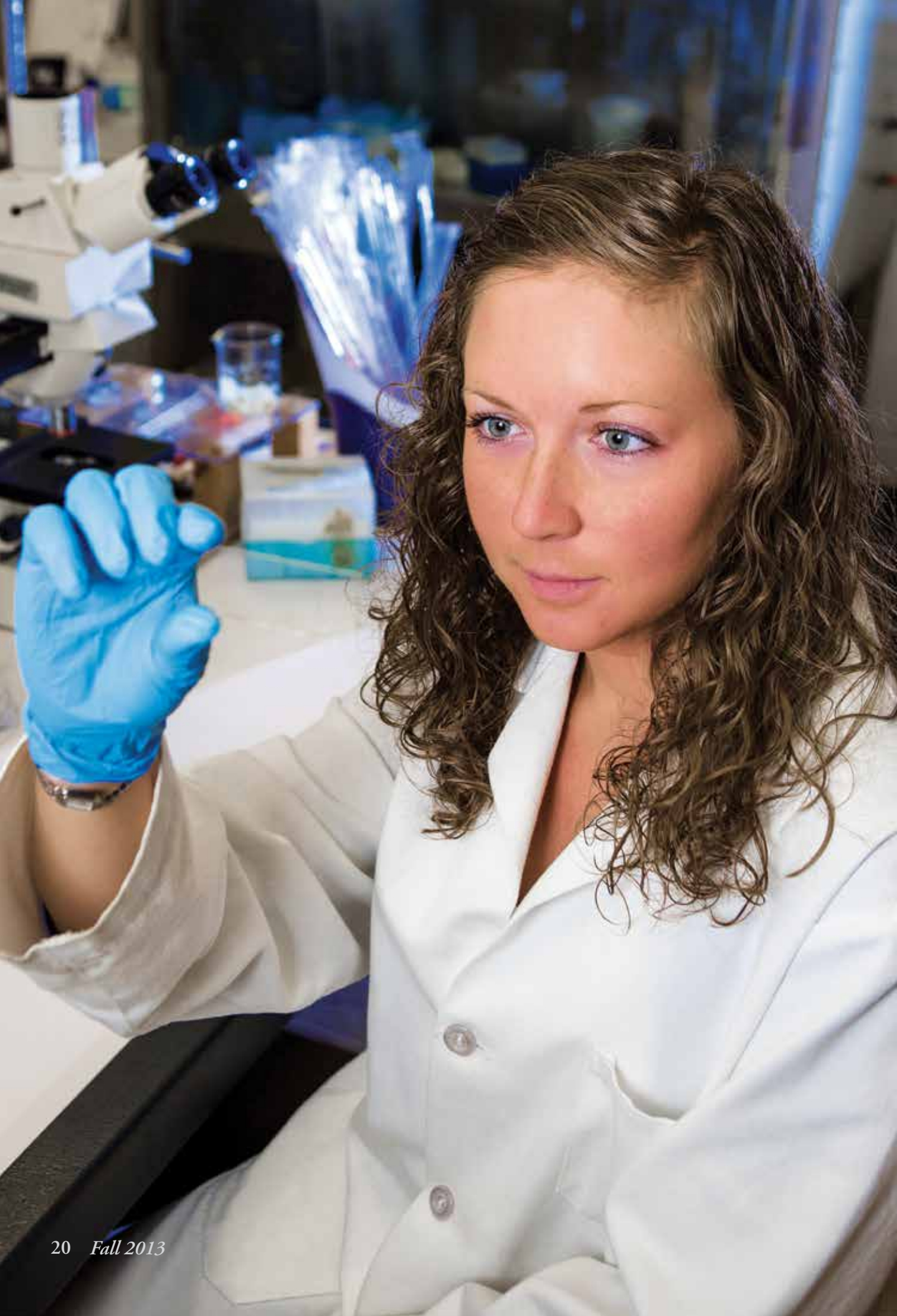
"I am excited about what new mobile technologies are doing to change business and change life. We now carry devices that have our life on them, and our devices are connected to other devices. Mobile and wireless networks are changing the way work is done and they will continue to change and improve our lives. I'm glad to be a part of it."

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*“Mobile and wireless networks are changing the way work is done and they will continue to change and improve our lives. I’m glad to be a part of it.”*

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# THE COMFORTS OF HOME

*Anastasia Kruse didn't know UK could offer her a high-quality engineering education; advice from an unlikely source convinced her otherwise.*

Don't tell our dean, John Walz, but the University of Kentucky College of Engineering owes someone in the chemical engineering department at Virginia Tech—where he was chair—a hearty thank you for sending us Anastasia Kruse.

When Anastasia was researching universities with engineering programs her senior year of high school, she intentionally omitted the University of Kentucky from her list of prospective institutions. A lifelong Lexington resident, Anastasia was ready for a change in geography and college presented the perfect opportunity to experience life in a new state.

