INSIDE THIS ISSUE:

- ABE Spring Banquet
- Illinois research collaboration with Brazilian partners addresses postharvest loss
- ABE establishes new BSL 2 laboratory
- ABE Alumni Rise to the Challenge of ROTC

AND MORE!
Roscoe Pershing’s long history with the Department of ABE and the University of Illinois began when he came to Champaign as a master’s student in the fall of 1962. Pershing earned both his M.S. and his Ph.D. in agricultural engineering, with the distinction of being the department’s first Ph.D. recipient.

“I finished my Ph.D. in 1966,” Pershing said, “and I had a decision to make. Should I continue on the professorial track, or should I go into industry? I had offers from wonderful schools like Texas A&M, North Carolina State, and Minnesota, but I also had industry offers from companies like John Deere and Ford and Caterpillar.”

As an undergraduate, Pershing had spent two summers as an intern for John Deere in corporate product development. “That was a great experience, with good exposure to the company, and I liked it,” Pershing said. “So that was the tie breaker. They had just opened their engineering research operation and had a slot that fit very well with what I had just studied here, vehicle dynamics. I was excited to go back.”

Pershing began his time with John Deere in the fall of 1966 as a senior research
Pershing's influence in ABE continues after retirement

continued from page 2

engineer in the company's Technical Center. In 1973, he was chosen executive assistant to the office of the chairman and spent a year in that position. From there he became project manager of Deere's parts division for two years. In 1976, he became division engineer in advanced products, working at John Deere Ottumwa Works.

“In 1979, they brought me back to corporate to head up a new department in engineering computer systems,” said Pershing. “They were trying to get more compatibility and commonality in their computer systems at all the different Deere locations.” In 1983, Pershing returned to the Technical Center as manager of engineering science, and that's where he was working when he became reacquainted with Howard Wakeland, then associate dean in the College of Engineering.

“Howie and I served as members of the ABET board together; I was a representative from industry, and he was from the university. When Roger Yoerger was ready to retire as head of ag engineering, Howie was put in charge of the search for a new head by John Campbell, dean of the College of Agriculture at the time.”

Along with Don Holt, associate dean of research for the agriculture college, Wakeland lobbied hard for Pershing, and Pershing joined the faculty as professor and head in 1985. Under Pershing's leadership, a number of distinguished faculty were hired, including John Reid, Bruce Litchfield, Phil Buriaik, Steve Eckhoff and Dick Coddington. Undergraduate enrollment increased 35 percent, the department was ranked consistently in the nation's top five by U.S. News and World Report, and job placement continued at virtually 100 percent.

Pershing began and taught the freshman class Ag Engineering 100. “I wanted to see those students when they first came in. I put things in the class that were fun and eye-opening as to what might be ahead for them in industry and in their careers. The first class had less than 20 students, but it quickly went up to 50.”

After serving as head of the department for eight years, Pershing was appointed to the position vacated by Wakeland as associate dean for academic programs in the College of Engineering, a position Pershing held for 11 years. In that role, he met regularly with associate deans from 17 of the nation's top engineering schools. In addition, his office advised the Student Engineering Council, which worked with about 50 student clubs related to engineering, and worked closely with 12 engineering departments and 14 undergraduate programs on matters of curriculum and accreditation. Pershing also taught Engineering 298, Executives in the Technological World, a college-wide elective course for juniors and seniors that attracted over 100 students each year. The course featured guest executive speakers each week and covered business organizational changes, leadership, teamwork, and globalization issues.

Since his retirement in 2004, Pershing has remained active in ABE. He was approached by K.C. Ting (current
A match made in . . . ABE

Most alumni in the Department of Agricultural and Biological Engineering keep in touch with at least a few of their friends and colleagues after graduation. Some find themselves working with a fellow alum. Others marry one.

Justin Bruns ’07 AgE and Elizabeth Brooks Bruns ’09 AgE were married the summer after Elizabeth graduated. The two grew up in the same area and attended the same high school in Lincoln, Illinois. The spellings of their surnames often placed them next to each other in band and the advanced classes they took, and they began dating at the age of 15. Although both chose to attend college at Illinois, Justin said their paths to get here differed.

“Growing up, I knew I wanted to be a mechanical engineer,” said Justin. “Illinois is near the top of most lists that rank engineering schools, both nationally and worldwide. Having such a great school in my home state made it a no-brainer for me to go to Illinois.”

Justin said when he learned about the ag engineering department, he knew it was for him. “I wanted to become an engineer, but I didn’t want to disregard growing up on a farm and forget the agricultural background that helped develop me into who I was. Ag engineering was the perfect combination that would allow me to become an engineer while still contributing to agriculture as a whole. Of course,” he added, “a nice detail was how highly the ag and bio engineering department had been ranked.”

Elizabeth’s path to ABE was “somewhat longer.” Unsure of what she wanted to study or which college to attend, she learned more about engineering and visited the U of I campus. “Then it was an easy decision to attend U of I, mostly because there would be so much to choose from if I ever decided to change majors.” Because she wanted to learn more about the different types of engineering before choosing a technical specialty, Elizabeth decided to begin in general engineering.

However, shortly before high school graduation, Elizabeth was diagnosed with a relapse of cancer, four years after she had finished treatment the first time. She missed the fall semester but was able to finish treatment in time to take classes on campus in the spring. Then she was diagnosed with a second recurrence just before school started again in the fall. She spent the next year undergoing, and then recovering from, chemotherapy, radiation, and a bone marrow transplant at St. Jude Children’s Research Hospital in Memphis, Tennessee.

