



Impulse

Jerome J. Lohr College of Engineering
South Dakota State University Spring 2015



**PURPLE
HEART**



Dear **ALUMNI AND FRIENDS,**

We're counting down until the 24th

The excitement is building here at the Jerome J. Lohr College of Engineering as we anticipate the dedication of the Architecture, Mathematics and Engineering Building April 24.

The contractor is now wrapping up the final punch list and we will begin classes in the 61,750-square-foot building this fall. We will begin moving in as soon as the spring semester ends in mid-May. The \$17 million facility is a combination of private giving and \$10 million in public funds through the Higher Education Facility Fund, which draws its dollars from student tuition.

This building is the final jewel in the college's facility crown, which has been almost totally revamped since 2001.

To see the old Solberg Annex and a parking lot become a three-story, state-of-the-art facility to serve the state's and nation's future architects, mathematicians, statisticians and mechanical engineers has me as excited as I have ever been in my time as dean. I can't wait for you to see it.

Please see our invitation on the back cover of this edition or go to the SDSU Foundation website (SDSUfoundation.org). If you can't join us, please follow the day on our Facebook page.

Good news abounds

Of course, that's not the only good news found in the college. In fact, this issue is full of good words I like to hear, such as:

- "Getting a doctorate will give me more options." That's from a student in our new civil engineering doctoral program, one of two new Ph.D. programs started in the fall. The other is in agricultural, biosystems and mechanical engineering.
- "It has been gaining steam ever since." That's from a program coordinator with sustainable energy, which is a minor that was created five years ago. We're expecting a similar result from three new minors that were started this fall.
- "SDSU produces some of the hardest-working, motivated engineers." That's from an alumnus, donor and employer who has made it his practice to attend our career fairs for many years.

Hats off to our veterans

As I conclude, I salute those with the Lohr College of Engineering who have served or are currently serving our country in military service.

Most notable is Richard L. Bogue, a May 2014 graduate who was honored at a Purple Heart ceremony at SDSU Dec. 13, 2014. It was the first such ceremony on campus in recent memory and I'm proud of the effort by those within the SDSU Department of Agricultural and Biosystems Engineering to aid Sgt. Bogue in earning his degree.

Seven members of our faculty and staff are military veterans, including Janet Merriman, a 20-year Navy veteran who joined us three years ago.

These faculty members are among many reasons why veterans feel comfortable when they enroll at State. Don't just take my word for it. Read the article on Page 10 of this issue.

Stay tuned

These are just a sample of the reasons that it's exciting to be the dean of the Jerome J. Lohr College of Engineering.

Thank you for your support. I hope to see you at our dedication event on April 24.

Lewis Brown, Ph.D.
Dean of Engineering

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- **Kathryn Walker** '81, executive, Openair Ventures
- **Jim Wilcox** '76, manager of government and regulatory affairs, Xcel Energy

ABOUT THE COVER

Sgt. Richard Bogue, center, shakes hands with Col. Stan Carrigan after receiving his Purple Heart medal at a ceremony at the Performing Arts Center at South Dakota State University Dec. 13, 2014. Bogue, of White, is a May 2014 graduate of SDSU. At right is Staff Sgt. Walter Scott.

He completed his degree after being injured in Afghanistan in May 2011.

See story Page 8.

IMPULSE

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New **doctoral** degrees

add prestige,
research
power



“Getting a doctorate will give me more options for getting different jobs and a choice to work in schools as an academic and still do research.”

Ibrahim Abusallout,
doctoral student

Calculating excellence in higher education often is done with the measuring rod of doctoral programs.

Consequently, the addition of two doctoral programs within the Lohr College of Engineering in fall 2014 creates not only pride but also greater opportunities. The new research-based doctorates are in civil engineering and a joint program in agricultural, biosystems and mechanical engineering.

There are three students in the civil program now with eight in ag, biosystems and mechanical; all on the ag-bio track.

Nadim Wehbe, head of the department of civil and environmental engineering, said adding a doctorate is “a natural growth for any civil engineering program trying to achieve excellence. The rigor of research at the Ph.D. level is much higher than that at the master’s level.

“When you have a Ph.D. program, you also attract high-quality faculty who want to do research.”

Dean Lew Brown echoed that. “The Ph.D. degree is a research degree that is completed by doctoral students working on the highest level of research work. The highest achieving faculty members cannot be recruited without a Ph.D. program in their discipline because their achievements would be limited without the doctoral program.

“Additionally, the highest quality graduate students also cannot be recruited without an active Ph.D. program.”

Now 5 doctoral programs in college

The two new programs give the college five doctoral programs. A doctorate in electrical engineering was created in 2007 and has had 16 graduates with 10 current students. Working under five faculty members, students have specialized in photovoltaics and alternate energy systems, according to department head Steve Hietpas.

Of the three civil doctoral students, two are specializing in environmental engineering and one in structural engineering.

“The Ph.D. degree is a research degree that is completed by doctoral students working on the highest level of research work. The highest achieving faculty members cannot be recruited without a Ph.D. program in their discipline because their achievements would be limited without the doctoral program.”

Dean Lew Brown

Transitioning from master's to doctorate

One of those in the environmental engineering program is Ibrahim Abusallout, a Palestinian who earned his bachelor's degree from the Islamic University of Gaza and then arrived at SDSU in January 2013 to pursue his civil engineering master's degree, which he completed in December 2014.

As a master's degree student, he studied how sunlight decomposes the chemicals in disinfection byproducts in surface water supplies.

His doctoral research will be extended to include the degradation of disinfection byproducts by both natural sunlight and engineered ultraviolet light in the presence of catalysts.

His adviser, assistant professor Guanghui Hua, said, “The objective of his research is to provide a fundamental understanding of degradation mechanisms of disinfection byproducts by photolysis so that we can develop efficient photolysis processes to remove these hazardous chemicals from water to protect public health.”

Doctorate provides more options

Abusallout added, “I like doing research” and he said he chose to pursue a doctorate so he could not only continue doing research himself but also allow him to teach at a university level and help others do research.

“Getting a doctorate will give me more options for getting different jobs and a choice to work in schools as an academic and still do research,” Abusallout said.

After having an accomplished research span as a master's degree student, Hua offered him a position as a graduate research assistant in the doctoral program.

Hua said, “He shows a very high level of initiative and self-motivation toward his research project. Through his master study, he also demonstrated good critical-thinking ability and a strong potential to perform high-quality independent research.

“He has made three presentations at state and national conferences over the past two

years. I was very impressed with the progress he made on his written and oral communication skills. These qualities make him a good candidate to pursue a doctorate.”

Longer commitment benefits research

Doctoral programs typically take three to four years to complete compared with two years for a master's program.

Kurt Bassett, head of the mechanical engineering department, said, “As the university expands its influence, one of the goals has been to increase the research activity at the institution. The Ph.D. program is needed to get research that is sustainable.

“The master's students are not here long enough to keep a project going. There is so much turnover. Ph.D. students are here longer and have a deeper background. They're going to be much more productive in supporting a project that lasts longer than a year or two.”

High interest among internationals

Bassett expects the program to attract four to five students in the next three to four years.

Van Kelley, head of the department of agricultural and biosystems engineering, expects 20 to 30 doctoral students from the ag-bio area in the coming years. He said nearly all of the eight students currently in the program are international students.

Kelley explains, “Right now, the U.S. job market (for ag-bio students) is really good. A bachelor's degree graduate has a very good career before him. The international student doesn't always have that opportunity.”

Bassett said he sees the same thing among mechanical engineering students.

While his faculty does not yet have any doctoral students to advise, enrollment in the department's master's degree has boomed.

“Our faculty members are swamped managing to advise those people. Suddenly we ended up with a lot of people in the program,” Bassett said.

Last year there were 21 students, which was typical. Of them, three or four would be U.S. students. In 2014-15, there are 38 students with 29 being international, he said. Of the nine U.S.-born students, two are from Minnesota schools with the rest continuing their education at SDSU, Bassett said.

Master's degree students are researching biofuels and ag energy, such as grain drying, and material testing and composites.

At the Ph.D. level, that research will continue and will support a growing interest in precision agriculture, Bassett said. That research will include the design and use of sensors for sensing physical parameters, i.e., moisture contents, flow rates, temperatures; and sophisticated control systems for targeting delivery of pesticides and herbicides, he said.

Ph.D. programs benefit students, college

In the agriculture, biosystems and mechanical engineering doctorate, students could enter the program from the bachelor's or master's level.

Wehbe said civil engineering students already have their master's degree before pursuing a doctorate.

Brown noted having a doctoral program within a department enhances its overall research activities. In addition, “students who desire a career as a research scientist/engineer will no longer have to leave South Dakota to compete their degrees. Having the new Ph.D. programs will also help us compete with peer institutions for the very brightest graduate students.”

Kelley added, “For a lot of the questions we need to answer in South Dakota, this is one way to pull in the talent to get the answers.”

Dave Graves

Doctoral student Ibrahim Abusallout works in the environmental engineering lab in Crothers Engineering Hall preparing carbon columns for total organic halogen absorption to measure the concentration of halogenerated compounds. He is one of three students in the civil engineering Ph.D. program that started in fall 2014.

New minors

meeting major needs



“The job market for students with precision ag skills has just exploded in the last three to four years. Students coming into SDSU are interested in precision ag. We’re just trying to meet that demand from the students and the employers.”

Van Kelley, department head

College officials hope to see three newly created minors mirror the growth of a developing sustainable energy systems minor.

The South Dakota Board of Regents approved that minor in summer 2011 with the first students graduating in fall 2011. “It has been gaining steam ever since,” said program coordinator Mike Twedt. “The first full year we had two (graduates). From there, we’ve built.”

The minor has gone from two to three students per semester to five at the December 2014 graduation and six are slated for graduation in May.

“In the area of HVAC design, a lot of companies find this minor a very valuable tool. Their engineers deal with energy conversion on a day-to-day basis. This training also will prepare students to achieve certifications in LEED (Leadership in Energy and Environmental Design), which is very valuable.

“Also, many manufacturers are developing a sustainability program for their processes. A

student with this minor is a logical fit to lead those efforts. There’s quite a large net we can cast for applicability for these students—wind and solar energy, solar thermal design, and energy generation for the electric or natural gas industries.

It is a bonus that will separate the students from all the other competition. It’s not required (in order to be hired) at this point, but it definitely enhances their employability,” Twedt said.

Grad realizing benefits of minor

One student benefiting from the sustainable energy systems minor is Chris Maks, a December mechanical engineering graduate.

After graduation, he returned to his hometown of Rapid City and is doing HVAC design work at TSP’s engineering division.

“I can’t say that is why I was hired, but I definitely think it helped. The guy who hired me talked about energy-modeling software. That was part of my senior design project. We used



eQUEST, a free energy-modeling software, to analyze energy loads of a farm out in Pierre,” Maks said.

In his current work with mechanical systems, “a lot of people are looking to make their energy usage smaller, so my training does come into play,” Maks said.

He said his sustainable energy systems minor curriculum gave him confidence to begin his career as a practicing engineer.

“It does a really good job of tying some of the theoretical classes, like heat transfer and thermodynamics, with elective classes where you get to put that theory to work. (The minor was) a pretty good opportunity and it sounds like more people are taking it,” Maks said.

Grad list could grow to 20 annually

So far, most of the people who are taking the minor are mechanical engineers.

“Mechanicals do a lot of energy conversion, so it’s more popular with the mechanical students. They do a lot more energy conversion work in their core classes and find an interest,” said Twedt, noting that any engineering major would have the background for the minor. “I would think it could be reasonable to have 15-20 graduates a year.”

He added that 25 to 35 students take his renewable energy class yearly. “All of them could be eligible for the minor,” Twedt said.

Construction minor started in fall

In contrast to the well-established sustainable energy systems minor, the construction minor is just getting started.

But it’s not a new program. The construction management major has been around for a couple of decades and hit its peak before the 2008 recession. There were 155 majors in fall 2014. The new minor is geared for students in architecture, engineering and service firms, according to

Byron Garry, program coordinator in the department of construction and operations management.

The new architecture program at State was part of the impetus for creating the minor, Garry said.

“It covers cost estimating, project management and scheduling. The architecture program wouldn’t have those offerings,” he said. The 18-credit hour program also covers construction materials and methods, risk management and construction law.

At this point, a handful have declared the minor, but department head Teresa Hall expects at least 15 students to declare by fall.

“We have experienced exponential growth in recruitment on campus by our construction industry partners over the past two years,” department head Teresa Hall said. “This minor is a good fit for persons who are interested in a career with design-build firms, commercial subtrades like plumbing or electrical contractors, and sales-service industries affiliated with the industry.”

Two precision ag minors taking root

Two other minors that began in fall semester are precision ag and engineering for precision agriculture, both in the department of agriculture and biosystems engineering.

There are 18 students taking the precision ag minor. In engineering for precision ag, two students graduated in December 2014. There is one current student who has declared the minor. Department head Van Kelley notes that the tricky thing with minors is that students are not required to declare a minor until shortly before graduation, so numbers could be deceptively small.

He said the minor was created in direct response to industry needs.

“The job market for students with precision ag skills has just exploded in the

last three to four years. Students coming into SDSU are interested in precision ag. We’re just trying to meet that demand from the students and the employers,” said Kelley, adding that enrollment could hit 50 in both programs in the future.

Engineering for precision ag is “a collection of existing classes just to make sure students get an appropriate background,” he said.

Precision ag has one new class—electrical diagnostics for farm machinery, taught by new faculty member Aaron Franzen. This spring is the first time the class has been offered and 54 students are enrolled. A couple other courses in the program have similar numbers, Kelley said.

Kelley explained, “The two minors are fairly different from each other. The engineering minor is focused on students designing new equipment. The precision ag minor is aimed more at appealing to the practitioner in the field. The person working for the agronomics service provider, the large cooperative, machinery companies and some students just interested in farming.”

The only class taken by both minors is crop management and precision farming, and it’s an elective in the engineering for precision ag program.

Dave Graves

Above left and opposite page: Zack Campbell, a senior from Tracy, Minnesota, receives instruction from Professor Daniel Humberg as he plumbs a regenerative circuit during a hydraulics lab Feb. 11, 2015. Campbell, an ag engineering major, is pursuing the new precision ag minor that is now offered through the agricultural and biosystems engineering department.

Evan AlMBERG, a first-year graduate student in mechanical engineering, explains his corn stover project to ME seniors, from left, Austin VanderWal, Shane Pedersen and Sawyer Berg. Like AlMBERG, they all have minors in sustainable energy, which has gained a strong foothold since being established in 2011.

McComish

Richard and Karen McComish give back to engineering, sociology



Richard and Karen McComish want their financial gift to help students develop a love for engineering and what it brings to society.

The Richard and Karen McComish Power and Energy Systems Laboratory will open fall 2015 to give students an opportunity to develop that love for engineering principles through hands-on experience.

“We want this engineering lab to be part of the people who want to do good things for society—because that’s what engineering does,” said Richard, an electrical engineering graduate and CEO of Electrical Consultants Inc.

The McComishes’ decision to give back to their alma mater was based on the relationships the 1975 graduates have maintained with the university.

Those relationships prompted the couple to gift \$250,000 to the Jerome J. Lohr College of Engineering and \$52,000 to the College of Arts and Sciences. The McComishes have donated to both colleges for years through phonathons, but decided to make their contribution more strategic.

The Estelline natives own and operate the full-service engineering design firm ECI and its subsidiary, Engineer-Procure-Construct Services Company. Both are based in Billings, Montana.

The close-knit partnership with Lohr College professors throughout the years has helped their company identify and hire engineers. “It’s really been a personal effort by the people at SDSU,” said Richard.

From their donation to the Lohr College, the power engineering systems laboratory in Daktronics Engineering Hall will be renamed the Richard and Karen McComish Power and Energy Systems Laboratory.

Recruiting State grads

For the past 23 years, the McComishes have visited State biannually for the Lohr College of Engineering career fairs. They take pride in employing State graduates.

Their pilgrimage to recruit students to join their growing companies shows their confidence in the quality of State students.

“I’m not being biased when I say that SDSU produces some of the hardest-working,

motivated engineers,” Richard said. “Maybe part of it is that they’re from the Midwestern breadbasket and have good work ethic engrained in them. However, based on scholastic ability, common sense and application, SDSU engineers are at the top. It’s important to hire people who are smarter than you.”

Solid education

Richard grew up creating, building and designing, and knew he wanted to be an engineer since he was a freshman in high school.

He remembers two individuals in State’s engineering program who created excitement and motivation while he was a student. “I have a high regard for professor Virgil Ellerbruch, and remember professor Wayne Knabach being the heart and soul of the electrical power program.

“Without a doubt, State provided me with a solid education in the electrical power field,” said Richard. “I’ve always liked math and science, but my education was instrumental in my achievements over the years. The university had a great engineering program then, and has a great program now.”

Fresh out of college, Richard worked for another consultant company in Billings, first serving as an electrical engineer and project manager and subsequently as vice president engineering manager. After working for his former employer for 15 years, Richard said his love for business management formed.

Team and culture

In 1990, Richard joined Electrical Consultants Inc.—a company formed in 1985. In its humble beginnings, ECI employed four people, but now employs 440 engineers, surveyors and technical staff out of 12 national offices.

The engineering design firm specializes in power delivery, wind and solar energy fields, battery energy storage and technology applications. According to Richard, consultations with electric utilities are the bread and butter of ECI.

In 2000, Richard started ECI’s subsidiary company, EPC Services Company, which is ranked today in the top seven engineering

construction companies nationally in its field in terms of size and reach.

Richard attributes both companies’ success to his team and company culture.

“Our company truly exists for the employee,” Richard said, noting that ECI has never had to lay off an employee.

“If you want to build a successful company in services, the focus has to be on each and every one of your employees. Employees need motivation to do their part. If the employee feels the company genuinely cares about them individually, they put out their best work. The clients they are working with are now their own clients.”

Despite the company’s fast-paced growth, Richard said they do not exist to grow. “Our company has healthy growth because it’s organic growth,” said Richard. “We are aggressive when it comes to challenges. We make plans and are willing to succeed.”

Karen’s contribution

Karen, who serves as ECI’s vice president of corporate operations, also wanted to give back. The couple’s gift to the College of Arts and Sciences’ Department of Sociology and Rural Studies is an Endowment Challenge Gift, which will begin funding an annual \$2,000 distribution for departmental support in fall 2015.

The McComishes wanted to offer the endowment to encourage other alumni to increase their contributions and provide the department ongoing annual support.

“I know the department has had trouble receiving donations for scholarships and unrestricted use,” said Karen. “I wanted to offer this challenge endowment to initiate awareness for other alumni to give or increase their gifts.”

The couple’s financial commitment to State started because of the relationships they formed here and has strengthened because of them.

“We both received an excellent education at State,” said Karen. “Our main goal is to give back and help future students receive the quality education we did.”

Karissa Kuhle

Chris Schmit Outstanding Researcher Award



Civil and environmental engineering professor Christopher Schmit recently received the Jerome J. Lohr College of Engineering Outstanding Researcher Award.

Along with 18 other faculty members, researchers and scientists, Schmit was honored at the annual Celebration of Faculty Excellence banquet held Feb. 17. The event awards faculty members in each of the university's colleges for outstanding research, teaching and service.

Schmit, director of SDSU's water and environmental engineering research center, recently completed work on a filtration pilot plant study for John Morrell Wastewater Treatment Plant. The project began in April 2014 and ended in March.

Two of Schmit's recently completed projects involved improving waste treatment systems with the City of Sioux Falls.

Grease collections

A yearlong project researching how to use grease to reduce the energy demands of the wastewater plant ended in January 2014.

When restaurants dispose of their grease, it goes through the wet-processing portion of the wastewater plant. "That's expensive," Schmit said.

The plant collects grease directly from restaurants and then processes it in the digester to make electricity. Schmit explained, "This makes it a more sustainable process."

SDSU conducted a series of studies to determine how well certain greases or substrates impact methane production.

The results of the research indicated that adding fats, oils and grease to anaerobic digesters most likely will significantly increase methane production. While it is possible to add too much and inhibit anaerobic bacteria, the problem will not arise if the digester and digester feed are closely monitored.

Filtering wastewater more efficiently

The City of Sioux Falls now saves an estimated 1 million gallons of water a day, thanks to a wastewater filtration project done in collaboration with the SDSU Water and Environmental Engineering Research Center, the City of Sioux Falls and the city's

consulting firm, H.R. Green Engineering of Cedar Rapids, Iowa.

In 2010, the Sioux Falls Water Reclamation Plant set out to replace the filters that trap the remaining solids just before wastewater is released into the Big Sioux River.

The goal was to increase the flow rate through the filters and automate the backwash system.

The plant's dual-media filters, which use a combination of anthracite and sand to filter water, were operating well beyond their design life, explained Schmit. The filters would clog and then have to be backwashed every 24 hours.

With guidance from Schmit, graduate student Sean Sieler worked with H.R. Green Engineering and the City of Sioux Falls to come up with a filtration system that would meet the city's needs.

The wastewater filtration project has proven the value of investing in research for the City of Sioux Falls, one that has been recognized by engineers nationwide. Two papers were published in the Water Environment Federation magazine and presentations given at national Water Environment Federation Conferences in 2012 and 2013.

For more than a decade, the City of Sioux Falls set aside \$20,000 each year from its capital improvement program to fund



graduate research that will increase the efficiency of its wastewater treatment plant.

The City of Sioux Falls and its taxpayers have reaped the rewards of investing in research and serve as an example for what other communities might be able to accomplish through the partnership with SDSU.

Karissa Kuhle

Top: These monomedia filters at the Sioux Falls Water Reclamation Plant save the city an average of 1 million gallons of water per day.

Above: Professor Christopher Schmit determines the best method of removing nitrates from a sludge sample using a lab-scale reactor.



Afghan vet awarded

PURPLE HEART at SDSU ceremony



Three and one-half years after being wounded in the city of Kandahar, Afghanistan, U.S. Army Reserve Sgt. Richard L. Bogue is wearing a Purple Heart on his uniform.

Bogue, 44, of White, received the revered medal at an hourlong ceremony at SDSU's Performing Arts Center Dec. 13, 2014, in the first Purple Heart ceremony at the university in recent memory.

The May 2014 graduate of the SDSU Department of Agricultural and Biosystems Engineering disdains the spotlight, but the opportunity to hear the messages brought by some of his former officers and fellow servicemen offset the discomfort of the stage lights.

Bogue serves as an agricultural specialist with the 407th Civil Affairs Battalion in Arden Hills, Minnesota, part of the Twin Cities metropolitan area.

But traumatic brain injuries that he received while serving in Afghanistan leaves

him unable to travel the four hours to his battalion's headquarters, so arrangements were made by his unit and Michelle Ruesink with the SDSU Veteran's Affairs Office to have the Purple Heart ceremony on campus.

Honored guest at the ceremony was Chief Master Sgt. Richard Simonsen, who was riding with Bogue in the back of a V-hulled troop carrier as part of a six-truck convoy when the 32,000-pound, four-wheel drive vehicle went over a culvert and a command wire set off an explosive that rocked the carrier even though it was 6 feet off the ground.

Bogue exited the vehicle, which was struck while going through a market area, and began firing at the enemy.

Simonsen, a public affairs officer, recalled Bogue had asked him the day before if he wanted to go on a mission with him the next day. "It was basically to go out and look at some ditches," Simonsen playfully chided Bogue, who responded with a smile. The ditches were created for agricultural irrigation.

Bogue developed irrigation plans and systems for farmers and assisted in developing a link between Kandahar University, Farmer Extension Services and local farmers.

"These projects helped the region develop partnerships and equipment sharing to allow even the poorest farmers to increase production. He was assigned to the national water board and the environmental reclamation board to help address countrywide concerns," according to information provided by the military.

It was application of what Bogue had been studying at SDSU before being deployed.

Joins military at 39

A native of Stuart, Nebraska, Bogue grew up in Rapid City and joined the U.S. Army Reserve in 2008 at 39. He marked his 40th birthday with basic training exercises at Fort Bragg, North Carolina.

Joining the military was his manifestation of the midlife crisis.

"It was something I had always wanted to do. I'm a patriotic guy," Bogue said. "A lot of young guys were going in and I thought it was the correct thing to do; to go in and do my part. I had been thinking about enlisting for a while. It just kind of became time to do it. I was getting toward the upper age limit" for enlisting, which was then 42.

He had already passed the age limit to join the U.S. Air Force or Navy reserves.

After six months of training, Bogue returned to White and his job at Perry Electric in Brookings. He then enrolled at SDSU with the aim of completing a geological engineering degree he had began years earlier at South Dakota School of Mines and Technology. At SDSU, the coursework would apply to ag engineering.

Bogue helped teach a lab for ag and biosystems engineering department head Van Kelley and was a summer student employee for ag and biosystems engineering professor Todd Trooien.

"Rick would send pictures of the water projects he was working on. In fact, he got internship credit for the projects," noted Kelley, adding that Bogue worked for him as



an electricity lab assistant for three semesters before being deployed.

Deployed!

Within a year of being home from training, Bogue volunteered for deployment. After three months of training at a hot Camp Atterbury in southern Indiana, the company headed for the rural northern mountainous province of Nuristan near the border with Pakistan. It was the allied coalition's northernmost base.

The Nuristan Provincial Reconstruction Team was responsible for its own security and board, Bogue said.

He worked with Afghanistan officials to develop alternative crops to poppies, new varieties of wheat and a drip irrigation system. But the team stayed less than three months, leaving about Christmas 2010 because "the area was deemed too hostile to set up a government.

"The base was under almost daily attack from Taliban coming out of Pakistan. Our convoys were hit by IEDs (improvised explosive devices) several times while trying to go out and do our job," Bogue said.

He was in one of the convoys that was struck, but didn't receive serious injuries then, he explained in an interview prior to the ceremony.

Bogue's next assignment was in Jalalabad, a farming district south of Nuristan and east of Kabul where the Russians had built elaborate olive tree farms in the 1960s.

The team's mission was to help transition the complex from inefficient government management to a privately run operation, Bogue said. But their work was hampered by IEDs planted by the Taliban in fields and by olive trees. Again, Bogue received nondisabling injuries from an IED, he said.

Serving in Kandahar

The unit put in 17-hour days for about two months and in spring 2011 was transferred to Kandahar to replace a Canadian provincial reconstruction team. Bogue worked with the U.S. Agency for International Development and its Canadian counterpart to write agricultural plans to help individual communities.

Trooien recalls fielding irrigation questions from Bogue and "trying to help him apply the principles of irrigation" to the region.

Bogue was serving a farming community where crops were planted with a cow pulling a wooden plow, wheat was separated from the chaff using a wooden pitchfork and the average person farmed one-half to 1 acre.

Large-scale, technology-based farming common in North America wouldn't work there, but Bogue said he enjoyed working with the people.

Bogue said, "My experience in Afghanistan was more positive than negative. I would go back again, even with everything that has happened."

IED that changed his life

That "everything" included being hit with an IED for the fourth and final time during his year in Afghanistan. Bogue was working with the 4th Infantry Division and the Air Force Public Affairs in May 2011—the only one from his unit on this assignment. The sergeant's resiliency was about to be tested.

Bogue received brain damage from the sound waves that resulted from being in the enclosed "metal tin can (the troop carrier). Your head is not designed to take that abuse." He suffered, and still suffers from, massive headaches, dizziness, "even to the point I can't stand, ringing in the ears so loud you can't hear conversations and memory loss—that's the kicker," Bogue said.

He said the symptoms subsided after a week. "I opted not to go to the Kandahar hospital. There's nothing they can do for you."

He went back to work after a couple of weeks and then returned home at the end of July 2011, one day short of being gone for a year.

Injuries worsen with time

Initially after returning home, his symptoms were tolerable, but they have worsened, Bogue said. "About once a week I'm in the Brookings hospital to get strong medication for headaches ... Things continue to deteriorate."

He is making arrangements to go to the National Intrepid Center of Excellence, in

Bethesda, Maryland, the Department of Defense's premier facility for brain injuries. Bogue hopes treatment there will be able to "level the symptoms out so I can live a little more normally."

Bogue has done his best to live a normal life since returning to White. He returned to school in August 2011, needing two to three semesters to earn his degree. But Bogue said he "missed more classes than I was there." Plus, he couldn't retain the calculus he needed for a degree in ag and biosystems engineering.

He graduated in May 2014 with a degree in agriculture systems technology, a major that didn't require the calculus.

Kelley explains, "Todd and I both put together a list of classes that were suitable for him ... It's really just been great knowing Rick. Rick is the one that did all the work. He had to work really hard to get his degree finished up."

Trooien added, "It's very rewarding to see a student overcome those obstacles and value that degree."

Appreciates help from faculty

Bogue had nothing but praise for the help he received from SDSU faculty and staff. Several were among the 250 people at the Purple Heart ceremony.

Ruesink with the SDSU Veterans Affairs Office specifically cited the efforts of Kelley and Trooien, who maintained contact with Bogue and his wife, Tonia, during deployment and after he re-enrolled. "These two gentlemen have demonstrated the heart and soul of SDSU," Ruesink said.

Then looking to Bogue, who was on the stage with his wife, son and service dog, she said, "You truly are a hero."

Bogue's remarks were brief at the ceremony.

"It's been a pretty rough couple of years. It's pretty much turned us upside down." He went on to thank the town of White, "which has been so supportive of us," his family and military officials, particularly Simonsen. The audience responded with a standing ovation as he returned to his seat.

Earlier he noted the significance of receiving the Purple Heart, one of the highest honors that can be received, but added, "it's not one you want to earn."

Dave Graves

Posing in the SDSU Veterans Service Office Jan. 20, 2015, are, from left, department head Van Kelley, Veterans Affairs Service Officer Michelle Ruesink, Sgt. Richard Bogue and professor Todd Trooien.

Serving the serviceman

University hailed for developing a campus culture friendly to vets

Transitioning to college isn't just a challenge faced by the wet-behind-the-ear high school graduate. Military-hardened veterans also often struggle.

"As I was transitioning out of the United States Army I was constantly told of the difficulty in moving back to the civilian world. That is one of the truest statements I have ever been told. It is something only someone who has had to do that would understand," Tylor Johnson wrote last March.

"When the plane landed in South Dakota and classes started the next day, I felt completely lost," he said.

Johnson, originally of Montrose, Iowa, was enrolling in the doctoral program in the biology/microbiology program after having been a specialist in the U.S. Army from 2008-2012, working as a laboratory technician and a biosciences research specialist from 2010-2012 at San Antonio Military Medical Center at the U.S. Army Institute of Surgical Research.

He enrolled at SDSU because I wanted to move back to the Midwest. "I contacted Bill Gibbons because I was interested in industrial microbiology and after speaking with him I knew that was the lab I wanted to work in."

But "I was extremely nervous walking in the door (of adviser Bill Gibbons) for the first time. Within seconds of speaking with him I knew I had made the right decision in coming to South Dakota State University. He is the greatest mentor I have ever met and I have had some incredible mentors.

"He allows me to put my wife and children first while still pursuing my doctoral degree. When my father was injured at work, he allowed me to go home for a week to help him at the farm.

"His constant guidance and support made for the smoothest transition possible. There were times when it would have been easy to quit and get a job or return to the military, but Bill has always been there supporting me," Johnson wrote in a March 21, 2014, letter in which Gibbons received a military appreciation award.

Kelley, Trooien lauded

The ceremony was organized by the Veterans Affairs Office on campus and included recognition of a couple other faculty members.

Sgt. Richard Bogue praised ag engineering professors Van Kelley and Todd Trooien for showing "a true desire to help me as a student" before and after his deployment to Afghanistan, where he worked with Afghan agricultural leaders and came home with a traumatic brain injury. (See separate story, pages 8-9.)

"I soon learned I did not just have two phenomenal professors who were there for me but a phenomenal department as a whole," Bogue wrote in his appreciation letter.

Flag awarded to department

Continuing, he stated, "As my health declined further due to my injuries, there was not a single professor in the ABE/AST (ag and biosystems engineering, ag systems technology) departments who were not willing to help and go well out of their way to help when I was unable to make class ...

"I am truly humbled by the support I received from the department. I wish I could speak about the support each professor gave (me) ... There is no average professor in the department. The level that they naturally perform at is a very rare thing indeed.

"I present this flag, which was flown above U.S. forces in Nuristan and Kandahar, Afghanistan, to the professors and staff of the department of ABE/AST, South Dakota State University in recognition of their truly inspiring support and kindness.

"The length of which cannot be put into a simple speech."

The words of gratitude these veterans express go beyond the two departments in which those men studied.

Best for Vets recognition

The service SDSU provides to veterans has received national recognition. On Nov. 10, 2014, the Military Times, an independent news source for service members and their families, produced its fifth annual "Best for Vets: Colleges 2015" rankings. The editorially independent project ranked SDSU 11th in the nation.

"We factor in what is, to our knowledge, the most detailed school-by-school data on veteran students' academic success anywhere, including graduation, retention, persistence and course completion rates," said Amanda Miller, editor of Bests for Vets.

The rankings aren't set by subjective decisions or likes on a Facebook page.

Rather, the detailed survey requires schools to meticulously document a tremendous array of services, special rules, accommodations and financial incentives offered to military and veteran students and to describe many aspects of veteran culture on a campus.

SDSU's top-tier ranking was achieved because of the "different programs and support we offer. The support we offer is second to none, and the university and community support are things we're scoring very high on," according to Michelle Ruesink, head of the SDSU Veterans Affairs Office since May 2014.

Myriad services for vets

She said the services provided by the office include "everything from certifying education benefits to the Veterans Resource Center to organizing a combat support group."

Formal programs offered at SDSU to military-affiliated students and community members include:

- Monthly combat support group led by the vet center,
- Semimonthly veteran writing groups,
- Weekly Veterans Tutoring Veterans sessions,
- Monthly Warrior Wellness events,
- Suicide and stress management presentations,
- Two federal tuition assistance and state tuition assistance workshops,
- Hero2Hire presentations and mock interviews,
- Resume and career-building workshops,
- Paws for Vets, and
- Air Force, Navy, Marines, Army and National Guard branch birthday celebrations.

Tyler Jacob has experienced SDSU after a couple transitions. He enrolled after serving in Kuwait in 2009-10, continued to serve in the Guard, and was deployed to Afghanistan in 2013. He returned to SDSU in 2014 and now is a work-study student in the Veterans Affairs Office while still being in the Guard.

He notes that attending Guard is an excused school absence.

"As long as I let my professors know I'm going to be gone for drill, they are more than willing to work with me. I just email and see



From left, Professor Todd Trooien holds an American flag presented to him from Richard Bogue at a military appreciation event at SDSU April 14, 2014. Center in the basement of the University Student Union; doctoral student Tylor Johnson, left, presents a U.S. flag to his adviser, Bill Gibbons, at a military appreciation event March 21, 2014; an avenue



of flags is formed at the Brookings County Veterans Memorial during a 2014 Veterans Day ceremony honoring the 35 South Dakota service members who gave their lives in military action in Iraq and Afghanistan.



if there is anything I need to do in advance. They've always worked really well with me, especially with my ever-changing schedule. That is more than helpful for me," Jacob said.

Help, comfort at Veterans Resource Center

With total enrollment more than 12,500 (fall 2014 head count), it would be easy for veterans to feel like a serviceman lined up in the wrong formation.

But with more than 360 SDSU students receiving military education benefits, they're a major subgroup on campus.

Jacob said, "SDSU is a very welcoming place. We have a large veteran population ... Those of us that do associate with each other, we're a pretty tight-knit group"

The Veterans Resource Center provides opportunities for peer-to-peer support for academics and wellness as well as camaraderie, mentoring and a place to call home on campus.

Bogue said, "It's a space in the basement (of the University Student Union) where veterans can go to study that is a little more quiet."

The center has been in place since a ribbon cutting Nov. 12, 2012. It had been part of a student lounge and was renovated during the union remodeling in the 2011-12 school year. The meeting room includes a computer with a printing station, extra study space and a lounge.

In fall semester, there were more than 1,616 student visits.

Writing group reaches to community

The Veterans Resource Center serves as the home for the veterans writing group, which usually meets every other Thursday evening. Bogue, a six-month participant in the program, said, "It's helpful because it gets

people with different perspectives. Having stuff on paper tends to help people with PTSD and memories."

The program is coordinated by Amber Jensen, an English department adjunct instructor, with support from Distinguished Professor of English Charles Woodard, a Vietnam veteran who has long participated in military events on campus.

In the fall, Woodard did three guest readings, including one at a community workshop, which the group holds each semester.

Bogue said he is impressed with Ruesink's efforts to get community veterans involved with veterans on campus.

Ruesink, a former member of the South Dakota Army National Guard and a former contracted counselor with the Department of Defense, said it's important that the two groups of veterans connect because "Brookings has a long history of supporting veterans. To be able to bring those groups together for role modeling and community connection is an amazing opportunity."

An example of that would be the spring 2014 veterans symposium organized on campus to present information on military education benefits, transitioning back to civilian life, post traumatic stress disorder and services offered by community veterans organizations like the VFW, American Legion, Disabled American Veterans and the Royal Order of the Purple Heart.

In addition, the SDSU Veterans Affairs Office was on the planning committee for the South Dakota Coalition of Military Families Symposium in Sioux Falls Sept. 10-11. It brought together 150 professionals from across South Dakota and SDSU was involved in presentations promoting support for veterans in higher education.

Ruesink said such outreach by the university is important because "we have a very strong military population and to show that we are ready to support them is a great thing for our veterans to see.

"Also, we've had tremendous support from our administration. Our leadership at the top is willing to step up and give amazing support."

ROTC programs steeped in history

Separate from the Veterans Affairs Office is the Department of Military Science (Army ROTC) and the Department of Aerospace Studies (Air Force ROTC).

Army ROTC, known as the West Point of the Plains, has commissioned more than 2,700 officers during its 98-year history and more than 15 generals got their initial training at SDSU. Omar Bradley oversaw the program in 1919-20 before going to West Point and later fame in World War II.

It currently has 30 cadets contracted for the four-year program with 225 students enrolled in ROTC classes.

The Air Force ROTC has commissioned four who have gone on to become generals since the first commissioning June 11, 1948. Its most famous alum is former U.S. Senate Majority Leader Thomas A. Daschle, who received his Air Force commission through Detachment 780 June 1, 1969. It currently has 21 cadets contracted for the four-year program with 40 students enrolled in ROTC classes.

Both are housed in DePuy Military Hall, which was built in 1942 and is named after four-star general William E. DePuy, a 1941 grad.

Dave Graves

Merriman

When looking at class options while pursuing a master's degree in civil engineering at Penn State, Janet Merriman vividly recalls one thing.

"I remember saying to my mother 'I don't need to do that, Mom, I will never teach in my life,'" said Merriman, who is now in her third year with the construction and operations management department. "I always took my career as it came. They say you should plan your career but I never really did. The Navy kept offering me great opportunities so that's how I stayed for 20 years."

However, it was during that 20-year career in the U.S. Navy that Merriman got the opportunity to teach and mentor. That was when she realized what she wanted to do following her 2012 retirement ceremony.

That decision has paid off for South Dakota State and students in construction and operations management.

"I enjoy her classroom environment because she throws a lot at us, but helps us through each step," said Robbie Jelsma, a senior construction management major from Springfield. "We go into great detail with each assignment, but that is what I enjoy. She challenges us, just as the real world will, but in a learning environment. These are things we can truly apply to our future professional work."

Merriman had plenty of project experience in the real world. That career started after she graduated with a bachelor's degree in ocean engineering from the Naval Academy in 1992. Merriman then received one of six slots for women in the Civil Engineer Corps, realizing a goal she focused on as a female midshipman.

"Because the Civil Engineer Corps takes engineers of many different flavors, they train us on construction principles, scheduling, construction management and facility management principles as well as teach us all of the contract law we need to know," Merriman said. "They also teach us the military skills we need to know to be part of the Seabees. It was an all-encompassing course.

"It was a lot of fun," she continued, breaking into a laugh. "It was a lot easier than the Naval Academy."

Following that course, she then oversaw 17 construction projects over a three-year period at Barksdale Air Force Base in Louisiana.

"I was very fortunate to have a lot of good people working for me and with me. Like every ensign should, I took a lot of advice," Merriman said. "I had some projects that didn't go so well and some that went very well. A lot of it depended on the contractor and what their experience was working on a military project as we have a lot of requirements that civilian contractors aren't used to."

"I enjoyed the airfield projects the most because we were doing construction on a really big scale," she continued.

The scale of the projects grew in number and in dollar figure for Merriman. During a three-year stint at Naval Station Great Lakes—the Navy's largest training station where annually approximately 40,000 men and women complete the requirements to be Navy sailors—she was part of an \$850 million renovation of the Navy's boot camp.

One of her projects for the renovation was providing oversight and direction for the construction of an \$82 million simulator that involved input from Disney and other experts and contractors in the entertainment industry.

"The project had the recruits come in on a pier and go on what looked like a Navy destroyer," Merriman said. "They'd be running the ship and then we'd simulate



different scenarios. In one, the ship would get hit by a boat. Then we'd simulate that they'd have to put out fires or combat a flood. They'd have to move dummies that were in distress—all of the events were based on different events in naval history.

"At that point, I was in more of a leadership role. The people who were directly managing the contract were underneath me. I just got to go see it every now and then. I got to deal with the 'big' problems," Merriman

Top: Janet Merriman reconnects with U.S. Naval Academy classmates and members of the Civil Engineer Corps. From left, Charlene Mowery, Holly Johnson, Merriman and Eileen D'Andrea are pictured at Johnson's retirement ceremony in July 2012.

Bottom: Merriman stands in front of her signed Seabee flag, a gift from the staff when she transferred from her position as Executive Officer of the Center for Seabees and Facilities Engineering and the Civil Engineer Corps Officer School.

Right: At Merriman's July 2012 retirement ceremony, she is pictured with her husband, Michael, and daughter, Heidi.

said, breaking into a smile. “I now get to bring that aspect into my teaching. I can tell the students what the owner is looking for and what the owner’s opinions are on construction practices. I think that really helps.”

Construction and operations management department head Teresa Hall agrees.

“In my observations, she’s a mix of authority but also willing to guide and help them learn,” Hall said. “She finds a nice balance in the classroom and in the lab. She’s the total package. She’s been a very nice complement to the other great people we have here.”

Part of Merriman’s balance is humor and stories.

“Like many of our professors, Janet has many real-world experiences that she can apply in class,” Jelsma said. “It feels as if you are learning from someone who is out in the industry every day, not just a professor.

“She throws a few ‘curveballs’ in our projects purposely to simulate real-world issues that we must work around,” Jelsma continued. “It is a challenging, but fun, classroom experience. She seems very excited to be in class each day, which makes us enjoy being there as well.”

Matt Schmidt



“Because the Civil Engineer Corps takes engineers of many different flavors, they train us on construction principles, scheduling, construction management and facility management principles as well as teach us all of the contract law we need to know.”

Janet Merriman

Jerome J. Lohr College of Engineering Faculty/Staff Who have Served or Who are Serving in the Armed Forces

Name	Rank	Branch of Service	Active/Guard/Reserve	Years Served
Larry L. Weiss	Col. (Ret)	U.S. Army	S.D. Army National Guard	37 (8 enlisted, 29 officer)
Janet Merriman	Commander	U.S. Navy	Active	20
Lance Dyer	Technical Sergeant	U.S. Air Force	Active (10 yrs), Air Guard (12 yrs)	22 and still serving
Richard Reid	Lt. Col.	U.S. Air Force	Active (13 yrs) Air Guard (15 yrs)	28 (1981-94; 1996-2011)
Gary Anderson	TAC Officer	U.S. Army	Active (4 yrs) Reserve (3 yrs) Individual Ready Reserve (7 yrs)	14
Lewis Brown	E-4	U.S. Air Force	Active	4 (1972-76)
Daniel Kemp	1st Lt.	U.S. Army/Artillery	Active	2 (1965-67)

“Numbers” meets “CSI” at State

SDSU forensic statisticians awarded major federal grant

“CSI” and “Numbers” lead many people to believe that forensic science is a highly technical field relying on experts that always have a definitive answer about culpability.

In fact, forensic statistics is a relatively new field that is working to establish investigative techniques and quantitative methods that ensure accuracy in suspect identification. There are about 25 statisticians worldwide working in forensics science. Two of these happen to be in the mathematics and statistics department at South Dakota State and have received a \$780,300 grant to advance the science.

Assistant professors Chris Saunders and Cedric Neumann collaborated to prepare a grant proposal to work on the interpretation of pattern and impression evidence.

In late September 2014, they received notice from the National Institute of Justice that their three-year proposal was being funded. It’s the first grant to SDSU faculty from the National Institute of Justice, the research, development and evaluation agency of the U.S. Department of Justice.

Both Neumann and Saunders are relative newcomers to SDSU.

Neumann, a Swiss native, is in his second year in the mathematics and statistics department at State, coming from Penn State after working for the United Kingdom’s Forensic Science Service.

Saunders, a California native, is in his third year in the mathematics and statistics department at State, coming from George Mason University in Fairfax, Virginia, and worked as an intelligence community fellow with the FBI.

It wasn’t by chance that both ended up on the Dakota prairie. The men have known each other since 2006 and formed a bond

based on mutual respect for their respective work in forensic statistics. That was what, in large part, led Neumann to leave Penn State to forge new collaborations on the prairie.

Statistical accuracy in court

In a February 2012 article in *Significance*, the magazine of the Royal Statistical Society and the American Statistical Society, Neumann said some courts are scrutinizing fingerprints because of shortcomings in the way the probable value of the evidence is weighed and reported.

“Fingerprints have been used for more than a century as a way of identifying criminals. However, fingerprint evidence is not currently permitted to be reported in court unless examiners claim with absolute certainty that a mark has been left by a particular suspect.

“This courtroom certainly is based purely on the opinion of experts, formed through years of training and experience, but not on scientific data. Less-than-certain fingerprint evidence is not reported at all, without regard for the potential weight and relevance of the evidence in a case,” Neumann wrote in *Significance*.

By establishing the accuracy of likelihood ratios, a statistic used to quantify the probable value of forensic evidence, “courts can begin trusting statistical models when used to report evidence,” Neumann said.

Saunders, whose background has been in supporting FBI investigations, added, “A uniform way of evaluating evidence will make it easier for an agency to decide whether to pursue a suspect or not.”

As Saunders was completing his doctorate in statistics at the University of Kentucky in 2006, he was recruited to do work for the FBI in pattern recognition and handwriting identification. He spent the next



Chris Saunders



Cedric Neumann

two years as an intelligence community postdoctoral research fellow at George Mason.

After the fellowship ended, Saunders continued as an assistant research professor in the document forensics lab at George Mason until coming to State.

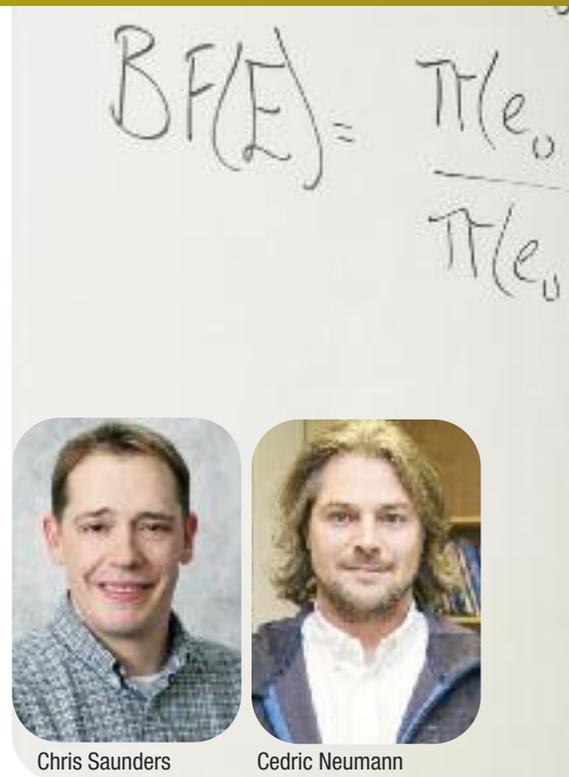
In summer 2013, Saunders was a visiting scientist with the FBI lab doing forensics research. “The FBI is trying to build up a group of statisticians because forensics researchers at the federal level understand the need for statistical methods to quantify evidence,” he said.

Research will help law enforcement

The National Institute of Justice-sponsored project, called “ambitious” by one grant reviewer, makes classic DNA forensic profiling seem simple. In fact, from a forensics viewpoint, it is, SDSU faculty members Saunders and Neumann say.

“With DNA, there is a well-developed probability structure,” Neumann said, explaining that within a DNA sample, the sequencing falls in a handful of ordered patterns. Neumann and Sanders will focus on evidence much more complicated than DNA.

“We will be working on highly dimensional characterization of evidence, where building statistical models is extremely complicated,” Neumann said.





“Our objective is to build a solid foundation on which other people can build.”

Saunders said, “This work is more theoretical than we’ve done in the past. This grant funding is to characterize the foundation for that.”

He said they are starting with objects that are simple in nature, such as glass fragments from a broken window, where they would look at low dimension characteristics like chemical composition and refraction index. Neumann called that a “baby problem.”

These initial results are promising and will be presented at major statistical and forensic conferences this summer and soon will be submitted for publication, he added.

As their statistical models prove accurate, they would apply them to more complex evidence, such as fingerprints, firearms and more complicated chemical data, such as the composition of fibers, Neumann said.

The bottom line is that investigators eventually could use their work to determine the probability that a particular trace recovered at a crime scene (such as a fingerprint or a bullet) was left by a suspect or using a particular weapon.

The outcome being that forensic investigators could use established probability models to evaluate evidence. “If we can establish how good of an estimate the probability value is, it will help the agency or

the court trust the forensic evidence,” Neumann said.

Doctoral students to assist

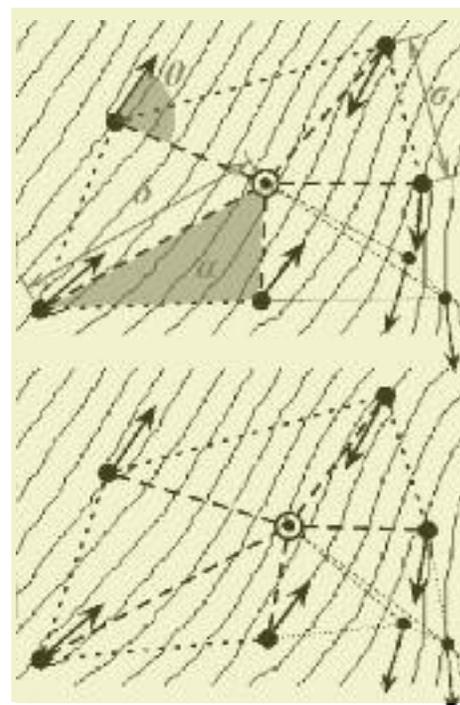
In their SDSU project, Neumann and Saunders will be assisted by Danica Ommen, and Douglas Armstrong, two doctoral students in statistics.

The \$780,300 project budget covers Neumann’s and Saunders’ summer salary, 20 percent of their academic load, two doctoral students and presentations at one conference per year for both Neumann and Saunders and one international conference. They also plan to publish results in several peer-reviewed journals.

“Statisticians now can come up with radically different probability values for the same fingerprint,” Saunders said. “We have to find a way to take raw data and turn it into probabilities. Then forensic experts wouldn’t have to say ‘I think’ and make subjective determinations.”

That could have a “lasting impact on the nation’s criminal justice system,” SDSU math department head Kurt Cogswell said.

Dave Graves



Math and statistics department assistant professors Chris Saunders, left, and Cedric Neumann eye a small portion of the math involved in creating formulas that can be used to evaluate forensics evidence. The men received a \$780,300 grant from the National Institute of Justice to advance their work.

This drawing illustrates how fingerprint features are extracted and organized for statistical analysis. The black dots represent the features, the arrows represent their direction. The gray lines represent the friction ridges on the skin of the finger. The grey letters represent the name of the variables used to represent the features.

Engineering students hook a winning idea



Eric Chapin, a junior mechanical engineering major at SDSU, stands behind the 3D printer that he used to make customized fishing bobbers. He and his teammates entered the idea in an international design contest and won the \$2,000 top prize.

What do you give the fisherman who has enough rods, reels and lures to open his own tackle shop? How about customized bobbers?

It's an idea generated by three South Dakota State University mechanical engineering students last spring. In short order, the idea became a prize-winning design that turned into hard plastic bobbers manufactured on a 3D printer at the college. On Nov. 15, 2014, the students won an international contest.

Assistant professor Todd Letcher took six students representing five SDSU teams to the inaugural IAM3D contest in Montreal.

Sponsored by the American Society of Mechanical Engineers, the Innovative Additive Manufacturing 3D Challenge competition selected 24 entries for the international contest. Six of those were from SDSU. The bobber team won the most innovative award. Another team was runner-up in best overall design.

To qualify, in addition to creating an object with a 3D printer, students had to submit a written business plan and a video.

Letcher didn't know if the contest judges were fishermen, but he said they were impressed that team members Eric Chapin, Tyler Tashner and Brandon Westrick could start selling the bobbers immediately, their teacher said. "Out of all the projects we saw, this is probably the best project set up to be a business today," Letcher, an Aberdeen native, said, quoting the judges.

Would a Twins' bobber sink?

Chapin, of Aberdeen, said they made a number of different designs of slip bobbers, beginning with a generic one.

After making changes to obtain buoyancy, they started designing custom bobbers, such as one in the shape of Minnesota Vikings helmet and another in the shape of big C styled after the Chicago Cubs logo. Letcher said the students also made logos from other sports teams and crazy shapes.

Chapin said he became proficient on the computer software used to design the bobbers, completing one in 3 ½ minutes.

The actual printing of the bobber doesn't take much longer—seven minutes, said Chapin. He and the other SDSU students entered as a result of a project in a sophomore level Intro to Mechanical Design class in spring 2014.

Letcher said he learned of the contest at last year's conference and wanted to get his students experience in the developing field.

A future business?

At Montreal, judging was based 60 percent on innovation, creativity, efficiency and feasibility and 40 percent on communication, presentation, business context and relevance. After the bobber was selected for the international contest, Chapin did a little refining of the product and a lot of research on the market.

With the most innovative title, the team received \$2,000, but there are no immediate plans to invest it into starting a business, said Chapin, who won't graduate until May 2016.

However, he does envision walking into Cabela's, placing an order, going to shop for other fishing gear and picking up the bobber on the way out.

"I definitely think there is a future. It's something I think I am going to continue to try sometime," said Chapin, who was already familiar with designing objects using computer software through his part-time position as a manufacturing engineer at sign and scoreboard giant Daktronics.

Among the contest design criteria was the object use less raw material than current techniques and be environmentally friendly.

Another top idea: mounts on wheelchairs

Winning \$500 for being runner-up in best overall design was the team of Ty Schoellerman, of Alcester; Nick Benz, of Sioux Falls; and Purna Poudyal, of Sioux Falls. They designed a mount that would be placed on a wheelchair to hold a pinwheel and a battery-operated fan, explained Schoellerman, a 2012 Alcester-Hudson High School.

The idea came as a result of Schoellerman having two cousins, ages 14 and 16, who are confined to wheelchairs.

The project involved measuring the wheelchair, designing a 6-inch main beam that was C-clamped to the wheelchair and a 6-inch arm that angled over the cousin's lap. The pieces were printed separately using the same plastic filament used for the bobbers and then the pieces were fastened with Super Glue.

The students used the same plastic, which is similar to the material used for Legos, to make an iPad holder/table top, Schoellerman said.

Other SDSU teams qualifying for the contest and their projects: Nicholas Nielsen, Brandt Schrankler, duck call; Kaleb Stepanek, Zachary Weddington, John Linneman, tabletop wind turbine; Jordan Vanderbush, Spencer Kane, Conrad West, goose decoy; Tyler Finnes, Mitch Vejvoda, Josia Schultz, omni fit customized sunglasses.

Letcher said this fall's class designed projects to submit for the 2015 contest in Boston Aug. 2-5 and this spring's class is doing the same.

Waytashek named to the Capital One Academic All-American Team



Senior mechanical engineering major Megan Waytashek, a guard/forward on the SDSU women's basketball team, was named to the Capital One Academic All-American Team.

While the team annually has one of the best GPAs of any women's basketball program in the nation, Waytashek is only the seventh SDSU player to make the Academic All-American squad.

Waytashek, of Lino Lakes, Minn., holds a 3.97 GPA. She spent summer 2014 as an SDSU undergraduate research assistant co-authoring a report on 3D printing that was presented at an international convention of the American Society of Mechanical Engineers.

In May 2013, she had a three-week internship at the Mayo Clinic in Rochester, Minnesota. Additionally, Waytashek is secretary of Beta Pi Engineering Honor Society and a member of Pi Tau Sigma Honor Society.

The academic teams are determined by a vote of the members of the College Sports Information Directors. The group named three five-member Academic All-American teams and Waytashek is on the second team with a mechanical engineering major from Oregon State.

Waytashek also is a two-time all-district selection.

While leading the Jackrabbits to their sixth NCAA Tournament berth in seven years, Waytashek was named to the All-Summit League Championship Team. She has been a three-time first-team all-league selection.

Waytashek, who finished her career ranked among the team's all-time leading scorers, led the Jackrabbits in scoring, three-point field goal shooting percentage and steals. Her career free-throw percentage was among the nation's top shooters.

Load of power scholarships go to State students



Scholarship winners and faculty members pose in the Microgrid Lab in Daktronics Engineering Hall. Pictured, from left, are department head Steven Hietpas, Evan Laursen, assistant professor Wei Sun, Tyler Fletcher, Andrew Hora, assistant professor Reinaldo Tonkoski and Mitchell Young.

SDSU electrical engineering students continue to outshine virtually every other university in the Midwest when it comes to the Power and Energy Society Scholarship Plus Initiative through the Institute of Electrical and Electronics Engineers.

For the 2014-15 academic year, four South Dakota State University students were again selected for the coveted honor, which awards \$7,000 over the course of three years. Only one school, the University of Illinois at Urbana-Champaign (6), had more recipients.

Since the scholarship originated in 2011, SDSU has had 18 recipients, second only to Illinois' 19 recipients.

Most member schools have one or no recipients. In 2014-15, that list includes Marquette (0), Michigan (0) and Notre Dame (0) as well as Iowa (1), Iowa State (1) and North Dakota State (1).

SDSU students earning scholarships this year are: Andrew Hora, a sophomore from Viborg; Evan Laursen, a junior from Aurelia, Iowa; Mitchell Young, a junior from Harrisburg; and Tyler Fletcher, a junior from Dakota Dunes, who is a repeat winner. The award is distributed over three years as long as the winner meets specific GPA and power internship requirements.

Program includes internship requirement

The "Plus" in the scholarship program refers to a summer internship in a power-related field.

Fletcher's internship was at Missouri River Energy Systems, a Sioux Falls-based transmission and generation wholesaler that serves 61 member communities in Iowa, Minnesota, North Dakota and South Dakota. He worked with generation engineers in load management and optimizing energy operations.

"The internship reaffirmed my interest in a career in the power field. I enjoyed working in an industry that provides a basic commodity—electricity—yet is filled with complex challenges," said Fletcher, a 2012 graduate of Dakota Valley High School.

Career field favorable for grads

Steve Hietpas, head of the electrical engineering and computer science department, notes that today's students are joining the power field at an ideal time as many engineers in the industry are reaching retirement age, while at the same time there is increased demand for engineers due to advancements in smart grid and renewable energy technologies.

SDSU's electrical engineering program began in 1899 and power system studies had been a strength for decades before the Center for Power Systems Studies was formed in 1968 with the regional power industry to promote teaching students through direct involvement with industry.

Formed by Junis Storry, who later became dean of the College of Engineering, the center is now headed by professor Hietpas.

ASCE chapter news



Gathering at the international convention of the American Society of Civil Engineers in Panama are, back row, from left, Rich Reid, associate dean of engineering at SDSU; Nicholas Rock '14; Michael Mingo '14; Rachel Schwartz '14; Carley Siewert '15; Nadim Wehbe, head of the SDSU Department of Civil and Environmental Engineering.

Front row, Courtney Hook '15, Chelsey Morrow '15, Jane McKee Smith '83 and Jessica Lemmerman '15.

Smith, a 2013 SDSU distinguished alumnae, was one of 11 civil engineers honored as "Distinguished Members" of ASCE.

Ken Versteeg, executive director of the Community Blood Bank in Sioux Falls, presented the student chapter with an appreciation plaque for collecting more than 1,000 units of blood through the blood drives they have sponsored in the past few years.

He also organized a Nov. 20, 2014, luncheon for the students in grateful appreciation for their efforts.

International convention

Seven members of the SDSU chapter of the American Society of Civil Engineers traveled to the international convention in Panama in October 2014 with professors Nadim Wehbe and Rich Reid.

An expected bonus of the convention was being able to watch an SDSU alum be honored as one of 11 "Distinguished Members" of the ASCE.

Jane McKee Smith, of Vicksburg, Mississippi, and a leader in the field of coastal engineering, was surprised to see such a strong contingent from SDSU and had her picture taken with the group. She also spent some time visiting with the students at her reception.



Engineering CAREER FAIR

Engineering students preparing to take their sheepskin and depart into the world of change orders and service requests are finding no shortage of companies wanting to take their resumes.

The Jerome J. Lohr College of Engineering hosted career fairs Oct. 7, 2014, and Feb. 10, 2015. In the fall, more than 400 students registered to visit a record 105 companies, which manned booths that overflowed the Volstorff Ballroom in the University Student Union and took over the east hallway.

The spring semester fair, traditionally a quieter session, drew 78 companies with almost as many students as the fall—320.

A new wrinkle with the spring fair was that the college contracted with the university photographer so that students could have a professional photograph to accompany their profile.

“Around 120 took advantage of the service. The college is working to get students connected with LinkedIn and are encouraging students to use professional pictures instead of selfies,” according to Barb Dyer, program assistant in the dean’s office.

Lew Brown, dean of the college since 2001, said, “This has got to be one of the best times I’ve seen for a graduating senior or one near graduation to be looking for an internship. This is outstanding.”

Grace Regan, a civil engineering major from Stillwater, Minnesota, came to the fall Engineering Career Fair with a full-time job offer in hand as well as plans to head to graduate school in January. “But I’m seeing what’s out here. With 105 companies, it never hurts to look around,” she said.

Cody Herman, a mechanical engineering major from Freeman, was figuratively “out knocking on doors, looking to stay local.”

The senior’s preference is for an ag-related firm, “but I’m open for anything as long as there is a challenge involved. I like solving problems.” He doesn’t expect finding a job to be a long-term challenge. “There are plenty of jobs out there. Everybody is hiring or is going to hire in the near future.”

List of job openings grows

One of the firms Herman met with in the fall was Vermeer, an ag and industrial equipment manufacturer



based in Pella, Iowa, with a satellite facility in Herman's hometown of Freeman.

Vermeer's job listings have grown from three to seven pages in the past year, according to Andrew Neary '06, a paint engineer who led the Joint Engineering Council when he was a senior. The council organizes the career fair.

"I've never seen this place so full. In my senior year, we had 63 booths and that was a record year," Neary said.

The 106 companies represent a 23 percent increase from the record 86 companies in 2013. Previous career fairs had been attracting between 60 and 70 companies.

This year's expo was the fifth time for Neary to represent Vermeer and the five-hour career fair wasn't a chance to catch up on emails. "I've had times in the past where it's been stagnant. Today has been busy" for Neary as well as his Vermeer partner Tyler Schiferl '09.

Expo draws wide student interest

The breadth of companies present at the career fair also provides students exposure to the wide variety of work available to those in the engineering, technology and math fields. "Many students enroll in the college not knowing which field to enter,

but knowing they will have plenty of options if their first choice doesn't fit them," Brown said.

The fairs drew students from all nine of the college's majors and for the first year, architectural students were invited.

Regan said, "The College of Engineering is absolutely awesome about emailing students about the career fair; letting them know when it is, what to bring and how to be prepared."

One of the recruiters working the Volstorff hallways in the fall was Delvin DeBoer, who retired in 2012 after 33 years on the civil engineering department faculty.

"The words I said to students as a professor are the same as I say to them as an employer. You are seeking a work environment that is mutually attractive to you and the employer, so learn the characteristics of companies and approach them in a professional manner.

"Those minutes spent with company representatives at the career fair make a significant first impression," said DeBoer, who is now in Fargo, North Dakota, with Advanced Engineering and Environmental Services.

'It's really competitive'

Scott Omland was at the career fair for a second year with Otter Tail Power Co. of Big

Stone City. The 2012 graduate went several times as a student and he has found a big difference being on the other side of the table. "It's a little less nerve wracking," the mechanical engineering graduate said with a laugh.

Of course, for this year's crop of seniors, the tension is less.

Dean Brown said, "I remember the years when students would look around hoping for one offer. Now they've got several offers. You ask any of these employers, they'll tell you it's really competitive."

Omland agreed, "It's a time when companies are really looking to the engineering field. Everybody is looking for good engineers."

Dave Graves

Left: Scott Omland '12, left, a plant engineer with Otter Tail Power Company in Big Stone City, discusses job opportunities with Jacob Daniels, a senior mechanical engineering major from Russell, Minn. Otter Tail was one of 105 firms at the Engineering Career Fair organized by the Jerome J. Lohr College of Engineering at South Dakota State University Oct. 7, 2014.

Above: Andrew Neary '06, a paint engineer with Vermeer in Pella, Iowa, discusses job opportunities with Cody Herman, a senior mechanical engineering major from Freeman.

ENROLLMENTS BY DEGREE (fall 2014)

Undergraduate Majors				
	Female	Male	Total	Percent
Ag & Biosystems Engineering	10	83	93	6.36
Civil & Environmental Eng.	35	195	230	15.72
Construction Management	5	150	155	10.59
Computer Science	23	155	178	12.16
Electrical Engineering	14	135	149	10.18
Electronics Engineering Tech	2	21	23	1.57
General Engineering	4	26	30	2.05
Operations Management	4	65	69	4.71
Mathematics & Statistics	56	73	129	8.82
Mechanical Engineering	45	362	407	27.82
Total	198	1,265	1,463	100.00
Total (2013)	186	1,247	1,433	
Total (2012)	181	1,218	1,399	

Master of Science Majors

	Female	Male	Total	Percent
Ag & Biosystems Engineering	7	8	15	5.62
Civil & Environmental Eng.	5	44	49	18.35
Computer Science	16	35	51	19.10
Data Science	2	10	12	4.49
Electrical Engineering	8	31	39	14.61
Operations Management	8	15	23	8.61
Mathematics	6	11	17	6.37
Mechanical Engineering	6	32	38	14.23
Statistics	9	14	23	8.61
Total	67	260	267	100.00
Total (2013)	57	156	213	
Total (2012)	43	138	181	

Doctoral Majors

	Female	Male	Total	Percent
*Ag & Biosystems Engineering	1	5	6	14.63
*Civil & Environmental Eng.	0	0	0	0
Computer Science & Statistics	2	18	20	48.78
Electrical Engineering	1	13	14	34.14
Geospatial Science & Eng.	0	1	1	2.43
*Mechanical Engineering	0	0	0	0
Total	4	37	41	100.00
Total (2013)	5	34	39	
Total (2012)	8	28	36	

* Programs began in fall 2014.

ENROLLMENTS BY PROGRAM (fall 2014)

DEGREES CONFERRED (2013-14)

Undergraduate			
	Female	Male	Total
Ag & Biosystems Engineering	0	9	9
Civil Engineering	13	34	47
Construction Management	2	48	50
Computer Science	3	22	25
Electrical Engineering	4	23	27
Electronics Engineering Tech.	0	5	5
Mathematics & Statistics	10	20	30
Mechanical Engineering	6	36	42
Manufacturing Engineering Tech.	0	9	9
Operations Management	0	4	4
Total	38	210	248

Master of Science Majors

	Female	Male	Total
Ag & Biosystems Engineering	0	5	5
Civil Engineering	4	7	11
Computer Science	0	3	3
Electrical Engineering	4	19	23
Mathematics	2	2	4
Mechanical Engineering	0	4	4
Operations Management	0	1	1
Statistics	1	6	7
Total	11	47	58

Doctoral Majors

	Female	Male	Total
Computer Science & Statistics	1	3	4
Electrical Engineering	2	1	3

College of Engineering Facilities

	Sq. Ft.
Agricultural Engineering	48,696
Crothers Engineering Hall	89,960
Daktronics Engineering	73,464
Solberg Hall	55,735
Harding Hall	28,441
Architecture, Math & Engineering Building*	62,000

* Open for classes in August 2015

Jackrabbit Guarantee Scholarship recipients (2013-14)

First Year	\$429,350	200
Second Year	\$274,950	115
Third Year	\$198,708	82
Fourth Year	\$171,100	78
Total	\$1,074,108	475
Total enrollment:	1,450	



A mantle of white blankets the future green space on the south, front, side of the new Architecture, Mathematics and Engineering Building, which will be dedicated April 24. To the west of the \$17 million facility is Solberg Hall, which was built in 1901 and completely renovated in 2003. See back cover for specifics on the dedication.

Total COE Undergraduate Student Makeup:

Year	% Female	% Male	% Non-US Citizens
2014	86.4%	13.6%	8.8%
2013	86.7%	13.3%	7.7%
2012	86.7%	13.3%	5.7%

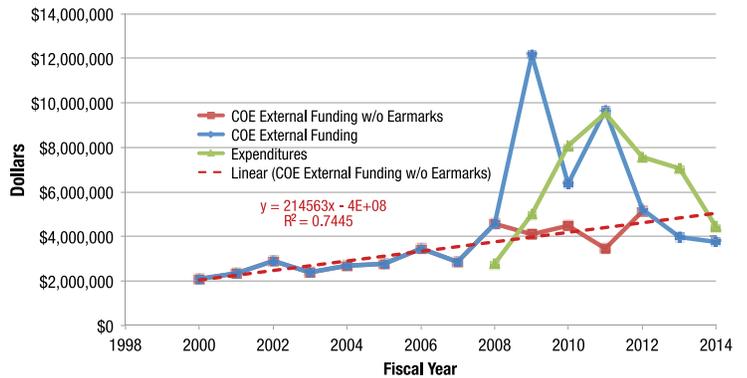
Total Graduate Student Makeup

Year	% Female	% Male	% Non-US Citizens
2014	15.7%	84.3%	63.8%
2013	24.4%	75.6%	55.5%
2012	24.1%	75.9%	53.2%

Grand Total Student Enrollments

Year	B.S.	M.S.	Ph.D.	Grand Total
2014	1450	266	41	1757
2013	1412	215	39	1666
2012	1361	181	35	1577

COE EXTERNAL FUNDING (FY2014)



COE external funding explanation

FY14 Awards: \$3,742,960
 FY14 Expenditures: \$4,426,109

Note: Awards don't match expenditures because awards are usually recorded in the year the award is made, even though it may be for a multiyear project. Because the expenditures for a project occur after the award is made there is not a one-to-one correspondence between the two.

A second reason for the difference is that the COE was finishing some large awards made a few years ago, so expenditures from those projects were occurring in recent years even though the original award may have been five years ago or so. The plot shows how expenditures and awards are actually converging again.

Turning off the teaching light

Electrical engineering professor retires after 23 years



“I was allowed to hone creativity as a professor. It was an advantage having the freedom and flexibility to research and experiment.” David Galipeau

Not everyone knows or cares about electronic devices and systems but after talking with professor David Galipeau, they probably would.

His energy is electric.

Although Galipeau recently retired, he still lights up when talking about electrical engineering. The Harold Hohbach Professor of Electrical Engineering’s last day was Jan. 21.

“I’ve been interested in chemistry, science and physics my entire life,” said Galipeau. “But electrical engineering seemed to be the most rewarding in terms of timely gratification. You connect wires and the light comes on.”

When he was in junior high, Galipeau’s parents bought him a chemistry set. “It’s not like my dad pushed electrical engineering on me at all,” he said, noting his dad was an electrical engineer. “I just watched him and thought the work he did was fascinating. It must be a biological interest because both of my sons are electrical engineers, too.”

Galipeau’s interest in electronic audio systems drew him to learning more about record players, radios and electric guitars. He started studying them and his fascination grew.

From that fascination, the New Jersey native decided to pursue an engineering education and earned a bachelor’s degree in electrical engineering in 1971 from the University of Rhode Island, Kingston.

Galipeau later earned a master’s degree in electrical engineering in 1989 from the University of Maine, Orono, and a doctorate in electrical engineering in 1992 from the University of Maine.

Opportunity in academics

Teaching at South Dakota State appealed to Galipeau because of the research opportunities associated within the academic arena.

Great opportunities lie in academic work, according to Galipeau. “A lot of people go into the industry right after college and miss out on the creative aspect of engineering,” said Galipeau. “I was

allowed to hone creativity as a professor. It was an advantage having the freedom and flexibility to research and experiment.”

Galipeau has enjoyed the opportunity to discover and self-direct his research, which included photovoltaic devices, alternative power, microsensors, microelectronics and electronic materials.

As coordinator of the graduate program, Galipeau formed close relationships with his students, many of whom were international students.

“I think it goes without saying what challenges a new international student who has never been to the United States may have,” said Roya Naderi, an electrical engineering graduate student from Chalous, Iran. “Dr. Galipeau was always a listening ear. He stressed the points, ‘Be brief, be exact and don’t waste people’s time. Don’t go too far, just see the facts and evaluate the elements that lead to its emergence. What can be the final integration of the elements? Analyze your approach and conclude.’”

“That was what he tried to teach me every single time I went to his office. There were times I walked out of his office with tears in my eyes, but I still miss him because he made me believe that improvement is an endless story.”

Contributions to college

At State, Galipeau led the Alternative Power Technology program, supported by the U.S. Department of Defense. He also started the Center for Advanced Photovoltaics, a research group supporting South Dakota’s focus on alternative energy. The program’s goal is to develop and commercialize new photovoltaic systems that provide cost-effective solutions for the nation’s energy needs.

Associate professor Qiquan Qiao took over the graduate program and serves as the center’s senior member.

Galipeau also started the electrical engineering clean room now housed in Daktronics Engineering Hall. The lab includes five bays for extensive research on

micro- and nanoelectronics materials and devices fabrication.

According to Galipeau, some of the biggest innovations involving electronic devices systems have been discovered and created in the clean room.

“Professor Galipeau was the first recipient of a named professorship in our college, and it is very fitting,” said Lew Brown, dean.

“He is an outstanding teacher, adviser, researcher and scholar. He has always had a reputation for setting high standards of rigor for students and advisees, and consequently, his students have really excelled. His research has also positively impacted the microelectronic sensors discipline.

“Dave has a reputation for having a very fun sense of humor. I will truly miss him.”

Retirement plans

Galipeau and his wife, Patricia, will keep their home in Brookings but plan to spend the rest of the winter in Florida with family. The couple have three children—Jeff, Catherine and James—and four grandchildren.

Galipeau has family living in Florida, and his parents live in New York, so the couple plans to split their time between the three states.

Galipeau has always had many hobbies, and looks forward to pursuing them more consistently. Boating, home repair and construction and car repair and restoration are just a few of his activities.

Galipeau will return to South Dakota in April for graduate student dissertations. He is co-teaching a class with Qiao and the dissertations will wrap his professor career.

“SDSU has been a great place to work in every aspect, but mostly because of the people. But it’s time for me to step away from teaching and clear the slate,” said Galipeau. “Watching my students develop and grow has been the most rewarding part of my time at State.”

Karissa Kuhle

Vandever memorial

engineering prof honored by peers



Professor Emeritus Jan J. Vandever, 69, of Palmer, Alaska, died Oct. 1, 2014, while in hospice care at Providence Hospital in Anchorage, Alaska, after a long battle with cancer.

Vandever was an award-winning math professor at SDSU from 1981 to 2003.

Among her honors were the F.O. Butler Award for Outstanding Service to Students in 1988 and the Larson Foundation Award for Teaching Excellence in 1998.

Vandever enjoyed hunting and fishing while living in South Dakota, and while growing up she often bow hunted with her father. So it is no surprise that after a trip to Alaska, she decided she wanted to live there.

As soon as she returned home to South Dakota, she worked toward moving to Alaska, and in Alaska she lived in a log cabin that she had built in the woods outside of Palmer. She enjoyed Alaska, made many friends and traveled to several remote locations.

Vandever retired from SDSU in May 2003 and started teaching at Matanuska Susitna College, a part of the University of Alaska-Anchorage, in August 2003.

During the 10 years she taught for Mat-Su College, there was always a core group of students who would do their homework in a classroom near her office so that they could ask for her patient help and guidance.

Educator to the masses

At SDSU she was known as an educator to the masses and SDSU's premier front-line instructor in mathematics. Vandever was known for a knack to help even the most mathematically intimidated students.

Testimony to this is the fact that her greatest supporters seem to have been the people who have struggled the most, according to a press release written after she won the Larson teaching award. Teacher evaluations give credence to the appreciation offered by so many of her students and peers.

Vandever was born Oct. 28, 1944, in Newark, New Jersey, raised in Jackson, New Jersey, and attended Lakewood (New Jersey) High Schools. She graduated from Monmouth College in West Long

Branch, New Jersey, in 1967 with a degree in elementary education.

Taught nearly 50 years

While still attending Monmouth College, Vandever began teaching mathematics at St. Mary's School in Middletown, New Jersey, which would be her first teaching job in a teaching career that spanned just less than 50 years. After graduating from Monmouth College, she taught mathematics in grades 9-12 and served as the mathematics coordinator/supervisor for Burlington Township School District in New Jersey until 1974.

The remainder of her career was spent in higher education. She earned a master's in mathematics education from Rutgers University in 1971, a master's in mathematics from Colorado State University in 1973 and a doctorate in measurement and statistics from the University of North Dakota in 1976.

Vandever had brief stints as an assistant professor of mathematics at Moorhead State University and Concordia College, both in Minnesota, before joining SDSU.

Vandever is survived by her sister Nancy Rogers, of Manchester, New Jersey, a nephew and a niece.

Vandever attended St. Michael Catholic Church in Palmer. A funeral mass was held there Oct. 17, 2014.



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Camps

Jerome J. Lohr College of Engineering

Ready to visit

Come learn about careers in science, technology, engineering, and mathematics!

ENGINEERING EXPO

DATE: April 24, 2015

LOCATION: Swiftel Center, Brookings.

High school students compete in contests for prizes and bragging rights in such events as human wallpaper, photovoltaic cannon and rocket car. Math and physics competitions also are held. The expo annually attracts about 400 high schoolers from eastern South Dakota, western Minnesota and Iowa, and eastern Nebraska. It is held in conjunction with the college's senior design project display and competition.

COST: Free, advanced high school registration requested.

CONTACT: Barb Dyer, 605-688-4161, SDSU_EXPO@hotmail.com.

YOUTH ENGINEERING ADVENTURE

DATE: June 21-25, 2015

LOCATION: on campus.

The camp allows high school students to discover the world of engineering through tours, demonstrations, hands-on projects and interaction with engineering professionals. Students are divided into groups of 10 and each group works closely with an engineer in their hands-on activities.

COST: Cost: \$100, advanced registration required.

CONTACT: Geoffrey Bonvallet, physics department lecturer, geoffrey.bonvallet@sdstate.edu, 605-688-4977

ACE (AEROSPACE CAREER AND EDUCATION) CAMP

DATE: July 12-15, 2015

LOCATION: on campus.

Sponsored by NASA and hosted at SDSU, this four-day camp provides high school students a look at aviation and aerospace careers. Students will receive two hours of flight and ground training, get behind the controls of an aircraft, build and launch air rockets, look into the workings of a jet engine, explore an F-16 fighter jet and visit with aviation professionals.

COST: \$350, advanced registration required. Tuition assistance up to \$200 available.

CONTACT: Cody Christensen, assistant professor, aviation, cody.christensen@sdstate.edu, 605-688-4983

BEST ROBOTICS

DATE: Oct. 31, 2015

LOCATION: Swiftel Center, Brookings.

BEST (Boosting Engineering, Science and Technology) Robotics is part of a national robotics competition for high school and middle school teams. Local winners advance to regions. Kick-Off Day: Sept. 19, SDSU Volstorff Ballroom. Participants receive kits and learn game objectives.

COST: There is no registration fee, but teams must have entered six weeks in advance of the local contest.

CONTACT: Kim Prohaska, Jackrabbit BEST hub director, kim.prohaska@sdstate.edu or 605-688-6268.

READY, SET (SCIENCE, ENGINEERING, TECHNOLOGY)-GO!

DATE: Nov. 14, 2015

LOCATION: Crothers Engineering Hall. The annual all-day session is the high school version of GEMS. It uses professional women and hands-on activities, such as electrical circuitry, electrical consumption and water treatment, to inspire girls to pursue courses of study introduced during the workshop. There also is a separate session to share college information with parents.

COST: \$25, advanced registration requested.

CONTACT: Rich Reid, associate dean for academics, richard.reid@sdstate.edu, 605-688-4161.

TEAMS (TESTS OF ENGINEERING APTITUDE, MATHEMATICS AND SCIENCE)

DATE: Feb. 24, 2016

LOCATION: University Student Union.

TEAMS is a one-day national competition that gives high-school and middle-school students an opportunity to discover engineering and apply knowledge. Teams of four to eight students work together to solve real-world engineering problems in a two-part competition, including multiple choice and short-answer essay questions.

COST: \$125 per team

CONTACT: Kim Prohaska, lecturer, computer science, kim.prohaska@sdstate.edu or 605-688-6268.

EASTERN SOUTH DAKOTA SCIENCE AND ENGINEERING FAIR

DATE: March 22, 2016 (tentative)

LOCATION: Frost Arena.

An all-day, judged exhibit for middle school and high school students who first compete at their local science fair. Grand-prize winners in the senior category receive an all-expense-paid trip to the Intel International Science and Engineering Fair, held in a new location every year.

COST: No charge to enter, but advanced registration required.

CONTACT: Brad Blaha, science fair director, sdsu_sciencefair@sdstate.edu, 688-5133.

GEMS (GIRLS, ENGINEERING, MATHEMATICS AND SCIENCE)

DATE: April 2, 2016

LOCATION: Crothers Engineering Hall.

The annual all-day session is designed to stimulate eighth-grade girls to pursue courses of study introduced during the hands-on workshop, which includes robots, bridge building and forensic science. There also is a separate session to share college information with parents.

COST: \$25, advanced registration requested.

CONTACT: Rich Reid, associate dean for academics, richard.reid@sdstate.edu, 605-688-4161.

Mike Headley

Figuring out how the universe works

“Trying to understand neutrinos is a big part of what we do. We also want to understand a substance called dark matter.”

Mike Headley



Whether it's overseeing projects miles in the sky or nearly a mile underground, Mike Headley '92 can say he's done it.

Now the executive director of the South Dakota Science and Technology Authority and laboratory director of the Sanford Underground Research Facility, Headley oversees 126 full-time employees who work in the United States' deepest underground lab, located in Lead.

Following graduation, Headley dealt with operating satellite systems while working for the U.S. Air Force and the National Reconnaissance Office before a position with the U.S. Geological Survey's Earth Resources Observation and Science Center brought him back to the state and in contact with South Dakota State.

Needing a change, Headley applied to be the South Dakota Science and Technology Authority's executive director. While he did not get the position, Headley was hired to be the laboratory's project manager. He was promoted to be the laboratory director before taking on the executive director role in July 2013.

The desire to further research in the United States was one reason for Headley's switch from the skies to an underground lab. The site allows scientists and their world-class experiments to be shielded from cosmic radiation that could alter the extremely sensitive measurements.

Detecting dark matter

“We are trying to figure out how the universe works. For example, neutrinos were discovered decades ago, but scientists are still trying to improve their understanding of how neutrinos behave and figure out their mass. We know it within a range but not to an absolute value,” Headley said. “Trying to understand neutrinos is a big part of what we do. We also want to understand a substance called dark matter. One of the experiments we have underground is the most sensitive dark matter experiment in the world. It hasn't directly detected dark matter yet but it's basically detected nothing better than anyone else in the world. They did an initial, 85-day, data-taking run to shake out the detector. They started another run in October 2014 and the hope is that they would have a chance to directly detect dark matter.”

When the Sanford laboratory or another site detects dark matter, Headley can only speculate how those findings will change the world.

“There are advancements that have come out of this type of work that are incredibly valuable to humankind right now. On the other hand, if you ask me what's the practical application going to be of us finding dark matter, I can't give you an answer. It's one of those things I don't think we're going to know until we get there and figure it out,” he said. “When the electron was discovered, we really had no idea that many, many years later, electrons and the electronics that use them, are in everything we do and in every part of our life. There are things that we can point at

that are good applications but there is a portion of this we don't know yet."

Headley said Canada, China and several European countries also are pursuing underground physics experiments.

"This is a worldwide competition to see how the universe is put together," Headley said. "We are not the only country in the world spending money on this. It's incredibly competitive and the work that's being done is really part of being able to develop and maintain a technical edge. Not only for what we know, but also for developing the bright minds who are figuring that out from a national capability perspective."

Familiar with State

Before walking on campus as a freshman, Headley had a unique perspective of South Dakota State. His grandfather, John W. Headley, was president at State from 1952 to 1957.

"We've had a relationship with SDSU forever. Growing up in Brookings a few blocks from campus, we were always involved in activities at SDSU," he said. "I knew it was a great school. I had relationships with some of the professors growing up, as far as Boy Scouts and those sorts of things. So I knew people who were up on campus, knew it was a great school and had an interest in the Air Force ROTC

program. I knew the Air Force ROTC program was strong at SDSU as well. I ended up having an interest in computer science and that's why I pursued it at SDSU.

"My computer science background from SDSU taught me how to approach and solve highly technical and management problems. It gave me valuable skills I've used throughout my career."

Dennis Helder, the Jerome J. Lohr College of Engineering's associate dean for research, recognized those skills when they worked together during Headley's time with EROS.

"Mike was very good at what he needed to do to coordinate the Landsat ground system; that is, pull all of the necessary items together to make sure we had a schedule that was workable and identify any issues that could possibly be problematic," Helder said. "He was quite adept at keeping all the balls in the air on a very complex project. Mike is able to filter through the chaff to find the key elements of an issue. That is a very important quality to have when you are trying to make sure that many elements come together correctly to put a satellite into space and build a ground system together to receive the data and make imagery."

And Headley now uses that ability to put the U.S. first in the race.

Matt Schmidt



Top: Headley uses a chart to describe the Sanford Underground Research Facility's space in the former Homestake gold mine.

These elevators, or 'cages,' transport personnel and equipment to the Davis Campus, approximately 1 mile underground.

The Yates Shaft hoist system, which uses wire ropes, was installed in 1939 and is used today. The system is checked regularly to ensure the safety of those operating and riding in the conveyances.

Left: Headley stands on the hoist operator platform. The hoists are used to lower and raise the cages to the Davis Campus.



Nicole Lecy

Civil engineer works to benefit the City of Rapid City

When driving by a new housing development or retail space in Rapid City, Nicole Tomaszewski Lecy '06/'08 takes a sense of pride and ownership.

Currently working as the development review engineer for the City of Rapid City, she is responsible for reviewing new developments, specifically reviewing the public infrastructure associated with those areas.

"When a project I've worked on from beginning to end is actually built and I can drive by and actually see it—knowing I had a part in a project like that—is what is satisfying to me," said Lecy, noting those feelings happen whether the development was a retail area that used to be an open field or older part of town that was run down so a developer demolished and redeveloped that area. "That's probably what makes me come to work every day, knowing I'm working to benefit the City of Rapid City and seeing it improve and grow."

While planning on majoring in engineering at State, she was unsure what area until she was invited to an American Society of Civil Engineers meeting.

"Even though I wasn't a dedicated civil major at the time, I attended an ASCE meeting my freshman year and got involved in that. It piqued my interest," she said. "Going to college, I didn't quite know what I wanted to do but I liked math and science so I thought maybe engineering would be something. I was looking for a smaller school that had a reputable engineering program and, for me, it had to be just far enough away from home so my parents couldn't just show up unannounced. I visited a couple of colleges and when I visited SDSU, it felt right, that's ultimately why I chose SDSU."

"Civil engineering is a very broad field. As a student, you learn about water, wastewater, streets, geotechnical surveying

... there are a lot of components to civil engineering," continued Lecy, a native of Blaine, Minnesota. "Today, my job is more broad and encompasses all aspects of civil engineering, you could say it ties them all together. I work with a little bit of everything in the civil engineering field in this position. One thing that was beneficial about being at SDSU was I gained knowledge in all of these areas so I'm able to apply it and use it today."

After receiving her master's degree in 2008, Lecy landed a position with Carollo Engineers in Phoenix. She worked there for three years as a process engineer, primarily working on the water and wastewater aspects of the field.

Return to South Dakota

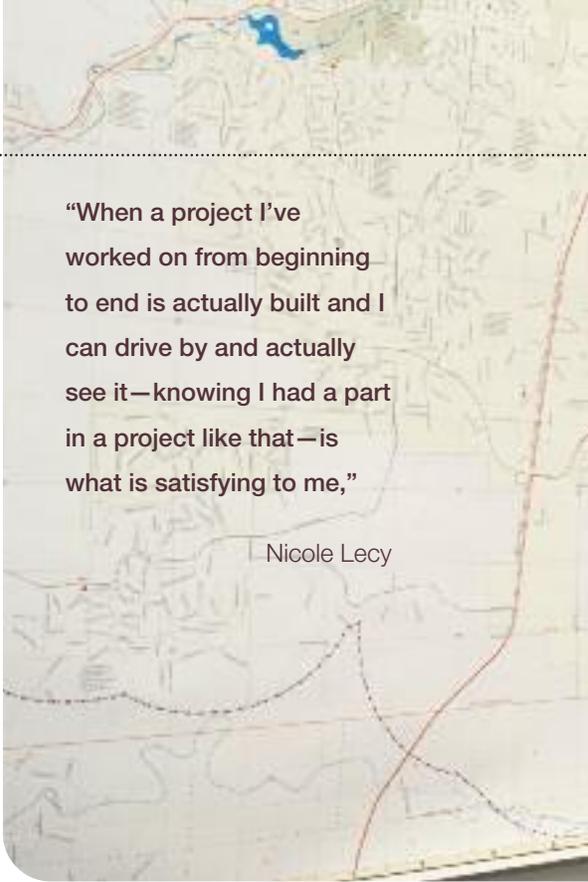
After getting married, she returned to South Dakota. Her husband, Dustin, is an assistant golf professional at Hart Ranch Golf Course. That return brought her to her current position with the City of Rapid City.

"Being involved in the engineering field allows me to make a contribution to society, which I feel like I'm making a difference," she said. "The engineering field itself is very broad. There are so many aspects to engineering but it means getting people together, solving problems, creating solutions and improving our society whether it be what I do, in terms of streets or public infrastructure, or medical advances in the biomedical engineering field."

Takes different approach

Lecy admits she sometimes takes a different approach to solving problems.

"We (women) have a different way of looking at things than men," she said. "Women come at problems from a different angle than men do. There are times when I feel like I'm able to break things down to a



"When a project I've worked on from beginning to end is actually built and I can drive by and actually see it—knowing I had a part in a project like that—is what is satisfying to me,"

Nicole Lecy

simpler form than others I work with. I start with the basics, start at the root of the problem and come to an ultimate solution."

That approach also helps when working with the citizens of Rapid City, too.

"We get a lot of calls from concerned citizens about something they see or they have an issue with or want to do something on their property and see if that's allowed by the city. Oftentimes, I can't speak in my engineering terms to relay that message to them, I have to say it in a way they'll understand," Lecy said. "Oftentimes, I put something on paper to help them understand or explain issues."

"I had many presentations in college that helped me prepare for presentations now," she continued. "The biggest presentation that sticks out in my mind was my thesis because your heart and soul goes into that. I looked at water demand trends in residential water use in the City of Brookings."

During her time in Brookings, Lecy discovered a few other items she did not quite predict upon arriving on campus. One was the number of women enrolled in the Jerome J. Lohr College of Engineering.

"It was definitely an adjustment. It was usually me and one other girl in the typical class of 30," she said. "It took some adjusting. I don't know if it made things easier but you just find a way to work with males."

"Knowing that's the way it is in school and thinking that's what my future career



would be as well, you just have to adjust to it,” Lecy continued. “Now, there are days when I’m the only female in most of my meetings. You just learn you have to fend for yourself.”

Willing to help others

But Lecy is also looking out to help anyone, male or female, who is interested in engineering. That interest started at State. She participated in the college’s GEMS (Girls, Engineering, Mathematics and Science) workshop and put on a program to showcase the field at Medary Elementary School.

“Anyone who expresses an interest or I know who has an interest in the math or sciences area, I highly encourage them to look into the engineering field,” she said. “Whether it is to job shadow somebody for a day to see what they do or attend a camp or is just interested in learning more, I tell them definitely to look into it.

“I just see it as a career that is very fulfilling, especially if you like to get in and solve problems,” Lecy continued. “If I know of any females who are interested in math and the sciences or are interested in how things work or are put together, I try to make a little extra effort to talk to them about what I do and the potential there is by being an engineer. The firms I’ve worked with have seen females in engineering as being an asset. There are a lot of opportunities because there are so many things you can do in engineering, especially in civil. You can take so many different avenues with it once you get that degree. You can really do what you want.”

Matt Schmidt

TSP

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Distinguished Engineers

The 39th class of Distinguished Engineers will add three plaques to the Wall of Fame in Crothers Engineering Hall, bringing the total to 135 persons since Dean Junis O. Storry initiated the award in 1977. To be honored at an April 28 banquet will be Cal Vaudrey, of Litchfield Park, Arizona; Donald L. Veal '53, of Longmont, Colorado; and Jane McKee Smith '83, of Vicksburg, Mississippi, who were all schooled in the field of civil engineering.



CALVIN VAUDREY

Vaudrey, age 90, headed the office of Banner Associates Inc. for nearly four decades.

Born on the family ranch 2 miles north of Glendo, Wyoming, April 27, 1924, he graduated from Glendo High

School in 1942, served in the U.S. Army Air Corps from December 1943 to October 1945, and then enrolled in the civil engineering program at the University of Wyoming in 1946.

It was while he was a student in Laramie that Vaudrey met his future employer and later business partner, Joe T. Banner.

Vaudrey was a nose-to-the-grindstone student who lived in a basement while his family was back in Vermillion, the hometown of his wife. Taking a rare study break, Vaudrey decided to go bowling. Two men bowling on the alley next to Vaudrey invited him to join them. One of those men was Banner.

That was the start of a partnership that would last until Banner's unexpected death Dec. 25, 1971, at age 61.

Banner invited Vaudrey to help him with a couple surveying projects. After a 1947 fire burned two full blocks of downtown Laramie, Banner was deluged in work, so Vaudrey joined him in the office while finishing his degree.

He proved his worth when Greyhound Lines Inc. officials called to say they would be in town the next day to look at bus terminal expansion plans that Banner was doing. But Banner was out of town and Vaudrey could only find the original plans. He visited his professors to see if they were helping on the project.

They weren't and suggested that Vaudrey trace over the original plans and create his own plans for the expansion.

After swallowing a couple of times, Vaudrey decided he could give it a try. Equipped with plenty of midnight oil,

Vaudrey had plans in hand when the Greyhound officials arrived. After examining them for a couple of hours, the contingent returned with the message to go on and create final plans.

Banner liked the plans as well. Vaudrey continued to work out of the Laramie office until earning his bachelor's degree in 1948.

After graduation, he immediately began graduate work in Laramie while considering a teaching offer from South Dakota State. The Vaudreys moved to his wife's home state and Banner accepted Vaudrey's idea of starting a partnership in Brookings after he became a professional licensed engineer.

Vaudrey earned his master's in 1950, when he also advanced in rank from instructor to assistant professor. In November 1952, Vaudrey became a licensed practicing engineer. Banner loaned him money to set up an office in the Vaudrey home at 1104 Fifth St. and by January 1953 he was meeting with city councils and county commissioners looking for work.

Also in 1953 Vaudrey became associate professor. "I enjoyed teaching, but I still wanted to be an engineer in private practice because I wanted to be in construction. I wanted to design something and build it," he said.

Vaudrey resigned in May 1957 to manage J.T. Banner & Associates. That year he also built a new home at 1432 Second St. that had a room in the basement for the three men who were working for him as drafters.

In 1961, Vaudrey became vice president of the firm, and it continued growing. Its first true office, 2,000 square feet in the upstairs of a building south of the post office, became reality in the mid-1960s.

By 1968, the office was on the move again, relocating to a 4,000-square-foot building the firm designed at 11th Avenue and Sixth Street.

Vaudrey became president in 1967 and with Joe Banner's death on Christmas Day 1971, Vaudrey also became chairman of the board, holding those offices until 1986.

In 1976 the corporate name was changed to Banner Associates Inc. By 1978, the company was again in need of space and

property was purchased on 22nd Avenue. Construction was completed in late December 1979 on what is now corporate headquarters—409 22nd Ave. S. The doors officially opened in January 1980.

Vaudrey reduced his role to chairman of the board in 1986 and retired from Banner in 1989. At the time, there were about 130 employees with Banner offices in Rapid City, Grand Junction, Colorado, Laramie and Cheyenne, Wyo.

"Banner became a multiple discipline design firm. We designed architectural, water and wastewater projects as well as roads, bridges and a couple dams in Wyoming," Vaudrey said. The firm designed many miles of Interstates 29 and 90 in South Dakota as well as facilities associated with the Minuteman missiles near Ellsworth Air Force Base.

But a lot of Banner's projects weren't jobs that put its name on a plaque.

"We never did think a project was too small. We did a lot of small projects," Vaudrey said.

That philosophy, hard work and "being at the right place at the right time" meant Banner was working on as many as 150 projects at a time, he said. Consequently, most of Vaudrey's time was spent writing project specifications, promoting the company and hiring good people.

"The pool of engineers that South Dakota State produced was top-notch. They really put out some great engineers," he declared.

In addition to working at Banner, Vaudrey was a charter member of the board of Daktronics, serving from 1968 to 1978, stepping down due to possible conflict of interest. He was a director for Northwestern Public Service Co. from 1978 to 1994 and also served a number of years on the Norwest Bank-Brookings advisory board.

Vaudrey and his wife, Denice, had one son, Kennon, who lives in San Luis Obispo, California, after retiring as a consulting engineer in sea ice engineering. Denice died April 9, 1997.



DONALD VEAL

Veal, who attended a one-room rural school for the first eight grades, distinguished himself in the air, academia and the business world.

The fifth of seven children, Veal was born on a

ranch at Chance in northwest South Dakota April 17, 1931. He went to Lemmon High School, about 45 miles from the ranch. After graduating in 1949, he enrolled in the civil engineering program at South Dakota State College, where he played football all four years.

Veal also was part of the U.S. Air Force ROTC program all four years at State and was commissioned as a second lieutenant upon graduation.

Just before graduation, May 8, 1953, he married Bonita D. Larson, a farm girl from Redfield whom he met at college. Daughters Sherrill and Barbara were born in 1954 and 1958, respectively.

After graduation, he worked for a short time for the state of California. In the fall, he entered the U.S. Air Force Pilot Training Program and earned his pilot wings in 1954. He was then assigned to the Air Force Training Command, where he was an instructor pilot until he was honorably discharged in 1957.

Veal then entered grad school at SDSU and later transferred to the University of Wyoming, earning a master's degree and then a doctorate. While a graduate student, he taught in the civil engineering department, specializing in fluid mechanics.

Veal also flew as a research pilot for the university while he was a student and long afterward. He also flew for the U.S. Forest Service and gave private instruction, logging more than 11,000 hours in the cockpit.

Veal served the University of Wyoming in several capacities, including professor, assistant director of the Natural Resources Research Institute, the first head of the Department of Atmospheric Science, which

he started and nurtured; vice president for research, and ultimately, president from 1981 to 1987.

After nearly 30 years at the University of Wyoming, Veal retired to become president and chief executive officer of Particle Measuring Systems in Boulder, Colorado, a company that specializes in manufacturing instruments to optically observe small particles in various media.

Veal received the Distinguished Alumnus Award from SDSU in 1983 and the Medallion Service Award from the University of Wyoming in 1990. He also is a member of the Wyoming Engineering and Wyoming Aviation Halls of Fame.



JANE MCKEE SMITH

The daughter of Charles and Shirley McKee graduated from Rapid City Stevens High School and enrolled in the civil engineering program at State.

There she developed a passion

for hydraulics under professor Alan Prasuhn and met her future husband, Ernie Smith, while attending a civil engineering class.

Upon graduation in 1983, with no background or experience in coastal engineering, she accepted a job with the Coastal Engineering Research Center of the Waterways Experiment Station (now the Engineer Research and Development Center) in Vicksburg, Mississippi, and has spent her career with the Corps of Engineers learning and advancing the field of coastal engineering.

Smith has achieved international acclaim in the field and in fall 2014 was honored as a Distinguished Member of the American Society of Civil Engineers.

She is the waves group leader at the Vicksburg center. The redesign of the New Orleans levees, based in part on a wave model she co-developed, was successful in protecting the city during Hurricane Isaac in 2012.

Smith also worked with emergency managers in Hawaii and the National Hurricane Center to implement fast and accurate forecasts for hurricane inundation in Hawaii and her expertise has been sought for reviewing design standards following Hurricane Sandy.

In an article in the Society of Women Engineers magazine, Smith states, "My role after Hurricane Katrina was determining what drove the winds, the waves and the surge during the hurricane."

She developed a computer model that simulates how wind separates storm waves and how the waves interact with other waves, currents and the ocean bottom and with levees, floodwalls and other structures.

She also devised a model known as SWIMS (surge and wave island modeling studies) to quickly forecast hurricane waves, surges and flooding on the Hawaiian Islands. The model simulates the processes in a few seconds and displays results within the geographic information system, quantifying the dangers approaching the islands.

Smith's work on numerical wave and surge modeling was featured on the "Megastorm Aftermath" episode of the PBS series NOVA, which aired in 2013.

At age 26, when she was just four years out of college, Smith became the youngest person to receive the Waterways Experiment Station Woman of the Year Award in 1987. In 2010, she was named Government Civil Engineer of the Year by the American Society of Civil Engineers.

Her honors at SDSU included being named a Distinguished Alumna by the Alumni Association in 2013, and the outstanding civil engineering student her freshman (1980) and senior (1983) years.

Within her profession, Smith chairs the Coastal Engineering Research Council of the American Society of Civil Engineers, was 2013-14 president of the governing board of the Coasts, Oceans, Ports and Rivers Institute of ASCE, and has served as editor of several trade publications.

Smith and her husband have one son, Tyler.

David Schiller

ME grad patenting plastic products

Following four years of study in the Jerome J. Lohr College of Engineering, mechanical engineering graduate David Schiller found his learning was only beginning.

Armed with a solid background in heat transfer, thermodynamics and material properties, the Tracy (Minnesota) Area High School graduate began work at Bedford Industries in Worthington, Minn., shortly after graduating from SDSU in 2010. He had worked with a lot of materials at State, but plastics wasn't one of them.

At Bedford, a manufacturer of twist ties and similar products, Schiller began his study of elastomers and plastics.

"It's much more of an industry-taught knowledge," Schiller said of the on-the-job-schooling he has received in extrusions and plastic coatings. Evidently, Schiller is paying attention in class. The U.S. Patent Office notified him in September 2014 that his application for ElastiTabs had been approved.

ElastiTabs is a loop and an adhesive label that allows sachets, packets or other lightweight items to be attached to larger bottles and containers for on-pack promotions, he explained.

Bedford, which has been working with elastomers for about 10 years, sells several Elasti products. "What makes ElastiTabs unique is it is the first process we've made with automated processing in mind and the ability for customers to

apply it to their product using existing industry equipment.

"Our current products were developed for bundling applications, bag closures, product identification or marketing of consumer products, including bundling of produce, bread twist ties, coffee bag closures and wine tags.

"ElastiTabs is one of the first products we've made to do a cross promotion with a sample product, creating value for a customer to deliver a product," Schiller said.

He began working on ElastiTabs within his first year at Bedford. Schiller, who shares the patent with Bedford graphic artist Curt Heinrichs, filed for the patent Nov. 21, 2012. Within two months of starting on the project, Schiller said he had a product that was "very close to the end product."

It took another four months for testing and to get the production line in place at Bedford, Schiller said.

A sticky challenge

The biggest challenge was working with adhesives. "The world of adhesives is like the world of steel. There can be a lot of steels that work, but when you really get down to it, it is hard to find a unique product that fits the need," Schiller said. "Cost is a factor. I can't go with construction-grade adhesive. I have to use an



David Schiller holds a plaque representing the patent he received for ElastiTabs, a product he created as a mechanical engineer at Bedford Industries. The items on his desk are a roll of ElastiTabs and some examples of products using the ElastiTab.



adhesive that is dollars per pound rather than \$10-\$20 per pound.

“We went through four or five iterations of adhesives to find one that would hold up and meet the customer’s expectations. Every adhesive had to go through 12 weeks of testing. We had the first couple adhesives hold up to 10 weeks, but that’s not 12 weeks,” Schiller said.

All told, he spent more than a year testing adhesives to assure the customer that ElastiTabs would hold onto the product, he said.

Beats doing it by hand

Schiller explained how ElastiTabs truly are an improvement: “Before the tab, a few customers were having to spend extra money to increase the height of the product to create holes and then would have to manually thread rubber bands through the holes to bind the products.

“They wanted to bind 200 to 300 pieces per minute, so it took 30 to 40 people to do that much work in a minute.”

The ElastiTabs loop is “very similar to a soft rubber band. The adhesive is very similar to a sticky label,” Schiller said. However,

ElastiTabs can be applied to products using standard equipment at a rate of 200 to 300 pieces per minute.

The consumer market isn’t the only place the ElastiTab will be getting use. A variation of ElastiTab is going to enter the medical market for labeling of instruments, scopes, containers, carts and surgical trays in the near future.

Also, ElastiTabs probably won’t be his only patent. Four more patent applications have been filed from his work at Bedford.

These will include another State grad Trevor Wintz (ag engineering 2010) as a co-author. He started at Bedford around the same time as Schiller.

Schiller said, “Both of us are always thinking of new products to make or processes that can be improved here at Bedford. Most mornings start with one of us going to the other’s office and saying, I had an idea last night ...

“It’s exciting when work is not work, it’s designing new things, testing them, building the machines to produce them and finally seeing them out in use. What could be more fulfilling to an engineer?”

Dave Graves

HAHN MEMORIAL



Jennifer Kay Hahn, a member of the Dean’s Advisory Council since 2008, died Feb. 16, 2015, at Avera Dougherty Hospice House in Sioux Falls after a battle with melanoma.

Hahn, 58, of Sioux Falls, earned her bachelor’s degree in biomedical and electrical engineering from Duke

University and her master’s degree in systems engineering from George Washington University.

An ROTC scholarship student, Hahn spent eight years in the Army and then joined Science Applications International Corp. (SAIC), working in San Antonio, Germany and Denver. In 2007, she moved to Sioux Falls as program manager at EROS Data Center, eventually becoming vice president before transitioning to senior capture manager in business development.

She is survived by her husband, Dick; three children, Sergio “Alex,” Lucy and Anthony Benitez, as well as her parents, stepparents, a brother and a sister.

ALUMNI NEWS

Gerard Johnson ’10 was elected to the board of the Fort Pierre Development Corp. at its annual meeting in January.

Johnson, project superintendent with A.G.E. Corp., will serve a three-year term on the board. He is a 2003 graduate of Stanley County High School and earned a construction management degree at State. He and his brother, Andy, are the fourth generation of Johnsons to be involved with A.G.E.



Fritz Kub, a scientist at the U.S. Naval Research Laboratory in Washington, D.C., has been inducted into the University of Maryland’s Innovation Hall of Fame. The 1972 grad was recognized for his technology innovations related to gallium nitride (GaN) Light Emitting Diodes (LED) and microwave transistors.

The award was presented at a ceremony at the University of Maryland Nov. 25, 2014.

Kub, head of the Power Electronics Branch in NRL’s Electronic Science and Technology Division, received his doctorate and master’s degree in electrical engineering from the University of Maryland (1985) and the University of Minnesota (1976), respectively.

Kub invented a novel gallium nitride engineered substrate (up to 300 mm), which can reduce the cost of LEDs for lighting applications.

Kub has played key technical and leadership roles in research and development of microelectronic devices such as: wafer bonded materials and devices, GaN power transistors, integration of diamond with GaN power transistor silicon carbide power transistors, neutron detectors and analog CMOS circuits.

He holds 53 U.S. patents and has written more than 180 journal publications.

In 2011, Kub was designated a Fellow of the Institute of Electrical and Electronics Engineers and received the Distinguished Engineer Award from SDSU in 2010.

He has received two NRL Best Publication Awards and five NRL Technology Transfer Awards.

The Innovation Hall of Fame recognizes Maryland engineering alumni, faculty and associates who have pioneered many of the most significant engineering advances in the past century. Inductees include Robert Briskman, the co-founder of Sirius Satellite Radio; and George Laurer, inventor of the Universal Product Code.

Alan Roy Sternquist ’68, mechanical engineering, died Jan. 1, 2015, at his home in Pleasanton, California, at age 68.

After graduation, he moved to California to work as an engineer at the Naval Ship Yards in Alameda. He spent most of his career improving the design of steam turbines to propel naval aircraft carriers and nuclear submarines. He was lead engineer for Northrup Grumman Corp. from 1986 until his death.

A memorial service was March 28 at Dalesburg Lutheran Church near where he grew up. Survivors include two brothers, a sister and nieces and nephews.

Memorials may be made to the SDSU mechanical engineering department.

Steven Warren, ’81 civil engineering, was promoted to chief of staff with the South Dakota Air National Guard at Joe Foss Field in Sioux Falls Oct. 4, 2014.

Also during the ceremony, Warren was promoted to brigadier general. His daughter, Ashley, and his son, Kyle, handled the pinning. Warren had been serving as vice commander of the 114th Fighter Wing and commander of the 114th Mission Support Team in Sioux Falls.

In his new position, Warren reports directly to Brig. Gen. Matt Jamison, assistant adjutant general for combat readiness and operational effectiveness.

Warren and Jamison are the only brigadier generals in South Dakota Air National Guard.

DEAN'S CLUB

January 1, 2014 through February 2015

Dean's club membership consists of alumni and friends who have contributed \$500 or more annually to the Jerome J. Lohr College of Engineering. Dean's Club members are recognized as devoted friends of the college who make significant impact on the college's future. Member names will be listed in the SDSU Honor Roll and the college newsletters. They also will receive invitations to special college and university functions, updates from the college dean, and an SDSU Dean's Club car decal.

3M - Brookings	Charles N. Blackman	Dow Corning Corporation	Richard L. Gunderson
3M - Matching Gifts	Francis M. and Beverly A. Blaze	Neal D. Drefke	Dale A. and Barbara A. Haack
3M - St. Paul	Gary L. Bliss	Burdette H. Dugdale	Preston C. and Patricia Haglin
AE2S Industrial LLC	Lori S. Bocklund	EAPC Partnership	Bruce C. and Cathy M. Hall
AGCO Corporation	Boeing	East River Electric Power Cooperative Inc.	Kurt L. and Dori Hansen
Agland Cooperative	Duane D. Boice	Eastern Chapter South Dakota Engineering Society	Michael R. Harms
Mary A. Akkerman	Brian A. Borgstadt	Delvin D. and Athene M. Eberlein	John D. Hauge
American Council of Engineering Companies of S.D.	Steve W. and Jean Brockmueller	Edinger Brothers Partnership	HDR Engineering Inc.
American Society of Civil Engineers Eastern Branch	Brookings Economic Development Corp.	James O. and Rita M. Edwards	Jerome D. Heeren
American Tower Corporation	Brookings Regional Builders Association	Errol P. EerNisse and Sonja Chesley	Allen D. and Roxanne Heiden
Timothy T. Amert	Lewis F. and Danelle M. Brown	Charles P. Eggen	Michael R. Heier
Daniel L. and Ginny Amundson	Jon R. and Wendy A. Brown	Electronic Systems Inc.	James A. and Sandra L. Hembd
David A. Anderson	Curtis D. and Phyllis E. Brudos	Thomas D. Elverson	Henry Carlson Company
James M. Anderson	Michael A. Bucher	Benjamin J. and Kelli J. Endorf	Kent L. Hofer
Marilyn C. Anderson	Tim and Suzette Burckhard	ExxonMobil Foundation	Wallace J. Hoff Jr.
Robert M. Anderson	Ronald J. Bymers	Falcon Plastics Inc.	Hormel Foods Corporation
Roderick B. Anderson	Edward and Judy Cannon	Adolph Fejfar	Burton and Gladys Horsted
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January 1, 2014 through February 2015

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Transformation results of investments



When then-Dean Duane Sander used his own money to fund a facilities study for the College of Engineering in the fall of 1996, his intent was to learn what steps the college needed to take to address the limitations that had emerged in terms of quality and quantity of space.

No one could imagine the transformation that would occur as a result of that \$100,000 investment by Dean Sander.

The addition and renovation to Crothers Hall began less than five years after that study, in the winter of 2001. A year later, construction began to restore the historic Solberg Hall.

By the fall of 2007, construction began on the first phase of Daktronics Engineering Hall. Three years later, work began on phase two.

On April 24, 2015, the Jerome J. Lohr College of Engineering will be the focal point of a fifth building dedication in a 13-year span with the Architecture, Mathematics and Engineering Building.

In simple terms, there has not been a time since 2000 when the Lohr College of Engineering wasn't either in the midst of construction or in the planning stages of a next building. Fundraising for capital projects for engineering has been a constant throughout the time.

This transformation has been amazing to watch. Time and again, donors stepped forward to fulfill the plan that was born from the Sander-funded study nearly two decades ago. We have to thank alumni, friends and private industry for the investments they have made, along with the students who contributed \$10 million to the Architecture, Mathematics and Engineering Building through the Higher Education Facility Fund.

Through it all, Jerry Lohr has been a relentless and passionate donor and fundraiser for the cause. For much of the past decade, Tim Reed was overseeing the fundraising efforts as development director for the Lohr College of Engineering. Reed left the Foundation at the end of 2014 to devote more time to family and his role as the Mayor of Brookings.

Fittingly, a donor who Reed worked with provided a \$250,000 gift on New Year's Eve—his last day on the job—that helped the Foundation reach its fundraising goal for this project.

Engineering has a rich history at SDSU and it's been a remarkable run to address the college's facilities needs. We hope everyone can join us April 24 for the dedication of this latest milestone.

*Steve Erpenbach
President & CEO
SDSU Foundation*

“HELP US SERVE THE NEXT GENERATION.

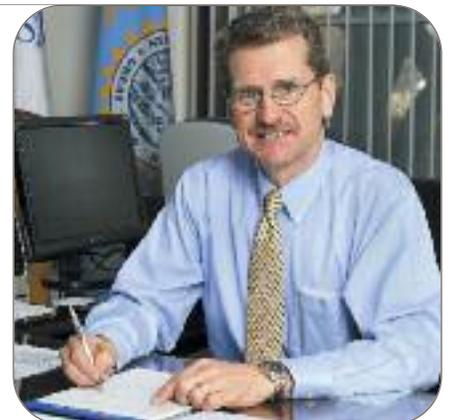
Remember the SDSU Foundation in your will.”

– David L. Chicoine

President of South Dakota State University

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ARCHITECTURE, MATHEMATICS, AND ENGINEERING

Please join the Jerome J. Lohr College of Engineering
and the College of Arts and Sciences for an afternoon of celebration

ARCHITECTURE, MATHEMATICS AND ENGINEERING BUILDING DEDICATION

**Friday, April 24, 2015
4 pm**

Architecture, Mathematics and Engineering Building atrium
Building Tours: 3 - 3:45 pm



The 62,000-square-foot Architecture, Mathematics and Engineering Building cost \$17 million. Private donors provided \$7 million of that total; \$10 million came from the Higher Education Facilities Fund, which is built from 20 cents for every \$1 in tuition paid by students. The new facility will be used starting in fall 2015.