Upon visiting Virginia Tech—widely regarded as a national leader in engineering education and research—Anastasia received quite unexpected advice.

“The people in their college of engineering pointed out that I actually had a great engineering school in my backyard,” she recalls. “I hadn’t seriously considered UK for engineering, but the people at Virginia Tech only said great things about it.”

And that’s how Virginia Tech helped UK land an eventual National Science Foundation (NSF) Graduate Research Fellowship winner.





Once Anastasia began seriously considering UK for her engineering education, she discovered the Chemical and Biopharmaceutical Engineering Certificate program, which accepts 10 new students per year and allows them to take special classes offered by the College of Pharmacy. The track exposes students to areas like drug formulation and development as well as processing and manufacturing. Anastasia was intrigued.

“The biopharmaceutical track appealed to me because while I was interested in pharmaceutical studies, I didn’t like the idea of pharmacy school,” she says. “I didn’t want to do more school on top of my undergraduate education.”

Anastasia can only laugh at that last statement since she is now working on her Ph.D. in chemical engineering here at UK; however, as a freshman she couldn’t have accounted for the influence of chemical engineering faculty advisors like Drs. Kimberly Ward Anderson and Zach Hilt who introduced her to a possible future in research.

“During my sophomore year, Dr. Hilt asked if I wanted to do undergraduate research,” Anastasia remembers. “I said, ‘Sure! I didn’t even know I could!’ That was when I began working on cancer therapy research.”

Anastasia says Dr. Anderson, then director of undergraduate studies in the Department of Chemical and Materials Engineering and now associate dean for administration and academic affairs, has also served as a mentor—not just in the area of research, but also as a female in a largely male dominated industry.

“Dr. Anderson has been a great role model for me, both to see where she has gotten and how hard she has had to work to get there. Her roles in the college demonstrate that she really cares about the direction of the college.”

While spending a summer engaged in a Research Experiences for Undergraduates (REU) program with Drs. Anderson and Hilt, Anastasia was bit by the research bug. Suddenly graduate school was a far more appealing option than when she had entered school. Her grades

were excellent and she applied to Vanderbilt, Georgia Tech, Carnegie Mellon, Purdue... and UK. Could UK compete with such schools—three of which were ranked in the top 10 on the 2014 *U.S. News & World Report* “Best Engineering Graduate Schools” list?

After visiting each school, Anastasia pared her choices down to UK and Purdue. While weighing her options, she was offered a position with the Integrative Graduate Education

and Research Traineeship (IGERT) program, which is supported by the NSF. The offer, combined with the local support of her advisors, led Anastasia to make the counterintuitive decision to get her Ph.D. at the same institution that awarded her a bachelor’s degree.

Count Dr. Anderson among those glad she did.

“Anastasia is one of our department’s best graduate students. She has made significant progress on her innovative and exciting research while taking a full load of challenging courses,” she confirms.

Drs. Anderson and Hilt also played significant roles in Anastasia’s NSF Graduate Research Fellowship. Students vying for the fellowship may only apply during the final

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*“Anastasia is one of our department’s best graduate students. She has made significant progress on her innovative and exciting research while taking a full load of challenging courses.”*

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*- Dr. Kimberly Ward Anderson*

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year of their undergraduate degree and the first year of their graduate program. Anastasia applied her senior year with discouraging results.

“Not only did I not get it, but I got poor reviews on my essays,” she admits. “The application is substantial and involves writing three essays, so I debated whether to even apply again. Dr. Hilt and Dr. Anderson encouraged me to try again, so I did. I pulled out my old essays, realized that they really were awful and worked harder on them. I was pleasantly surprised when I got it.”

The fellowship will fund Anastasia’s tuition and research for the rest of her Ph.D. program. Her research involves targeting nanoparticles for hyperthermia applications in cancer therapy. Studies have demonstrated that the presence of heat increases the effectiveness of radiation and chemotherapy treatments. Anastasia says that if magnetic nanoparticles can be conjugated with peptides that specifically target cancer cells, scientists could induce hyperthermia—intense heat—at the tumor site.

“If successful, we would get the same treatment results with a lower dosage of chemotherapy and/or radiation, leading to fewer side effects.”

Anastasia is not, and has not been, afraid to work hard. She admits that as an undergraduate, she studied or worked on homework whenever she was awake Sunday through Friday afternoon (it would be unfair to point out that this must be an exaggeration since she somehow found time to serve as the American Institute of Chemical Engineers (AIChE) student chapter president for one

year and as an Engineering Ambassador for three years). This past spring, she faced her toughest challenge when she took 14 credit hours (above full-time for a graduate student), served as a teaching assistant, supervised five undergraduate researchers in the cell culture lab and advanced her own research.