“I was looking forward to getting back to campus, but I had a lot of time to think about what I wanted to do,” said Elizabeth. “I considered dropping out of engineering and doing something less challenging. Justin thought I would like soil and water resources engineering, so he encouraged me to talk with Dr. [Prasanta] Kalita. He was right; it seemed like the perfect fit for my interests and background, so I decided to transfer into ABE. I’m very blessed with the way things worked out and to have had a home in the ABE department.”

Both Justin and Elizabeth were involved in a variety of activities in the department. In 2004, Justin was in the first group of students (led by Professor Alan Hansen) who traveled to South Africa to study with peers at the University of KwaZulu-Natal in Pietermaritzburg. Elizabeth made the same trip with another group of students in 2008. Both were also actively involved in the Illinois student chapter of ASABE, each serving in several capacities, including president and treasurer. Elizabeth was a member of a team that competed for and received a grant for the EPA P3: People, Prosperity and the Planet Student Design Competition for Sustainability. As a senior, Elizabeth was selected as the University of Illinois recipient of the Lincoln Academy of Illinois Student Laureate Award.

Justin began work for John Deere Harvester Works in East Moline, Illinois, shortly after graduation in 2007. “I’m in the design engineering group on the current product support team,” he said. “We support the factory in a design role. We work with our quality and manufacturing engineers inside the factory. They bring up issues to us, as do the assemblers and operators that work on our line. Some designs may still have issues after they’ve been implemented. We try to improve on or solve any issue, anything from safety to speeding up the process of filling the combine.”

Elizabeth works as a civil engineer in hydraulics for the Army Corps of Engineers (in the Rock Island District) in the water quality and sedimentation section. Some of her many projects include working on long-term water quality monitoring.

continued on page 5
Greg Stierwalt ’01 TSM is a sales associate at Birkey’s Farm Store, a Case IH and New Holland service dealer, where he helps fulfill farmers’ equipment needs through sales, service, and technical support. Greg said his agricultural background has given him what he needs to relate to his customers and help them with their equipment needs.

“Having grown up on a farm makes you appreciate the new technology that is available to the people who grow our food and take care of the land,” he said.

As Greg pursued a technical systems management degree at the University of Illinois, he had the opportunity to explore several career paths, including dealership management with John Deere and harvest support with New Holland.

“My internship in dealership management gave me great experience while letting me see what part of a dealership fit me best and what I enjoyed the most,” he said. “But most memorable was the summer I spent with New Holland. We supported the custom wheat harvest crew, starting in Texas and ending in Montana.”

Greg believes the U of I’s well-known agricultural history is what sets it apart from other institutions.

“Having my diploma hanging in my office brings comments and respect from many customers,” he said. “I am impressed with the notoriety my degree also gets from the agricultural industries that I encounter abroad. I am proud to be a third-generation College of ACES graduate.”

Elizabeth Bruns kayaking.

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Members of the Department of Agricultural and Biological Engineering (ABE) at the University of Illinois gathered at the I Hotel and Conference Center in Champaign on April 14 to celebrate a year of outstanding achievements. More than 130 faculty, staff, students and alumni were present for the annual Spring Awards banquet.

In addition to awards presented to undergraduates, graduates and faculty, each year ABE spotlights two respected alumni. Wendell P. Bowers, BS ’48 AgE, MS ’56 AgE, was recognized as the 2013 Distinguished Alumnus. Allen R. Rider, PhD ’73 AgE, was named the 2013 Professor for a Day. [See additional articles on Bowers (page 8) and Rider (page 9)]

Congratulations to all of our award winners. It is an honor and a privilege to work with such talented individuals! Following is a complete list of the 2013 ABE awards.

Caterpillar Foundation Scholarship
John Cloud, Abraham Omar

John Deere Foundation Scholarship
Julie Honegger

Bernard C. Mathews/Mathews Company Scholarship
Serena Brodsky

H. Paul Bateman Congeniality Award
Leigha Curtin

Frank B. Lanham Award
Sarah Garrow, Micah Zehr

Richard C. and Helen Coddington Design Team Award
Stephen Braker

Ben and Georgeann Jones Undergraduate Student Scholarship
Hoi Chun Ho, Scott Strutner

Ben and Georgeann Jones Graduate Student Scholarship
Justin Maughan, TSM/PSM, MS; Natasha Bell, ABE, MS; Tao Lin ABE, PhD; Siddhartha Verma, ABE, PhD

J.A. Weber Outstanding Freshman Award
Thomas Ramsay

K.J.T. Ekblaw Outstanding Sophomore Award
Xuehui Guo

E.W. Lehmann Outstanding Senior Award
Brittany Shoemaker

continued on page 7
Graduate Student Awards

Mavis Future Faculty Fellows (MF3) - Yan Zhou, PhD

Superior Paper Award


Teaching Awards

J. Kent Mitchell Teaching Excellence Award - Joe Harper, professor
Ben and Georgeann Jones Excellence in Teaching Awards - Richard Cooke, associate professor, Carlos Bulnes Garcia, graduate teaching assistant

Alumni Awards

Professor for a Day - Allen Rider, retired president of New Holland North America
Distinguished Alumni Award - Wendell Bowers, retired professor and Extension specialist

Travel Awards

Dr. Philip and Carol Buriak Award - Matthew Doherty

Additional Undergraduate Awards

Illinois Engineering Enhanced Scholarship - Morgan McCarthy, ABE; Kendra Zeman
Engineering Visionary Scholar (Edward E. and Elizabeth Joanne DeZwarte Engineering School) - Olivia Webb

Club Awards

Alpha Epsilon - Taylor Leahy
Illini Pullers Outstanding Member - Scott Strutner
Illini Pullers New Outstanding Member - Matt Murphy

Carlos Garcia, graduate teaching assistant, and Dr. Richard Cooke, associate professor, accept the Ben and Georgeann Jones Excellence in Teaching Award from Mrs. Jones.
Wendell Bowers, B.S. ’48 and M.S. ’56 AgE, is the 2013 Distinguished Alumnus for the Department of Agricultural and Biological Engineering. Bowers joined the faculty as an extension specialist in farm power and machinery in June of 1951. He earned his master’s while on staff. During his time at Illinois, Bowers was a pioneer in the concept, development, and implementation of minimum tillage practices. In 1967, he accepted a position at Oklahoma State University as a professor of agricultural engineering, where he received the prestigious grade of Fellow in the American Society of Agricultural Engineers. He retired from OSU in 1985.

