The egg-shaped instrument may look like a device designed to send someone into the stratosphere, but its real purpose is much weightier. It’s called a BOD POD® (technically known as displacement plethysmography), and it determines a person’s body composition: lean mass versus body fat. The instrument is the Kinesiology and Sport Department’s latest state-of-the-art acquisition, purchased to prepare students for careers in a range of disciplines: medical testing, research/nutrition, health/fitness, and more.

“My philosophy is to provide students the opportunity to learn by practicing tasks they’ll use in their careers,” said Jason Langley Ph.D., assistant professor of kinesiology and sport. “They’ll make mistakes now, so they’ll be proficient after graduation.”

“My philosophy is to provide students the opportunity to learn by practicing tasks they’ll use in their careers.”

—Dr. Jason Langley
Letter from the Dean

The 2013–2014 academic year is off to a great start. This fall we welcomed several new faculty and staff who join an outstanding group of professionals dedicated to providing exceptional educational experiences for our students. Along with the educators and staff, the Pott College welcomed a new freshman class with the highest admission credentials to date. We’re proud of our ability to attract and retain some of Indiana’s brightest achievers.

Earlier this semester, we had a very successful grand opening for our newest facility, the Applied Engineering Center. The open house was attended by several hundred guests ranging from those in K-12 education to regional business and industry. Since officially opening, the number of inquiries for collaboration has skyrocketed, and we look forward to developing partnerships to enhance our regional workforce and support our manufacturing-based economy. Our engineering and advanced manufacturing students are getting hands-on and real-world industrial experience.

Summer 2013 was busy as we completed our fifth summer of the National Science Foundation-sponsored Early Undergraduate Research Program. We had 18 students and 13 faculty participate in research projects which encompassed nearly every department and discipline within the Pott College. The experience the students receive from this program is invaluable, and many students have presented and published work in peer-reviewed outlets. Thanks to a no-cost extension of our NSF grant, summer 2014 will mark the sixth and final year of the program. A team of faculty has been formed to begin seeking another grant to continue and/or expand this program.

The 2008–2013 strategic plan was successfully implemented as we doubled enrollment and increased graduation rates within STEM (science, technology, engineering, and mathematics) majors; created the SwISTEM Resource Center, making it a national model for support of STEM education; increased the number of majors/minors we offer students as career choices; established an Advising Center to increase students’ success and graduation rates; and initiated a number of outreach programs to engage students within the community, to name a few. This academic year, we are embarking on the 2014–2019 strategic plan, which will build on our accomplishments and provide a roadmap to new levels of success. We hope to unveil this new plan in the spring 2014 issue of Periodic Review.

The Pott College continues to provide leadership in the region with an extensive array of STEM activities and teacher professional development. Additionally, faculty are actively engaged in a variety of service activities in the region, a sampling of which can be found in this edition of Periodic Review. Additional information on these and other items can be found at usi.edu/science. I hope you find this issue of Periodic Review both enjoyable and informative. Also, if you haven’t done so, please join us on Facebook at facebook.com/pottcollege.

Dr. Scott A. Gordon
Scott A. Gordon, Dean
Pott College of Science, Engineering, and Education

Biology department grows houseplants for health

In 2011, Gloria Butz, biology laboratory supervisor, attended the Health and Wellness Fair sponsored by the College of Nursing and Health Professions. She noticed plants being given away, and wondered where they came from. A little inquiry led her to discover the College had purchased them from a local nursery, and she wondered if the Biology Department might grow the next group of give-away plants for the fair.

“Most groups and organizations on campus don’t have a lot of funds to make such a purchase. This is one thing we can do for them,” Butz said.

When Butz offered the Biology Department’s greenhouse and the services of her undergraduate assistant and biology major Brittney Verble to the College, she couldn’t predict the extent of the collaboration. In 2012, the first year of service, biology provided 100 plants, and the College bought the other half from a local nursery. This year, 150 to 200 plants came from the biology greenhouse, grown from cuttings Verble took from a variety of low-maintenance plants, ranging from spiders to Moses in the boats to ornamental peppers.

