THE IMPACT OF Lohr
Dear ALUMNI AND FRIENDS,

As this issue reaches you, we are now well into the start of another exciting year for SDSU and the Jerome J. Lohr College of Engineering! Yes, that is correct—the College of Engineering has been formally renamed after Jerry Lohr (BS CE ’58). You can read more about this historic event in this issue.

The renaming of the college was formally celebrated simultaneously with another historic event Oct. 4, 2013: the groundbreaking and construction of the new Architecture, Math and Engineering Building. Read how the new AME Building project will serve the needs of four departments and two colleges.

You will find many articles on the outstanding activities and achievements of our students and faculty who are impacting our community, region and world. I’m sure you will enjoy them.

I want to thank all of you for your generosity and encourage your continued support of the college. If you are not already a member of our Dean's Club, please consider becoming one and help us continue to produce the best graduates in science, technology, engineering and mathematics. Your generous financial support is part of the lifeblood of the college.

I hope you enjoy this latest issue and will drop us a line or stop in for a visit if you’re in our area. Remember, Jackrabbits are always welcome.

Lewis Brown, Ph.D.
Dean of Engineering
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ABOUT THE COVER

Jerome Lohr with his children, from left, Lawrence, Cynthia and Steve, at the J. Lohr Vineyards & Wines in California. The engineering college at SDSU was renamed the Jerome J. Lohr College of Engineering during a dedication ceremony Oct. 4.

Lohr, a 1958 civil engineering graduate, has been a pivotal fundraising force for the university, particularly leading fundraising efforts for five major engineering building projects during the last 11 years. He has given in excess of $10 million for college construction projects.

Construction began in August of a 60,000-square-foot building that will complete an ambitious time of facility improvements within the college.

Students

- Brian & Jim Lawburgh
  These identical twins from Hendricks, Minn., also share common interests when working in the biofuels research laboratory at Crothers Engineering Hall.

10 Extracurricular engineers

- Engineers turn up in the damnest of places, like band practice (Austin VanderWal), theater (Brian Schulte), dance class (Alyssa Clemen), Hobo Day (Casey Janisich), and the art studio (Mackenzie Fahy).

12 Taylor Suess

You might recognize him as a starting offensive lineman for the Jackrabbits, but he also is a top-end student and researcher in the mechanical engineering department.

13 Megan Waytashek

The Lino Lakes, Minn., junior is expected to lead the SDSU women’s basketball team this season, but the 3.97 GPA scholar envisions a future in biomedical engineering.

14 Athletes and engineers

Engineering students can be found in almost every sport that SDSU fields, and they’re doing much more than “just getting by” in the classroom.

15 A successful algorithm

The Research Experience for Undergraduates program has been the pathway for opportunity for math major Chris Galbraith.

16 Undergraduate research

Ryan Hahn has used his first taste of undergraduate research to crunch numbers from a government satellite, expand his knowledge and earn a check.

17 Paid in full

May graduate Caitlin Gerdes is pursuing her master’s in mechanical engineering at State on a $30,000 per year award from the National Science Foundation.

18 Student competitions

Whether its a racecar, a robot or a concrete canoe, students find contests a fun way to apply their classroom learning and experience teamwork.

20 Senior design projects

This capstone class not only puts application to countless courses, it can also lead to a patent as students at last year’s Engineering Expo discovered.

22 Living Learning Communities

Engineering students living and studying with other engineering students continue to pay dividends.

24 Engineers Without Borders

The fourth trip by students from this group to Carmen Pampa, Bolivia, included an old friend and students from his new school.

26 Trevor Layh

The mechanical engineering graduate from Winner becomes the sixth SDSU student to receive the $10,000 Tau Beta Pi fellowship for graduate study.

27 National winners

Students from several disciplines earn national scholarships.

28 Scholarship dollars

In a decade, the value of scholarships given to SDSU engineering students has almost tripled to $1.4 million for the 2010-11 school year.

30 Faculty farewells/news

Alfred & Madeleine Andrawis, Bruce Berdanier say goodbye.

31 Alumni news

College

2 Jerome J. Lohr

For the College of Engineering, no one has left a larger impact than this 1958 alumnus.

6 Architecture, Mathematics, Engineering

Construction began in August of a 60,000-square-foot building that will complete an ambitious time of facility improvements within the college.

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8 Brian & Jim Lawburgh

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J. LOHR
has lasting imprint on the
College of Engineering
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—Jerome J. Lohr

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here’s nobody quite like Jerome J. (Jerry) Lohr, a transformational figure like none other in the history of the College of Engineering or the university for that matter.

First, some background.

When Crothers Engineering Hall was built in 1957 it marked the first new engineering structure on campus since Solberg Hall was erected in 1902.

The College of Engineering then had to wait 45 years for something new with the addition and renovation of Crothers in 2002.

The college then began moving swiftly with four more building projects: reconstruction of the original Solberg Hall (2003), Daktronics Engineering Hall (east phase in 2009, west phase in 2012) and currently the Architecture, Math and Engineering Building scheduled to open in 2015.

Five major projects in 11 years! The projects would not have been realized if it weren’t for the millions raised from donors.

One person in particular has always stepped to the plate when needs arise and that individual has been Lohr, a 1958 civil engineering graduate, who has given in excess of $10 million for college construction projects.

“My whole passion is seeing a need and figuring out what can I do with my abilities to make it happen,” said Lohr. “We needed to do those projects to get up with the rest of the country and the world.”

College carries his name

Lohr hasn’t done it alone, of course. His fundraising prowess is well known, bringing countless others on board—all in the name of keeping the college among the top engineering schools in the nation.

For that reason, and more, the college was renamed the Jerome J. Lohr College of Engineering during a dedication ceremony Oct. 4.

“I wasn’t looking for this, but it’s exceedingly neat,” said Lohr. “It’s a tremendous honor.”

Dean Lewis Brown said, “We need the best facilities to get the most talented faculty and you need both to get the most talented students. For that reason, we now carry his name because he has literally transformed the entire College of Engineering.”

Tim Reed, the college’s director of development, agrees. “Jerry always said we’ve got great faculty, but they deserve better facilities and then scholarly work and research will take off. I don’t know how many times he’s preached that to me.”

Lohr’s efforts aren’t confined to just the college. He has been a board member of the SDSU Foundation for 25 years. He chaired the 1994 Visions for the Future campaign, a fundraising drive that netted SDSU $52 million. He co-chaired It Starts with STATE: A Campaign for SDSU, a fundraising effort that generated $255 million for the university when it ended in April 2013.

A few years ago, when the foundation needed a new home, it was Lohr who led the effort. It resulted in a three-story brick building that also houses the 4-H Foundation, the office of the vice president of research and the office of technology transfer. The structure was formally named the Lohr Building in May 2012.

Lohr presently funds 31 scholarships at the university with the largest being $5,000 per year for four years. All total, his scholarships yield $200,000 every year. He was a founding member of the SDSU architecture program, and he provided a leadership gift for the dairy manufacturing plant.

What can we do next?

“There will never be another alum, friend and donor who has impacted this university like Jerry Lohr,” said SDSU President David Chicoine.

“Jerry has provided leadership to private fundraising for decades. His money, time and talent have set the bar on the type of impact one person and their family can have that is transformative.

“He is committed to the pursuit of excellence, knowing full well that the margin of excellence for public universities comes from private funds.”

Indeed, Lohr has and does make an impact, but he’s the first to point out that he doesn’t have an open checkbook.

“Absolutely not,” he said. “I only want to put up money to help inspire others. It’s not how much you give, it’s the sweat equity you put into it to get other people involved in the process.”

Lohr always sticks around for the finish, too.

“I don’t dabble. If I go in, I go in like gangbusters and really try to get something done. I don’t want to just do something and then say, ‘well, that was fun.’ I want to be involved and see results. I want to make something really happen.”

And, he doesn’t lay in bed at night with any self-gratification thoughts. “What I think about is the next thing—what can we do?”

Background of success

Lohr’s drive can be traced to his upbringing as the son of a hard-working farm family near Raymond in Clark County.

“Well, my parents were very much active in the community—we have a history of that,” he said. “If there was something that needed to be done, Dad or Mom would do it and then move on to something else.”

Getting a good education was very important to the Lohrs, too. “Education was always a big thing in my family, and I have a tremendous amount of gratitude for the education I received at SDSU. The university does an excellent job of providing not just an education, but a life transition.”

Lohr made his mark in winemaking and home construction.

In August 2013 he resigned as chairman and CEO of J. Lohr Vineyards & Wines, a
company he founded in 1974 that ranks as one of the top wine producing operations in the United States. It employs 150 people who are responsible for 3,400 acres of grapes in northern California and the central coast of California.

The business remains in the family. Lohr’s eldest son, Steve, was named chairman and chief executive officer and his youngest son, Lawrence, continues as the director of wine education. His daughter, Cynthia, is vice president of marketing. Jerry remains actively involved with the titles of chief financial officer and president of the vineyards.

Prior to the wine world, Lohr had a highly successful land development and building business. Originally known as Saratoga Foothills Corporation and later J. Lohr Properties, the company was one of the biggest builders of custom homes in Saratoga and adjacent cities from 1964 until it ceased operations in 2003.

Expertise saves money

Lohr became keenly aware of the state of the college’s engineering facilities when he came back to serve as parade marshal for Hobo Day in 1983. Taking time to tour his former stomping grounds, including Solberg Hall, he recalls a life-changing scene.

“It was my senior year and I was asked to teach statics and dynamics in the southeast corner of Solberg. I remember walking ever so carefully because the linoleum was curled up and there was a hole where the previous professor stood. I actually moved the lectern over a bit so I didn’t stand on the hole. When I came back 25 years later that same linoleum was still there. From that point on, I said, ‘look, we need to do something about this.’”

Lohr’s knowledge is unique, because as a civil engineer, he knows what he’s talking about. A case in point was the Crothers project.

“We had reached a log jam on the design of the building addition that had us so upset as department heads because the design from that firm was way over budget,” said Brown, who was department head of electrical engineering at the time. “We naturally thought the building project had to be scaled down from our needs and expectations.

“I will never forget—Jerry was on a teleconference call from California listening in. He patiently waited until the discussions were done, and said, ‘OK, this is unacceptable, here is what we are going to do.’

“Jerry ended up proposing a new design for the addition and by doing so cut the costs way back by making it a much more efficient design. We probably got half again more square feet than we would have otherwise. I’m telling you, the department heads from that day on looked at him as our hero.”

Likewise, constructing Daktronics Engineering Hall in two phases compared to one big piece was a huge money saver, thanks to Lohr’s input.

“We built it for 60 percent of the cost of what it would have been just because we did it in two halves and got very efficient bids,” said Lohr.

In addition to their friendship, Brown has always viewed Lohr as a business executive who completely understands how to get big things done.

“You better have a vision, you better have a plan and you better be able to articulate what the needs are—that’s how he operates,” said Brown. “I’ve always been comfortable with that.”

Explaining his methodology, Lohr matter-of-factly replies, “I’ve got experience that other people don’t have because I did 962 custom homes. What I’ve done is both conceive things and get good value for the money.”

The Lohr touch

Lohr leads by example, and his tactics are legendary when it comes to raising money.
“Jerry is the best room worker there is,” said Reed. “He taught me, ‘Tim, you don’t ask: Will you give money? You ask how much, because when I go and ask I don’t say, ‘Do you want wine? I ask, ‘Do you want red or white?’ He carries both bottles with him when he is serving.”

Reed recalled one time when Lohr walked around the room and went to every person and put his hands on their shoulder asking for their help. “For Jerry, it wasn’t about how much they gave, it was more about getting everybody involved.”

According to Brown, Lohr isn’t one to give up easily. “He’s the first one to personally ask other donors to do what he did to step up and give to a project. I remember one meeting he said we aren’t going to open that door and leave until we get this much raised.”

Lohr, himself, posed the question in his remarks during the Oct. 4 dedication.

“This is the time to say thank you ... this is a time for celebration ... and this is a time for challenge. I’m 76 years old. Who among you in the audience is going to carry this on so this college and the university as a whole can continue to prosper and move forward?”

In essence, Lohr is all about the big picture. “His leadership has more value than how much money he has given,” said Reed. “He motivates other people and he leads the project. If something stalls, Jerry comes along and makes it happen.

“Jerry doesn't do these things for himself. He does them for the university and his love for South Dakota.”

Kyle Johnson

The College of Engineering was renamed the Jerome J. Lohr College of Engineering during a dedication ceremony Oct. 4. Lohr, a 1958 civil engineering graduate, made his mark in winemaking and home construction. Over the years, he has donated in excess of $10 million for college construction projects for SDSU.

In photo at far left, Jerry inspects a crop of grapes on the 3,400 acres J. Lohr Vineyards & Wines owns in northern and the central coast of California.

In the immediate top photo, Lohr gestures to fellow speakers at the dedication, from left: Governor Dennis Daugaard, Harvey Jewett and Dean Krogman (president) of the Board of Regents, SDSU President David Chicoine and Engineering Dean Lewis Brown.

Lohr's children, from left, Lawrence, Cynthia and Steve look on with pride as their father speaks to a packed house.

At the podium, Brown said that the college carries Lohr’s name because he has literally transformed the entire College of Engineering.

In the bottom photo, family and friends gather for a group photo following the dedication.
Twelve years ago the landscape at the Jerome J. Lohr College of Engineering pointed to buildings from the 1950s—and those were the new ones.

Solberg, the historic engineering hall, had been vacated in 1998 after architectural studies found it to be unsafe and incapable of supporting necessary loads. Classes continued in the attached Solberg Annex, a 1930s building, and the small industrial arts building (1936).

What a different landscape today with the fifth major construction project well underway.

“There has been a transformational impact on the Lohr College of Engineering. It’s put us on a par with any of our peers that we compete with for talented faculty and students,” says Dean Lew Brown ’84, who noted facilities had changed little between his college days and when he became dean July 1, 2001.

The current game changer is the Architecture, Mathematics and Engineering Building.

Construction of that 60,000-square-foot, $17 million project begins in earnest this fall after the summer was spent cleaning out and then demolishing Solberg Annex and the Industrial Arts Building. The new building’s footprint also extends to the parking lot north of those structures.

It’s funding is a combination of private ($7 million) and public ($10 million in state higher ed funds).

Credit goes to Lohr

Brown credits the college’s namesake, Jerry Lohr, for making the Architecture, Mathematics and Engineering Building happen. (In June, the Board of Regents approved renaming the college the Jerome J. Lohr College of Engineering. See story Page 2.)

“His enthusiasm and his leadership in fundraising are the reasons we’re going to be able to celebrate this new building,” Brown said.

The renaming of the college was recognized at a 2:30 p.m. Friday, Oct. 4, ceremony that also served as the groundbreaking for the already underway Architecture, Mathematics and Engineering Building. Due to weather, it was moved to Lincoln Music Hall.

Lohr was a lead donor and chief fundraiser for all five engineering projects in the past 12 years.

Brown said, “The Lohr College of Engineering has produced many great entrepreneurs, innovators and leaders throughout its storied tradition. Frankly, Jerry Lohr has no peer when it comes to his overall and lasting imprint on this college.”

Joining in the cause

Of course, Lohr hasn’t been alone in making the new building happen. There are 19 other major contributors. (See “Major Donors” list on Page 7.)

Brown said, “Industry has been very excited” about the building. “Industry has stepped up and helped it become a possibility. We have had companies sponsor many rooms and labs. They understand the importance of educating their future employees.”

Engineering, architecture collaborate

Each department has its own floor and engineering and architecture will share lab space on the first floor.

Brian Rex heads the architecture program, which is only in its fourth year and is located academically within the College of Arts and Sciences. Engineering and architecture programs typically operate in parallel relationships.

Rex is excited about having more integrated relationships with engineering programs.

“I don’t know of any other university where you have mechanical engineering, construction management and architecture in one building,” Rex said.

“Other schools are beginning to link the architecture and construction management programs together, but their history has not had them together, so it’s more difficult for them than us. Having a joint facility that was designed for direct collaboration makes our partnership natural. We’re not just names together on a board.”

The planning to create the Architecture, Mathematics and Engineering Building began before there was an architecture program.

Initial discussions were in 2007 with Lohr, Brown and Kurt Cogswell, head of the math department.

“Once word came around that we were considering an architecture program, Jerry (Lohr) got really excited. He loved the idea of having architecture physically close to engineering. It was his idea to have architecture on the top floor,” Brown said.

Planning includes ‘green’ measures

Nearly five years of planning and fundraising transpired before the project was taken to the Board of Regents in March 2012 for preliminary facility statement approval. In December 2012, the Regents approved advancing the project to the design phase. Sioux Falls Construction already was on board at that time as the construction manager at risk. When school got out in May, college staff began to sort through the
content of Solberg Annex and the Industrial Arts Building. Sioux Falls Construction began demolition work June 17, but it was initially a gentle effort.

The exterior stone and some brick from Solberg Annex were removed for decorative use in the new project.

Serious excavation work began in late July, but even then the debris was separated with light ballastics, electrical items and steel sent to a recycling firm. “There was a concerted effort to divert demolition material from the landfill,” said Amy Jones, project engineer within the university’s facilities and services department.

That is among the measures being taken to produce silver certification from the Leadership in Energy & Environmental Design.

Other measures include daylighting and occupancy controls to allow users to turn off lights when not needed, energy efficient lighting, including some LED fixtures; low-flow plumbing fixtures to reduce water consumption and a white roofing membrane to reduce the heat island effect.

**To connect with Solberg Hall**

According to the university’s facility plan, the building will be 61,750 square feet, spanning 200 feet east-west and 110 feet north-south, about 20,000 square feet for each of the three floors. There is a mechanical penthouse, and the building will connect to the existing Solberg Hall on the first floor.

The brick finish will complement Solberg Hall, and there will be a glass-enclosed entryway.

Completion is set for early 2015 with most of the moving to occur in spring and summer 2015. Having a facility in the heart of campus to show off senior design projects excites Brown, who notes glass panels on the lower levels will make it possible for visitors to see students at work.

Currently, mechanical engineering projects are built in a shop near the equine unit on the west edge of campus.

**Building creates a ‘necessary synergy’**

Kurt Bassett, head of mechanical engineering, touts the building’s collaborative design. “Our students will not only have state-of-the-art space and tools for both process and design work, they will have a more appropriate learning experience.

“They should have a better understanding and a chance to practice the interdisciplinary aspects of the careers they are pursuing.”

Teresa Hall heads the construction and operations management department, a new name for the engineering technology and management department. She too is excited about what the department can accomplish through shared lab and design space.

Architecture department head Rex calls it a “necessary synergy” that often is neglected in academic settings.

The math department will be moving from Harding Hall. Brown asks, “What building could give a worse impression than Harding Hall? None on our campus and anyone who says otherwise hasn’t been to the basement of Harding Hall ...”

“For them to be able to get every faculty member on one floor is a dream come true” for the department.

Dave Graves

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**TIMELINE OF AME BUILDING**

March 2012 — Preliminary facility statement approved by the Board of Regents.

April 2012 — Perspective, of Sioux Falls, and Ratio Architects, of Indianapolis, hired as architectural engineering firms.

Aug. 30, 2012 — Sioux Falls Construction selected as contractor.

December 2012 — Regents approve project to proceed to full design.


June 17, 2013 — Sioux Falls Construction begins demolition work, but the exterior stone and some brick are being saved for reuse.

Late July 2013 — An excavator makes quick work of Solberg Annex and the Industrial Arts Building with the wood and metal separated and hauled off to the landfill so excavation and footing work can begin.

Oct. 4, 2013 — Formal groundbreaking and a ceremony recognizing the naming of the college as the Jerome J. Lohr College of Engineering, coinciding with Hobo Day events.

Early 2015 — Completion.

**THE FINAL CROWN**

Dean Lew Brown calls the Architecture, Mathematics and Engineering Building the “final crown” in the construction projects that have “transformed the College of Engineering.”

The other crowns:

- Addition and renovation of Crothers Engineering Hall (2002),
- Reconstruction of the original Solberg Hall (2003),

**AME FLOOR BY FLOOR**

**First floor:**

Home to the mechanical engineering prototyping and design labs and construction and operations management departments as well as shared lab space with architecture.

- Woods and model shop, digital fabrication shop, mechanical engineering assembly, general assembly area, engines lab, team design lab, welding and casting area.
- Overall donor recognition wall display.
- Display area for the Society of Automotive Engineers Formula car and smaller student projects.

**Second floor:**

Home to the mathematics and statistics department.

- Two active learning style classrooms with student clusters of six (with table seating for 30 and for 42), a math education classroom (allowing for flexibility in teaching scenarios for up to 40 students), a math help center, work room, designated office space for teaching faculty, research faculty, graduate students, postdoctoral students and the department head.

**Third floor:**

Home to the architecture department.

- Large, undeveloped studio area, print bureau, staff work room, placement and advising room, conference rooms, staff and faculty offices, data and electrical room.

**OF SPECIAL NOTE:**

The project also includes an outdoor workspace and an engineering plaza.

- The outdoor workspace (135 feet by 35 feet) will be north of the building and will allow students to engage in large-scale projects, such as constructing a modular building or mixing and pouring mortar or concrete.

Current plans call for it to be screened off from the remainder of campus.

- A plaza with grass, walkways and other features will be developed between Daktronics Engineering Hall and Crothers Engineering, and to the south of Crothers and the new building on what had been Administration Lane. That road was closed for the construction project and will not be reopened.

“The plaza will unite our Lohr College of Engineering buildings on the southwest corner of campus,” Brown said.

Dave Graves

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**MAJOR DONORS**

$1,000,000+
- Jerry Lohr
- Arlo & Barbara DeKraai

$500,000+
- Charles & Judy Wagoner

$100,000+
- Gage Brothers
- Keith & Glynn Barbeis
- Ed & Judy Cannon
- DGR Engineering
- Errol EerNisse

$50,000+
- Dennis & Mary Jo Little
- Gordon Niva and Susan Lahr

$25,000+
- Harvey & Midge Mills
- Palace Builders
- Associated Consulting Engineering
- Falcon Plastic
- Otter Tail Power Company
- Twin City Fan & Blower
- AGCO Corporation

Dave Graves
The fact that Brian and Jim Lawburgh do laboratory work together shouldn’t come as a big surprise. Ever since coming into this world two minutes apart, the identical twins from Hendricks, Minn., have been pretty much inseparable.

The Lawburghs are 2013 mechanical engineering graduates from SDSU. Aside from the same major, they enjoy restoring boats and have a huge passion for music. They are also pursing master’s degrees in mechanical engineering with a December 2014 graduation date.

As graduate students, the Lawburghs share another passion as research assistants in the biofuels research laboratory in Crothers Engineering Hall.

They are investigating fuel production from feedstocks that are byproducts of food crops or from crops grown on marginal land. The fuel would be used for transportation and electricity generation.

Specifically, they are studying the effects of reaction temperature, residence time and reactor configuration on the characteristics and yield of bio oil that is produced.

They are taking feedstock, typically native cord grass from prairie farms, and quickly heat it to 500 degrees Celsius in a reactor. Depleted of oxygen, the feedstock turns into vapor, which then condenses and forms oil.
Seeking the right method

“We’ve always been interested in other forms of energy, especially renewable energies,” said Jim, who sees a greater interest in restoring fertile soybean and corn land to feedstock like cord grass.

“Cord grass grows up to 8-feet tall in fertile land,” he said. “Being able to produce biofuel from this feedstock would definitely contribute to the success and turning over more farm land to prairie farms.”