Bowers’s dedication to education is evident in his involvement with various scholarship programs. In 2009, he established an annual scholarship in his name in the U of I Department of ABE for an undergraduate student with demonstrated leadership skills and activities and the respect of classmates. From 2000 to 2008 Bowers also chaired the scholarship program of La Posada, a continuing care retirement community in Green Valley, Arizona. La Posada awards scholarships to high school graduate employees pursuing degree programs and those wishing to attend seminars or short courses. The program has a budget of more than $80,000, and an endowment has been established in Professor Bowers’ name to recognize his dedication and to provide funds for special scholarships. The endowment is approaching $1 million.

Bowers’s memories of his time at Illinois stretch back to the days of Emil Lehmann and Frank Lanham, the first two men to head the ag engineering department. When Bowers joined the faculty in ’51, Lehmann was on sabbatical, and other faculty members “warned me about Prof. Lehmann,” said Bowers. “They said sooner or later I would have to write something he asked for, and he would grab his drippy old ink pen and start to scratch my work up.

“Well, that day came, and I ended up in his office with what I’d written. We hadn’t gone past the first sentence, and I said, ‘Prof. Lehmann, if you touch that thing, I’m done with it.’ All of a sudden I realized what I said. Stone silence for a long time. I finally had the grace to say, ‘I’m sorry if I didn’t understand what you wanted.’ But I didn’t get past ‘I’m sorry.’ He looked me straight in the eye and said, ‘Don’t you ever apologize for standing up for what you believe.’ He was a great administrator. That’s the greatest tribute I can pay to a man who had a lot to do with my life.”

Bowers was also impressed with Frank Lanham’s determination to “build a great school. He wrote a letter to every vocational ag teacher and every county agent in the state. He wrote over 600 letters – all personally signed – explaining the need for agricultural engineers and the need to recruit new students. Of course, it didn’t have much impact on the seniors that year, but it did on the juniors and sophomores. After two years, we had a tremendous jump in enrollment in ag engineering.”

On June 18 faculty, staff, emeriti, alumni, and friends attended a reception honoring Bowers. On accepting his award, Bowers said, “I look at this list [of previous winners] and I see that I am in great company. This is a great honor, one of the highest I have ever received. I can’t thank you enough.”

Congratulations, Wendell!
Allen Rider, ABE 2013 Professor for a Day, promotes renewable energy in retirement

Allen Rider, Ph.D. ’73 AgE, has deep roots in agriculture. He grew up on a farm in northeastern Colorado, a farm he and his brother still manage today. He received both a bachelor’s and a master’s in agricultural engineering from Colorado State University.

“Then I spent two years with Uncle Sam,” said Rider. “I was stationed at Fort Belvoir, Virginia, where I went through the nine-week officer basic course. About six weeks in, a civilian who taught soils and roads asked me if I was interested in staying on as an instructor. I said yes, and they assigned me to the engineering school, where I spent two years testing soils that were flown in from Vietnam.”

After his discharge from the Army, Rider felt he needed to earn his Ph.D. He wrote letters to ten schools, including Illinois. Frank Lanham, department head of agricultural engineering at the time, offered him an assistantship and a fellowship. But when Rider received a job offer from Proctor and Gamble, he decided to go back to work instead.

“I called Dr. Lanham to tell him I really appreciated his offer, but I was going to work for Proctor and Gamble,” said Rider. “He asked me if I’d accepted their offer yet, and I said no. He said, ‘Do me a favor. I’m going to send you a letter. Read it before you do anything.’

“Well, I got his letter and read it. I almost thought U of I was going to close down if I didn’t go there,” Rider said with a laugh. “He was a wonderful writer. My wife and I decided it was a once-in-a-lifetime opportunity, so we came to Illinois. It was one of the smartest things I ever did.”

After graduating in the spring of 1972, Rider began his career at Oklahoma State, where he developed nationally recognized extension and research programs in hay, forage, and livestock handling equipment.

“I started doing research with New Holland while I was at Oklahoma, and I continued when I moved to the University of Nebraska,” said Rider. “New Holland kept asking me to come work for them. I said no, I’m a university guy, but one thing led to another, and next thing you know I’m in Lancaster County with the company.

“I started as a senior research engineer, and every three years I had a new job. When I first took over test operations, the president called me in. He told me I was the conscience of the company. They wouldn’t release a product unless I agreed. If it wasn’t ready, I made the call. And he lived by his word. He was an engineer by training, so we got along very well.” Rider eventually managed test operations for all products being developed.

In 1992, Rider was named vice president of engineering worldwide, which included Brazil, Australia, and Europe. When he was named president of New Holland North America in 1996, he managed sales operations as well. “So I was in manufacturing, engineering, and sales,” he said. “I also went through a couple of mergers and acquisitions and survived them all. I finally left on my own twenty-five years after I began.”