“I would get to the lab every morning at 7:15 and stay until 6,” she answers when asked how she survived. “Then I would go home and do homework. I had to figure out how I learn and work best—especially working with others when stressed—and maintain consistency. I was

pushed to the limit, but I learned a lot about myself.”

Now that her coursework is complete, Anastasia is already proactively devising strategies to avoid becoming complacent.

“Without the structure of classes, it’s easy to come

into the lab around 10 or 11 in the morning because no one checks up on you. I have tried to combat that by coming in at 7:30 every day and working until 5 or 6. Again, it’s simply being consistent,” she says.

It is that kind of discipline and determination that makes Anastasia a shining star among the over 500 students pursuing graduate degrees in the UK College of Engineering.

Dean Walz’s vision is that seniors evaluating graduate schools will regard UK just as highly as the historically renowned engineering schools on Anastasia’s list. Her story certainly lends credibility not only to the hope that it can happen, but that it is happening already.

But for goodness’ sake don’t tell him *how* she got here.

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**“I had to figure out how I learn and work best—especially working with others when stressed—and maintain consistency. I was pushed to the limit, but I learned a lot about myself.”**

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# TICKET TO RIDE

*Alumnus Mike Marberry's chemical engineering scholarship links the past to the future.*

Mike Marberry is CEO of J.M. Huber, one of the largest family-owned companies in the world. Huber's engineered materials have been enhancing consumer products ranging from pharmaceuticals to food ingredients to residential and commercial wood for 130 years. As CEO, he is no stranger to air travel, having easily amassed over one million miles due to the company's global operations in China, Europe, India and South America. In spite of the years of travel, Mike vividly remembers the first time he ever flew on an airplane.

"My first time on a plane was as a graduate student at UK," he recalls. "I had been conducting proprietary research for Phillips Petroleum and was given the opportunity to fly to Bartlesville, Okla. to present my research to the sponsors. It's one of my fondest memories of my time at UK."

Mike is a proud UK alumnus who earned his bachelor's degree in chemical engineering in 1981 and his master's degree in chemical engineering in 1983. His successful career has enabled him to create a new scholarship that became available to chemical engineering students in 2012. The scholarship, which totals \$50,000 over five

years, is designed to provide not only scholarship aid, but also contribute to student enhancement. In addition to annually awarded scholarships, chemical engineering students will receive funds to attend annual conferences and take interactive field trips.

Mike was inducted into the College of Engineering's Hall of Distinction in 2005 and serves on the advisory board for the Department of Chemical and Materials Engineering. Whether visiting for an advisory board meeting or greeting the newest Hall of Distinction class, Mike enjoys returning to the university he wanted to attend since childhood. "I can't say enough about the role the University of Kentucky played in developing my passion for learning and cultivating the discipline and problem solving skills I have used throughout my life and career," he reflects.

Mike's generosity provides a fitting link between the past and the future. "I have been more successful in my career than I ever would have thought possible as a young man. It has given me a strong sense of gratitude and a desire to help young people in Kentucky move forward with an education in a tough economy."

*"I have been more successful in my career than I ever would have thought possible as a young man. It has given me a strong sense of gratitude and a desire to help a young person in Kentucky move forward with an education in a tough economy."*

Photo credit: Robin Nelson



# BY THE NUMBERS

734

FRESHMEN  
(up 50% from fall 2008)

28.1

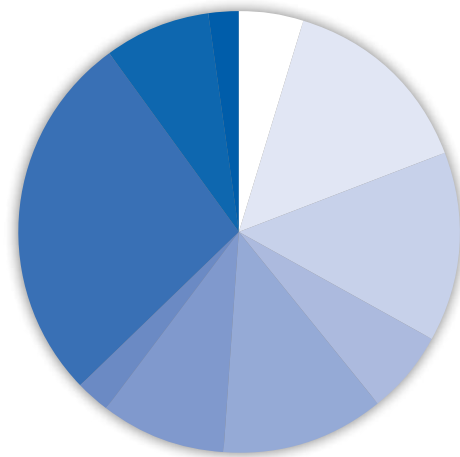
ACT COMPOSITE  
(university-wide average 25.3)

2,911

UNDERGRADUATES  
(up 62% from 2008)

28.7

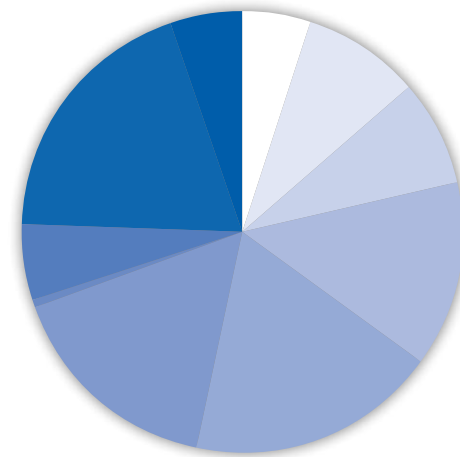
ACT MATH



UNDERGRADUATE  
MAJORS IN THE  
COLLEGE

Biosystems	144
Chemical	420
Civil	400
Computer Engineering	184
Computer Science	345
Electrical	268
Materials	70
Mechanical	789
Mining	227
Undeclared	64

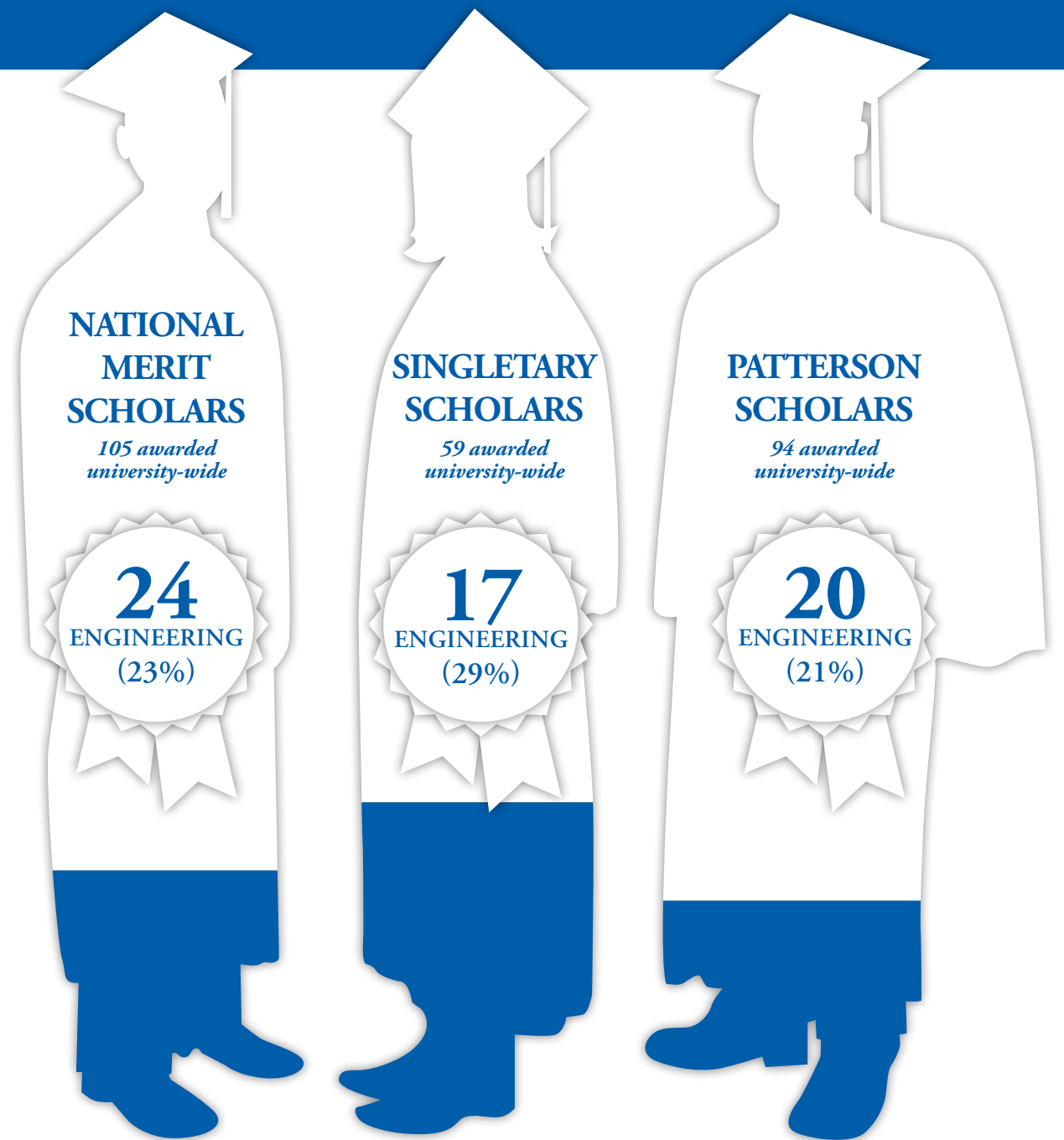
Total 2,911



GRADUATE  
MAJORS IN THE  
COLLEGE

Biosystems & Agricultural	27
Biomedical	44
Chemical	40
Civil	70
Computer Science	94
Electrical	83
Manufacturing	3
Materials	28
Mechanical	98
Mining	27

Total 514  
Master's students: 208  
Doctoral students: 306



18:1

STUDENT/FACULTY RATIO







**David Silverstein, Ph.D.**  
Director of Engineering Extended  
Campus Programs – Paducah

**D**avid Silverstein, Director of Engineering Extended Campus Programs – Paducah, joined the Department of Chemical and Materials Engineering as an assistant professor in 1999. Upon his arrival, Silverstein was tasked with building an independent student chapter of the American Institute of Chemical Engineers (AIChE) for the Paducah Campus. From the beginning, Silverstein established a tradition of professional dedication and outreach among the Paducah students that has led to the chapter receiving an Outstanding Student Chapter Award 12 years in a row—every year since its inception. In recognition of his outstanding achievements as chapter advisor, Silverstein received the national AIChE Outstanding Student Chapter Advisor Award in 2009. This summer, he taught in Christchurch, New Zealand courtesy of a University of Canterbury Visiting Erskine Fellowship.



**Gabriel Dadi, Ph.D.**  
Assistant Professor of  
Civil Engineering

**W**hen Gabe Dadi drives by the relatively new College of Pharmacy building, he admires the edifice from a perspective other passersby don't have—he participated in the building's construction. After receiving a bachelor's degree in civil engineering and a master's degree in business administration through the UK College of Engineering's BS/MBA program, Dadi joined a construction firm to put his knowledge of construction engineering and project management to use. His work sparked interest in going back to school and this summer Dadi earned his Ph.D. in civil engineering, focusing his research on cognitive workload and performance of construction professionals in using new technologies—such as 3D CAD modeling, building information modeling (BIM) and 3D printers for spatial engineering information. Upon receiving his Ph.D., Dadi was hired as an assistant professor in the Department of Civil Engineering.



**Kenneth Freeman**  
Mechanical Engineering  
Sophomore

**K**enneth Freeman is a sophomore mechanical engineering student who is considering eventually pursuing graduate studies in biomedical engineering in order to design and innovate cochlear implants. Why cochlear implants? Perhaps because Freeman's own implant allows him to hear—something which otherwise would be impossible since he is profoundly deaf. However, deafness hasn't affected his education since he finished his first year as a mechanical engineering major with a 3.7 GPA. In fact, handling the rigor of an engineering education might not even be Freeman's biggest challenge—that could be swimming. This summer, he and his brother, Edward, traveled to Sofia, Bulgaria to participate in the 22nd Summer Deaflympics. Kenneth swam in eight events, placing in the top 10 in four of them. The Lexington native also competed in the World Deaf Swimming Championships in Coimbra, Portugal in 2011.

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## Mechanical Engineering Research Team Wins Multi-Year NASA Grant

Researchers from the University of Kentucky have received a \$1.05 million NASA Research Award through the Experimental Program to Stimulate Competitive Research (EPSCoR). The grant is titled, "Improving Heat Shields for Atmospheric Entry: Numerical and Experimental Investigations for Modeling Ablative Thermal Protection System Surface Degradation Effects on Near-Wall Flow," and aims at understanding the complex behavior of sophisticated ablative heat shield materials. These materials are able to withstand higher velocity interplanetary atmospheric entry by vaporizing some of their surface material to move heat away from the vehicle.

The science team is led by Dr. Alexandre Martin, who is developing theoretical and numerical models that can be tested through targeted laboratory experiments. Numerical simulation using these models is then optimized with the help of Kentucky State University professor Dr. Chi Shen utilizing UK's new supercomputer cluster. Co-investigator Dr. Sean Bailey will perform the experimental part of the research with the help of Dr. Michael Winter. All three UK researchers are professors in the Department of Mechanical Engineering. In addition, the team is working with five researchers from NASA Ames Research Center, NASA Johnson Space Center and NASA Langley Research Center.

NASA Kentucky Space Grant Consortium and EPSCoR programs director Dr. Suzanne Weaver Smith and associate director Dr. Janet Lumpkin will help manage the grant and communicate new opportunities for the research team and accomplishments to the NASA program office.



*Dr. Alexandre Martin*

## Department of Biomedical Engineering Established



The longstanding biomedical engineering program at the University of Kentucky is now a department within the College of Engineering.

The former Center for Biomedical Engineering officially became the Department of Biomedical Engineering on July 1, following unanimous approval by the UK Board of Trustees. David Puleo, chair of the department, says the move is a big step forward for the program.

"We have had biomedical engineering here, in one form or another, since the late 1950s. By becoming a department, we take another step forward, building on the decades of achievements of our alumni, students, staff and faculty."

John Walz, dean of the College of Engineering, says the move will help to advance the goals of the college in undergraduate education, in addition to graduate study and research.

"Forming a Department of Biomedical Engineering is an important step in the continued evolution of this program at UK. Having a formal department will not only help us attract the best faculty and graduate students, it will also allow us to offer undergraduate courses in this area, which are always in great demand."

## UK Students Travel to Honduras for Humanitarian Mission



**Left to right:** Faina Matveeva, Stephen Parsons, Austin Dahlem, Alexa Deep, Dr. Nick Stamatiadis, Patrick Bischoff. Not pictured: Andrew Davis.

In July, a group of University of Kentucky engineering students left Lexington for Honduras, where they put their skills to use to provide clean drinking water for a small village.

The five students, members of the UK student chapter of Engineers Without Borders (EWB-UKY), traveled to the Central American nation along with faculty advisor Dr. Nick Stamatiadis and 2005 alumnus Patrick Bischoff to visit the rural, geographically isolated village of El Carrizo.

The UK student group drew up a plan in 2011 to build a gravity-fed clean-water distribution system, employing a central water tower and a network of tap stands throughout the village. The design phase of the project took close to a year and the recent visit involved planning, taking measurements and coordinating efforts with the local residents. The plan calls for the entire project to be completed in stages over the course of four years.

"It's what you could call humanitarian engineering," explains Austin Dahlem, a civil engineering graduate student and EWB-UKY founder, "using engineering skills to solve basic human problems and make a difference in people's lives."



## Truszczynski Elected Association for the Advancement of Artificial Intelligence Fellow



University of Kentucky computer science professor Miroslaw Truszczynski was one of eight individuals recently recognized as a Fellow in the Association for the Advancement of Artificial Intelligence (AAAI). The AAAI honors a select group of renown artificial intelligence (AI) scientists each year for their outstanding contributions to the theory or practice of AI by electing them AAAI Fellows, which is a lifetime honor.

“Election to AAAI Fellow is an honor I value a lot as it comes from the most influential professional organization promoting AI. It gives me a great deal of satisfaction to know that my research contributions were deemed worthy of this kind of recognition by the AI community,” says Dr. Truszczynski.

Dr. Truszczynski has taught computer science at UK since 1984.

## Two Chemical Engineering Undergraduate Students Win Research Awards in China



Max Croft and William Croft, chemical engineering students at the University of Kentucky College of Engineering Paducah Campus, participated in the 3rd International Conference on Sustainable Chemical Product and Process Engineering (SCPPE) in Dalian, China May 27—30.

At the conference, Max and William both took home an Outstanding Undergraduate Research Award for their collaborative work with chemical engineering professor Jeff Seay, who accompanied them on the trip. Max’s paper was titled “Interfacial Phenomena in the Production of Low-Cost

Biodiesel in Rural Africa,” and William’s paper was titled “Developing an Optimal Chemistry for Producing Low Cost Biodiesel from Local Feedstocks in Rural West Africa.”

## Jawahir Awarded 2013 Milton C. Shaw Manufacturing Research Medal

I.S. Jawahir, James F. Hardymon Endowed Chair in Manufacturing Systems and Founding Director of the newly established Institute for Sustainable Manufacturing (ISM), was named the 2013 recipient of the American Society of Mechanical Engineering (ASME)’s Milton C. Shaw Manufacturing Research Medal.

The award is named after Milton Shaw, a prominent manufacturing researcher and educator who taught for five decades at MIT, Carnegie Mellon and Arizona State University.

“I used Professor Shaw’s textbook to learn metal machining in the 1970s,” says Jawahir. “He was a role model and mentor to many of us who studied manufacturing and I am very privileged to receive this prestigious ASME award.”

## Seay to Receive Inaugural Sustainability Engineering Award



Chemical engineering professor Jeff Seay has been named the inaugural recipient of the American Institute of Chemical Engineers (AIChE) Sustainable Engineering Forum Education Award for outstanding achievement as an educator in the area of sustainability engineering. He will be recognized for his work at the Sustainable Engineering Forum luncheon at the November meeting of AIChE.

In May 2012, Dr. Seay led a group of seven students to Cameroon, Africa, where they produced this prototype of a biodiesel processor that converts indigenous oils to diesel fuel.



# CLASS NOTES

**John Moeller, BSEE 1969**, is a principal at Fosgren Associates. He is also a director at the American CuMo Mining Corp. He resides in Boise, Idaho.

**Rick Crouch, BSChE 1972**, was recently elected president of the National Terrazzo and Mosaic Association during the organization's 90th annual convention in Italy. He is the CEO of Desco Coatings, Inc., a specialty construction firm in Olathe, Kan., working with pharmaceutical production facilities, hospitals and schools.

**Derek Guthrie, BSCE 1978**, was named executive director of the Kentucky Engineering Center, comprising Kentucky Society of Professional Engineers, American Council of Engineering Companies of Kentucky and the Kentucky Engineering Foundation. He was previously with HDR Engineering Inc. He resides in Fisherville.

**Tom McGuigan, BSME 1979**, has been named executive account manager at Flotek Industries, Inc., a diversified global supplier of drilling and production-related products and services to the energy and mining industries. Previously he was with Carbo Ceramics where he served as director of executive sales since 2007 and in other executive sales positions since joining Carbo Ceramics in 1982. He resides in Montgomery, Texas.

**Greg Heitzman, BSCE 1980, MSCE 1982**, is the executive director of the Louisville Metropolitan Sewer District. He

was previously the president and CEO of the Louisville Water Company.

**Matt Clift, BSChE 1981**, recently retired from Tempur-Pedic International, Inc. where he served as executive vice president of global operations. He had been with the company since 2004. He resides in Windermere, Fla.

**Jim Brammell, BSCE 1982**, was named president and CEO of the Louisville Water Company. Since 2007, Brammell served as vice president of operations and chief engineer there.

**Andy Poplin, BSME 1989**, is an industrial product sales manager for Atlas Machine and Supply, Inc., and was previously a territory sales manager for Gardner Denver. He resides in Versailles.

**Patricia Blain Dunaway, BSCE 1994**, is chief engineer for the Kentucky Transportation Cabinet District 4. She resides in Leitchfield.

**Jon Kimberlain, BSChE 1996**, has been elected chair of the Glass Association of North America (GANA) Building Envelope Contractors (BEC) Division. He is an application specialist in high performance building for Dow Corning, which he joined in 1999. He lives in Elizabethtown.

**James Murray, BSCE 1998**, has been promoted to the rank of lieutenant colonel in the U.S. Air Force. Murray is a deputy of

contingency plans branch assigned to Headquarters, Pacific Air Force and has served in the military for 15 years.

**Casey Tyree, BSCE 2001**, has been promoted to civil group leader for the land resources business unit at Barge Waggoner Sumner and Cannon. Tyree recently earned the Project Management Professional credential. In his new position, he will be responsible for design and technical leadership, client satisfaction and sales in the Knoxville, Tenn. office.

**Rendong Bai, MSCS 2007, Ph.D. CS 2008**, is an assistant professor in the School of Technology at Eastern Illinois University. He resides in Champaign, Ill.

**Evan Kovarik, BSMAT 2007**, married Tanya Wesner on August 24, 2013. He is an MBA student at the University of Michigan.

**Lance Lucas, BSME 2007**, married Lauren Goodin on June 29, 2013. He is employed by Lexmark International as a hardware program manager.

## BE INCLUDED

Please send Class Notes to [alumni@engr.uky.edu](mailto:alumni@engr.uky.edu)

## UK Grads Team up for Award Winning Indianapolis Interchange



Civil engineering graduates **Charlie Starling, BSCE 2007**, and **Jason Deering, BSCE 2002**, have been busy putting their Kentucky fingerprints on one of the highest-profile interchanges in Indianapolis.

Charlie Starling, a professional engineer with RW Armstrong (now CHA) was the lead road designer for the highly traveled interchange. "It isn't every day that a new engineer gets to have such an integral role in the design of a major interchange," Starling admits. "I feel very fortunate to have a project like this on my resume."

Jason Deering, the INDOT project engineer, was entrusted with managing the field activities of the \$19 million project. Deering had the daunting task of overseeing construction as the state's contractor worked to demolish and rebuild the entire interchange in only 110 days.

The north-side interchange of Allisonville Road & I-465 carries over 50,000 vehicles per day and provides a gateway to one of the state's busiest shopping areas. Allisonville Road was closed for construction in May 2012 in an attempt to completely rebuild the existing diamond interchange into a single-point urban interchange (SPUI) before the holiday shopping season began. "The schedule was very aggressive," Deering acknowledges. "On-time completion required the work to continue day and night. It proved to be the right decision, as the local motorists and businesses were very pleased to have the new interchange open so quickly."

The project team has received numerous awards, including AASHTO's "Ahead of Schedule" award, as well as a 2013 ACEC Indiana Engineering Excellence Merit Award. The interchange has also been selected as one of AASHTO's top 10 projects in America for 2013.

Unfortunately their effort to paint the interchange blue and white was not approved.

# IN MEMORIAM

Prof. Orville W. Stewart	Mechanical Engineering	1934, 1955
George G. Dixon	Electrical Engineering	1943
John P. Sheehan	Metallurgical Engineering	1943
Merl Baker	Mechanical Engineering	1945
Cecil J. Baker	Mechanical Engineering	1947
Frank A. Heilman	Mechanical Engineering	1947
Edgar H. Sawyer, Jr.	Mechanical Engineering	1948
Elmer T. Lee	Electrical Engineering	1949
Bob L. Paris	Mechanical Engineering	1949
James E. Smith	Electrical Engineering	1949
Herbert L. Fogel	Electrical Engineering	1949, 1954
Walter E. Porter	Civil Engineering	1950
James R. Line	Mechanical Engineering	1951
James R. McNeal	Electrical Engineering	1951
George R. Giles	Electrical Engineering	1954
Logan W. Wallingford	Civil Engineering	1955
William T. Henshaw	Mining Engineering	1956
Glenn Jackson	Electrical Engineering	1956
Lawrence R. Jones	Mechanical Engineering	1956
Charles E. Vandeveld	Civil Engineering	1956, 1968
Joel D. Igleheart	Electrical Engineering	1957
Robert L. Pace	Electrical Engineering	1957
Orville R. Threlkeld	Civil Engineering	1957
John J. Schiller	Mechanical Engineering	1958
John T. Kelly	Civil Engineering	1959
Robert J. Seward	Mechanical Engineering	1959
Billy L. Ball	Civil Engineering	1960
Charles R. Dixon, Jr.	Metallurgical Engineering	1960
John S. Kenney, Jr.	Mechanical Engineering	1960
Marshall L. Payne	Civil Engineering	1963
Joseph E. Whitfield, Jr.	Electrical Engineering	1963
Tommy C. Hopkins	Civil Engineering	1964, 1969
Wayne F. Rogers	Electrical Engineering	1965
George W. King	Electrical Engineering	1967
Fred R. Koury	Mechanical Engineering	1969
William N. Stacy	Electrical Engineering	1970
Laura L. Anderson	Civil Engineering	1971
Jerry C. Neal	Civil Engineering	1971
Charles E. Sohl	Metallurgical Engineering	1972
Everett T. Green	Civil Engineering	1973
Robert S. Nims, Jr.	Electrical Engineering	1973
Robert A. Young	Mechanical Engineering	1974
Charles W. Cornett	Civil Engineering	1978
Edwin Brady	Civil Engineering	1980
Paul A. Clark	Electrical Engineering	1980
Glenn M. Damron	Mining Engineering	1998
Brad Wesley Critchlow	Mechanical Engineering	2004





## HANS GESUND

*"I have known Dr. Gesund as an instructor and a colleague for over 40 years. Given his stamina, I look forward to Hans sending me off when I retire."*

— George Blandford ('74, '76)  
Chair of the Department of Civil Engineering

**H**ans Gesund was born in Vienna, Austria and moved to the United States in 1940. He joined the UK College of Engineering's Department of Civil Engineering in 1958 and is now celebrating his 56<sup>th</sup> year of teaching. We sat down with the iconic professor and asked him to reflect on his time at UK.

**Q:** *What were your ambitions when you began pursuing an engineering degree?*

**HG:** I graduated with my bachelor's degree from Yale in 1950. The idea was that when I got out, I would work with my dad, who operated his own structural engineering consultation business. But my senior year, the department chair, Hardy Cross, asked me if I would like to go to graduate school. I said, "Probably...but I need to make a living." He said, "Let me take care of that. I'll support you." So I agreed and near the end of my master's program, Cross asked if I would like to go on for a doctor of engineering degree (basically the same thing as a Ph.D.). I hesitated and said, "I really need to get to work one of these days." He replied, "You can always work when you get through."

**Q:** *Did you ever get to work with your dad?*

**HG:** I worked with him part-time while earning my doctor of engineering degree, which was good because

I was always up on the latest codes and he had a fairly busy practice. I was able to make some extra money and he was happy I was working with him.

**Q:** *Why did you come to the University of Kentucky?*

**HG:** UK made me the best offer. In a way, that didn't matter because when I came down to interview, it was near the end of April and we had just gotten 22 inches of snow in Connecticut. I came to Lexington and it was 70 degrees. The birds were singing, the trees were budding and I called my wife and said, "Honey, if they make us an offer, we're coming!"

**Q:** *How long do you plan to keep teaching?*

**HG:** As long as the good Lord permits it. My wife and I have been married for 62 years and we're both in good mental and physical shape. As long as we're healthy, I see no reason to quit. Besides, she once told me, "I married you for better or worse, but not for lunch!"

*"Estate planning allows us to give something back in a way that fits within our upcoming retirement plans."*



**The College of Engineering** possesses a long history of loyal donors whose forward-thinking generosity led them to remember the college in their estate.

Former dean Tom Lester knows the power of deferred philanthropy. His own estate plan, which he is developing with his wife, Frances, is geared toward supporting the Thomas W. Lester Scholarship program—the college's undergraduate scholarship program that was renamed in his honor in 2011.

For more information about including the college in your estate plan contact Jeff Snow at (859) 257-9191 or [jeff.snow@uky.edu](mailto:jeff.snow@uky.edu).