Although the physical process of making biofuel may sound easy, the challenge lies in determining the right method to produce the best quality of oil.

“Some of the things we look at when we test the oil are how much energy content there is in it, how much water content and the level of acidity,” explained Brian. “These are all things that determine how stable the oil is as it ages.”

Said Jim: “We’re figuring out the best way to make biofuel. It’s a difficult concept because the process involves a lot of chemistry. Basically, it’s taking a solid biomass and breaking it apart and putting it all back together in the liquid form.”

Their thesis advisers are Stephen Gent and Greg Michna, both assistant professors of mechanical engineering.

“It has been a pleasure working with Brian and Jim on our biofuels research,” said Michna. “They are dedicated and enthusiastic students who really care about getting down to the fundamentals of the processes that they are investigating.”

Gent cites that the Lawburghs have advanced their academic and professional experience by applying what they have learned in courses to new and interesting challenges.

“It has been quite rewarding to see Jim and Brian progress in their research experience,” he said.

Sophomore introduction

The Lawburghs’ first exposure to work in the lab came during their sophomore year when professor Alex Moutsoglou needed assistance on a Department of Defense project that involved producing transportation fuel from feedstock.

The twins are still involved in the project, whether it’s setting up and troubleshooting the reactors or making modifications in overcoming difficulties encountered while running them, according to Moutsoglou, who is their supervisor.

“They have been enthusiastic and resourceful throughout their work in the lab,” he said. “They seem to thrive on being challenged and always like to think outside the box in overcoming difficulties. It has been a blessing having them on our research team.”

In keeping with their twin identity, they want to find employment in this part of the country—and if history holds, the odds are good that they will be with the same employer, too.

“I have so many interests, but I would really like to find something where I can be creative at and work in something that’s in engineering,” said Jim. “I’m thankful for the experience that SDSU has given us. I love this part of the country so I would like to find a job in energy in the Midwest.”

Said Brian: “We play music together so I don’t think we will end up too far away from one another. I don’t know if I will find another keyboard player. I agree that this part of the country has something that’s great and unique in America.”

Kyle Johnson
AUSTIN VANDERWAL — MECHANICAL ENGINEER TAKES ‘PRIDE’ IN MUSIC

As a 5-year-old, Austin VanderWal wanted to be the head of engineering at John Deere. As a fifth-grader, the Volga native wanted to be part of a drum line and always wanted to be part of the Pride of the Dakotas Marching Band. “Grandma Gina really enjoyed them, and I had older cousins who had been members,” he said.

So when the 2011 Sioux Valley High School graduate decided to enroll at SDSU, the decision to be in the band had already been made. “I never considered not being a part of them,” the junior mechanical engineering major said.

Anticipation has not exceeded actuality. “I’m definitely excited to be in the Pride. The neat thing about the Pride, anyone can be a part of it,” VanderWal said. There are about a half-dozen engineering majors in the Pride and a significant minority of the 190-member band is not music majors.

What’s more, the music and nonmusic majors don’t segregate themselves, he says. “I have just as many, if not more, friends in the music department as mechanical engineering,” the affable trumpeter said. “We really enjoy hanging out together. That’s the nice thing about music classes. In calculus class, you’re not going to be talking to someone.”

Also, calculus class doesn’t provide an opportunity to go to trips to Orlando, Fla., or Washington, D.C. In his freshman year, VanderWal joined in the Pride’s trip to the Fresh from Florida Parade, which was nationally televised, and its 30-minute parade performance at Universal Studios, where people asked him “What is the Pride?” and “What is a Jackrabbit?”

After a couple minutes of choreographed music by 325 band members in new uniforms, bystanders knew why the group calls itself the Pride.

In May, VanderWal traveled with the symphonic band for performances in Washington, D.C., and Gettysburg, Pa. In March, he traveled as a pep band member to Michigan for the NCAA men’s basketball tournament. In 2012, the pep band went to Indiana for the NCAA women’s basketball tournament.

But VanderWal said he would enjoy band even if the groups didn’t travel. “I even enjoy baking on asphalt,” as the group did during rehearsals the first week of school, “because you’re around all your friends, making jokes, having fun. The directors (Jim Coull, Aaron Ragsdale, Eric Peterson) keep it all pretty light.”

Dave Graves

BRIAN SCHULTE — MAY GRAD DOUBLE MAJORS IN THEATER, ELECTRICAL ENGINEERING

The distance between Daktronics Engineering Hall, home to the electrical engineering program, and Donor Auditorium, the site for most theater productions at SDSU, is only two blocks—but it could be light years.

Electrical engineering majors might attend a play, but they typically don’t help stage one. And you never see theater majors joining the circuit-building team.

The exception to that oil-and-water principle is Brian Schulte, who graduated in May with a rare double major—electrical engineering and theater.

“To be able to learn both was a lot of fun,” said Schulte, a 2008 graduate of Sioux Falls O’Gorman High School. He started work Aug. 5 with General Dynamics in Bloomington, Minn., doing software engineering for the defense department contractor.

Not everybody could understand the thinking behind the unusual combination.

“A lot of classmates and teachers were surprised. Teachers suggested if you want a theater major, why don’t you get it after you get your engineering degree? There were times I definitely struggled in class” because of time commitments, Schulte said.

Late nights with tech crew

Except for one production his freshman year, Schulte was always behind the curtain handling technical issues. When rehearsals ended, Schulte would work in the theater. “I was staying up until 3 a.m. doing lighting work because you had to wait until the actors were off the stage,” said Schulte, who found balancing the demands to be the toughest task in double majoring. “Some teachers could see the idea of majoring in both, but others couldn’t. They’d just wonder why I occasionally didn’t get homework turned on time,” he said.

However, he did have the support of both his advisers—Corey Shelsta, a former engineering student who decided to pursue theater, and Bob Fourney in electrical engineering.

“When he first mentioned that to me, I thought it was kind of weird,” said associate professor Fourney, noting he had never heard of such of combination. “But he explained to me that his interest was more in the special effects than acting.”

Dave Graves

Almost followed brother’s lead

While the fields might seem worlds apart, Schulte knows they actually intersect.

Since his brother is a professional entertainment lighting technician, Schulte thought he would follow his footsteps in the theater field. But Schulte also “enjoyed knowing how things work. A lot of people in theater have worked with circuits, but to have an engineer who has that theory, that can be really helpful to them,” he said, adding that his dream job would be a design engineer for a company that makes theater lighting.
ALYSSA CLEMEN — CIVIL ENGINEERING MAJOR GOES OWN WAY AS DANCE MINOR

Dance was a part of Alyssa Clemen’s life since she was 3 years old, then she gave it up when she became a civil engineering major at State. However, the Sioux Falls O’Gorman graduate wasn’t away from dance for long. “I didn’t take dance classes or participate in club in my freshman year, but I missed it,” the senior said.

Clemen danced some on her own, but “I realized I wanted to keep growing and learning more, not just doing what I already knew,” she recalled. To do that, she joined dance club and signed up for dance classes in her sophomore year. In May 2014, she will earn a minor in dance.

It’s a small program. There are only about 15 students in most classes, so students know each other well. In comparison, there are 240 civil engineering majors, but none go with her to dance class. Clemen knows it’s an unusual combination, but she said it is one that benefits her engineering studies.

Clemen said that dance instructor Melissa Hauschild-Mork “always asks us to think deeper into the movement about what we’re doing. Doing that in dance classes helps me to think more in engineering classes, which can seem like plug and chug.”

She added that dance “gets me out of that step-by-step routine (of engineering) and allows me to think a different way.

“You’re thinking with not quite as many defined lines. Plus, if you like dance, you learn a little more about creativity and know your way can be different than someone else. So when it comes to engineering, you can think maybe there is a different way to think about that.”

For Clemen, dance is a stress reliever, a chance to use the other side of her brain and a way to express herself.

“It’s a way to say what I want to say without using words,” said Clemen, who also kept her words to a minimum during this interview. “There’s not always a word to say what you want to say, but you can always find a movement.”

CASEY JANISCH — CIVIL ENGINEER DIRECTS 2013 HOMECOMING CELEBRATION AS GRAND POOBA

Hobo Day’s arrival meant the parade and a football game for Casey Janisch when he was a freshman and sophomore.

That changed his junior year when he responded to a request for help from Grand Pooba Abby Settle. In his senior year, the civil engineering major was the grand pooba. He is the first engineering major to head the Hobo Day committee since Angela Stotesbery in 1993.

In 2012, when SDSU observed the centennial of the first Hobo Day, Janisch was animal and special entries coordinator for the parade. The end of the parade left a strong impression on the Clark High School graduate.

“While being such a crucial part of the parade, getting people lined up, you get to see all the floats and other entries. Then at the end you get to ride through on golf carts with the other committee members and everybody is cheering. We could celebrate what we had accomplished. It was a great deal,” Janisch said.

Also at the 100th observance of Hobo Day in 2012, an effort was made to bring back that tradition of decades earlier and a similar effort was made in 2013. Janisch says the committee sought funding that student groups could apply for to offset float-building costs.

The float entered by the mechanical engineering department, a giant rocket (“launching into the future”), won top prize in the 2012 parade.

Janisch added, “It’s kind of a blessing that Hobo Day was Oct. 5, so it got done before first round of midterms.” He said during the first five weeks of school he made a point to “delegate a lot to the committee and made sure I was using the weekends to get caught up with homework.”

However, Janisch is used to budgeting his time.

He is president of Chi Epsilon, the civil engineering honor society; corresponding secretary for the SDSU chapter of the American Society of Civil Engineering, a member of the Honors College student organization and was president of the sophomore honor society Alpha Lambda Delta.

But none of those organizations encourage their leader to wear ratty clothes, grow a beard and eat bum stew.

MACKENZIE FAHY — DRAWING FROM BOTH SIDES OF BRAIN

Neither of Mackenzie Fahy’s parents were engineers or artists, but the junior mechanical engineering major comfortably lives in both worlds.

“I find both of them satisfying. I’m trying to have the best of both worlds to be happy. Both of them bring so much to the table in terms of artwork,” said Fahy, a Sioux Falls Roosevelt graduate whose schooling also includes a year of fine arts at the University of South Dakota and three years, off and on, as an architecture and art student at the University of Minnesota.

She enrolled at SDSU in 2010 and took art classes as electives at the University Center campus in Sioux Falls in 2010-11.

Now, her academics are focused on mechanical engineering but she hasn’t lost the interest in art. “It’s important for people to have time for things like this to keep us sane,” said Fahy, adding that ideally she would like to spend 10 hours per week on her drawings.

She said engineering tends to work itself into her artwork.

“I rarely set out to involve engineering, but it finds its way in there sometimes. For my drawings, I’m very detail oriented. My drawings are very realistic, so I bring the draftsman’s aspect. But as far as the subject, that’s where it gets to be more creative,” Fahy said.

Her works done in Liz Heeren’s class in 2010 are good examples.

One features an electrical schematic for a guitar amplifier in the background with a clearly frustrated girl in the foreground unraveling a black cord. Fahy sought to show the exacting standards of engineering and a conflicted student trying to break away from that, she says.

“I find (drawing) very therapeutic, very relaxing. When I’m drawing, I’m just present in the drawing. Everything else fades out. I love it.”

Unlike the stereotypical artist, Fahy said, “I’ve always been good at math, I like my math classes. I love the problem-solving classes, the critical thinking. It really challenges me and I appreciate that. Engineering meshes the creative part of my brain as well as the analytical.”

She hopes to use that analytical part of her brain by working in the sustainable energy field after graduation in May 2015.
Taylor Suess
Finding success on the line, in the lab

Fifth-year senior Taylor Suess diligently completes his homework each night, but a lot of it is done with the lights off, especially in the fall. That's because his assignments include studying film of his SDSU football teammates and upcoming opponents. Suess, a 6-3, 295-pounder from Columbus, Neb., is a returning starter on a Jackrabbit offensive line that helped the team advance to the second round of the NCAA playoffs in 2012.

He's also a mechanical engineering major with a 3.95 GPA and a Briggs Scholar. Pairing the demanding disciplines has “worked out better than I ever thought it could have,” said Suess (pronounced Cease). “Stereotypically, athletes at other schools will take an easier major to get through sports and then take a second major after they are finished with athletics.”

But football — even at the NCAA Division I level — doesn’t come first for Suess. It never has.

“I realized I wanted to be an engineer early in high school. Dad and I did research on engineering schools in the region. The biggest thing that stood out in my mind at SDSU was the people,” from the coaching staff to the faculty to the campus tour guides. “It just had a different feel than any of the other schools I went to,” says Suess, who had to earn an athletic scholarship.

Began as a walk-on

He came to Brookings in August 2009 as a preferred walk-on. That meant he could eat and sleep with the scholarship players during fall camp, but there was no athletic scholarship money for books and tuition. Of course, his Briggs scholarship paid for a little over half his college expenses.

“The fact that they let me play football (while attending a top engineering school) was icing on the cake,” he said.

Unquestionably, football demands a lot of Suess’s time, but he said the football program “has always pushed the academics first. They’re so understanding that academics is what is going to get you through life. Football is just a pastime. It’s something I enjoy doing. That’s why I’m still doing it.”

Suess played without a football scholarship his first two seasons, and started producing results in his first year as a scholarship player.

In 2011, he worked his way into the regular rotation, starting two games and being named SDSU’s offensive lineman of the week three times. In 2012, he started every game at a variety of line positions and in 2013 earned a starting nod at center.

His success in the classroom has allowed him to twice win a Commissioner’s Academic Excellence Award.

Four years in the lab

But Suess is more than a good test taker. He’s also a skilled researcher. For the past four school years he has worked in a mechanical engineering lab under assistant professor Stephen Gent and lecturer Michael Tvedt doing work on corn stover, which is a biofuel, and grain drying.

In his first summer, 2010, the work was undertaken as an independent research credit. Since then, he’s been a paid assistant.

In his first summer, 2010, the work was undertaken as an independent research credit. Since then, he's been a paid assistant.

In 2012, he received a Joseph F. Nelson Undergraduate Research Mentorship to work with graduate student Ozan Ozdemir to determine the properties of corn stover to help engineers design a better system of feeding the stalks and leaves into bio/thermochemical reactors.

The product tends to plug up when ethanol makers try to get the product through pipes and augers, Suess says. Ozdemir and Suess first had to create equipment to do the testing and determine the accuracy of their testing procedures before testing corn stover for hardness, tensile strength and how the properties are changed when the stover is chopped.

They learned that stover is stronger than woody materials and that it’s properties vary within the length of the stalk.

Suess hasn’t finish calculating what he will do after graduation in May 2014. He expects to do corn-processing research in graduate school in the mechanical engineering department. In his senior year, he wants to “keep getting good grades and learn what I want to do for a job, get a good grasp on that one thing that appeals to me,” Suess said.

As an athlete and engineering student, he said, “I’ve learned so many lessons, like time management. I almost can’t see how not playing a sport, you can be busy as a student. It’s given me such a true work ethic.”

Dave Graves
Last season was Megan Waytashek's most successful yet as a member of the SDSU women's basketball team.

In her third season as a Jackrabbit, Waytashek finished second on the team in scoring (13.6 points per game) and twice reached the 30-point mark as the 'Rabbits qualified for the NCAA Division I tournament for the fifth consecutive year.

But it wasn't just her teammates that were assisting the Lino Lakes, Minn., resident. The mechanical engineering major not only was named a first-team All-Summit League selection based on her play, but also was named a first-team Academic All-Summit League selection based on her studies. She carries a 3.97 GPA into the fall semester.

The stat sheet doesn't show it, but her academic success comes in part because of the team within the Jerome J. Lohr College of Engineering, which also helped her land a three-week internship at Mayo Clinic in Rochester, Minn., during her abbreviated summer vacation.

**Internship at Mayo**

"I thought it was helpful to see real-world examples of how mechanical engineering applies to the medical industry," said Waytashek. "It was interesting to see how the different disciplines of engineering work together to improve health and patient care."

The one-credit internship was an informal experience facilitated by a mutual friend who used to work at Mayo.

During her time there, Waytashek said she "met with several different engineers who informed me on their role within the division and talked about the projects they were working on. While I was there I sat through about 25 meetings."

"In other words, I had a lot of information thrown at me in a short period of time. I would love the opportunity to have a longer internship with Mayo and actually get some hands-on experience."

**Life in Division I basketball**

She will have to wait a while for that. At SDSU, the summers are scheduled for basketball players. They are off the month of May, when Waytashek took her internship, and the first three weeks of August before school resumes. They are on campus in June and July.

While performing basketball drills and lifting weights, Waytashek also took a six-week anatomy class this summer.

During the formal basketball season—from mid-October to late March—the players' lives are even more confined with practices, games and travel figured into the equation. It would be easy to give academics just enough effort to meet NCAA standards.

**A team commitment**

But neither Waytashek or her teammates do that. They annually have one of the top team GPAs in Division I.

In addition to performance goals, "we also set academic goals. We want to have a team GPA of 3.7 or higher and try to be a top-ranked (academic) team," she said. "We always hold each other accountable. ... We're all very disciplined."

In the 2012-13 season, the team appeared in the Women's Basketball Coaches Association Academic Top 25 Team Honor Roll for the eighth consecutive season, placing 13th among NCAA Division I programs.

The Jackrabbits compiled a 3.5 team GPA. Although SDSU fell out of the top three in the Division I rankings for the first time since moving to the D-I ranks, the Jackrabbits were one of only two programs to appear in the WBCA Academic Top 25 and play in the NCAA Tournament.

DePaul (Ill.), which tied for second with a 3.625 team GPA, was the other program to accomplish both feats.

**SDSU led all divisions of women's college basketball three consecutive seasons from 2005-06 through 2007-08. The Jackrabbits added their fourth D-I team academic title in the 2010-11 season.**

**Faculty supports athletic program**

Waytashek said that success happens because coaches care—making tutors available when needed; teammates care—encouraging one another to study during road trip downtime; and she cares—"I've always held myself to a high standard. Academics have always been very important to me."

But the student-athlete stool has four legs. "The professors have been very helpful in accommodating my busy schedule. They are willing to meet outside of their office hours and have worked with the coaching staff to administer missed tests while on the road traveling," she said.

After graduating in May 2015, Waytashek plans to attend graduate school and perhaps land a job at Mayo Clinic.

Dave Graves
In memoriam

Civil engineering major and distance runner Phillip LaVallee was killed Aug. 8 when struck by a vehicle while on a training run near his Minnesota home. LaVallee, a Summit League Distinguished Scholar and a member of the SDSU track team, was struck by a vehicle on County Road 19 near Otsego, about 35 miles northwest of the Twin Cities at about noon.

The northbound van crossed the centerline on the two-lane road and struck LaVallee as he ran on the southbound shoulder.

LaVallee, a Summit League Distinguished Scholar and a member of the SDSU track team, was running on the wide shoulders of County Road 19 at the west edge of Otsego.

To be named to the Summit League’s Academic Honor Roll, a student-athlete must have at least a 3.0 GPA in the semester in which they compete.

For the winter-spring sports in 2013, there were 160 SDSU qualifiers with 25 of them—about one in six—coming from the Jerome J. Lohr College of Engineering. The breakdown shows five math majors, four mechanical engineering and one each in civil, computer science and general engineering.

For the winter-spring sports in 2013, there were 160 SDSU qualifiers with 25 of them—again, about one in six—coming from the Lohr College of Engineering. The breakdown shows eight math majors, eight mechanical engineering, four civil engineering, three computer science and general engineering.

The Summit League presents Distinguished Scholar Awards to student-athletes with at least a 3.60 GPA in the semester in which they compete.

To be named to the Summit League’s Academic Honor Roll, a student-athlete must have at least a 3.0 GPA in the semester in which they compete.

For the winter-spring sports in 2013, there were 76 SDSU qualifiers with 12 of them—again, about one in six—coming from the Lohr College of Engineering.
A successful algorithm

Undergrad research project solves problem of career objective

Today, Christopher Galbraith earns credit for graduate school, finishes classes for a bachelor’s degree in math and works part time as a statistical consultant for Wells Fargo Retirement Technologies.

It was just a few years ago he was an undeclared student taking history and philosophy, trying to find his niche.

An undergraduate research experience in the summer between his sophomore and junior years has been life shaping.

The Rapid Citian came to State in 2010 with 28 Advanced Placement credits earned while attending St. Thomas More High School. But when it came to an academic emphasis, “I was pretty open coming in. I thought I would have four years to decide. Hopefully, I can figure it out by then,” Galbraith thought to himself.

It took him only a year before becoming a math major after briefly trying mechanical engineering.

While he was pondering what to do in summer 2012, he received an email from Kurt Cogswell, head of the math department. The email encouraged students to apply for the National Science Foundation’s Research Experience for Undergraduates.

Galbraith wasn’t sure of the work, but he knew he liked the student support of almost $5,000, so he applied and was chosen.

Program offered nationally by NSF

SDSU received a $312,000 award to support undergraduate research. Each summer of 2012-2014, this NSF-sponsored funding will support 10 undergraduate students and their research activities, including conference presentations. Four graduate students are partially supported as the graduate assistant mentors.

The REU program offers experience in 18 broad subject areas with numerous universities around the nation serving as sites, often in more than one subject area.

During summer 2013, seven non-SDSU students completed REU at State while another three were SDSU students.

REU is an eight-week program, but Galbraith continued his project during the school year and received three credits of independent study in spring semester. He said the work opened the door for his current job with Wells Fargo.

“I don’t think the opportunity would have been there if not for the REU,” said Galbraith, who is to graduate in May 2014.

Students gain confidence

When his mentor, Jung-Han Kimm, an associate professor in math, explained the project and gave him articles to read, “I was like ‘What is going on?’ I felt overwhelmed. But I asked questions, did research and now it doesn’t feel overwhelming at all,” Galbraith said.

To illustrate the effectiveness of the REU program, Kimm notes that in 2012, eight of the 10 participants made presentations at national conferences.

Also, in both 2012 and 2013 an SDSU participant in the REU program was chosen to attend a super computing conference at no cost. Only 30 students were chosen from a nationwide pool in 2012 and only 25 in 2013.

“Our program is supporting research progress and it helps students get in a real career,” Kimm said.

By the third week of the experience, Galbraith had found his bearings, was learning a new computer language and growing in his love for computers.

In fact, he now is minoring in computer science and wants to study computer science and statistics in graduate school at Carnegie Mellon University. “It really opened up a whole new world that I wouldn’t have been introduced to,” he said.

Project validates graphic processing units

His REU project involved computer modeling of the U.S. dollar, the United Kingdom pound sterling and the Dow Jones Industrial Average.

The currencies had been the subject of a 1997 paper written by premier Oxford economists, Galbraith said. With daily data going back to 1896, the Dow Jones Industrial Average is the most robust stock exchange in terms of data, he said.

Galbraith is leaving the statistical interpretation to the economists. His goal was to demonstrate how the statistics could be processed.

Not surprisingly, he found that processing the data with a graphic processing unit to be the most efficient. The increasingly popular processing unit has 300 nodes where calculations can be processed at once as opposed to a central processing unit, which could have as few as one node or as many as eight.

The project gave Galbraith an opportunity to work on Big Jack, the supercomputer located in the Administration Building. “I don’t think many undergraduates get an opportunity to work on supercomputers, either here or across the country,” he said.

Dave Graves
Motivated by no higher calling than the need for a summer job, Ryan Hahn approached faculty members Larry Leigh and Dave Aaron concerning work in the Image Processing Lab.

The summer job he got continued when school resumed with the fifth-year senior earning more than a paycheck.

“It helps me see different ways to solve problems. I can use the math equations and physics problem-solving methods I’ve learned in class,” the physics major from Pierre said. He’s also expanded his knowledge in computer software and language.

“I was overwhelmed because of all the new language I had to learn and the new programs I had to learn,” Hahn said of his early days.

This has been Hahn’s first taste of undergraduate research, and he admits it took him at least a month before he felt comfortable working in the Image Processing Lab, which is located on the third floor of the four-year-old Daktronics Engineering Hall.

Steep learning curve

While the work Hahn is doing isn’t rocket science, processing information from satellites isn’t a simple task.

“Ryan is a bright student. He came up to speed pretty quickly; halfway through the summer he came up to speed,” according to Larry Leigh, senior imaging engineer at the lab. “It usually takes half to a full semester to build up that confidence.”

For that reason, undergraduates must be willing to commit a full year in order for Leigh to hire them.

Hahn worked 40 hours per week in the summer. In the fall semester, he is putting in 15 to 20 hours per week crunching numbers obtained from the U.S. Geological Survey’s Landsat satellite to be sure its transmissions are accurately calibrated.

The Image Processing Lab has been in business since 1990 and it is now working with Landsat 8, which was launched in February.

The work involves collecting light wavelength data during periodic field days when the satellite is passing overhead in Brookings and comparing those numbers to white board readings to determine the amount of sunlight that actually reaches the ground, Hahn explained.

He calls his role “very enjoyable and at times frustrating because at times there may not be a clear, guiding solution.”

Character does count

Leigh said that goes with hiring undergraduates. “The biggest drawback with undergraduates is lack of confidence. They approach the problem as if there is no way they can do it. I might have to come alongside them a little more than a graduate student, but nonetheless we can still get them through the work.”

He finds that personal character to be more important than knowledge, whether students be electrical engineering, physics, math or computer science majors.

“I want a person who will come ask me questions and let me know when there are problems rather than sit a week looking at the computer screen making no progress. I also look for someone who is a self-starter, self-motivated.

“Ryan worked as a lab assistant last year in the physics department and I could see he would take on tasks,” Leigh said.

An undergrad advantage

The lab employs an average of two undergraduates and eight graduate students.

“My attraction to undergrads is we can get a lot more real work out of them ... and not have to worry about is this thesis-worthy material. Sometimes the work just has to get done,” Leigh said.

He adds that undergrads often get excited about doing the work because “this is actual real research. Those are possibilities that don’t exist for an undergraduate in general.”

Leigh is one of four staff members working full time in the lab, which is overseen by Dennis Helder, the college’s associate dean of research.

While they could do Hahn’s job quicker, “our job here is to educate the students and build up their confidence. It is much better for him to learn to do it himself,” Leigh said.

Hahn, who will graduate in May 2014 with a degree in physics, might not be applying the Image Processing Lab experience in his next job. He has earned a pilot slot in the U.S. Air Force as a result of his success in the ROTC program.

But he’s thankful the experience is on a different wavelength than past summer jobs at Pizza Ranch and Wal-Mart.
Caitlin Gerdes, a May mechanical engineering graduate, is working toward a master's degree in the field at State after receiving a Graduate Research Fellowship from the National Science Foundation.

The award provides $30,000 per year for up to three years to complete her graduate education.

The last SDSU student to receive the award was Laura Baumberger in 2001. Gerdes followed the footsteps of her grandfather and father when she came to SDSU from Breckenridge, Minn., in 2009. She had an Honors College Scholarship, good for $20,000 during her four undergraduate years, but she didn't enroll with the thought of going to graduate school. “I got a pretty good scholarship to come here, but I just didn't think it was possible to get paid to go to graduate school,” she said.

**Summer research experience invaluable**

Her experience in the Jerome J. Lohr College of Engineering piqued her interest in graduate school. “I really liked research. I thought about grad school because of that.” So when a professor talked about a summer research opportunity, Gerdes listened closely.

She decided to apply for the National Science Foundation's Research Experience for Undergraduates.

Gerdes spent summer 2012 working on campus with two other SDSU students and seven students from other schools in various engineering and math projects. Gerdes was applying computational fluid dynamics in a project to increase the efficiency of photobioreactors.

The water-filled tanks are used to grow microalgae for use as a biofuel, a developing alternative to ethanol.

The overall project is being done in collaboration with the SDSU Department of Agricultural Biosystems Engineering, which works directly with the photobioreactors. Gerdes' work was on a computer in a lab in the mechanical engineering department.

Through computer simulation, Gerdes sought ways to increase light penetration for photosynthesis in the photobioreactors.

“I thought it was really cool how I could run these tests and get results that matched the real world. I liked the idea that I could contribute information that could be used for scientific advancement,” said Gerdes, who graduated with a 3.78 GPA.

**Helped found engineering society**

She was told that the summer research experience would help her in getting a graduate scholarship. So she began writing the scholarship’s required essays, including one detailing personal involvement on campus. That one was easy for Gerdes. During her freshman year, 2009-10, she was a founder of the women's engineering sorority Alpha Omega Epsilon.

During her senior year, Gerdes was president of the Society of Women Engineers, a professional society.

She also participated in the college's programs to reach young girls with an interest in science. In fact, she plans to share the results of her graduate research with the young girls. Of course, that will require putting the information in a much simpler format.

Gerdes considers the ability to “talk about your results and have others understand it” a mark of a good engineer.

She also cited the importance of patience and creativity, a couple qualities she had to call upon during her summer 2012 research.

Her initial results were "erratic and very inaccurate. It was very frustrating because the work I was doing closely matched the methods used in similar research. A small difference led to my results being incorrect. "(But) the patience really paid off because once I got the results, I was very excited," Gerdes said.

**A future in the classroom**

That's also the way she felt March 29, when she opened an email from the National Science Foundation to tell her that she had been selected for the $30,000 per year graduate fellowship.

She is working under the mentorship of assistant professor Stephen Gent and lecturer Michael Twedt in the department of mechanical engineering; people whose footsteps Gerdes would like to follow.

Her career plan is to become a professor. “I always figured if I got my master's, I might as well get my doctorate.”

Dave Graves
Concrete canoes, steel bridges, robots and Formula One-style race cars—all are designed and fabricated by SDSU student competition teams. Through these projects and contests, mere formulas and concepts become hands-on experience and real-world applications that help students on the path to their futures.

**ROBOTICS**

The importance of hands-on experience is one reason Steven Hietpas, head of the electrical engineering and computer science department, values the SDSU Robotics Club: “This is an opportunity that few young students have—to do software and electronic hardware implementation with an open platform robot that is very configurable.”

Tyler McEntee, a senior computer science major from Mitchell, has been a part of the club since it began when he was a freshman. “I always had an interest in electronics and software and felt it would be a good investment as an extra curricular activity.”

The robotics club operates under the supervision of Wei Wang, who came to SDSU in 2010 and began working with Hietpas to get the group up and running. “The robotics club is a truly interdisciplinary organization for students from various backgrounds,” said Wang. “It primarily involves students from electrical engineering and computer science, as well as mechanical engineering and other related majors. The students can meet and work together and become exposed to challenges they never met in textbooks.”

Members have traveled to the past two Midwest Instruction and Computing Symposia to compete in robotics events. “Most group members have never done any work in robotics. I myself had only done hobby work in high school for fun. Last year, our team had to find a small red square in a large grid with obstacles,” said McEntee.

“The focus of these competitions is to build robots that can traverse obstacle laden areas to find an end goal. Our group placed third overall, with only a few of the groups ever even finding the red square.”

Wang places high value on the knowledge and experience students gain from participation in the club and the processes of completing the projects. “The primary gain is the ability to learn new knowledge and solve the challenges unfamiliar to them,” he said. “When they put circuit pieces together and load programs to the robot, a lot of exploration, pain, trials and errors have already taken place. They learn beyond the textbooks.”

As McEntee prepares to graduate, he appreciates the experience the robotics club and competitions gave him as well. “Being in the robotics club here has allowed me to be exposed to a myriad of electronic and programming challenges. From implementing color-sensing hardware to learning how to program motors, there have been many things that I’ve learned that will no doubt assist me in my career as a software developer.

“For any students, clubs and competitions like these provide opportunities that would be almost impossible to find otherwise. I am immensely grateful for the experiences I had through robotics.”

**Formula racecar**

“It’s not just calculations,” said Stephen Gent, faculty adviser for the formula racecar team. “It’s practical experience. Students get to watch their calculations take shape and bring their classroom fundamentals into a tangible project that they can justify to experts in the field.”

The competition, sponsored by global engineering association SAE International, gives students almost an entire year to complete the car. “They create a design from scratch all the way to the physical car,” said Gent’s fellow adviser Shawn Duan. “It’s a cross-campus effort, too. In addition to mechanical engineering students, we have students from electrical engineering, agricultural and biosystems engineering, construction management, agronomy and more.”

The Formula One-style car team has usually included between 20-25 students, though just fewer than 60 attended this year’s informational meeting. Gent estimates that 70 percent of the team is mechanical engineering students.

These students learn skills beyond car production. Part of the project involves working and coordinating with sponsors such as POET ethanol and Caterpillar who contribute both monetarily and provide fabrication.

The completed vehicle is, of course, properly shown off. “We try to make the car noticeable on campus for things like Senior Day and Hobo Day,” said Gent.

**Steel bridge and concrete canoe**

The steel bridge builders’ final product is a bit less mobile, and rightly so. The team is tasked with constructing a 19-foot bridge with minimum span deflection when a 2,500-pound load is applied vertically, and a 50-pound lateral force is induced.

“The success of the project is measured by the amount of deflection in the bridge—the difference between its position when there’s no weight and the position with the weight applied. They also test the sway of the bridge with weights attached to the sides,” said Grace Regan, a senior civil engineering major from Stillwater, Minn., and this year’s project manager.

Regan also holds a leadership position in SDSU’s chapter of the American Society of Civil Engineers, which organizes the steel bridge team. “We’re lucky to have such a strong student chapter of ASCE,” said Regan.

The team, usually consisting of close to 10 students, receives their prompt in August and has until late March to design, test and finalize the project. The competition is set up to mimic putting each project up for bid for a specific set of circumstances such as replacing a worn-out bridge used for transportation of necessary materials. The finished bridge, in addition to being tested for deflection, is also judged on aesthetics.
“Teamwork, communication, and time management are vital to engineering. These things are very difficult to teach in a classroom setting. ASCE competitions give students experience of how to communicate and work with other people to finish a project on time.”

—Zach Gutzmer, ASCE adviser

and feasibility, including weight, construction time and cost-effectiveness.

For Regan, the steel bridge competition is a test run for her future professional life.

“I want to work with bridges—be a project manager, design bridges, something like that—so, for me, this is a simplified version of what I’d like to do full-time someday. Overall, this competition is very important. We learn the theory of bridge building as well as teamwork and leadership skills.”

ASCE adviser Zach Gutzmer oversees both the steel bridge and concrete canoe competitions and agrees that important skills are obtained through such activities.

“Teamwork, communication and time management are vital to engineering. These things are very difficult to teach in a classroom setting. ASCE competitions give students experience of how to communicate and work with other people to finish a project on time.”

Student design

Students belonging to ASME, ASCE’s mechanical engineering counterpart, compete in a competition with significant variations in prompts from year to year. Unlike the steel bridge builders, the student design team is composed of all types of engineering students.

Last year’s contest was inspired by the tragedy at the Fukushima nuclear facility. The group constructed a proof-of-concept robotic remote inspection device. Such a device might be used to investigate areas dangerous to humans, such as nuclear reactors damaged by earthquakes or tsunamis. The robot was required to be able to navigate tight spaces, provide visual inspection data, and pick up and drop simulated radiation sensors, all with the operator located in another room. The SDSU team took second place in ASME’s District C competition, competing against 26 other engineering schools from the Midwest.

This year’s team will design and create a lighter-than-air unmanned aerial vehicle for use in fighting forest fires. The fall semester is spent working on designs and possibly a prototype, while the second semester is used for building and testing.

“These projects are usually pretty fun since there is a new challenge each year,” said Gregory Michna, ASME student section adviser and adviser to the student design team.

“It’s an iterative process—the students develop the design, learn what works and what doesn’t, and redesign. There’s a whole hands-on process of breaking and fixing to complete a project.”

Madelin Mack

Interest in student competitions, particularly with the SAE Formula SAE Series cars, has climbed in recent years. While the SAE Series car team has averaged 20 to 25 students in past years, approximately 60 students showed an interest in working on the car this year.
Senior design projects
more than just a lot of work

Senior design projects have been part of the Jerome J. Lohr College of Engineering curriculum for almost 20 years. The efforts behind each project can be extensive and the rewards upon completion cannot be measured.

“Not many 22-year-olds can say they have a patent in their name,” said Jaclyn Clark, who teamed with Mandy Hebbert, Michael Sukalski and Colin Taylor on a multi-point injection system. The group not only won the Engineering Expo in April but also, with Raven Industries Inc., has applied for a patent on their creation.

“It really gave you the real-world experience,” Clark continued. “We had to meet their standards instead of doing what we wanted. We had scheduled meetings, deadlines and budget constraints.”

Their project initially had the goal of determining the time delay of current injection technology on a standard spray boom. They also designed an improved system to be an after-market solution to all sprayers.

“By using a gear-flow divider, we were able to use the width of our gears to deliver the amount of flow that was needed in each section, to keep it all proportional so the mixture that would exit each nozzle would be the same,” Sukalski said.

After spending the fall semester gathering data on flow, they went to work. Despite being in different departments—Sukalski and Taylor in agricultural and biosystems engineering and Clark and Hebbert in mechanical engineering—they worked through the differences in experience and education.

“It felt like something you’d walk into an industry and deal with,” Taylor said. “You see a lot of cross-discipline work in many industries.”

Working across disciplines

Also working on a multi-disciplinary project was Jake Swensen, who was in a group with John Langholz, Sarah McMahon and Matt Nedved. Swensen and McMahon are in electrical engineering while Langholz and Nedved are in mechanical engineering.

Langholz is a double major in mechanical and electrical engineering.

Their project removed the camshaft from an engine that had been used for the SDSU Formula One competition and replaced the camshaft with a pneumatic and hydraulic system that was controlled by electronics.

“One of the biggest challenges, as we started to get into the math, was that we realized it was going to take a lot, a lot more, than we thought it would,” Swensen said. “We talked to some of our professors and Dr. (Steven) Hietpas mentioned that he thought it could be an entire thesis project. It was quite a bit of a challenge. We probably didn’t get in quite as much depth as a thesis project but we modeled our system based on a real engine response.

“Matt and John went into the lab, characterized the piston movement and what it would take to manipulate a hydraulic system to move pistons without a camshaft,” continued Swensen. “Our purpose was to do engine profiling.”

Current solutions use a camshaft that has three different lobes on it and switch between them to alternate profiles.

“Our thought was that if we could make it completely electronic, it would take out any mechanical components in switching times so you can get more exotic timing profiles,” Swensen said. “Instead of the typical bell-shaped curve, you’d make something more like a square. It wasn’t going to be a perfect square but more like something that resembles it.”

Swensen built a microcontroller test bench to simulate a running engine while McMahon helped create the control system.

“We got to the point by the end of the semester where we had our pneumatic valves running. We were still waiting on one part at the Expo, so we didn’t actually get everything put together but we got the valve running, moving and responding the way we thought it would,” Swensen said.

Following graduation in December, Swensen will start at 3M in Maplewood, Minn., in the software, electronic and mechanical systems laboratory.

“The lab does a lot of interdisciplinary work so the project itself was hugely beneficial as we got the interaction of building a system with other types of engineers,” Swensen said.

Automation helps

The interaction in the Clark-Hebert-Sukalski-Taylor team allowed them to build a system to measure the rate chemicals were delivered to the nozzles. Ethernet cables were connected to a breadboard for the source voltage and to a measurement device to send the signal to the Labview program.

Following a trial using only water, the dye mix injection was started with a timer added to the Labview program to determine the time of injection. The test was allowed to run until all nozzles had a full dye mix present.

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“The lab does a lot of interdisciplinary work so the project itself was hugely beneficial as we got the interaction of building a system with other types of engineers,” Swensen said.
Their efforts in taking a project from start to finish—including creating models, determining tolerances, assembling, dismantling and creating parts—allowed them to win the consumer products division. “It made all of the midnight, early-morning work worth it,” Hebbert said. “The win validated our project. We were told by our advisers and our corporate project manager that we had done an amazing job but to have someone from completely outside the project, come over, judge it and look at it for what it is, and tell you you did a heck of a job, that felt awesome,” Taylor said.

Matt Schmidt

MATHEMATICS WINS RECORD NUMBER OF SCHULTZ-WERTH SCHOLARSHIPS

The mathematics and statistics department received five of the 19 Schultz-Werth awards distributed in 2013. Winning awards were Riley Burfield, Steven Moore, Sumantha Peteron, Haaken Phelps and Benjamin Roycraft.

The Schultz-Werth award promotes and recognizes the scholarly achievement of outstanding SDSU undergraduate students. The competition is open to students in any major. Papers are judged in one of two categories: social sciences, arts and humanities; and physical and biological sciences, mathematics and engineering.

The program is endowed by and named for SDSU alumni Dr. Theodore W. Schultz, who won the Nobel Memorial Prize in Economic Sciences in 1979 and whom Schultz Hall is named, and his wife Esther Werth Schultz, who earned her bachelor’s degree in commercial science from SDSU in 1927.

“The SDSU Math/Stat Department faculty members are very proud of all our math majors, including this year’s five Schultz-Werth Award winners,” said Kurt Cogswell, professor and head of the department of mathematics and statistics. Cogswell said the department’s previous high was three in 2008. “The outstanding results achieved by these five demonstrate in a very direct way what we have always known about math majors. They are far more than great “equation solvers.” They are also great communicators, great critical thinkers, and more generally an exceptional group of young people ready to go out into the world and make a positive difference.”

Fractal analysis

Burfield, who is now pursuing a master’s degree in statistics at SDSU, submitted his capstone project on fractal analysis of capital markets. “I’d heard of fractals before and they piqued my interest,” said Burfield, who hails from Chatfield, Minn. “I’ve always been interested in the stock market and I wanted to do a project related to that so I could do some analysis.”

He read Edgar E. Peters’ book, “Chaos and Order in the Capital Markets: A New View of Cycles, Prices, and Market Volatility.” In it, Peters went against the efficient market hypothesis that markets are efficient and returns follow normal distribution. Peters proved his thoughts by analyzing markets up to 1988.

Burfield decided to see if Peters’ work was still correct by reviewing data through 2012 from the Standard & Poor’s 500, U.S. housing starts, the 30-year Treasury bond and the U.S./U.K. exchange rate.

Better understanding of markets

Working approximately five to eight hours a week on the project for the first three months of the spring 2013 semester, Burfield developed a better understanding of the markets and how they function.

“My main focus was the S&P 500,” he said. “I used a process called rescaled range analysis.”

Using an algorithm and R, a software program for statistical computing and graphics, Burfield calculated the Hurst exponent, which is used as a measure of long-term memory of a time series.

“In his book, Peters found the S&P 500 to have a Hurst exponent of 0.78 and when I ran the analysis I got a Hurst exponent of 0.7, a little bit lower, but still significant,” Burfield explained. “That basically told me that S&P 500 returns aren’t random and don’t follow a normal distribution. They actually follow a stable distribution.”

“The one nice thing when you have the Hurst exponent between 0.5 and 1, the time series of returns is considered persistent,” he continued. “That means if returns are increasing in the previous state, in the current state, they are more likely to be increasing still. The higher your Hurst exponent is to 1, the stronger that relationship is. Also, a high Hurst exponent means the probability distribution has heavy tails and a higher peak, differentiating the stable distribution that the S&P 500 returns follow from the normal distribution.”

Burfield also conducted analysis on the other three sets of data but thought the S&P 500 data was the most significant.

Despite his recently gained knowledge of the financial markets, Burfield is not thinking about going into that field after graduation. He would like to analyze professional sports and has interviewed with two National Basketball Association teams.
Students

Living-Learning Communities

Creating comfortable living, learning locales on campus

Students looking for that something extra to add to their college experience have discovered living-learning communities (LLC), one of the many recent additions to the SDSU campus.

The communities, which have approximately 1,000 students participating, include Engineering, Honors, Health Professions, Agriculture and Biological Sciences, Healthy Living and Transfer. The success has Housing and Residential Life looking to expand LLC options to include communities focused on the first-year experience, the second-year experience, leadership development, diverse cultures and inclusivity, and other important topics and interests.

“The communities reject the traditional approach of separating a student’s experience into two worlds—inside and outside the classroom,” said Laurie Nichols, provost and vice president for academic affairs. “This approach understands that learning continues after a student leaves class and returns to the residence hall.”

Engineering has roughly 100 students living in its LLC, located in Mathews Hall. Nearly 50 other engineering students are in Honors Hall. In case the learning community idea sounds familiar, engineering had an informal learning community in Brown Hall since the 1970s, according to associate dean Richard Reid. Engineering faculty donated books for an informal library and a computer room was also available.

“The advantages of being in the Engineering LLC come from a few different places,” said Ryan Randall, a junior majoring in mechanical engineering. “One of them is the capability of being able to walk out into the floor lounge and have a group study section for an upcoming test.

“It can also put together study groups to help with homework problems, labs and subjects in the classes that the students may not have understood fully,” he continued. “It also helps engineering students make lifelong connections with other people in the engineering field. Lastly, it allows for some fun programming that is centered around engineering, such as building bridges or towers out of toothpicks, straws and tape.”

Randall, from Blair, Neb., is serving as a community adviser (CA) in Mathews Hall. CAs are selected specifically for the LLC. These peer leaders help coordinate study groups and tutoring sessions and serve as a support person for residents’ personal, social and academic needs.

“I wanted to specifically help other students who are studying the same field as me, and since I was a CA last year, I thought that being in an LLC would be a great way to do that,” said Randall. “There are many benefits that come with being in an LLC. Many of the residents I have are either taking classes I have taken, which allows me to help them better, or are taking the same classes that I am now.”

That connection was part of the goal in creating LLCs.

Getting local help, either with a homework assignment or a project, has been key for the students living in the LLC.

“I think it provides another resource for students that’s closer to ‘home’ than a math center that’s open these hours and you have to pack up and go to ... it’s easier to walk down the hallway,” said Lura Poyner, a sophomore majoring in mechanical engineering and Spanish. She was a member of the Women in Engineering LLC as a freshman.

“I think it helped that the Women in Engineering LLC was in the same building as the men. I could go to their floors and get help with homework and work with them on projects,” Poyner said. “I returned
to living in the LLC for most of the same reasons. I now can help the freshmen on my floor if they have homework questions and talk to them about teacher preferences, and I know I can do the same with my CA (Olivia Allen).”

According to Tobias Uecker, assistant director of residential life for Living Learning Initiatives, the LLCs are designed to enrich students’ academic experience by offering study groups and connections to faculty members; their social experience by creating an immediate connection and shared identity with other students; and their community experience by involving students with service projects both on and off campus.

“The living-learning communities send a message to our students that we think about their college experience holistically. It’s not about you having to navigate through lots and lots of silos. We’re trying to think of ways to help you connect and navigate through your college experience,” he said.

As a result of living in an LLC and taking part in other events, Poyner claims she knows almost everyone in her classes. But there’s more to it than just knowing faces.

“The LLC seems to create a community of its own because all of the residents on the floor have about the same class schedule and have interests centered around the same areas,” Randall said. “This makes it easy for residents to make friends with each other on the floor.”

That community aspect keeps Allen, a junior from Marshall, Minn., as a member. After living in an LLC as a freshman, she—like Randall—now serves as a CA.

“The main benefit is being able to help the residents. They randomly drop by and ask questions. You’re the first person to know if they have a problem,” said Allen, who is in her fourth semester as a CA. “I’m going into operations management so it definitely helps me understand how to interact with others and teach them how they can help themselves.

“My freshman year we formed study groups for pretty much all of our general classes. We would study together, would take online quizzes and tests together, and help each other out,” she recalled. “From a CA point-of-view, it definitely brings everyone closer together academically because of the fact they can interact with each other and if they have a question, they can ask multiple people without going out of the building.”

Additionally, LLCs help prepare students for the next step.

“They’re getting skills that are going to augment the academic information they are learning in that LLC setting and make them that much better as colleagues, as researchers or as upperclass students,” Uecker said.

And the connections not only help in the classroom now but also could help in the future.

“A lot of the people who are in your classes are going to be who you work with in the field after graduation,” Allen said. “Networking is a plus for the LLCs.”

Matt Schmidt

The Jerome J. Lohr College of Engineering has approximately 100 students in a living-learning community in Mathews Hall and roughly 50 more students living in Honors Hall, photo upper left. Opposite page: A study session takes place at Mathews Hall. Top Middle: Clockwise, Leah Gosch, Cat Kukowski and Kaitlin Torgerson Wickre look over calculus problems. Bottom Left: Kaitlin Torgerson Wickre reviews an assignment. Middle left: Eric Janssen shows Nikolas Voigt a possible solution on his computer. Middle right: Lura Poyner helps her roommate, Semehar Ghebrekidan. Right: CA Ryan Randall explains a formula to Nathan Genetzky.
Engineers Without Borders

Bolivia trip includes Fairfield students

Students

Engineers Without Borders student members have now completed four visits to Bolivia in three years.

The most recent visit to Carmen Pampa, a rural, mountainous village in west-central Bolivia, was directed by Bruce Berdanier, who also directed the three previous trips as head of the SDSU Civil Engineering Department. That wasn’t his title on the Aug. 5-13 trip.

Berdanier became dean of the School of Engineering at Fairfield (Conn.) University July 1.

When Engineers Without Borders left for South America, four civil engineering students from SDSU were joined by two mechanical engineering students from Fairfield. “It would be nice if we could continue to partner with them,” said Deidre Beck, head of the SDSU chapter.

“We all got along great. They were mechanicals. They brought a little different perspective.”

Making dirty water clean

The group made adjustments to a PVC pipe chlorinator installed by chapter members in December 2012 on the upper campus of Unidad Academica Campesina, “the united college for the peasants,” a branch university of the Catholic University in Bolivia.

Also while there in August, the group did survey work to install a similar chlorinator on the lower campus in August 2014.

The chlorinator, housed in a concrete bunker and operated via gravity feed, destroys parasites and bacteria in drinking water that can lead to disease. Previously, the water running off the Andes would collect a lot of soil and other organic compounds as it passed through fertilized fields and livestock ranges.

“The water was so yellowish brown it was hard to see into more than a couple inches,” Berdanier said after the December trip. Within an hour after sealing the system and installing the chlorinator, the water was nearly clear. “It was incredible how fast the water cleared up after some piping changes and exclusion of some contaminated runoff,” said Berdanier. “Within a short time, there was almost 10 feet of visibility into the water source.”

In August, the group also did a topographic survey and testing for adding two new sand filters: one to the current chlorination system and another as part of the next chlorinator.

Initial site selection, soil sampling and topographic surveying was also completed for a wastewater treatment system.

Berdanier commented, “Although the UN Millennium Development Goal to cut in half the number of people without access to clean water was met about a year ago, there are still 2.5 billion people without access to improved sanitation, and over 1 billion people are still defecating in the watersheds of the world.”

Project, Americans well received

Two students from the University of Colorado-Boulder also were at Carmen Pampa with the SDSU group. The CU students presented survey information on student attitudes toward the chlorinator, which was generally positive, Beck said.

There was some measure of health improvement, although water is still being boiled to kill pathogens.

Matt Auch, who has been a part of all four trips to Bolivia, said the people of Carmen Pampa are “welcoming. They made an effort to get to know us even though there was a language barrier.” He noted that at a soccer game, a band pulled the group in to sing and dance so they could hear some American songs.

The other SDSU students on the trip were Emily Sumner and Jed Reimnitz.

Dave Graves
Opposite page: Members of the Engineers Without Border delegation pose with a native leaf reader at Carmen Pampa, Bolivia, Aug. 10. Pictured, front row, from left, Melinda Berdanier, wife of Bruce Berdanier; the leaf reader; and Emily Sumner, SDSU. Back row, Dean Bruce Berdanier, Fairfield University; Sean McGuinness, Fairfield; Jed Reimnitz, SDSU; Matt Auch, SDSU, Deidre Beck, SDSU, and Katherine Pitz, Fairfield. The SDSU students are civil engineering majors. The Fairfield students are mechanical engineering majors.

From left to right, beginning upper left: The group heads down a street in Coroico. From left, Auch, Beck and Pitz set up the surveying equipment. Second row: A student at the university in Carmen Pampa cleans leaves from a makeshift filter, one of the water sources for the community. Traditionally dressed Bolivian women march in the Independence Day parade in Coroico. Examining erosion around the existing system infrastructure. Third row: From left, McGuinness, Beck and Pitz survey an existing water tank, which is a possible location for a future sand filter. McGuinness and Auch remove a soil sample from a potential building site. The sample was taken back to SDSU for analysis. McGuinness climbs up next to the waterfall that is one of the sources of the water for the university in Carmen Pampa.
Trevor Layh, a May 2011 mechanical engineering graduate from Winner, is one of 40 students nationwide to receive a Tau Beta Pi graduate school fellowship for 2013-14.

Layh is only the sixth SDSU recipient in the program that dates to 1930 and is the first SDSU recipient since Travis Kubal and Aaron Boomsma in 2008.

Michael Tvedt, his academic adviser, said, “Trevor is an exceptionally pleasant and very intelligent person, as reflected in his GPA (3.94). He possesses exceptional people, problem-solving, technical and writing skills.

“This combination of skills make him an excellent candidate for elite scholarships and provides him with the tools to make his application stand out.

“As an example of his superior abilities, Trevor, with his project sponsor and team member, synthesized his senior-design project into a graduate-level biomedical journal article for publication, which is a very rare occurrence for undergraduate engineers.”

Tau Beta Pi Fellowships offer a $10,000 stipend and are awarded on the competitive criteria of high scholarship, campus leadership and service, and promise of future contributions to the engineering profession.

All fellows are members of Tau Beta Pi, the world’s largest engineering society, and may do their graduate work at any institution they choose.

**Now working, studying at U of M**

Layh is studying in the aerospace engineering and mechanics department at the University of Minnesota, Twin Cities campus and also is a teaching assistant and research assistant in that department.

While at the university, he wants to improve the safety and reliability of unmanned aerial system technologies.

Previously, he was a civilian engineer at the Naval Surface Warfare Center in Dahlgren, Va. He worked in the Unmanned Systems Group of the Test Engineering Branch.

His responsibilities included coordinating the logistics, writing safety documentation, installing and troubleshooting unmanned aerial systems equipment, and piloting/operating unmanned aerial vehicles in support of various testing projects for both on-land operations and at-sea/shipboard operations.

**Exelled in, out of classroom**

Now he is on a leave without pay to go back to school.

At SDSU, Layh graduated in the top 5 percent of his Jerome J. Lohr College of Engineering graduating class and maintained a 3.94 GPA while majoring in mechanical engineering with a minor in physics.

In 2009-2010, he was president of the SDSU chapter of Tau Beta Pi, and vice president of the SDSU chapter of Pi Tau Sigma mechanical engineering honor society.

He also did volunteer tutoring for students in SDSU engineering courses, participated in the adopt-a-highway trash cleanup, and helped coordinate and start the Introduction to Engineering event for Brookings Middle School students.

Upon completion of graduate school, Layh hopes to pursue a career in aerospace engineering in either the public or private sector with the possibility of returning to academia to become a professor and researcher.

Layh credits Tvedt and Alex Moutsoglou, the Tau Beta Pi advisor, as being “instrumental in my successful undergraduate career at SDSU and being a recipient of a 2010 Department of Defense SMART Scholarship, which ultimately led to my job at the Naval Surface Warfare System.”

Dave Graves

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**PAST TAU BETA PI FELLOWS FROM SDSU**

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<tr>
<th>Name</th>
<th>Grad year</th>
<th>Fellowship year</th>
</tr>
</thead>
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<tr>
<td>Richard A. Stoebner</td>
<td>1978</td>
<td>(Fellow 1974)</td>
</tr>
<tr>
<td>Soha M.N. Hassoun</td>
<td>1986</td>
<td>(Fellow 1986)</td>
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<tr>
<td>Donald A. Ufford</td>
<td>1987</td>
<td>(Fellow 1987)</td>
</tr>
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<td>Aaron A. Boomsma</td>
<td>2008</td>
<td>(Fellow 2008)</td>
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<td>Travis D. Kubal</td>
<td>2008</td>
<td>(Fellow 2008)</td>
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<tr>
<td>Trevor Layh</td>
<td>2011</td>
<td>(Fellow 2013)</td>
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</table>
Three members of the SDSU chapter of the American Society of Civil Engineers received national awards for the 2013-14 school year.

- Michael James Mingo, a senior from Armour, received the $4,000 Figg Scholarship. Applicants must have an interest in bridge design and construction.
  Mingo joined ASCE at the start of his freshman year. He has participated in the concrete canoe contest since he was a sophomore and this year he is one of the concrete canoe captains. He also participated in the steel bridge contest last year and plans to again participate in the steel bridge contest this year.

- Wiphawi "Mo" Phifer, a senior from Hutchinson, Minn., received the Student Leadership Award as well as a $3,000 Moorman Scholarship.
  Phifer received another national ASCE scholarship—the Moorman Scholarship—in 2012-13. For this year, she also received a district scholarship from Chi Epsilon, a national civil engineering undergraduate honor society. Phifer was her class’s freshman representative to ASCE and has continued to be involved since. This is her second year as the treasurer and the golf tournament chair for the chapter. She also has volunteered at several conferences and leadership workshops through the chapter.
  Last year she attended the national conference in Montreal and will attend this year’s national conference in Charlotte, N.C.

- Emily Grace Sumner, a senior from Omaha, Neb., received a $2,500 Samuel Fletcher Tapman Scholarship.
  Her scholarship essay highlighted why she chose to become a civil engineer, long-term goals and plans, specific ASCE student chapter involvement and any special financial needs.
  She also received this award in 2012.
  This year Sumner is president of the SDSU-ASCE student chapter. She has also been a concrete canoe co-captain and the corresponding secretary.

**IEEE national winners**

Three electrical engineering majors received renewal scholarships from the Institute of Electrical and Electronics Engineers’ Power and Energy Society for 2013-14 and another received a first-year award.

- Richard Fitzpatrick, a senior from Foley, Minn., received a $3,000 award. It’s his third year to receive a scholarship from the institute. Kelly Nelson, a senior from Sioux Falls, and Cole Sandness, a senior from Brookings, each received $2,000 awards. It’s their second year to receive a scholarship from the institute.
- The scholarship recipients were selected from more than 800 applications nationwide. Within the central United States, which includes about 20 universities, 70 new applicants were considered with only 20 receiving a scholarship. One of them was Tyler Fletcher, a sophomore from Sioux Falls, who received a $2,000 award.
- In the past three years, 14 scholarships have been awarded to SDSU students, more than any other school in the region.

**Tau Beta Pi winners**

This year’s SDSU winners of Tau Beta Pi scholarships are Philip Albu, a senior computer science major from Charlie Lake, B.C.; Ryan Rossiter, a senior computer science and math major from St. Peter, Minn.; and Phifer.

SDSU students are frequent recipients of the $2,000 award made by the world’s largest engineering society.

A total of 210 scholarships were distributed nationwide based on scholarship, campus leadership and service, membership in Tau Beta Pi and future potential to the engineering profession.

**Upsilon Pi Epsilon winners**

SDSU recipients of scholarships from Upsilon Pi Epsilon for 2013 are Rossiter, the $1,500 Jim Nolen Award; and Jiameng Hu, a graduate student from China, the $1,000 UPE Scholarship Award.

They were among the 31 recipients nationally from the international honor society for computing and information disciplines.
Keeping South Dakota’s top students in state and attracting others from nearby states has been priorities for the Jerome J. Lohr College of Engineering. As a result, South Dakota State University has made many changes in the past 10 years, including new residence halls, University Student Union renovations and moving to NCAA Division I athletics. The Lohr College of Engineering has also made many changes and it isn’t done yet.

With the construction underway on the Architecture, Mathematics and Engineering Building, Associate Dean Rich Reid states the college attempts to attract approximately 450 students each year. To do that, Reid not only has the stunning credentials and facilities to display but also increased scholarship dollars. Those scholarships include:

- Stephen F. Briggs
- Omega
- Lohr Scholarships
- Raymond W. and Helen S. Sundstrom "Sundstrom Scholar"

“There’s no one magic bullet that does it but when you look at all of those things together, you make one great impression,” Reid said. “We continue to strive for more scholarships, not only more scholarships but also higher dollar scholarships.”

Both figures are on the rise as scholarship money had a huge impact on my final decision to come to SDSU, but what made me look at this school in the first place was the engineering program and track team. I was really set on finding a school big enough that it had a good engineering program, but still small enough that I could be on the track team,” said freshman Libby Molitor, who hails from North Freedom, Wis. She will also compete as a pole vaulter for the Jackrabbits.

Receiving a scholarship was just one part of freshman Jason Van Winkle’s decision to attend State.

“The opportunity to be part of the Honors College, the scholarship I received and the opportunity to play football,” Van Winkle explained, adding all of the factors played a part in the decision. An all-state defensive end from Canistota, he is a preferred walk-on for the football program. “I’m super grateful I received a scholarship, but it wasn’t the only thing that I based my decision to come upon.

“(The scholarship interview) was a little intimidating but the professors were all really personable during it,” said Van Winkle, who plans to major in mechanical engineering. “When I took the campus tours, I really liked the professors I met and definitely liked the atmosphere at SDSU. It’s a D1 school and has that big campus atmosphere but everything is really centralized. The people are really nice and you feel like you have a personal experience while in a big-school atmosphere. I thought it was the best of both worlds.”

Like Van Winkle, Molitor was impressed by professors’ interest. “When I interviewed over the phone for my scholarship, all the professors and faculty I spoke with were very friendly and genuinely interested in what I had to say. During orientation, I met Dr. Reid, and he made me feel even more comfortable about my decision to attend SDSU,” said Molitor, who also plans to major in mechanical engineering. “The recent and future growth at SDSU is exciting. Being able to live in a brand-new dorm, having an expanded union, and the plans for an indoor track facility all made SDSU stand out among the colleges I was considering.”

Multiple factors also played a part in Deidre Beck’s decision to attend SDSU three years ago.

“I wasn’t 100 percent sure on my major but I was interested in engineering or the sciences,” said Beck, a junior from Pierre. “It also had Spanish and I could do band. And the price was definitely right. “

Beck, who is a baritone in the Pride of the Dakotas, is a Briggs Scholar. To qualify, one must have the following:

- score 30 or higher on the ACT,
- rank in the top 10 percent of one’s high school class,
- record a 3.85 or higher GPA, and
- demonstrate leadership, community and extracurricular involvement.

She has been impressed with the opportunities for engineering students on and off campus. She attended the 2012 American Society of Civil Engineers’ annual civil engineering conference and plans to attend the 2013 conference.

“It was real interesting to hear different professionals from around the country and across the world,” she said.

Beck has also participated in an Engineers Without Borders project at the Unidad Academica Campesina in Carmen Pampa, Bolivia.

“We’re working on providing them clean water. We built a chlorinator in December.
and have done some follow-up work, making sure it was working properly,” she said. “We plan to build another chlorinator next summer. It was a fun experience as you get to actually do something, instead of doing things on paper.”

The project in Bolivia confirmed Beck’s decision on her major.

“I always wanted to work in sustainability and help the environment somehow,” said Beck, who is majoring in civil engineering. “I thought this was a really practical way to do that and you could actually make a difference. It’s challenging but it’s something you see every day and don’t really think about. I can see myself improving the sustainability of different things in the future and enjoying it.”

While Molitor, Van Winkle and Beck plan on futures as engineers, Reid’s future focus is on attracting students.

“We now have the elements in place to attract highly qualified students who previously didn’t consider SDSU,” Reid said. “By offering competitive scholarships, we will continue to entice future stars of the college.”

—Matt Schmidt

For registration forms, visit http://www.sdstate.edu/engr/camps/gems.cfm
Faculty Farewells

ANDRAWIS RETIRE

Longtime electrical engineering professors Alfred and Madeleine Andrawis were granted emeritus status by the South Dakota Board of Regents this spring.

Both retired June 21, Alfred after 26 years and Madeleine after 28 years. They were honored at a joint reception April 19 at the South Dakota Art Museum, where department head Steve Hietpas announced the Regents’ action.

Dean Lew Brown told the Andrawises, “You two have influenced thousands of electrical engineering students through the years.”

A late-season snowstorm caused former department head Dennis Helder to be stuck in the Minneapolis airport while icy roads kept Andrawises’ two sons, David and Danny, from driving in from Minneapolis. Their daughter, Mary, was on hand.

The Andrawises spoke with Helder via Skype.

Alfred remarked, “It’s remarkable that we are conversing over a video conference when I think to when we started, we had a four-function calculator.”

In their retirement, the Andrawises are traveling and meeting with family, but they are keeping Brookings as their home base.

BERDANIER TAKES NEW POST

After five productive years as head of the department of civil and environmental engineering, Bruce Berdanier has moved on.

The Rhode Island native traded the plains of the Upper Midwest for the Connecticut seashores. On July 1, he became dean of the School of Engineering at Fairfield University in Fairfield, Conn. He left SDSU in mid-May.

Dean Lew Brown appointed Nadim Wehbe as interim department head. Berdanier leaves a department that has made impressive strides, Brown said.

Wehbe, in his 17th year at SDSU, oversees the Jerome Lohr Structures Lab within the civil and environmental engineering department and in 2012 was honored by the American Concrete Institute as a fellow, a recognition bestowed to less than 4 percent of the trade group’s members.

The Lebanon native also directs a University Transportation Center at SDSU that conducts research, education and outreach activities on transportation systems.

Faculty News

GREGORY MICHNA, an assistant professor in his fifth year with the mechanical engineering department, was awarded one of seven competitive state research grants through the South Dakota Board of Regents this summer.

Michna’s $99,118 grant is for a project on pulsating heat pipe electronics cooling systems.

The grant program, started in 2005, helps faculty members and departments build a more sustainable research program. The Board of Regents staff reviewed 37 proposals and funded seven for $431,503.

DOUG PETERS, a mechanical engineering instructor, resigned at the end of spring semester to devote full time to Green Acres Equipment, the used farm equipment dealership he owns.

Peters, of Wentworth, spent 13 years in the mechanical engineering department, beginning as a technician while working toward his bachelor’s degree in mechanical engineering in 2001. He spent 10 years as an instructor.
GERALD DERDALL ’57 died Jan. 6, 2013, after an extensive bout with pneumonia. The Brookings native earned a degree in physics and went on to work in the aerospace industry in the Los Angeles area. Survivors include a son, Stephen, of California.

ADAM ELLIS ’12 died unexpectedly from natural causes at the Brookings hospital March 29, 2013.

Ellis, 23, of Brookings and formerly of McCook Lake, earned a degree in electronics engineering technology. While a student, he worked for three years at Daktronics and then went full time with the Brookings firm after graduation. He was a member of Epsilon Mu Eta Engineering Management Honor Society.

He also was a member of Delta Chi fraternity and had recently joined its alumni board and housing corporation.

RICHARD HEGG ’67 died April 1, 2013.

Hegg, 69, of Arlington, Va., was an ag engineering major who was named as a Distinguished Engineer by the college in 2010. He earned his master’s from the University of Missouri and his doctorate from the University of Minnesota. He spent 23 years on the Clemson University faculty, retiring in 1998. He then became the national program leader for ag engineering with the USDA in Washington, D.C.

BRETT RUNGE ’04/’06 joined Bartlett & West in Sioux Falls as a lead engineer earlier this year. In March, the National Society of Professional Engineers honored him as one of five semifinalists for the national Engineer on the Rise award. The civil engineering graduate has a background in the design and construction of water and wastewater facilities.

Runge, formerly a project engineer for HR Green in Sioux Falls, led the design team and construction efforts for a major Sioux Falls wastewater project that harnessed unconventional filter backwashing techniques to conserve water and improve efficiency. Filter capacity was nearly doubled and water usage was reduced by 85 percent, saving the city thousands of dollars.

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He was awarded the South Dakota Engineering Society’s 2011 Young Engineer of the Year.

RYAN SERNETT, a 2013 mechanical engineering graduate with a minor in sustainable energy systems, joined G&R Controls, of Sioux Falls, in summer 2013 as a system specialist.

MARJORIE SKUBIC ’76 received the University of Missouri Nursing Alumni Organization’s Honorary Alumni Award April 5 at its annual awards ceremony.

Skubic, a professor with a joint appointment in the MU Department of Electrical and Computer Engineering and the Department of Computer Science, has provided vital experience and technology to the nursing school’s Aging in Place research.

The 1972 Brookings High School graduate is the daughter of Louis and Mary Ann Skubic. Louis is a retired general engineering faculty member.
Jerry Lohr — Creating a culture of giving

Jerry Lohr has been a towering figure within the College of Engineering for the past quarter-century, offering his time and his financial resources to support the college.

The South Dakota Board of Regents honored the university’s request to rename the college the Jerome J. Lohr College of Engineering. A formal celebration was held Oct. 4.

The celebration was about so much more than the name. Jerry Lohr, who graduated from the college in 1958, shared the billing with the formal recognition of the construction of the Architecture, Math and Engineering Building, the fifth new or renovated project for the Lohr College of Engineering since 2002. Like each of the preceding fourth building projects, Lohr was among the first and among the largest donors—and then became the project’s chief fundraiser.

While the buildings stand out as the most tangible evidence of Lohr’s impact, he is probably most proud of the culture of giving that has been created at his alma mater through two successful comprehensive campaigns (1994 to 1998; and 2007-2013).

Early on, Jerry understood that private giving was the only way to combat declining state support. For all of SDSU’s greatness, the university lacked a robust culture of giving.

Jerry also understood that you needed to give first before asking others to do the same. He led by example, whether it was for a building, a program or a scholarship fund. His leadership has tripled the college’s annual gift totals in the past decade—from $1 million in 2003 to more than $3 million in 2012.

Jerry Lohr has been the driving force behind five new engineering facilities. His greater legacy is the culture of giving that he helped build.

Tim Reed

JEROME J. LOHR COLLEGE OF ENGINEERING
DEVELOPMENT DIRECTOR
SDSU FOUNDATION

“HELP US SERVE THE NEXT GENERATION.
Remember the SDSU Foundation in your will.”

– David L. Chicoine
President of South Dakota State University

For a free Will Information Kit, visit http://plannedgiving.sdsufoundation.org.
WHEREVER YOU ARE, WE ARE TOO.

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The construction management club's entry won "Most Outstanding Float" in the 2013 Hobo Day parade.