Rider was named the ABE 2013 Professor for a Day and came to campus on April 15; he spoke to ABE students and presented a seminar to students and alumni on campus for the department’s spring banquet. Rider’s presentation addressed the issue of renewable resources and 25 by ’25, a grassroots-led and supported initiative that hopes to set a goal for America to get 25 percent of its energy from renewable resources by the year 2025.

“This is something I’m passionate about,” said Rider. “There are naysayers, but if you look at the problem realistically, nothing is perfect. There are always tradeoffs.

“I feel strongly that this is the way to manage our long-term energy future,” he continued. “We’re not in this to put big oil out of business – that’s not going to happen. But when you consider that we’re spending a billion dollars a day to import oil, that’s frightening. We need to do what we can to make 25 by ’25 a viable alternative.”

Since retiring, Rider and his wife, Renee, spend as much time as possible with their family – sons Randall and Richard and their four grandchildren. “It’s a fun experience, watching them grow up,” he concluded.
The Archer Daniels Midland (ADM) Institute for the Prevention of Postharvest Loss is funding research collaboration between the University of Illinois and three universities in Brazil to measure and document postharvest losses of soybeans and corn. Significant amounts of grain are lost every year to postharvest waste, and the problem takes on global implications when studies show that this lost food could meet the minimum annual food requirements of millions of people.

Grace Danao, an assistant professor in the Department of Agricultural and Biological Engineering, is administering the grant from ADM. Richard Gates and Kent Rausch, professors in ABE, and Marvin Paulsen, professor emeritus in ABE, are also investigators with the project. The Brazilian partners include the Universidade Federal de Viçosa (UFV), the Universidade Federal de Goiás (UFG), and the Universidade Federal de Mato Grosso-Sinop (UFMT-Sinop). The Brazilian partners are committing resources towards the activities in the form of faculty time, graduate and undergraduate support, and materials and supplies.

The project has three components. The first is an effort to determine the extent and cost of harvest losses for farmers in the major soybean- and corn-growing states. The second component is studying transportation and storage losses in order to develop guidelines for proper handling, transportation, and storage of soybeans and corn. Third is testing and analyzing costs of implementing effective structures for on-farm storage, in particular silo bags.

Marvin Paulsen is leading the harvest loss measurement team, with collaboration from Francisco Pinto (UFV), Darly G. de Sena, Jr. (UFG), and Rodrigo S. Zandonadi (UFMT-Sinop). The team visited eight Brazilian farms in February to measure losses of soybeans during harvest season and 11 farms in June to do the same for corn.

“It’s important to measure loss at each step during harvest in order to understand total loss contributions,” said Paulsen. “We measured preharvest, combine header, and threshing and separating losses using a standard method developed by EMBRAPA,” a state-owned company affiliated with the Brazilian Ministry of Agriculture. The team also estimated yield in both crops. In soybeans, losses as a percent of yield ranged from a low of 1.4 percent to a high of 5.7 percent, or 0.88 to 4.45 sacks per hectare. In corn, the losses ranged from a low of 0.33 percent to a high of 3.64 percent, or 0.6 to 5.3 sacks per hectare.

“U.S. guidelines say if total crop losses are less than 3 percent, you’re doing pretty well, but over that usually means you need to take time to stop and make adjustments to reduce them,” said Paulsen. In both corn and soybeans, Paulsen said, those adjustments could be as simple as slowing the speed of the combine and lowering the header. In both harvests, the combines with the highest losses were also running with the header high and at an advanced speed.

Paulsen said a large combine can easily harvest 4.5 hectares of soybeans an hour. “If the operators slowed down and saved two sacks per hectare, reducing those losses would theoretically save nine sacks an hour. At $28.60 per sack, that would be about $257 an hour. That’s a tremendous savings to the enterprise.”

Francisco Pinto, a member of the UFV research team, said “there has been much speculation about the amount of grain lost during harvesting in Brazil. The numbers found in this first year of measurements show some farmers are doing a very good job adjusting their combines. Others still have room to improve their harvesting process.

“However,” he continued, “the key point is to understand that without the research to determine these measurements, it would be impossible to make effective and efficient decisions.”

Grace Danao and Rich Gates are the lead investigators studying transportation and storage losses. “Traditionally, soybean and corn production was in southern Brazil,
and everything was exported from ports in the south,” said Danao. “In the last 20 years, production has moved north, and transportation has become an issue.”

Only 10 percent of Brazil’s road network is paved, and more than 60 percent of agricultural production is transported by truck. “Losses during these long hauls have not been well documented,” said Danao, “and it will be interesting to see if we can correlate particular segments of these roads [and their conditions] to losses, or if losses occur because the trucks are filled over their capacity.”

Danao said they are working on using an instrumentation system that monitors temperature, moisture, air flow, and carbon dioxide buildup in grain in trucks during transportation. “We want to measure not only quantity losses, but quality losses as well. We want to measure the nutritive quality of grain used for animal feed and how those properties change over time.”

Danao said they are also studying the storage used most commonly in Brazil, commercial elevators called graneleiros. In these flat storages of about 100 by 50 meters, with a large V-shaped bottom of concrete, aeration is difficult to engineer and operate efficiently. The proper sizing of fans and ducts and the accurate placement of ducts must be practiced to maintain consistent air flow throughout the bed of grains.

“As production has increased, they have had to scale up their storage facilities,” Danao continued. “We would like to assess the basic graneleiro and design, evaluate how current practices in filling and managing deep silos and graneleiros contribute to kernel damage, and compare air-flow measurements to designed air flow and assess adequacy and efficiency of aeration operations.”

The third component of the study is designing, testing, and analyzing the costs of alternate structures for on-farm storage, said Danao. “Only 17 percent of the small farms have adequate grain storage. In Argentina and Paraguay, silo bags have been found to be a great temporary on-farm storage option. In Brazil, many farmers leave their corn in the field to dry, but they still don’t have a way to store it. Silo bags may offer a temporary storage solution that allows the farmers to hedge and sell their corn at a higher price.”

Danao said they hope to partner with a facility such as a beef cattle operation. “They need to store a lot of grain for their feed mill,” she said. “A side-by-side study of storing corn in a silo bag and in a structure allows us to compare to see if the quantity and quality of the nutrients and grain are different.”

The entire project is ongoing, Danao said, and the team hopes in the next three to five years to demonstrate low-cost and efficient strategies that can be adopted by small and large producers.
A biosafety level 2 (BSL 2) laboratory has been established in the Department of Agricultural and Biological Engineering. Kaustubh Bhalerao, an associate professor in the department, is the director of the lab. “This lab has given us more breathing room,” said Bhalerao. “We were in the shoe closet down the hall,” he said with a laugh, “and it didn’t take long to grow out of that space. Students were making schedules, ‘you work in the morning, I’ll work at night,’ and it was still very crowded.”

Now Bhalerao’s students can work together if they wish, with a variety of equipment that remains set up, such as an electronics work bench and a microscopy suite. “It gets used if it’s there,” said Bhalerao. “It’s an ‘if you build it they will come’ kind of thing.”

There are four levels for biosafety laboratories, and they come with increasing levels of precautions and security measures. In a BSL 2 lab, personnel can handle pathogenic (capable of causing disease) material of moderate potential hazard to personnel and the environment, including various bacteria and viruses such as hepatitis A or B, influenza A, Lyme disease, salmonella, mumps, or measles.

Bhalerao listed some of the equipment, supplies and facility requirements necessary in a BSL 2 laboratory. “You must have a certified biosafety cabinet, which means it has negative air flow. That assures that anything that might be spilled or creates a spray will not come out at you; it will go up into the filter. [Bhalerao’s lab has two cabinets.] We also have to have an autoclave that is tested on a regular basis, containers for disposing glassware and sharps, lab coats, and safety equipment, like eyewear and gloves.”

Restricted access is another requirement for the lab, which Bhalerao appreciates. “We have some very nice equipment here, like the $60,000 spectrophotometer. We sometimes have guests coming to use that, which is good, but having restricted access allows me to keep a closer eye on things.”

Students working in the lab are required to go through two safety courses online, one for general lab safety and one to understand biosafety. “They need to be aware that there are materials they handle that are potentially pathogenic to humans,” said Bhalerao, “so for instance, they learn about spill procedures. If there’s a chemical or a biological spill, what do you do?”

Bhalerao requires a third course, specific to his lab. “This gives them instructions on such things as where the spill kit is located, what the exit plans are, and who to contact. It’s important to place that kind of responsibility on the students. It keeps them a little bit scared, and a little bit scared is a good thing.”

Bhalerao emphasized the importance of having enough space for students to work together. “When they are in the lab at the same time, they ask each other questions, they solve each other’s problems, they get lunch together. It helps their synergy. They are enthused about each other’s ideas and more productive.”

He said the new lab also greatly enhances their ability to collaborate with colleagues from other universities or departments across campus. “We’ve had meetings in the lab to show what we have and what we can do. That opens up opportunities to work together.”

The lab is currently being used for a variety of research projects spanning synthetic biology, environmental impacts of nanotechnology, and sensors and instrumentation development for plant and animal agriculture.

“I’m truly thankful for this great asset that the department has provided,” he concluded. “It’s a wonderful thing.”

Bhalerao works with Abhishek Dhoble (blue shirt) and Xiaowen Lin (striped shirt) on biological samples in BSL 2 laboratory.
Yuanhui Zhang and Lance Schideman, both professors in ABE, have combined their research efforts to develop an innovative system that uses swine manure to produce biocrude oil, grow algal biomass, capture carbon, purify wastewater, and recycle nutrients. Zhang has spent more than a decade researching the conversion of swine manure and biomass into crude oil. Schideman has done significant work in integrated algal systems for wastewater treatment and bioenergy production.

“We first convert swine manure into crude oil in a hydrothermal liquefaction reactor,” Schideman said. “There is a very strong wastewater that comes off that process. It contains nutrients that can be used to grow algae that simultaneously clean the water. Lately, we’ve added low-cost, bioregenerable adsorbents into the system that allow us to grow additional bacterial biomass and further improve effluent water quality.

“Our recent research, a combination of experimental work and some computer modeling, has shown that we can reuse the nutrients multiple times and thus amplify biofuel production from waste feedstocks,” he explained. “If we start with a particular waste stream that has one ton of volatile solids in it, we might be able to produce three, five, or even ten tons of algal and bacterial biomass. This new biomass is then recycled back into the biofuel production process,” he continued. “It can also clean the water with the goal of making it suitable for environmental discharge or reuse in some other application. So we get more bioenergy and more clean water resources – both good things in the long run.”

Schideman said the two are also focusing on developing markets for the downstream products of the biocrude oil. “This crude oil is similar to but not exactly like petroleum. It generally has higher oxygen and higher nitrogen content than traditional petroleum, but lower sulfur content. Some of those things are positive, some are negative, but regardless, they’re different. We have to understand those differences in order to make the new materials compatible with existing infrastructure.”

In the near term, Schideman said that “bridge” markets are likely needed to begin using biocrude oil products on a smaller scale than current petroleum refineries. “Refineries need hundreds of thousands of barrels of material each day,” he said. “It can be a chicken-and-egg kind of question. We have material, but not that much. And you don’t want to build or modify a refinery unless you have more material.”

Schideman said that one bridge market to consider is blending light fractions of the oil into existing fuels. “Right now, your gasoline has a certain amount of ethanol mixed in it. We are looking at other blending arrangements where light fractions of this oil could go directly into an existing fuel matrix.”

Schideman noted that the heavy fraction can potentially be used in asphalt-like products. “Innoventor, an engineering and design firm near St. Louis, licensed some of Professor Zhang’s earlier work and converted animal waste into a bio-oil product used in pavements,” he said. “They made an asphaltic binder and paved a 500-foot stretch of road to Six Flags St. Louis. Now they’re monitoring wear and tear on the road to see if it performs as well as conventional pavement.”

Schideman said there is a need to expand collaborations, and he noted work with other researchers at the Illinois Sustainable Technology Center and the Department of Civil and Environmental Engineering. “There is still significant work that needs to be done in order to better understand the bio-oil products and their potential use in different applications. We look forward to working with others to accelerate the development of bio-oil products that can provide sustainable alternatives to petroleum.”
Every student at the University of Illinois has a wide array of opportunities outside the classroom when coming to the Champaign-Urbana campus. One of the most challenging opportunities—and for many, one of the most personally rewarding—is the Reserve Officers’ Training Corps, or ROTC. Many students in the department have taken advantage of this leadership training—let us introduce you to three of our outstanding ROTC graduates.

Nichole Evans

Nichole, a 2013 graduate of agricultural engineering, comes from a family with a military history; her parents both served in the Air Force and met in Germany. Her father retired from the Air Force after serving twenty years.

“I was seven when he retired, so we were out of the military environment when I was fairly young,” Nichole said, “but I became interested in high school and went to a summer camp and really liked it.” Her parents were “surprised,” she said, “but they’re happy. They’re proud of me.”

Nichole received a four-year scholarship from the Air Force and commissioned as an officer (second lieutenant) when she graduated. Most officers have a four-year commitment of active duty after graduation, but Nichole’s commitment will be longer because she has chosen to go through pilot training. “I’m excited about that. I hope to train at the Columbus Air Force Base in Mississippi.”

Although Nichole is eager to fly (“I want to fly fighter jets”), she isn’t yet sure if she will make flying or the Air Force her career. “There are Air Force Institute of Technology programs which provide 100% tuition assistance for an officer to pursue an advanced degree in their free time while on active duty,” she said. “I’d love to get my master’s degree in engineering. If I’m able to fly jets, I don’t think I would enjoy going from fighter jets to commercial airlines. That’s probably when I would hope to go into engineering or teaching and keep flying as a hobby.”

Nichole said learning responsibility, practicing time management, and finding her leadership style were some of the most valuable lessons she learned in ROTC. “It’s a unique program and very rewarding. Of course, there’s bureaucracy as well, and that comes as a surprise. It’s not what you go into ROTC for, but you deal with it because, overall, you love ROTC. We’re a big family, and we take care of each other. It’s great.”

Isaac Blue

Isaac received his bachelor’s degree in technical systems management in 2011 and now serves as an engineer platoon leader in the Illinois Army National Guard with the 631 Engineer Company in Lawrenceville.

“I’m a second lieutenant, and I serve one weekend a month and two weeks in the summer,” said Isaac. “I also have to be available to deploy for natural disasters or overseas combat and humanitarian missions at any given time.”

In his National Guard role, Isaac oversees 27 heavy construction equipment operators who specialize in earthmoving operations. “On a normal day, I oversee their training and I plan future training or construction missions with my commander. During missions I oversee the progress of my platoon and set goals or adjust workload. We also train for potential

continued on page 15
Isaac Blue preparing for a live fire exercise at Fort Leonard Wood, Missouri.

combat missions, and I’m responsible for coordination of that training and commanding during combat if that need arises.”

Isaac said ROTC made his academic and personal life challenging, but it was very manageable. “I had an extra 3 or 4 credit hours of work to do, which essentially made my schedule 16 to 18 credit hours a week for every semester I was there. Fortunately, the program gives you the discipline and mental toughness to accomplish tough goals.”

He also said the physical training was a commitment many freshmen couldn’t understand. “PT was from 0600 to 0730 on Monday, Wednesday, and Friday mornings. That could put a damper on your personal life, especially when country night at Kam’s [campustown bar] was on Tuesday. But if you were willing to make the commitment and make the most of it, you got into great shape and became focused and disciplined.”

Isaac appreciates most strongly the leadership training he received. “Most people view those in the Army as gun-toting grunts who know how to shoot and work out,” he said. “That couldn’t be further from the truth. We received leadership, planning, and management training that most companies pay hundreds of thousands of dollars annually to provide to their employees, and we were getting paid to do it! I can’t speak highly enough of the level of professionalism and motivation that Army officers are trained to.”

Sean Martin

Sean received his bachelor’s degree in technical systems management in 2011. He is currently an active duty Army Infantry second lieutenant stationed at Fort Benning, Georgia.

“I arrived in Fort Benning in April of 2012 for IBOLC [the Infantry Basic Officer Leadership Course], followed by schools such as Ranger School, Airborne, and Bradley Leader Course,” said Sean. “I graduated IBOLC and received my Blue Cord in September 2012, signifying my readiness to lead infantry troops.”

Sean said IBOLC is rigorous, designed to test officers physically as well as intellectually. The course is 16 weeks, half in the field and half in the classroom. Classroom weeks consisted of PT from 0600 to 0730, followed by classes from 0900 to 1600. “Weeks in the field usually consisted of training exercises such as patrols,” said Martin, “which are platoon-sized operations simulating actual missions.”

continued on page 16

Sean Martin (on right) ‘clearing the objective’ at IBOLC
Sean said injuries are somewhat common during the course. "After graduating, I discovered I had injured my shoulder, so I have to heal up before I can continue the rest of my schools. Once those are finished, I’ll move to Fort Bliss, Texas, where I’m slated to be in the 2nd Brigade of the 1st Armored Division."

Sean said that as a teenager, “I always assumed I couldn’t cut it in the Army physically. I had always been out of shape growing up.” Martin reached 300 pounds in high school before deciding enough was enough.

“I needed to make some changes. Even with those changes, I still weighed 250 when I joined Army ROTC in the spring semester of my sophomore year.” But one of the most valuable lessons ROTC taught him was that limitations are relative and merely perceptions based on previous experiences. “With the help of friends, family, battle buddies, and cadre I was able to succeed and commission. I weighed in at 192 pounds when I entered IBOLC. I mention this simply to illustrate the extent of progress that the Army and ROTC have helped me to obtain.”

Martin plans to marry his college sweetheart, Kelly Blaney, in October of this year. Sean and Kelly met their sophomore year at Illinois. Kelly lives and works in the Chicago suburbs, and Sean said the hardest part of military life “isn’t the training, the sleep deprivation, or the physical exertion; it’s being away from her for extended periods of time. I know it takes a strong woman to be an Army wife, and sometimes I have to remind myself that she worries about me. I have to reassure her I’ll be safe, even in training.”

2013 a memorable year at ASABE International Meeting

Faculty, staff, students and alumni from the Department of Agricultural and Biological Engineering attended the 2013 ASABE Annual International Meeting held in Kansas City, Missouri, July 21-24. This year’s meeting held special significance for Illinois attendees, as University of Illinois President Robert Easter joined other Illini at a special reception Sunday evening. Easter was in attendance to moderate the Global Challenges Forum on Monday morning.

“The Global Challenges Forum was a first-time event for the ASABE meeting,” said K.C. Ting, department head of ABE. “The coordinators wanted a high-profile person to moderate the forum. President Easter has visited many countries around the world and attended many policy-setting meetings. He has incredible experience, both at a national and international level. He was the ideal person for this. When I asked him to consider it, his response was almost immediate. He was glad to do it.”

The forum was designed to address the challenges facing humanity in the struggle to provide enough food, feed, fiber, clean water and renewable fuels for a growing population, all while resources continue to be constrained. “The format encouraged dialogue to discuss these problems,” said Ting. “It is essential to understand the importance of collaboration of people around the world to solve them.” The panel included eleven representatives from international agricultural and biological technical societies from regions around the world, including Africa, America, Brazil, Canada, China, Europe, Japan, Korea and Taiwan.

Tuesday was designated “Bioenergy Day” at the conference, and Ting participated on a panel which addressed the issue of “Supply of High Tonnage Feedstock.” The panel reviewed recently developed innovative equipment and systems to overcome barriers in delivering high tonnage biomass for cellulosic biofuel production. Ting’s presentation addressed engineering solutions for biomass feedstock production and how to bridge the gap of feedstock provision between field and biorefinery.

The department was well-represented at the General Session Recognitions, and the Awards Luncheon. Following is a list of faculty and students who were recognized for various achievements as members of ASABE.

continued on page 17
Dr. Prasanta Kalita, Professor and Division Leader in Soil and Water Resources Engineering, and Assistant Dean of Research in the College of ACES, was inducted as an ASABE Fellow.

Dr. Qin Zhang, former Professor in ABE and now the Director of the Center for Precision and Automated Agricultural Systems at Washington State University, was inducted as an ASABE Fellow.

The University of Illinois Fountain Wars Team received first place in the G.B. Gunlogson Student Environmental Design Competition. Prasanta Kalita is the faculty advisor. Team members include Nichole Evans, Julie Honegger, Erica Mui, Ferisca Putri, Austin Roepke, Savana Savage and Paul Schumacher.

The University of Illinois Robotics Team received second place in the ASABE Robotics Competition. Tony Grift is the faculty advisor. Team members include Hao Gan, Haibo Huang, Matthew Ong, Liang Tao, Wei Zhao.

Liangcheng Yang received first place in the Graduate Oral Competition for the Boyd Scott Graduate Research Award. Yang’s presentation was “Moisture Effects on Gas-Phase Biofilter Ammonia Removal Efficiency, Nitrous Oxide Generation and Microbial Communities.”

Paul Schumacher received second place in the Undergraduate Oral Competition for the K.K. Barnes Student Paper Awards. Schumacher’s presentation was “Quantifying Erosion Control Blanket Effectiveness at Reducing Soil Loss.”


Congratulations to all our winners!

OUTSIDE THE CLASSROOM

2013 a memorable year at ASABE International Meeting
continued from page 16

Save the Date for Celebrate ABE@Illinois 2013 on September 13th. Keep an eye on our website for updates.

From left to right: Retired ABE professor Mike Tumbleson, University of Illinois President Robert Easter, retired ABE professor Marvin Paulsen and department head K.C. Ting, greet alumni and students at ASABE reception.

Dr. Ta-Te Lin, President Robert Easter and ABE department head K.C. Ting at the ASABE reception.

http://abe.illinois.edu
Gates works to enhance livestock environment networking on three continents

Richard Gates, a professor in ABE, has spent much of the last few years coordinating opportunities for experts in animal–environment interactions and technologies to exchange their research discoveries and to promote collaborations. Gates was the co-chair for three international conferences: The Eighth and Ninth International Livestock Symposium (ILES VIII and IX), held in Iguassu Falls, Brazil, in September 2008 and in Valencia, Spain, in July 2012, and The First International Workshop on Emissions, Ventilation and Animal Welfare in Livestock Production Systems, held in Campinas, Brazil, in October 2012. Gates also co-chaired ILES VIII in Rio de Janeiro, Brazil, in 2008. This year he will coordinate another conference in China and participate in others in Brazil and Belgium.

Dr. Richard Gates

“When we look at the livestock production systems of the world and the people who are studying them, it’s a fairly small network of people,” said Gates. “These conferences provide them with the opportunity to share notes and try to determine the major research questions. It’s important to understand that this field of research is not just engineering,” he continued. “It’s veterinary medicine, it’s animal science, it’s ethology – all those things, and probably more. That’s one of the reasons it’s difficult putting these conferences together. It’s relatively easy getting ag and bio engineers together. But we’re all stretched in so many ways, reaching out and getting all those other sciences involved is a challenge.”

Gates said one of the most important questions being considered in recent years is animal welfare. “How do we fit animal welfare into our livestock designs in such a way that we provide a healthy and safe source of protein for the world, but do it in a way that maintains the animal’s well-being, and maybe even improves it?” he asked.

To consider this subject, ILES IX addressed two major topics: animal production systems (housing, animal welfare, thermal and non-thermal environments, and modeling) and agricultural air quality (measurement and abatement of gas, odor, particulate matter, bioaerosols, and pathogen emissions).

Several members of the ABE faculty participated in the proceedings. Gates contributed to five of the papers presented at the conference; others involved were Angela Green, an associate professor in ABE; Laura Pepple, an ABE extension specialist; Yuanhui Zhang, another ABE professor; and John Reid, a former ABE professor.

Gates’s co-chair for the conference in Valencia was María Cambra-López, a postdoctoral researcher from the Polytechnic University of Valencia. ILES IX was held as one of seven special parallel conferences in conjunction with CIGR-AgEng2012. CIGR (Commission Internationale du Genie Rural, or International Commission of Agricultural and Biosystems Engineering) hosts an international conference every four years that serves as a large umbrella for several simultaneous thematic conferences, with the goal of promoting interaction between CIGR and EurAgEng Working Groups.

In October, Gates co-chaired the First International Workshop on Emissions, Ventilation and Animal Welfare in Livestock Systems with Professor Daniella Jorge de Moura of the Universidade Estadual de Campinas (UNICAMP), in Campinas, Brazil.

“The Brazilians are working on a multi-million-dollar project right now to measure emissions,” he continued, “and we wanted to connect them with experts who have been working in this area for many years. We didn’t want them to go down the path of making all the mistakes that the Europeans and the Americans have made in the last twenty years.”

To that end, the three-day conference focused on lessons learned in Europe and the United States; similarities and differences between Brazilian and American/European ventilation systems; similarities and differences in the environmental control challenges in animal welfare and productivity, and current challenges in emission measurements for livestock systems and national emission inventories in Brazil, the United States, China, and Europe.

“These types of conferences help us figure out how to move forward in the future as we continue to develop livestock production systems,” Gates said. “We want to make sure that science-based decision-making takes place.”

Gates concluded, “I’m not quite done with these efforts. This year I’m working with a Brazilian poultry and swine trade organization to promote improved ventilation systems, I’m program chair for the first International Research Center for Animal Environment and Welfare – to be held in October in Chongqing, China – and I have other duties for a precision livestock farming conference in Belgium.” Apparently, three other continents is the right audience for Gates.
Pershing’s influence in ABE continues after retirement

continued from page 3

department head) to form an advisory group. “We decided to call it the Futures Committee, thinking in terms of our future stock,” Pershing said. “How can we get our ‘stock’ to go up? We’ve developed a number of ways to connect with our alumni, including the idea of a ‘Professor for a Day,’ growing our alumni database, and offering ideas for the departmental newsletter.” In recognition of his many contributions to the department, both past and present, Pershing was named ABE’s 2012 Distinguished Alumnus and honored at the spring awards banquet in April.

Pershing and his wife, Ann, spend much of their free time with their three children and nine grandchildren. “They’re in all kinds of activities, and they pretty much dominate our schedule. We have traveled – to Brazil, Hawaii, Alaska – but even that’s slowed down in favor of the grandchildren.”

Pershing was once a member of the Agricultural Engineering Four (a quartet consisting of Pershing, Mike Hirschi, Dick Coddington, and Donnell Hunt), and he continues to sing in other groups. He also enjoys summer golf outings with Coddington, Loren Bode, and his favorite teacher, Bob Miller, professor emeritus of theoretical and applied mechanics.

“And I’m doing a lot more ‘fun’ reading,” Pershing said. “I used to do a lot of technical reading, just to keep up. Now I have a Kindle, and I’ve got 85 books on there. There are so many good things that come out of fiction writing. It often shows how we’re all connected in some way,” he concluded. “As I learned from Mitch Albom, author of The Five People You Meet in Heaven, “Strangers are just family you have yet to know.”

New facility to link research and commercial viability for advanced biofuels

A proposed facility at the University of Illinois will take biofuel processing to the next level. The state’s Capital Development Board has designated $20 million to build the Integrated Bioprocessing Research Laboratory (IBRL) on the ACES campus. An outgrowth of the Center for BioEnergy Research (CABER), IBRL will complete the value chain link between research and commercial viability for advanced biofuels.

Vijay Singh, a professor in the Department of Agricultural and Biological Engineering, said recent ACES biofuels research includes studies on converting cellulosic biomass into biofuels. In anticipation of the new facility, Singh is working to develop industry relationships and provide connectivity between industry and other institutions and units interested in pilot-scale proof-of-concept activities.

Groundbreaking for the new facility should take place this fall, with completion expected in 18 months.
Agricultural and Biological Engineering
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Integrating life and engineering for the enhancement of complex living systems

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