Focusing on student success

UNIVERSITY OF NEBRASKA–LINCOLN COLLEGE OF ENGINEERING
If you visit the engineering complex in Lincoln or our campus in Omaha at PKI, you’ll notice some common wording and attractive graphics aimed primarily at our students: “Your Success Matters.” This is more than just a catchphrase or slogan – it’s our promise that we will do all we can to ensure our students receive a high-quality education and impactful out-of-class experiences to ultimately help them define and achieve their own successes.

How are we doing this? We’re focusing our resources on high-reaching and attainable goals and strategies, understanding that we must meet the specific needs of our students as soon as they decide to join Nebraska Engineering.

We want to train engineers from bachelors to Ph.D.s with superior technical knowledge and skills, as well as help them master the other necessary skills. We do this as a vital partner with the state of Nebraska, working to enhance workforce development and economic health. As such, some of our primary goals include:

- Increasing undergraduate enrollment to 3,600 students (2,400 in Lincoln; 1,200 in Omaha) over the next five years
- Building stronger industry-university partnerships – for class development and research
- Creating first-year experience courses to engage students in engineering as soon as they enroll
- Building a leadership/teaming curriculum to enhance our future engineers’ essential non-technical skills (the ‘soft’ skills) that will position them for leadership roles throughout their careers
- Offering an innovative Master of Engineering Management degree for working professionals and alumni
- Hiring 100 faculty over the next five years who will layer high-impact research and development on top of world-class teaching.

For this issue of Engineering @ Nebraska, we are showcasing some of the ways in which we are contributing to our students’ successes – featuring faculty who are making a difference in the classroom, new and innovative teaching methods, and out-of-the-classroom experiences. These are just a few snapshots of the myriad approaches we are taking to become one of the nation’s best engineering colleges – not only for our students but for the state.

As always, we invite you to join us, to visit and engage with our students and faculty, and to support us with your time and resources.

Timothy Wei, Ph.D.
Dean, UNL College of Engineering
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ON THE COVER: Wieslaw Szydlowski, associate professor of mechanical and materials engineering, explains the design of an engine to students Matt Thompson and Maggie Clay as it is drawn on the glass walls of the Olsson Room inside the Engineering Library in Nebraska Hall. Photo: Craig Chandler/University Communications.

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Team led by UNL professors secures NASA grant for research into metallic surfaces

Sidy Ndø, assistant professor of mechanical and materials engineering, Troy Anderson, electrical and computer engineering research assistant professor; and Craig Zühlke, electrical and computer engineering post-doctoral research assistant – has secured a $563,131 NASA Nebraska EPSCoR (Experimental Program to Stimulate Competitive Research) grant and about $250,000 in other funding to create functionalized metallic surfaces that can be used to help with thermal management systems in space applications.

The group also includes four mechanical and materials engineering faculty – professors Jeff Shield and Joe Turner, and assistant professors Ben Terry and Lucia Fernandez-Ballester – electrical and computer engineering professor Ned Ianno, computer science engineering professor Jitender Deogun, 10 graduate students and eight undergraduate students.

With this team, a new path of study emerged: functionalization of metallic materials – basically, treating a surface with a laser to change the makeup of microstructures and nanostructures, thus giving the metal entirely different and, sometimes, desirable properties.

Some of these layers, Gogos said, are as small as one-fifth the diameter of a human hair.

When the researchers functionalized stainless steel pans, they noticed that not only did water boil much more quickly than in an untreated pans, but also that more and smaller bubbles were created and that the bubbles rise through the water at a faster rate.

It was then that Alexander sought the help of Gogos, who could help him conduct research on the heat-transfer properties associated with these new surfaces. It also led to the creation of the Center for Electro-Optics and Functionalized Surfaces (CEFS), of which Alexander is the director.

With the addition of Ndø in 2012, the team has made “great strides in showing why these processes have increased boiling efficiency,” Alexander said.

The team’s expertise and experience, Gogos said, led to the NASA EPSCoR grant, which will allow for the better thermal management of NASA applications by using titanium and silicon carbide in the functionalization process to improve thermal heat management during space travel.

The group is also researching processes to improve heat transfer to keep other equipment, such as electronic devices, from overheating.

“It’s expected that the surfaces would help in saving energy, having better engines and making more comfortable environments for astronauts in space,” Ndø said.
Civil Engineering professors aim to improve water quality in small communities

Decades of innovation have helped large American cities improve their public water systems, but smaller, rural systems are being left behind.

Three UNL faculty, led by Civil Engineering Professor Bruce Dvorak, are part of the Water Innovation Network for Sustainable Small Systems (WINSSS), a national project that hopes to bring up-to-date technology and safer water to America’s small communities.

WINSSS, with a three-year, $4.1 million grant from the U.S. Environmental Protection Agency, is headquartered at the University of Massachusetts-Amherst, with associate centers at the University of Nebraska-Lincoln and the University of Texas at Austin.

Dvorak will direct WINSSS operations and will work alongside Chittaranjan Ray, professor of civil engineering and director of the Nebraska Water Center, and Rebecca Lai, professor of chemistry.

The project has particular relevance in Nebraska, where most of the public water systems serve fewer than 10,000 people and, thus, usually have small streams of revenue and small operations staffs. Many small systems, Dvorak said, also have rates of public health violations three times higher than those in bigger cities.

“A large system, like in Denver or Omaha, can hire consultants and researchers and develop new technologies,” Dvorak said. “Small communities don’t have that. And in Nebraska, given that not a lot of smaller communities are growing, there’s not a lot of financial capacity.

“We’re trying to develop markets and modify existing technologies to make them appropriate for small systems.”

However, improving and updating small public water systems is not a simple task.

The EPA had not previously put a lot of funding or research into updating these systems, Dvorak said.

“Many of the technologies work for Lincoln or Grand Island but are not well-adapted for a small community. The assumption has been that what works for big communities is the priority, and that small communities should figure out how to do this. It hasn’t been real effective,” he said.

“The EPA wants researchers to start taking technologies – like off-the-shelf sensors and point-of-use devices – and adapt them for the unique situations of small water systems, so that entrepreneurs can start making them available for the actual systems.”

Accomplishing that, Dvorak said, will also require overcoming political hurdles, which include getting the new technology approved separately by each of the 50 states. WINSSS is trying to find ways to get research and testing information to multiple state regulatory agencies with the hope that when one state approves the new product, others will follow suit.

“Legislators and congressional delegations are concerned about finding cost-effective solutions for supplying safe drinking water for these small communities,” Dvorak said. “What we’re trying to do is reduce the risk.”

Even though the EPA grant only covers the next three years, Dvorak expects the work will continue longer.

“We’re being given 3½ years to do the first three years’ work, but I see this lasting at least 10,” Dvorak said. “We’re trying to not just have scientists and engineers develop innovation, but set up a framework where we can go back and forth with government agencies and communities to figure out what makes sense now and for the future.”

“Legislators and congressional delegations are concerned about finding cost-effective solutions for supplying safe drinking water for these small communities,” Dvorak said. “What we’re trying to do is reduce the risk.”
More than 500 first-year students from Nebraska Engineering converged in downtown Omaha on October 10 to explore engineering careers and opportunities.

The college’s annual Industry Day, held this year in collaboration with the Greater Omaha Area Chamber of Commerce, provided students with the opportunity to tour various engineering projects and area firms, agencies and businesses that offer engineering careers, as well as network with professionals.

The day began with a tour of TD Ameritrade Park – focusing on the construction, electrical and civil aspects of the project – before the morning finished with the students being divided into 30 smaller groups for walking tours that included Union Pacific Harriman Dispatch Center, ConAgra Campus, NRG, Omaha World-Herald Freedom Center, Metropolitan Utilities District Riverfront Plant, Gallup IT, Holland Center, Gene Leahy Mall, Capitol District Project and ConAgra Foods.

At noon, students attended a luncheon that featured a keynote speech from Patricia Walsh, who overcame obstacles created by blindness to become an award-winning engineer at Microsoft and also a two-time national champion triathlete.

Amanda Houston, a freshman electrical engineering major from Elkhorn, said the tour gave her plenty of opportunities to further her education and improve her employment prospects.

“It was so beneficial to get to meet people who do engineering for a living and make connections with them on a professional level,” Houston said. “These are people who could be our bosses and coworkers someday and this could lead to internships and jobs down the line.”

This was the third tour offered by the college. Other trips were to Grand Island and Columbus.
Chancellor says first-tier College of Engineering a top priority for UNL

The College of Engineering is one of the driving forces behind UNL achieving its highest enrollment totals in more than three decades.

- Total fall 2014 enrollment in the College of Engineering - counting undergraduate, graduate, College of Agricultural Sciences and Natural Resources, College of Arts and Sciences and Pre-Engineering students -- is 4,101, up from 3,733 in fall 2013 (a 9.9 percent increase)
- Undergraduate enrollment is 3,477, up from 3,127 in 2013 (an 11.6 percent increase)
- The number of international students enrolled increased by 140
- First-time freshman enrollment is 666, up from 614 in 2013 (an 8.5 percent increase from fall 2013)
- The college also experienced huge increases in other enrollment totals
- A record number of female students enrolled jumped to 486 (an increase of 81 from 2013)
- There were also record numbers for black (69) and Hispanic students (114)
- Undergraduate students from other states increased by 36.

College of Engineering leads way as UNL attracts biggest freshman class in 35 years

'Making for Innovation' is first class at NIC

A new course allows up to 30 students to get hands-on experience and help launch the UNL Maker Space in the spring semester. The course, "Making for Innovation," is the first to meet at Nebraska Innovation Studio — formerly the UNL Maker Space — on Nebraska Innovation Campus. Shane Farritor, professor of mechanical and materials engineering, and Liana Owad, Maker Space coordinator, will guide the class.

The course is designed on two basic ideas: building and hands-on problem solving are important paths to innovation; and that innovation occurs at the boundary between humanities and technology.

MME professor Nelson chosen one of ASEE’s "20 Under 40"

The American Society of Engineering Education recently spotlighted UNL’s Carl Nelson in the September issue of its magazine, Prism.

Nelson, associate professor of mechanical and materials engineering, was chosen as one of “20 Under 40”, a group of educators under the age of 40 who have demonstrated a talent for teaching and research.

The article noted how one of Nelson’s projects – a collaboration with therapists at Lincoln’s Madonna Rehabilitation Hospital – led to the development of the Intelligently Controlled Assistive Response Elliptical (ICARE) exercise machine. Based on the elliptical trainers found in many gyms, ICARE machines are smaller than many other rehabilitation machines and cost about 10 times less.

Perlman announced a new initiative to increase by 50 the number of tenure-track faculty in key parts of the university, with 17 of those faculty being hired.

He also said the university and the college must continue to identify and exploit the unique opportunities they have in Omaha because of the college’s relationships with The Peter Kiewit Institute and the University of Nebraska Medical Center.

“To build our research agenda, supply the human talent needed to make Nebraska competitive statewide and compete with our Big Ten colleagues, Nebraska’s flagship campus must have a first tier College of Engineering,” he said. “... This has to be a top priority for the entire campus.”

The prepared text of Chancellor Perlman’s State of the University address, as well as his 14 previous State of the University addresses, are available at http://go.unl.edu/stateoftheu.
DURING THIS PAST SUMMER BREAK, ANASTASIA SANDERSON HAD A GREAT WINTER.

While Nebraska was in the throes of a typical hot, humid, stormy summer, the junior Biological Systems Engineering major spent 10 weeks of winter Down Under, working at an internship at Griffith University in Brisbane, Australia.

UNL career fairs offered plenty of options for internships, but there was also plenty of competition for those positions which often go to juniors and seniors. So Sanderson started researching internship possibilities on her own, and the thought of working in a foreign country for a summer became more appealing.

“I’ve always wanted to go abroad,” Sanderson said. “As an engineer, I didn’t want to be stuck in the classroom all the time. Other majors, they get to travel a lot and I was like, ‘Why can’t I do that?’ I was debating the differences between study abroad and internship abroad and I decided on an internship because I knew I wanted to go into industry and an internship would have more weight overall.”

After finding an internship at Griffith’s Queensland Sports Technology Cluster, Sanderson applied and was accepted a few days later.

Sanderson, who studied ballet as a child, was interested in the QSTC’s previous studies of body sway of dancers during pliés (a smooth and continuous bending of the knees outward with the back held straight). That sparked her idea to study a more difficult maneuver – a relevé, in which a dancer rises to balance on one or both feet in either demi-pointe (on the balls of her feet) or full pointe (on the tips of her toes).

The study resulted in a direct link between a dancer’s body sway during a relevé and the evaluation score given by a professor. It also revealed a practical application for the information.

“We guessed that while they were up, their backs and wrists would move and that basically came out as we thought. Their sacrum was moving more, and the dancers who scored better weren’t moving their sacrum as much,” Sanderson said. “We also found that when dancers go up, their ankle has some initial movement. But if they take a second to stabilize the ankle before committing to the hold, then they had a better score because they weren’t wobbling.”

The internship experience has already changed Sanderson’s approach to school and work.

“Now I think a little differently. It’s not just, ‘This is how we solve the problem.’ There’s also another way. It’s opened my eyes to the fact that everything’s not black-and-white,” Sanderson said.

“In school, you make a mistake and you have a few points taken off of your grade and you get a lower grade or you might fail a class. In the scientific world, that’s just a trial and you get to try again. I really liked having that option of multiple choices and getting to figure it out for yourself.”
To say that Cody Kanger is all business might be an overstatement, but not by much.

While in high school at Creighton Prep in Omaha, the junior mechanical engineering major from Papillion ran a successful lawn care and snow removal business for more than four years. The money he earned from that venture has helped pay for part of his college expenses as he works toward his degree.

But that wasn’t what Kanger envisioned happening when he started CJK Lawn Care as a high school freshman. The original plan was to have a pair of buddies keep the business going while he pursued his engineering degree and then for Kanger to start a new business venture – buying a house or a piece of commercial property in Lincoln and renting it out.

“I planned to keep running some kind of business while I was in college,” Kanger said. “There was a plan for where the money was supposed to go, but it ended up going to school. My ACT score wasn’t high enough to get grants or anything like that. I didn’t get financial help from government programs or anything else.”

The need to help fund his own education and the demands of being an engineering student caused Kanger to rethink his plans to keep the business running while in college.

“It was about the business first, then get a degree. I figured that the business would be something I’d have forever,” Kanger said. “I thought about it and, once I ran into the issues you face your freshman year, I thought it would be easier to start the lawn service up after finishing a degree than it would to be mowing 10, 15 years down the road and then want to go back and get the degree.”

Kanger’s ability to adjust his career goals to fit the changing circumstances is something he’s learned from the experience of running his own businesses, especially since his first try didn’t exactly take off. As a 12-year-old living in Plattsmouth, Kanger and his family spent a lot of time at Beaver Lake, and Kanger was inspired to try making money on his own over the summer.

“I started a beach-care business. That didn’t work. Turns out that not a lot of people wanted their beaches cleaned,” Kanger said with a laugh. “So, I started mowing lawns. I had one lawn out there, then we moved to Papillion and I started mowing lawns in the neighborhood.” Before his junior year in high school, the business grew large enough that he had to hire two friends to cover all the requests for his services. By the summer of 2012, before he came to UNL, Kanger’s business had grown to 51 clients for mowing, 26 for fertilizing, 20 for snow removal and a few others for landscaping projects.

Kanger also learned that running a lawn-care business required a lot more than pushing a mower – payroll, scheduling, budgeting, maintaining equipment and supplies, paying taxes and the need to advertise and market the business.

All that experience, Kanger said, may have helped him land an internship this past summer with CNH Industrial tractor division in suburban Chicago. That internship helped Kanger learn what direction he’d like to take in his engineering experience.

Even though he’s committed to getting his degree, Kanger isn’t ready to limit his professional goals – there is the allure of again running his own business. He hopes to find a way to combine a love for lawn care with an engineering degree.

Hard work and love for his business are driving Kanger toward his degree, but the mechanical engineering student looks forward to running his own company again. Perhaps Kanger could build the world’s best lawn mower.

“Maybe. Who knows?” he said. “That’s a good idea. I’ll have to think about that.”
Balancing studies and pole vault training creates long days for three biological systems engineering majors

When athletes talk about their performances by using the phrases “soaring to new heights” or “raising the bar,” the words are usually dismissed as just one of many sports clichés. Not for Paula Andrie, Steven Cahoy and Karlye Cygan. For these pole vaulters and biological systems engineering majors, those words carry meaning in all phases of their campus lives. That’s especially so when committing to being both a top student and an elite athlete.

“I pretty much live at campus or here (the Devaney Sports Center indoor track),” said Andrie, who was on the Dean’s List this past spring and finished fifth in the 2013 and 2014 Big Ten Indoor Championships and has a personal-best vault of 13 feet, 4 inches. She’s a two-time Academic All-Big Ten selection and was a 2013 Big Ten Distinguished Scholar. “But studying engineering is very time-consuming. I have to stay committed.”

One of the greatest challenges of balancing their engineering studies with being a college athlete is making scheduling adjustments that are foreign to some of their teammates, who usually begin their daily practices at 3:30 p.m.

“The funny thing is that (the track coaching staff) always tries to get us to work our class schedule around our practice schedule, but we basically have to work our practice schedule around our class schedule,” Andrie said.

“The further along you get in school, the more you run into wanting to take a certain class and it’s only offered at this one time,” Andrie said. “If it’s offered only late in the afternoon, then I’m going to take that class and go practice at 6 p.m.”

This semester, for example, Cahoy has an engineering class that starts at 3:30 p.m. three days a week. That pushes his training schedule later in the day.

“Rarely do I get back to my apartment before 8 p.m.,” said Cahoy, a sophomore and the son of former Husker national champion gymnast and Olympic gold medalist Phil Cahoy. “I have biosystems, then I have practice, then I go home and from 8 to midnight I’m studying. But I’m getting used to it.”

Cygan, however, is finding the pace of her life to be less hectic now that she’s in her first year of college.

“I think this is a lot easier than when I was running around and playing three different sports at once and doing schoolwork,” Cygan said. “Now, with study halls built in and having time scheduled to study, it’s a lot more structured and every day I have a schedule I stick to in order to succeed.

“School’s hard, still, but it’s fun. It’s a good balance. I feel that if I wasn’t in sports, it would be really hard to balance it and the back-and-forth of having a life outside of school.”

Occasionally, the vaulters find themselves applying what they’ve learned in engineering classes to their athletic training.

“Pole vaulting involves a lot of what we learn in engineering classes,” said Cahoy, who finished fifth at the 2014 Big Ten Indoor and on Feb. 7 cleared 17 feet, 11 inches, third-best all time by a Husker men’s vaulter in an indoor meet. “In biosystems, we work with compression, and I’ve thought about how a vaulting pole compresses and recoils and how I can use that to go even higher.”

To see a list of engineering students participating in varsity athletics at UNL and UNO, see this story at engineering.unl.edu/engmag/
Miles Wynn has always been a car guy. The senior mechanical engineering major grew up the son of an auto body mechanic in Albion, Nebraska, and has a 1953 Chevrolet Bel Air that he sheepishly admits to have been working on "before I became a teenager."

So it comes as little surprise that Wynn has settled on a future in the automotive industry after he graduates in December 2015.

However, it is a touch ironic that it was his research into harnessing the power of the ocean to create an energy source on the land that helped to bring Wynn back to his roots with a fall internship at Tesla Motors, which has created a buzz in the automotive industry by making America's top line of electric cars.

"I've always shot high, and in 2013 I applied for a Tesla internship for kicks because it doesn't hurt to try. But it dropped off my radar," Wynn said. "I always wanted to do something with cars, and especially electric cars, but at the same time I've been on the fence about my future – do I want to go into renewable energy production with the research that I do or go straight into electric automotive?

"Either way, both of those technologies can help further humanity rather than burning up our resources. I grew up very environmentally oriented, so both paths were open to me."

That path became more clear when Wynn took the Electric Vehicles class taught by Don Cox, a visiting professor of Electrical Engineering. Cox, who used to live not far from Tesla's factory in Fremont, California, owns two Tesla vehicles that he lets his students test drive.

Wynn said that class helped to reawaken his love of working on cars.

"I didn't know whether I wanted to be an electrical engineer or a mechanical engineer. I took Dr. Cox's class and that got me interested in combining the two fields," