



ABE @ Illinois

Agricultural & Biological Engineering

Fall 2010



Celebrate
ABE@Illinois
September
23-24

Inside:

- 3rd Annual Celebrate ABE@Illinois a Great Success
- Wakeland a National and International Influence in Engineering
- Illini Algae Focus on Bioenergy Production
- Dave Smith and Gary Wells Inspiring Examples in Agricultural Engineering
- ABE Honors a Year of Achievements at Spring Awards Banquet



ABE@Illinois
Fall 2010

Editors:
Anne Marie Boone
& Leanne Lucas

Published by the Department of Agricultural and Biological Engineering of the College of Agricultural, Consumer and Environmental Sciences and the College of Engineering at the University of Illinois at Urbana Champaign.

338 Agricultural Engineering Sciences Building
1304 W. Pennsylvania Ave.
Urbana, IL 61801

Phone: (217) 333 3570
E-mail: abe@illinois.edu

Greetings from Agricultural and Biological Engineering

Since July, I have had opportunities to travel to China (twice), Brazil, Singapore, and India. All the trips were to engage with the long time, current, and future collaborators of ABE@Illinois. Regardless of whether I was traveling with a group or by myself, it was very heartening to see the warm reception that the local hosts extended to the people from the University of Illinois. University of Illinois' global preeminence is very evident.

As a unit within a true world class university, our department has a long history of global engagement. Most of our faculty members have very strong partnerships with their colleagues in many parts of the world. This engagement has recently been elevated to a new level. In the past three years, our faculty and staff have lead study abroad activities to Brazil, China, Greece, India, Puerto Rico, South Africa, and Taiwan. In cooperation with Purdue University and Virginia Tech, we have two U.S. Department of Education funded FIPSE projects with two universities in Brazil and four universities in Europe. FIPSE is the *Fund for the Improvement of Postsecondary Education*. We are working with John Deere to implement a unique exchange program with China Agricultural University. We have signed a memorandum of understanding with each of our sister units at Kyoto University in Japan and Zhejiang University in China. This past summer, working with our College of Agricultural, Consumer and Environmental Sciences' Office of International Programs, we had a delightful experience of hosting 18 undergraduate interns from Zhejiang University for six weeks. The students were placed into a number of laboratories within the College.

So you can see that while we are very successful in making our department locally relevant, we are also very effective in bringing global experience to our students. There is no doubt that this is a very challenging time for many higher education institutions like ours. We are doing our best, during this time of emphasizing budget reduction and revenue generation, to continue enhancing the top quality programs built by many years of excellent work. During my international travel, it is quite uplifting to experience first hand that our programs continue to be highly valued and our partners continue to have strong interest in further strengthening collaborative relationships with us. I believe the unflinching support from our emeriti, alumni, and friends has played a critical role in our success. For that, I express my sincerest appreciation.



K.C. Ting,
Professor and Head

Best regards,
K.C. Ting
Professor and Department Head
ABE@Illinois

**Do you know a high school student who is interested in ABE or TSM?
Tell them about the summer camps associated with the department.**

Illini Summer Academies

Agricultural & Biological Engineering: Technical Systems Management

Check the website for further information: <http://web.extension.uiuc.edu/state4h/events/summeracademies.cfm>

Research Apprenticeship Program II

Agricultural & Biological Engineering

This program offers a seven-week intensive laboratory and academic enrichment experience working with a faculty or graduate student mentor in one of the many areas of ABE. The costs of the meals activities, supplies, and housing are covered by the program, and admission is open to all high school juniors from under-served or economically disadvantaged groups. Preference is given to previous RAP I participants. Check the website for further information: http://www.aces.uiuc.edu/Academics/Diversity/pre_collegiate/rap2.cfm

Wakeland a National and International Influence in Engineering

Howard Wakeland, MS '54 AgE, retired from the University of Illinois in 1993.

"I officially retired in '93," said Wakeland, "but I finally got out of the office in 2003. I continued working part-time for ten years because of a variety of projects I was involved with."

Wakeland began his time with the University in the Department of Agricultural Engineering, working his way through the ranks to full professor. During that same time, he took a position in the College of Engineering in 1954 as an assistant dean and was soon promoted to associate dean.

"I was involved with directing undergraduate programming in Engineering, which included admissions, discipline, graduation, all kinds of student-related activities," he said. "That was my life for 39 years."

As associate dean, Wakeland began the "Revolving Deans" program in the College of Engineering. Faculty members from each department in the college would work out of the Dean's office half-time for one year. "That gave us a good working relationship with all the departments," he said. "It kept them involved in the College, and we got a handle on what was going on with them."

Wakeland noted that, with his encouragement, a number of the faculty from Agricultural Engineering eventually "found their way" into positions with the College of Engineering, including Roscoe Pershing, Don Hunt, Richard Coddington, Bruce Litchfield and Mike Hirschi.

Wakeland's last ten years at the University were spent servicing international programs he had set in place to provide opportunities for students to be involved in exchange programs with schools around the world.

"To arrange these programs," said Wakeland, "I would visit the country and the college or university we were working with and make an agreement with them. Then I would visit maybe every other year to see how the program was going. The exchange fees we collected from their students helped pay for our students to visit their countries.

"It was a little like the United Nations," he continued. "We had programs everywhere - in



Left: Howard Wakeland and his wife, Joyce.

Asia, South America, Europe, and Australia. We probably had over 200 students a year traveling somewhere abroad. And over that ten-year period, that included 30 or more students from Ag Engineering."

Wakeland was instrumental in establishing EAGLE, the Engineering Alliance for Global Education. "I wrote the proposal for that program, and we received seven million dollars from the federal government. Engineering students studied Japanese while they were in school in the States," he said. "Then they would go to Japan for an intensive language program. They came back here to finish their degree, and the idea was that after graduation, they could return to Japan to work for a firm there for a year.

"We ran that program for eight to ten years, and there were a number of other schools across the United States that were involved," he noted, "including Georgia Tech, the University of Texas, Arizona, Berkeley, Wisconsin, and Michigan. All total, about 400 students went through that program, and I think about half of them returned to Japan for that year of practical training."

Wakeland served on the boards of IAESTE (the International Association for the Exchange of Students for Technical Experience), an international organization exchanging students for technical work experience abroad, and ABET (the Accreditation Board for Engineering Technology). He is also a long-time member (and past president) of Rotary.

continued on page 15

Inside:

3rd Annual Celebrate ABE@Illinois a Great Success.....	6
ABE Honors a Year of Achievements at Spring Awards Banquet	12
ABE Introduces Technical Systems Management Graduate Degree Program	10
Alumni Spotlight	
Tim Hall	4
Paul Taylor.....	5
Club Update	
Illini Algae.....	9
Dave Smith and Gary Wells Inspiring Examples in Agricultural Engineering.....	8
Giving Back	15
Profile Emeritus	
Howard Wakeland	3
Study Abroad Programs Offer Students Unique Look Into Other Cultures.....	10
Singh Research Changes Corn Bioprocessing and Biofuels Production.....	14

Tim Hall a Winner in the World of Monster Truck Racing

Tim Hall '85 AgM grew up at the race tracks. Hall's father, Jack, worked as an announcer for the American Motorcycle Association, the World of Outlaws Sprint Car tour, and a variety of tractor pulling tours, so "we were at a race track somewhere almost every weekend," said Tim.

"Because I was exposed to racing pretty early," he continued, "I knew I wanted to be in the racing industry." When it came time to choose a university, he said, "Here's this great school ten minutes from home that has a pretty well-rounded program. Ag Mech offered a little bit of everything I needed. I knew the program would be perfect for me."

After graduation, Hall worked briefly for a company that manufactured fertilizer spreaders. The company went bankrupt within the year, and today Hall sees that as a blessing in disguise.

"I decided it was a good time to go out on my own," he said, "so Mark [Hall's brother] and I started our racing operation and away we went."

Despite a certain amount of skepticism from other people ("No one will pay you to drive monster trucks – go get a real job!") the two brothers persisted in their dream, and today they own and operate five RAM monster trucks. These trucks include the "Raminator" and "Rammunition" and the team travels the country to compete in races or participate in shows.

"Mark is our primary driver, and he just wrapped another season with a championship in Indianapolis in September," said Hall. "Our team has 17 national championships, so we're pretty proud of that."

Other family members are involved in the business as well. Mark's wife June is the merchandise manager, and the Halls' mother, Joan, and aunt, Patty, run the office.

Tim is the Hall Brothers Racing crew chief and team manager. Tim's expertise lies in turning the supercharged Dodge Monster Truck Hemi engines; he is also responsible for much of the design and building of both the Raminator and Rammunition. In addition, he handles the booking and logistics for both the racing and for the many dealer and personal appearances the team does around the country.

"Chrysler is our primary sponsor, along with Hotsy Cleaning Systems and a number of others," said Hall, "so when we're not racing, we're often on the road at a Dodge dealership or another type of racing event to exhibit the trucks."

When asked about his time at Illinois, Hall noted that the Department opened the doors of the 'new' building at 1304 West Pennsylvania his senior year. "I was active in the Ag Mech club from the beginning," he said, "and I think I held every office there was, starting with treasurer and moving up to vice-president, then president."

Hall is particularly pleased that the Ag Mech club renewed its ties with the American Society of Agricultural Engineers (now the American Society of Agricultural and Biological Engineers) during his tenure.

"We knew we needed to get involved again with the national meetings, so Tom Kelly, Marty Kocher, Jeff Knollenberg, and I took a road trip to a meeting at the University of Tennessee in Knoxville," he said. "We filed our report. We didn't win, but we did okay. It was a great trip. And the next year we knocked one out of the park and won."

Hall also has fond memories of a number of his professors, in particular Roland Espenscheid and Paul Benson. "They probably corrupted me a bit," he said with a good-natured laugh. "There was a different level of political correctness in those days, but they were great guys."

Hall concluded with some advice for today's graduates. "Be versatile, and be flexible," he said. "You want to have your goals, but there may be ways to reach them that you haven't tried."

"When we started in this business, everyone said it was just a fad. It would only last three or four years at most. That was 25 years ago and we're still going and it's expanded and gotten better. We feed a lot of mouths out of here, and it's all because of some funny-looking trucks with big tires that smash cars."



Above: Tim Hall works on "The Raminator."

Below: Tim Hall prepares to transport one of his monster trucks to competition.



Paul Taylor Makes a Difference in Business and Community

Paul Taylor '94 AgE is the founder and president of ESS Clean, Inc., a company which provides commercial contract cleaning and janitorial services to much of Central Illinois.

Taylor and a partner founded ESS in 1995, with the goal of providing businesses with indoor air quality testing, duct cleaning, and environmentally sensitive janitorial services.

"We spent about a year buying lots of equipment for duct cleaning and air quality monitoring, but we couldn't find enough customers to support that side of the business," said Taylor.

After a period of "serious financial struggles," Taylor's partner left the business in 1997. Taylor shifted the focus of the company to janitorial services, and business took off.

"But we had accumulated a significant amount of debt," said Taylor, "and I wanted to focus on paying that off and becoming financially sound." Taylor reached that goal in 2002, when ESS became 100 percent debt free; the company remains debt-free today. In addition to the parent company located in Urbana, ESS opened a second branch in Effingham in 2004 and a third branch in Bloomington in 2007.

One of the core values of ESS is to improve the lives of its 240 employees, and Taylor works hard to see that happen. He is certified to teach Dave Ramsey's Financial Peace University class, and offers the 13-week course at no cost to his employees every spring.

"During that time, we keep track of how much debt people pay off," said Taylor, "and typically a class is paying off \$10,000 to \$15,000 dollars of debt, just during that 13-week period."

ESS also has a scholarship program, the Five Stones Foundation, to assist employees and their children in overcoming the financial hurdles associated with higher education. "It's fairly small right now," said Taylor, "but this fall four people each received a \$2,000 scholarship."

Taylor talks of another Illinois alumni, Doug Bosworth, MS '64 AgE, citing him as a significant influence early in his career. Although Bosworth was an adjunct professor with the Department from 1995 through 2004, the two men met after Taylor graduated, when both were employed at a start-up company in Savoy.

"Doug Bosworth is one of my greatest mentors," said Taylor. "When I was buying out my partner, Doug actually invested in my business, so he was a stockholder for a long time. Now he's on my advisory council, and we meet a couple of times a year, just to throw around ideas.

"Doug doesn't hold back," Taylor continued, "and I really appreciate that. It's hard to find somebody who is willing to say what needs to be said. I have a lot of admiration for him."

Taylor's memories of his time at the U of I include living at Nabor House (an agricultural fraternity), classes with Professors Marvin Paulsen, Loren Bode and Les Christianson, and trips with other ag engineering students.

"I didn't come from a big city," he said, "so having a 'community' like the ag engineering department to keep me grounded was a really good thing."

And Taylor said lessons he learned as a college student have been invaluable to him as a young entrepreneur.

"To be honest, school was hard for me," Taylor noted. "It wasn't easy to get good grades, and I had no choice but to work through those problems to get the homework done, to pass the exams. It required a lot of persistence.

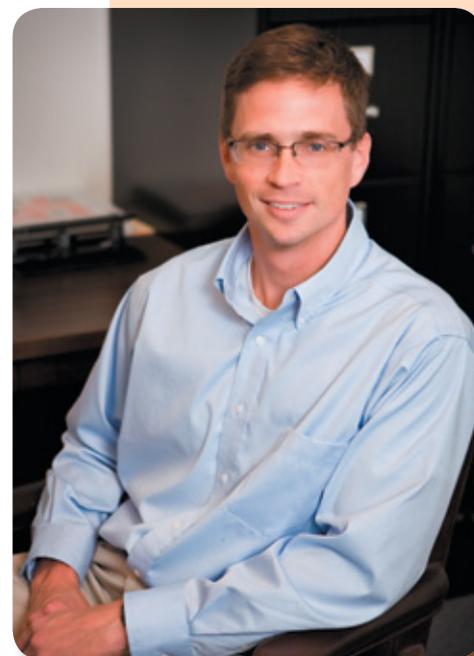
"In business, if you're the guy who starts the business, it comes down to you. You're the last resort, and you have no choice but to figure out the solution. The persistence I learned in college really helped me."

Taylor is married, and he and his wife Andrea have three daughters. Taylor is actively involved as a lay leader at Savoy United Methodist Church, is a member of Savoy Rotary and a mentor for the "TALKS" Mentoring Movement of Champaign County. He also enjoys competing in triathlons and marathons.



Above: Paul and Andrea Taylor with their three daughters.

Below: Paul Taylor in the office of ESS, Inc.



3rd Annual Celebrate ABE@Illinois a Great Success

Alumni, faculty, students and friends met once again to Celebrate ABE@Illinois the weekend of September 17 and 18, 2010.

Activities began with a seminar Friday at noon, given by “Professor for a Day” Gary Wells, MS ’62 AgE. Wells spoke about his many and varied experiences as a student at the University, as well as his extensive career with International Harvester. A box lunch was served to a standing-room only crowd of students and faculty.

Internal tours of many of the labs at the Agricultural Engineering Sciences Building were available in the afternoon, as well as tours of the Cave, an immersive virtual environment; The Cube, an immersive, stereo-capable visualization chamber; the Business Instructional Facility (BIF) with the College of Business; and the Gable House, the University of Illinois solar house that took second place in the 2009 Solar Decathlon design competition.

One of the highlights of the weekend was the annual banquet held at the I Hotel and Conference Center. Former Department Head Loren Bode was the emcee for the event and speakers included Robert Hauser, Dean of the College of ACES, current Department Head K.C. Ting, Ph.D. ’80 AgE, and Donnell Hunt, a professor in Agricultural Mechanization from 1960 to 1996.

Dean Hauser congratulated the department on another successful year, citing its ranking in the current *US News and World Report* as the #1 graduate program and the #2 undergraduate program as evidence of the Department’s continued excellence.

“This is a ranking that tells you what your peers think of you,” said Hauser. “This is a small profession, and departments across the country actually know one another very well, so to have them tell you they think you have the first- and second-ranked programs in the country really means something. That’s impressive.”

Ting spoke of the accomplishments of the Department as well, citing the Illini Pullers first place win with the “Chief’s Tradition” at the ASABE International ¼ Scale Tractor Student Design Competition for the second consecutive year. He also spoke of the multitude of awards given to students, faculty and alumni at the ASABE International meeting. Gina Francis ’10 AgE was named the Yoerger Preprofessional Engineer of the Year, Mary-Grace Danao, an assistant professor in ABE, received the A.W. Farrall Young Educator Award; Ryan Mackin ’96 AgE, was named the winner of one of ASABE’s 2010 Sunkist Young Designer Award; Chad Yagow ’01 AgE, received the Conference Chair Recognition Award and the Presidential Citation

This page: Lynda Cabrales, Ph.D. ’06 AgE, shares her memories of ABE at the banquet on Friday night.

Opposite page, top: Gary Wells receives some instructions before taking 1/4 scale tractor for a spin.

Opposite page, bottom: Robert Hauser, Dean of the College of ACES, speaks at the Friday evening banquet.



Award; and Rich Gates, professor in ABE, and John Replogle, Ph.D. '64 CE, were both inducted as ASABE fellows.

Hunt gave a brief presentation on the 50th anniversary of the Technical Systems Management program (formerly Agricultural Mechanization). He spoke of the early years of the program, the influence of former faculty member Jay Weber, and the involvement of charter member Dave Schilling '09 AgM. He cited the distinguished careers of many Ag Mech graduates over the years, which included numerous positions in management, sales, and service with John Deere, as well as graduates who went on to become teachers and writers of distinction in the field of agriculture.

On Saturday morning, ASABE student members sponsored a free breakfast at the ABE research farm attended by more than 50 students, staff and alumni. Breakfast was followed by a tractor pull and presentation given by the Illini Pullers. Gary Wells was given the opportunity to drive one of the ¼ scale tractors and with a little instruction and cheers from the crowd, he did a great job.

The Fighting Illini football team gave ABE alumni a sweet end to their reunion with a victory over Northern Illinois University, 28-22.



“This is a small profession, and departments across the country actually know one another very well, so to have them tell you they think you have the first- and second-ranked programs in the country really means something.”

— Dean Robert Hauser

Dave Smith and Gary Wells Inspiring Examples in Agricultural Engineering



Above: Dave Smith

Below: Gary and Anita Wells



In 2010, the Department of Agricultural and Biological Engineering was honored to sponsor two distinguished alumni for the semi-annual “Professor for a Day” program. David Smith, Ph.D.’74 AgE, served as the Spring Professor for a Day in April, and Gary Wells, MS ’62 AgE, came to campus in September to serve as Professor for a Day at Celebrate ABE@Illinois.

Dave Smith worked as a research engineer for John Deere Moline Technology Innovation Center (in Moline, Illinois) where he retired in 2007. “I spent my 34-year career at Deere doing what I called applied dynamics consulting with engineers at the Deere factory product engineering departments,” Smith said. “Most of those projects involved the application of multibody dynamics analysis software to areas such as vehicle stability, ride vibrations and structural load prediction.”

Smith said his most interesting project during his time at Deere was an analysis of the self-excited vibration known as power hop. Power hop occurs most frequently on four wheel drive tractors pulling drawn implements in dry soil conditions. “Deere engineers had tackled power hop without much success until my manager suggested using a classical stability analysis,” said Smith. “That provided a powerful analysis tool for understanding power hop and how to control it.”

Smith said as he worked on the material he would be presenting at his seminar for students and faculty, he realized a recurring theme was change. “For example,” he said, “I was born the day the first atomic bomb was dropped on Hiroshima. My father was stationed on a hospital ship off the coast of Japan, and it took one month for news of my birth to reach him. Think how much communication has changed in the last 65 years!

“Sometimes we lose track of how relatively recently mechanization revolutionized farm life,” he continued. “My grandfather farmed 100 acres and he never owned a tractor. All his farm work was done with horses.”

Smith showed students a picture of the first scientific calculator he purchased in 1973 for a price of \$400, comparing it to the price and capabilities of the PDA’s that are common today. “I used that calculator throughout my 34 years at Deere, and it still works today,” he said.

Smith’s undergraduate years were colored by the Vietnam War, and he said the possibility of being drafted is another aspect of life that has changed for today’s students. After receiving his master’s degree, Smith was drafted into the Army and assigned to Yuma Proving Ground in Arizona, where he conducted cooling tests on a variety of Army vehicles.

Smith came to the University of Illinois after his service and said attending graduate school at the U of I was “one of the best decisions I made in my life.” Roger Yoerger was his thesis advisor, and Smith said the opportunity to get to know the faculty was one of the greatest benefits of graduate school.

“But it wasn’t all classes and research,” he noted, citing his participation on the departmental softball team, sharing an office with other graduate students, and the practical jokes they played on one another.

Smith said if there was one thought he could leave with students, it would be to accept and embrace change. “Work life at the end of my career was nothing like its beginning,” he concluded. “I’m sure students will be likely to encounter as much change as I did during their career as well. No amount of education can prepare you for all that will happen in your future, so be open to opportunities to learn and grow throughout your lifetime.”

Gary Wells has had a long career in engineering and management that he says was profoundly influenced by good relationships. Wells’ first experience with the impact of good relationships with family and friends came shortly after his high school graduation in 1955.

Wells’ family was large and no one in his parents’ immediate family had ever attended college. Wells said, “The cost was thought to be unmanageable, so no one seriously considered the option.” But a very generous aunt and uncle recognized Wells’ potential. They approached his parents with an offer to provide a long-term loan in the amount of “whatever it takes.” They gave Wells an initial loan of \$500 toward his first year of college education. Another good relationship with the owners of a local International Harvester dealer got his application for work at the IH plant in East Moline noticed, and he was able to supplement his income with that work for the next four summers. He also tested for and received a scholarship that fully paid his tuition costs, all of \$65 per semester, so he was able to finish his first year with some of the original loan unspent.

“My aunt Lois assured me that she would replenish my new checking account as needed, for as long as needed,” said Wells. But at the end of his freshman year, Wells was fortunate enough to secure a 4-year scholarship from General Motors. “Together with the tuition scholarship and savings from my summer

continued on page 15

Illini Algae Focus on Bioenergy Production

An article in *National Geographic* was just the spark one student needed to spearhead an organization that uses a myriad of resources at Illinois to study algae as a source for bioenergy production.

Derek Vardon, a founding member of the student organization *Illini Algae*, said “I was doing research as an undergrad on how algal blooms can foul and shut down desalination plants. The article talked about how to use algae to capture waste CO₂ from power plant production. Well, we have a power plant, and we already grow algae, so I thought it would be interesting to try to do something to merge the two.”

The result was *Illini Algae*, a group of students and professors who have set up modular bioreactor units on the south-side of the Abbott Power Plant at the U of I to grow algae using waste flue gas (CO₂) from coal combustion. Abbott hosts the tanks during the summer months, then the tanks are relocated from the power plant to the university greenhouse during fall and winter months.

Vardon said the algal biomass is used in one of two ways. “We send the biomass to the Illinois Sustainable Technology Center and they work with us to extract and analyze the oil, which is then turned over to the *Engineers without Borders* student organization. They combine it with all of the waste vegetable oil they collect from the campus dining halls and convert that into biodiesel.”

Vardon said the group is also collaborating with researchers from the Department of Agricultural and Biological Engineering (ABE) on a promising technology to convert algae biomass directly into biocrude oil.

“We pull the wet algae from the tank and convert it into biocrude oil using a process called hydrothermal liquefaction,” he said. “The entire biomass is broken down under high pressure and temperature, with water as the reaction solvent.”

Students who work on the project come from ABE, Civil and Environmental Engineering, Chemistry, Mechanical Engineering, and CABER, the Center for Advanced Bioenergy Research. The group is divided into four teams that work on growing the algae, harvesting the algae, converting the algae to oil, and providing an education outreach on the Internet through an interactive website – www.algae.illinois.edu.

In addition to the website, the organization offers other opportunities for educational

outreach, said Vardon. “We have an exhibit at the Engineering Open House, we had a high school student from the Illinois Math and Science Academy come down for an eight week summer research program, and future plans include working on a project with one of the ABE classes to evaluate carbon sequestration that can occur in this kind of facility.”

Lance Schideman, an assistant professor in ABE, and the group’s faculty advisor, said, “This type of hands-on experience is a great complement to these students’ education. They wouldn’t get this through regular classroom participation. It gives them an opportunity to practice all those soft-side skills, such as leadership, communication, organization, and project management.”

Vardon agreed, saying, “We’ve had to work with the plant supervisor to get approval for things like tapping into the existing system without negatively affecting their permit, or coordinating with the technicians as to their availability.”



“Those things are non-issues in a laboratory,” said Schideman, “but they can pose significant limitations when you get out in the real-world. Dealing with those problems aren’t explicitly taught in the classroom, but they’re very important when you begin to practice your profession.”

“There have been a lot of challenges,” Vardon concluded, “but it’s been a great experience.”

Above: Derek Vardon stands next to algae bioreactor units at Abbott Power Plant.

ABE Introduces Technical Systems Management Graduate Degree Program

—LeAnn Ormsby

A new graduate degree program in technical systems management (TSM) will be offered by the Department of Agricultural and Biological Engineering in August 2011.

According to Joe Harper, professor of agricultural and biological engineering and the program's director, students can choose to earn a professional science master's (PSM) degree, for which they will complete an industry internship rather than a traditional research thesis.

"We place a heavy emphasis on internships and use input from industry to develop the program's curriculum," Harper said. "This fall, we are planning to create an industry advisory group to help direct the graduate curriculum and offer internships to PSM students."

The PSM in TSM curriculum combines coursework in business and technological fields with professional experience.

"Students will complete advanced coursework in technical systems management; business, business administration or economics; and research methodology," Harper said. "They will also have the option to concentrate their studies on agricultural technology, construction management or environmental technology."

The PSM program can be completed in a year and a half, with three semesters of coursework and a summer internship.

"This is an excellent addition to the U of I's current PSM programs in bioenergy, agricultural production, and food science and human nutrition," said Laurie Kramer, associate dean of academic programs in ACES. "With their strong backgrounds in both science and management, PSM graduates will make unparalleled contributions to industry and society as a whole."

Several people have already applied to the program. According to Harper, applicants should be interested in technical systems management, have at least a B-average in undergraduate

continued on page 11

Study Abroad Programs Offer Students Unique Look Into Other Cultures

Puerto Rico and Taiwan were the destinations for two student groups traveling with faculty from the Department of Agricultural and Biological Engineering (ABE) this past summer. Luis Rodríguez and Grace Danao, both assistant professors in ABE, accompanied students to Puerto Rico and Taiwan, respectively. Both trips provided unexpected challenges as well as significant learning opportunities.

"The purpose of our trip was to have our students work with students there to study the sustainability of several of Puerto Rico's agricultural systems," said Rodríguez. "Through a colleague at the University of Puerto Rico, we had access to a dairy farm, a coffee plantation, an interesting hydroponics system, and through the Illinois Crop Improvement Association, a seed certification system. But right after we bought our plane tickets, the students at the University of Puerto Rico at Mayagüez decided to protest."

Students were protesting a tuition hike that would essentially double the cost of their education. The campus was locked up and off-limits to everyone, including faculty, for almost ten weeks.

"Although we considered canceling our trip," said Rodríguez, "our objectives were not just to consider sustainability, but also see the cultural side of the country. We realized there was probably a pretty important cultural lesson to be learned there. So we carried on. We just had to make a Plan B."

Before the strike, Plan A had the Illinois students working on projects they would design with their counterparts at the University of Puerto Rico. Although the strike lifted three days before the Illinois students arrived, the students in Puerto Rico were unable to participate in the program. Instead, the Illinois students worked together on a questionnaire to identify and evaluate sustainability issues related to tropical agricultural engineering problems.

"Initially, our students might have been very focused on only one or two of the systems. Now, they were able to see all the systems and assess the sustainability of each," said Rodríguez. "We toured each site, asking questions to try and determine their ecological footprint," said Rodríguez, "questions regarding what they consume and how much, particularly in the way of power, water and manpower."

"After each site visit, we would return to campus and run the calculations to see if we could quantify what their impact was on the environment. We would review the information, then modify and revise our questionnaire and go on to the next site."

Rodríguez said even after their visits, the students continued to communicate with representatives from each site who were happy to provide more information. The students have prepared reports on three of the four sites visited, and all of the sites have invited Illinois back next year.

Rodríguez said he is more than willing to make the trip again. There are two classes that are designed to prepare students for such a trip; Sustainability Biosystems International and Sustainability Biosystems Engineering. Rodríguez is currently teaching the latter.

"The class is going very well this fall. Registration capped out at 20 students, so it seems like we've found a niche that needs to be exploited. If we continue to do this class regularly, there will be a ready crop of interested students."

Four students from the Department of ABE made the trip this year: Andrew Gentile, Rachel Higgins, and Sia Xeros, all undergraduates, and Glen Menezes, a graduate student.

Grace Danao was invited by the Center for International Agricultural Education and Academic Exchanges in the College of Bioresources, and Agriculture at National Taiwan University (NTU), to accompany 28 students from the US and Taiwan on a four-week summer course on the biodiversity, agriculture and culture of Taiwan.



Above: Rodríguez and two students sample oysters in outdoor Puerto Rican market.

“Taiwan is a small island,” said Danao, “but its significant elevational changes create micro-climates, which in turn promote a very rich biodiversity and unique challenges in agriculture and conservation.”

The group, which included five students from programs in Technical Systems Management (TSM), Agricultural and Consumer Economics (ACE), and Natural Resources and Environmental Sciences (NRES), spent the first ten days of the course learning about the diversity of Taiwan through lectures on the geography, climate, forest, flora and fauna of the island. They also toured the campus and facilities of NTU. These tours included the Animal Museum, Insectarium, and History Gallery of NTU.

To better understand the culture of Taiwan, the group also travelled around Taipei to visit National Taiwan Museum; Chang Kai-shek Memorial; National Palace Museum; Yangmingshan National Park; the Beitou Hotspring Museum; the Sanshia Master Temple; the Li Mei-Shu Memorial Gallery; the Shihsanhang Museum of Archaeology; the Northeast Coast Intertidal Zone and the National Museum of Marine Science and Technology; the Highland Experimental Farm; the Endemic Species Research Institute and the Wildlife & Rescue Center; the National Palace Museum; Taroko National Park and the Shakadang Trail.

“As you can see,” said Danao, “with lectures and field trips like these in just ten days, plus crash courses in Mandarin, Taiwanese cuisine, and how to shop at night markets, we were fully immersed in Taiwanese culture.”

Debbie Porter, a junior in TSM, was one of the students on the trip. “Our schedule was pretty grueling most days,” said Porter. “We were up by seven, on the bus by eight, and we often didn’t get back to the campus until five or six at night.”

Sheffin Joseph, a student from Illinois in Natural Resources and Environmental Sciences, said, “I really didn’t know what to expect from a country like Taiwan, which isn’t as popular a tourist spot as its bigger neighbors. While the country is small, it really is a microcosm of development.

“We started at the capital, Taipei,” he continued, “which had all the amenities of any big city in the United States. The night markets were my favorite part of Taipei. They line the city streets with all the shopping needs you could imagine, and I never saw them close.”

The group spent the rest of the month hiking and traveling around the country, taking in the magnificent sceneries at Cingshui Cliff; Taroko Gorge National Park; Hehuanshan; and Sun Moon Lake.

Joseph said they also saw the more fringe mountainous areas, and he and Porter agreed that the scenery was breathtaking. Sheffin appreciated the opportunity to hike through the mountains, swim in a creek in Toroko National Park, and see wildlife “I would never see in the States!”

Porter was a little more reserved in her appreciation of her surroundings. “The mountains were gorgeous, but we went on one of the most dangerous hikes you can imagine,” she said. “All it would have taken was one slip on a rock and you’d be in the valley below. Our guide kept saying, ‘I’m so sorry. I don’t remember this trail being so dangerous before.’ It was a little nerve-wracking!”

The highlight of the trip was spending a few days at NTU’s Sitou Experimental Forest in Nantou County. Sitou encompasses one percent of the land area of Taiwan and is a popular forest recreation area, allowing visitors a glimpse at endemic plants and animals of the island.

At the end of the four weeks, Porter said, it was a great trip. “I didn’t think I would enjoy it so much. If you would have told me a month prior that I would be outside all day long and mosquitoes would eat me alive, I don’t think I would have signed up for it. But when you’re there, you’re learning in a group setting and it’s really pretty fun.”

Both Porter and Joseph said they believe the people they met will be lifelong friends, and their experience sparked an interest in the island and culture that they hope to pursue in future studies.



Above: Sheffin Joseph, first on left, and Debbie Porter, last on left, enjoy Taiwan’s local cuisine with fellow students.

ABE Introduces Technical Systems Management Graduate Degree Program

continued from page 10

work, and want a career in business or industry.

“This program has the potential to attract engineering students who are interested in business, as well as students in technical systems and construction management,” Harper said.

While several other universities offer traditional graduate programs in technical systems management, U of I is the only school to offer a PSM program.

“It’s a very unique approach,” Harper said. “With industry support, we can give people with a technology background—both recent graduates and those who have worked for several years—an opportunity to get a master’s degree.”

ABE Honors a Year of Achievements at Spring Awards Banquet



Above: Georgeann Jones with the winners of the Ben and Georgeann Jones Excellence in Teaching Awards: back row, left to right; Vijay Singh, Rabin Bhattacharai, Doug Barker: front row, left to right; Jones, Grace Danao, Yuanhui Zhang.

Below: Larry and Lola Huggins present scholarship to Anna Oldani, student in ABE.



The 2010 Spring Awards Banquet for the Department of Agricultural and Biological Engineering was held on Sunday, April 18, at the I-Hotel and Conference Center in Urbana, Illinois.

The banquet is co-hosted each year by the U of I Student Engineering Branch of the American Society of Agricultural and Biological Engineers (ASABE) and the U of I Student Mechanization Branch of the ASABE. Stephen Corban '10 AgE, Gina Francis '10 AgE, and Ross Dambacher, a senior in Agricultural and Biological Engineering, were the organizers for this year's event.

Dr. Robert Hauser, Dean of the College of Agricultural, Consumer and Environmental Sciences, gave the opening remarks for the Banquet.

"The research activity and external support for this Department has grown by leaps and bounds in the past years," said Hauser. "I know much of K.C.'s time is spent on resolving the difficult budget issues that we're all facing now, but the reality is that he's working with fantastic faculty, great students, great staff and great alumni. We all have to address the ongoing budget problems, but quality can go a long way in resolving those problems. As long as

we can maintain that type of quality across the board, this department will be in fine shape."

Dinner followed Hauser's remarks, and after dinner the awards ceremony began. More than \$20,000 in gifts and scholarships was presented to individual and group winners. Awards are given in 28 categories to both students and faculty. These include, but are not limited to, team awards given to members of ABE 100 (the introductory class for agricultural and biological engineering students), awards for the Best Undergraduate Exhibits at the annual Engineering Open House/ExplorACES event, and Excellence in Teaching awards.

In addition to these awards, two alumni are given special recognition each year – the winner of the Distinguished Alumnus award and the ABE Professor for a Day.

This year, Larry G. Huggins, MS '62 AgE, was announced as the winner of the 2010 Distinguished Alumnus award. Dr. Huggins was instrumental in forming Alpha Epsilon as the national Vice President in its founding year of 1964 before serving as President in 1965. Huggins also served as Department

Head of Agricultural and Biological Engineering at Purdue University from 1981-1994 before becoming an Associate Dean of the College of Engineering until his retirement in 2005.

David W. Smith, Ph.D. '74 AgE, was named as the Spring 2010 ABE Professor for a Day. Smith joined the John Deere Technical Center in 1974. An early user of multibody dynamics analysis software, Smith's 34-year career at Deere was spent in applied dynamics consulting with the Deere factory product engineering departments.

In addition to financial support from the student clubs, the banquet is funded each year by ticket sales and financial support from the John Deere Foundation.

2010 Spring Banquet Award Winners

Undergraduate Students

John Deere Foundation Award
 Bernard C. Mathews/Mathews Company Scholarship
 Bauling/Pershing Memorial Award
 E.W. Lehmann Award

Richard C. and Helen Coddington Design Team Award
 Bateman Congeniality Award
 Frank B. Lanham Award

Ben & Georgeann Jones Undergraduate Student Scholarships

Larry and Lola Huggins Scholarship
 Wendell Bowers ABE Student Scholarship
 J.A.Weber Outstanding Freshman Award
 K.J.T. Ekblaw Outstanding Sophomore Award
 Douglas L. Bosworth ABE Endowed Scholarship
 E. W. Lehmann Outstanding Senior Award
 Ryan Tucker McGinn Memorial
 Bateman Congeniality Award
 C.E. Goering Award for Excellence, (Outstanding Junior Award)
 Dr. Philip and Carol Buriak Award
 Steve Eckhoff, Pioneer Hi-Bred International Scholarship
 E.W. Lehmann Outstanding Junior Award
 ASABE Central Illinois Section Future Leaders Scholarship
 Illini Pullers Outstanding Member
 Illini Pullers New Outstanding Member
 Alpha Epsilon (gift certificate)

Faculty

J. Kent Mitchell Teaching Excellence Award
 Ben & Georgeann Jones Excellence in Teaching Awards

Graduate Students

Ben & Georgeann Jones Graduate Student Scholarships
 Ben & Georgeann Jones Excellence in Teaching Awards
 ABE Graduate Achievement Fellowship

Alumni

Distinguished Alumni Award
 Spring 2010 Professor for a Day

Miscellaneous

Best Undergraduate ExplorACES/Engineering Open House Exhibit Award
 1st Place – Sidney Knight and Anna Oldani
 2nd Place – Matt Doherty
 3rd Place – Loren Anliker

Mark Hull, ABE
 Stephen Corban, ABE
 Charles Merriken, ABE
 Gina Francis, ABE
 Brian Campion, ABE
 Amy Balek, TSM
 Brian Jacobson, TSM
 Stephen Corban, ABE
 Jaclyn Burke, ABE
 Loren Anliker, ABE
 David Diddier, TSM
 Andrew Fulton, ABE
 Anna Oldani, ABE
 Jeff Lambert, ABE
 Pakapreud Khumwan, ABE
 Brian Fehrenbacher, ABE
 Maxwell Williquette, TSM
 Jordan Tate, TSM
 Mark Colgan, TSM
 Tyler Zoeller, TSM
 Casey Millard, TSM
 Kristen Chonowski, TSM
 Ross Wilken, TSM
 David Diddier, TSM
 Jason Motsinger, ABE
 George Bozdech, ABE
 Brian Krug, ABE
 Anna Oldani, ABE

Robert Petrea, PROF
 Vijay Singh, PROF
 Grace Danao, PROF
 Yuanhui Zhang, PROF

Chris Cirone, MS
 Bernardo Vidal, PhD
 Doug Barker, MS
 Rabin Bhattarai, MS
 Rabin Bhattarai, MS
 Yan Zhou, MS
 Glen Menezes, MS
 Goutum Nistala, MS

Larry Huggins
 David Smith

ABE 100 Best Presentation

Delayne Durdle
 Aaron Schubert
 Austin Roepke
 Zach Brammeier

ABE 100 Best Poster (3-way tie)

Evaluation of a Quarter Scale Tractor by Team Aggies

Chris Devlin
 Brian Keller
 Jordan Lutz
 Jacob Larson

Building a Microsteam Car by Steam

Mingyang Jiang
 Ritchie Cervantes
 Kevin Verlee
 Kirk Beutke

Protect Your Lands: Erosion & Sediment Control by Keeping It Soil

Alison Melko
 Patricia Paulausky
 Leigha Curtin
 Michelle Kwak

Singh Research Changes Corn Bioprocessing and Biofuels Production



Above: Singh (second from left) after conducting a workshop at National Taiwan University (Pictured with Dean of College of Agriculture, Department Head of Bio-Industrial Mechatronics Engineering, Director of Bioenergy Research Center, Country director of US Grains Council)

Dr. Vijay Singh, Ph.D '98 AgE, an associate professor in the Department of Agricultural and Biological Engineering, continues to have a national and international influence in the development of new technologies in corn bioprocessing and biofuels production.

A primary area of Singh's research has been the development of a process called enzymatic corn wet milling. This process reduces steep time and produces starch yields comparable to conventional corn wet milling. To fractionate the corn, conventional milling soaks corn in water with sulfur dioxide. The enzymatic technology soaks the corn in water until the germ is pliable and does not break when the corn is ground. The ground corn slurry is then treated with enzymes to help in corn fractionation. Starch recovery is better with the enzymatic process and health and environmental concerns caused by the use of sulfites are eliminated.

"This technology is very useful for the big corn wet millers in the United States",

Singh said, "but the technology requires some modification from what they have been using for last 150 years; they were hesitant to do any kind of trials in their plants here."

That reluctance led Singh and David Johnston (a USDA/ARS researcher) to conduct research in other countries at smaller, single-owner plants. "These plants are much more manageable," Singh noted, "and we work directly with the owner. In Malaysia, we conducted a commercial trial at the Jamanis Corn Wet Milling Company. The owner, Soon Neoh, allowed us to modify his plant. Using our process, his starch yields jumped four to four-and-a-half percent. When we went back to the original process, they dropped. So we played around with different enzyme doses and all the doses gave us higher starch yields."

Singh's research in the wet milling process was initially funded by the USDA

Cooperative State Research, Education and Extension Service, now called the USDA National Institute of Food and Agriculture.

"Most of the work that I'm doing is a team effort," Singh was quick to note. "I am part of a team of very good grad students, technicians, colleagues here at the U of I and colleagues at two USDA research service laboratories in Peoria and Wyndmoor, Pennsylvania."

Singh and his colleagues are working to get this technology implemented in India and Israel, he said, "to show that other plants can do this and get these kinds of benefits."

Better technologies for ethanol production are another focus of research for Singh and his colleagues. One process, called enzymatic dry grind, is changing the way ethanol is produced and making it more economical in the process.

In the conventional dry grind process, raw corn is finely milled and cooked. The starch is fermented and converted into ethanol and the three non-fermentables (germ, protein and fiber) are carried through the process and recovered at the back end as distillers dried grain with solubles, or DDGS. Utilizing the massive amount of DDGS produced has been a drawback, since it can only be fed to ruminant animals.

Singh's process soaks the corn in water for a short period of time, then grinds it coarsely and incubates it with enzymes, which break down the corn kernel. That enables researchers to pull out the germ and fiber at the front end of the process, before fermentation. When the fiber is pulled out before fermentation, it reduces the total volume of DDGS. It also reduces the amount of fiber and increases protein content in the DDGS, which can then be fed to non-ruminant animals. Another benefit of this process is the recovery of germ and fiber, valuable co-products themselves, which can be used in a variety of products including corn germ oil and corn fiber. Singh's research has led to ten patent applications, four of which have been licensed to different companies.

Dr. Singh's expertise in corn bioprocessing and biofuels production has given him the opportunity to speak and teach in a number of venues here and around the world. In 2008, due to strong interest in the biofuels industry, Singh developed a professional course, "New Technologies in Ethanol Production," offered by the Department of Agricultural and Biological Engineering for representatives of the ethanol and allied industries.

For the last five years, Singh has been one of the faculty members at The Alcohol School, a five-day professional course on ethanol production that is held semiannually in Toulouse, France for European attendees and in Montreal, Canada for North American attendees.

Singh has also taught short courses and conducted workshops at universities and research institutes, including the National Taiwan University, Taipei, Taiwan; University of Columbia, Bogota, Columbia; University of Sao Paulo, Sao Paulo, Brazil and at COFCO Science and research Institute, Wuhan, China.

**Join us for the
Engineering
Open
House and
ExporACES
Friday,
March 11th
Saturday,
March 12th**



Return this form to update your information and/or donate to ABE or visit <http://abe.illinois.edu/ageAlumni>
 Department of Agricultural and Biological Engineering
 1304 W. Pennsylvania Ave.
 Urbana, IL 61801

- I want to invest in the Dept. of Ag & Bio Engineering Annual Fund at the University of Illinois. Here's my gift to support this fund (#775179):
 - \$500 \$400 \$300
 - \$200 \$100 Other: \$ _____
- My check for \$ _____ is enclosed.
 (Make check payable to UIF – Dept. of ABE.)
- Please charge my gift of \$ _____ to the following credit card:
 - VISA Discover Novus Mastercard American Express

CARD NUMBER _____ EXP. DATE _____
 SIGNATURE _____

 (PLEASE PRINT) NAME

 ADDRESS

 CITY, STATE, ZIP

 JOB TITLE/POSITION

 COMPANY

 ADDRESS

 CITY, STATE, ZIP

 PHONE

 EMAIL ADDRESS

Smith and Wells Inspiring Examples in Agricultural Engineering
continued from page 8

job at IH”, he said, “my financial needs were over-supplied by a greater percentage than ever before or since. Even today, I thank God whenever I think of the generosity of Aunt Lois and Uncle Curtie.”

After receiving his master's in agricultural engineering from the U of I, Wells moved to Rock Island in October of 1961 and began what would become an illustrious career at International Harvester. Wells worked a little more than ten years at the plant in East Moline. In January of 1972 he transferred to the new IH Product Reliability Center in Hinsdale for eight months before moving on to the IH World Headquarters in Chicago. There he served as strategic business planner and later as the Project Manager responsible for the final development work and the introduction of the revolutionary “Axial-Flow” Combine. Over the next 35 years this machine was not only the most successful product in the history of the company, but also the combine against which all others were measured. Wells ranks this accomplishment as the most important one of his professional career, saying, “The DNA we put in that machine is still there, handsomely paying back to the company and to every owner every harvest season.”

In 1981, IH sent Wells to the Advanced Management Development Program at Harvard Business School, a 13-week program for rising executives. International Harvester became CaseIH in 1985, and Wells rose to become the North American Director of Engineering of Crop Production and Crop Harvesting Equipment, and later World-wide Director.

In 1989, Wells left CaseIH to become Vice President of Engineering at Benteler Industries in Grand Rapids, Michigan. “A principal reason I was able to join this high-tech and highly profitable, rapidly growing foreign-owned automotive components supplier (a field far removed from my own) was that a friend and former colleague from IH was then the president there. This is yet another example of a good relationship really working to the mutual benefit of the parties.”

In the summer of 1997, Wells decided to reinvent himself as a consultant, and formed Wells Enginnuity Consulting. “Again, some good relationships paid off big-time for me,” he said. “A number of my colleagues from IH and CaseIH were still in grain harvesting engineering, and they hired me immediately upon becoming aware that I had transformed myself into a consultant.”

“Another treasured relationship that has not only enabled my career, but also brought me considerable pleasure and fulfillment for over 55 years is that which I've had with the University of Illinois and the Ag Engineering Department, now ABE@ Illinois, and a great many of the fine people there,” said Wells.

Today Gary lives with his wife Anita in DeKalb. They have four children and seven grandchildren, and Wells said his family comprises his most important relationships. “Being co-leader of the two-person team that produced this family is without doubt my most important overall accomplishment in life,” he concluded, “and being a good grandfather is the best job I've ever had.”

Wakeland a National and International Influence in Engineering

continued from page 3

Today Wakeland lives in Urbana with his wife Joyce. He has four children, two step-children and 14 grandchildren. He is part owner (with two of his children) of Advantage Properties. “I never wanted to sit in a rocking chair when I retired,” he said, “so I went into the housing business. We've put up eleven apartment buildings since 2003. My daughter and son and their spouses work in the business with me, and we're housing about 400 students a year now.”

Wakeland concluded with some succinct bits of advice for today's graduates. “Number one - be willing to travel,” he said. “Second, build a strong mentoring system. And finally,” he said, “don't be a braggart, but mention the University of Illinois. Regardless of how we rank nationally, we are one of the great international schools. We're just as good as Harvard or Berkeley. Be very proud of your university, and don't hesitate to mention that U of I is your alma mater.”

■ Agricultural and Biological Engineering ■ Technical Systems Management

*Integrating life and engineering for the
enhancement of complex living systems*

SOIL & WATER ENGINEERING

OFF-ROAD EQUIPMENT ENGINEERING

BIOENVIRONMENTAL ENGINEERING

FOOD & BIOPROCESS ENGINEERING

BIOLOGICAL ENGINEERING