Butz used the Biology Department’s supplier to purchase products for the College, such as sterile soil to reduce the risk of fungus transfer and pots for the plants, to keep the cost far lower than if the College had to buy from a commercial company.

The relationship between biology and the Health and Wellness Fair is a symbiotic one, with one supplying homegrown houseplants that will in turn help filter the air in students’ homes, providing a healthier environment all around.
Advanced manufacturing strengthened by center

Within the Engineering Department at USI, there exist three Bachelor of Science degree programs: engineering, industrial supervision, and advanced manufacturing. The engineering program and the more business-oriented industrial supervision program have been around since before Keith Benedict, instructor in engineering, came to USI 23 years ago. The advanced manufacturing program, however, was established in 2008 to provide students with a course of study that combines the drafting skills taught in engineering with training in the technologies used in the manufacturing industry.

The program offers students a four-year liberal arts education plus the opportunity to take extra math and engineering courses, as well as receive the technical training normally associated with two-year trade colleges. Students also have opportunities for co-ops with local businesses to gain valuable career experience. A self-proclaimed “shop rat,” Benedict’s courses emphasize robotics and manufacturing materials and techniques. “Students who are trained in these areas would have no problem walking into Berry Plastics, or any other employer, and getting right to work,” he said.

The ability to send students into the workforce equipped for today’s advanced manufacturing industry has been buoyed by the completion of USI’s Applied Engineering Center (AEC). The 16,226-square-foot “factory” opened this fall, allowing Benedict and others to move classes and equipment out of the Technology Center, which was shared with art and theatre programs. It also means there’s room for more students to earn degrees in the program. “Everybody recognized that we needed better facilities,” Benedict said. “What we now have is completely state-of-the-art.” The AEC facility features an array of equipment, including automation equipment, injection molding, AutoCAD, and more.

In 2012, the Pott College of Science, Engineering, and Education revamped the advanced manufacturing program’s curriculum. Using input from USI’s Industrial Advisory Board—made up of representatives from area industries—the College increased emphasis on skill areas such as automated equipment, lean manufacturing business management strategy, and other modern manufacturing philosophies.
“There’s not another program in the state that teaches students in such a practical and hands-on way,” said Daniela Vidal, director of the University’s Center for Applied Research and Economic Development, and former instructor and coordinator of advanced manufacturing and industrial supervision. “It gives students an understanding of the challenges they’ll face, as well as contact with industrial partners that could later translate into employment.”

As a result, an increasing number of students in USI’s Engineering Department are electing to complete technical degree programs—in industrial supervision and advanced manufacturing—compared to previous years. According to USI’s Career Services and Internships, more than 70 percent of students polled who graduated from the Engineering Department in 2012 accepted employment in the Tri-state area with average salaries of nearly $52,000.

According to data from the U.S. Bureau of Economic Analysis, manufacturing accounted for 12.8 percent of jobs in 2011, second only to healthcare in a list of largest industry providers of jobs in a four-county area which includes Vanderburgh, Posey, Gibson, and Warrick counties. Employees of manufacturing giants such as Toyota, Berry Plastics, and Alcoa accounted for a whopping 21.4 percent of earnings, higher than any other category with average earnings per job of $82,416.

This kind of education would allow the community access to home-grow talent in areas where skilled technical labor is in increasingly high demand. “I see this building really enhancing what USI is able to offer the community,” Benedict said.

Alcoa’s problem solved by USI math professor

Dr. William Wilding

Alcoa Warrick Operations had a problem. A function in the processing equipment of one of its production lines needed to be changed to improve the efficiency. Trouble was, the global corporation—of which its Southern Indiana plant is one of the largest aluminum smelting and fabricating facilities in the world—didn’t have an expert on hand to solve the problem. The University of Southern Indiana, however, did: Dr. William Wilding, associate professor of mathematics.

“There are production variables that can be measured in real time and one that can’t,” said Wilding. “Because the variable can’t be measured quickly enough, we had to find another way.”

That’s where math came in. To solve Alcoa’s dilemma, Wilding worked out a math function that would take data from known production variables and input it into an equation he’d formulated to arrive at an estimation of the unknown. In other words, the solution to Alcoa’s problem.

The collaboration between Wilding and Alcoa was made possible through USI’s Center for Applied Research and Economic Development (CARED), an office that serves as a “front door” for regional businesses and organizations to get expert help from USI resources. “It’s nice for faculty,” Wilding said, “because CARED acts as a go-between, handling the paperwork and payment. All I have to do is solve the problem.”

“It’s just a math problem, but one that involves a lot of art and subjectivity.”

Alcoa gave Wilding data and a formula developed by someone else as a place to start. The solution would take 26 hours (divided into two phases: preliminary and final) of Wilding at his office computer employing his creative powers and the graphical capabilities of the University’s math software to formulate a solution. “It’s just a math problem,” Wilding said, “but one that involves a lot of art and subjectivity. Finding the right model is the hard part. Estimating the parameters of the model is easy.”
New hires, department changes, promotions, and honors

### New Administrative Hire

**Mark “Kevin” Nelson**  
Clinical Assistant Professor and Coordinator of Advanced Manufacturing Program  
Master of Integrated Manufacturing Systems in Engineering  
North Carolina State University

### Administrative Promotions

**Dr. Glenna Bower**  
Associate Professor and Chair of Kinesiology and Sport  
Assistant Dean, effective August 5, 2013.

**Dr. Mark Krahling**  
Associate Professor of Chemistry and UCC Director  
Associate Dean effective August 5, 2013.

### Honors

**Glenna Bower**, associate professor and chair of Kinesiology and Sport, received the 2013 Midwest Association for College and University Physical Education Scholar/Lecture Award.

**Rick Hudson** is the new Chair of the Education Materials Committee for the National Council of Teachers of Mathematics.

**Michel Ndemanu**, assistant professor of education, was named a PDK Emerging Leader by the Phi Delta Kappa International, a professional education organization, for his work in educating pre- and in-service teachers about diversity and equality issues in education.

### New Faculty

**Dr. Chris Croft**  
Contract Assistant Professor of Sport Management  
Ed.D. Educational Leadership and Administration  
University of Texas El Paso

**Dr. Lawrence Armendarez**  
Contract Assistant Professor of Physics  
Ph.D. in Physics  
University of Alabama at Birmingham

**Dr. Christopher Sny**  
Associate Professor of Teacher Education  
Ph.D. in Educational Administration  
University of Wisconsin-Madison

**Kelly Sparks**  
Instructor in Teacher Education  
M.Ed. in Educational Technology  
Grand Valley State University, Michigan

**Dr. Clarissa Willis**  
Associate Professor of Teacher Education  
Ph.D. in Special Education  
University of Southern Mississippi

### Tenured and Promoted to Associate Professor

**Dr. Ronald Diersing**  
Engineering

**Dr. Vella Goebel**  
Education
Crane partnership provides engaging student opportunities

Running on parallel tracks, converging toward the same point, were administrators at USI and officials at Naval Surface Warfare Center, Crane (NSWC Crane). USI sought to find a way to expand opportunities for faculty applied research and student learning, while Crane searched for ways to involve Southwestern Indiana communities in the research and commercialization of its technologies. Their paths crossed in 2007, when each recognized the other had what it wanted and together they established an Educational Partnership Agreement, an arrangement that allows both parties to benefit from shared knowledge and resources.

The most recent project born of the USI-Crane partnership is focused on student innovation. With the guidance of USI faculty, engineering majors work full-time with students in the Romain College of Business to develop ideas and business strategies around commercialization of Crane patents in the summer Technology Commercialization Academy, which completed a second successful session in June.

Andy Moad, USI-Crane partnership manager, works with business and entrepreneurship students to help connect them with students and faculty in the Pott College who can help bring their ideas to life. Engineering students also have the option to work on ideas pitched by Crane for their senior projects.

“When students work on projects that involve Crane, it is highly beneficial to them because they work on things they aren’t normally exposed to,” he said.

Moad is driven to discover other ways in which USI can engage with Crane in technology transfer—a process of transferring advanced skills and knowledge, technologies, and resources from those who have them to those who do not.

“When people think about technology transfer, they primarily think about patents,” he said.

“...because they work on things they aren’t normally exposed to.”
—Andy Moad

The Technology Commercialization Academy is a prime example of the mining of patents for commercial ideas, a process begun in 2008, in which inventors discuss their projects and a panel of experts identifies potential disclosures to be pursued. The partnership also operates to serve the University and the community in other ways, through means such as personnel exchange, funding, equipment, facility use, and access to expertise.

USI expands SwISTEM footprint through Crane partnership

As part of its initiative to advance teaching and learning of science, technology, engineering, and mathematics (STEM) in the region, the University’s Southwest Indiana STEM (SwISTEM) Resource Center has expanded the SwISTEM/ Crane Equipment Lending Service to include seven more counties, for a total of 17.

The service, made possible through an Educational Partnership Agreement between USI and the Naval Surface Warfare Center, Crane (NSWC Crane), offers laboratory-grade equipment and hands-on mathematics learning tools. These are free-of-charge to organizations involved in STEM education of pre-kindergarten through grade 12 students through an inter-library loan program. Curriculum and instructional assistance also is available, as well as additional equipment through the Crane STEM Outreach Department.

All formal and informal education institutions in Owen, Greene, Daviess, Martin, Monroe, Lawrence, Orange, Knox, Gibson, Posey, Vanderburgh, Warrick, Dubois, Pike, Crawford, Spencer, and Perry counties can use the lending service.

Engineering and business students brainstorm ideas and business strategies around commercialization of several Naval Surface Warfare Center, Crane Division (NSWC Crane) patents during the Technology Commercialization Academy.

The Periodic Review Fall 2013
Lucrative leadership: alumnus establishes scholarship to benefit student trailblazers

As a senior preparing for graduation, Ken Schnautz ’11 challenged his fellow students—at a luncheon recognizing scholarship donors—to return the generosity they’d been shown through the gift of scholarships.

“I frequently hear people say they wish they had more time, and I feel that’s what scholarships provide students—time,” he said. “The less time a student has to spend focusing on how they’re going to pay for their education means more time to study, to get involved, to excel, and to lead.”

True to his own challenge to make education attainable for others, Schnautz established the Kenneth W. Schnautz Engineering Scholarship. “I know the importance of scholarships,” he said. “A donor paid for a large part of my education, and I want to do the same—enable someone else to have a successful college career.”

The scholarship is awarded to an engineering major who shows leadership at USI, an important attribute to Schnautz, who was a leader himself during his time as a student. In his freshman year, he played an integral role in forming the USI chapter of the American Society of Mechanical Engineers after it had been dormant for several years. He served as vice president for the chapter from 2007 to 2008 and as president from 2008 to 2011. He also established the Robotics Competition that attracts more than 100 middle and high school students each year.

Today, Schnautz is an application engineer at Matrix Design Group in Newburgh. He continues to volunteer at the University and is a member of the USI Alumni Council. The Kenneth W. Schnautz Engineering Scholarship will be awarded for the first time this fall, and he hopes it’s as impactful as his scholarships were to him.

USI alumni-established scholarships range from $100 to $2,500 per academic year. For information on how you can establish a scholarship, visit www.usi.edu/giving.

Four new scholarship opportunities

- The Pott College of Science, Engineering, and Education STEM Scholarship Endowment, established by Dr. Shelley Blunt, assistant provost for Academic Affairs, and her husband, Stephen Glueckert. The endowment will provide scholarships in perpetuity to USI students majoring in the STEM disciplines.
- The Dr. Howard and Barbara Dunn Chemistry Scholarship Endowment established by Dr. Howard Dunn, professor emeritus of chemistry, and his wife, Barbara. The annual scholarship will support juniors majoring in chemistry or biochemistry who are planning to attend graduate school to study in a chemistry discipline.
- The Leroy Jochum Memorial Geology Scholarship, established from gifts made in memory of Jochum, who died on April 18, 2013, at the age of 78. He was owner and CEO of Jochum-Vickery Drilling.
- The Three i Design Scholarship, established to support engineering students from the Southwestern counties of Indiana—Vanderburgh, Posey, Gibson, Warrick, and Pike.

New instrument, new possibilities in chemistry

Separating and measuring molecules became easier in the Pott College of Science, Engineering, and Education this semester, with the acquisition of a high-performance liquid chromatography (HPLC) instrument. The key to the HPLC’s scientific precision is the interchangeable chromatography column. The size of a drinking straw, the column contains compounds which can separate molecules in complex chemical solutions.

In addition to separating chemical samples, the HPLC makes the difficult task of separating geological and biological samples much more efficient. “Biological samples are a big pain,” said Dr. Mark Krahling, associate professor of chemistry and associate dean, explaining that the “mess” of nature makes isolating and measuring specific compounds difficult.

The HPLC instrument, along with a new state-of-the-art spectrophotometer, is similar to the equipment students will use in their careers after graduation—as chemists, laboratory technicians, pharmacists, and numerous other scientific and regulatory professions. Before the HPLC instrument was purchased, students used gel-permeation chromatography (GPC). Though GPC is useful for separation, it cannot measure molecules as small as the HPLC can, Krahling said.

Used in combination with other instruments, HPLC is capable of separating all the molecules in a cell into individual proteins and identifying them based on the amino acids that make them up. “That’s where we are right now in the scientific world,” Krahling said.
High school students explore engineering possibilities at EMC² camp

The growing need for professionals in STEM (science, technology, engineering, and mathematics)-related careers prompted the Southwest Indiana STEM (SwISTEM) Resource Center in USI’s Pott College of Science, Engineering, and Education to host the first Engineering and Manufacturing Creativity Camp (EMC²) this year. The week-long summer camp gave more than 20 area high school students the opportunity to gain hands-on experience in robotics and in programming a Raspberry Pi.

The creation of this Pi, however, didn’t include flour and fruit. The Raspberry Pi is a mini computer, about the size of a credit card, and works like a desktop PC. Students learned to program their Pis using the same text-based language used on robots in the Applied Engineering Center—robots that are used in modern industry. Once the programming was complete, the students then conceptualized cases for their new hand-held computers.

“The students came up with their own ideas for a case and then drew the outlines with CAD (computer-aided design),” said Dave Ellert, instructor in engineering and coordinator of engineering outreach. “They added all the openings for USB, SD card, power cords, and assembled their parts, creating a 3-D model. Just the way design is done by engineering professionals.”

EMC² was made possible by the Alcoa Foundation, the University of Southern Indiana, and the SwISTEM Resource Center. Ellert was especially grateful for the assistance from Alcoa. “Alcoa’s generous contribution allowed us to think outside the box and do something as involved as this,” he said. “It was only through their contribution that we were able to supply each student with their own Raspberry Pi and create cases for them.”

Thomas Nunn, a junior at Signature School in Evansville, attended the camp because he’s interested in studying engineering in the future. “I appreciated that I was able to see the real-world applications of engineering during this camp,” he said. “To be able to not only create a model on the computer, but to then see it in 3-D visualization was very cool.”

Advising center offers Pearson Education testing

Teacher candidates no longer have to leave campus to take the Core Academic Skills Assessment (CASA) required for admission to teacher preparation programs in Indiana. The Pott College Advising and Resource Center was approved this past summer as a test center for Pearson Education, Inc. The CASA tests in mathematics, reading, and writing are available at USI at least twice each month.

The three CASA component tests cost $38 each and allow test takers a maximum time of 75 to 105 minutes, depending on the content being tested. If a successful score is not achieved, each of the three tests can be retaken. In addition to the Pearson fee, there is a site fee of $30 for all three tests or $15 for each subtest.

This January, Pearson also will offer the content and pedagogy assessments required to apply for an Indiana teaching license. Plans are to expand the licensure testing service to students as well by making USI a licensure test site. Tests dates, registration information, and test preparation materials are available on the Pearson website: www.in.nesinc.com.

EMC² will be offered again to high school students from Posey, Vanderburgh, Warrick, Gibson, Dubois, Pike, and Spencer Counties in the summer of 2014. For more information, visit www.usi.edu/science/southwest-indiana-stem/student-outreach.
Geologist’s adventures grounded in diversity

When Brian Fribley’s phone rings at 2 a.m., the owner of Basinwide, LLC is out of bed and in his truck within five minutes. Those predawn calls often send him bumping down remote gravel roads to an oil rig 100 miles away. For Fribley, there’s never a typical day or night; it’s always something different, which makes his work an adventure and him a jack-of-all-trades in petroleum geology. A phone call from an oil company contracting his expertise might require him to correlate and document a new oil discovery or replace a clogged vacuum hose to a gas chromatograph on a drilling rig; he might monitor gas detection in real-time via his cell phone while hundreds of miles away, identifying trace elements of hydrocarbon gas in rock thousands of feet under the ground—gas that could be potentially dangerous.

Fribley, who earned a geology degree from USI in 2002, considers himself a hands-on petroleum geologist, and operates out of two offices: a high-tech one set among farm fields in rural Posey County, and a small trailer he tows to sites far from home. Although he jokes his neighbors think he’s always headed camping, in reality, the trailer is a low-tech toolbox on wheels containing the equipment necessary to maintain rigs on-site, as well as a high-tech lab equipped to analyze rock cuttings and core samples. Because Fribley might be in the field 22 hours at a time, the trailer is fitted with a kitchen, shower, and bed. “Some days I sleep a couple of hours then get up and do it all over again,” he said.

Even though 21st century technology has made his profession a little easier, Fribley admits the most exciting aspect of the work is relatively low-tech. During the oil-exploration phase, he works as a well-site geologist reading core samples of sediment and rock as they’re pulled from the ground. “The most fun for me is getting to see the rocks. I love seeing the micro-fossils in a core sample. These are fossils that are hundreds of millions of years old, and I’m the first one to see them. It’s a good feeling,” he said. “Of course, finding oil also is a pretty good feeling.”

As an independent contractor, Fribley concedes the oil business has changed since the early 20th century when the oil boom brought businessmen from big oil and gas companies into the Tri-state looking for the next gusher. Then, oil derricks and rigs popped up across gently rolling farmland. Today, you’ll still see wells in rural areas, stubbornly pumping away, supplying American-produced petroleum.

It’s on these wells that Fribley primarily works. His geology company specializes in working with oil companies located across Illinois, Indiana, and Kentucky’s petroleum and mineral-rich Illinois Basin. Working in the basin has given him an appreciation for the geology in his back yard. Too often, when students think of geology, he said, they think of rugged canyons and mountains out west, or the time-worn regions across the Shenandoah Valley. No matter what the area, however, geologists’ work is always the ground beneath their feet.

New degree targets growing field

The Pott College of Science, Engineering, and Education has a new program this fall that combines the study of biology, ecology, hydrology, geology, and sustainability to educate students on aspects of environmental science and societal issues related to the environment. Students focus on hands-on experiences in the field and laboratory, gaining valuable knowledge about green business and the need for renewable energy sources.

The field of environmental science employed over 1,300 people in Indiana in 2008, according to Bureau of Labor Statistics estimates. That number is projected to grow by 32 percent to more than 1,750 by 2018, higher than the national 10-year growth projection of 27.8 percent.

The environmental science degree aims to help meet this demand by preparing students to seek additional training in graduate and professional schools; to pursue careers in private sectors such as environmental consulting, environmental science, engineering, and environmental health; and to seek employment in public sectors such as state, federal, and local government agencies that regulate land use and pollution.
2014 Calendar of Events

February 8
USI State SeaPerch Challenge
(Mt. Vernon Junior High School)

February 8
Hearts on Fire 5k

February 15
Boy Scout Event

March 13–14
Tri-State Science and Engineering Fair
(Recreation, Fitness, and Wellness Center)

March 15
Run of Luck 7k

March (TBD)
USI ASME Robotics Workshop

April 5
Hoosier Science and Engineering Fair (Indianapolis)

April 11 (tentative)
USI Project Lead the Way Conference

April 12
Spring into Fitness 10k

April 19
USI ASME Robotic Competition (Carter Hall)

April 26
Indiana State Math Contest at USI

May 11–16
International Science and Engineering Fair
(Los Angeles, CA)

May 17
National SeaPerch Challenge (Hattiesburg, MS)

June 1–5
GO STEM! Summer Camp

June (TBD)
Girl Scout Camp at USI

July 14–18 (tentative)
Engineering & Manufacturing Creativity Camp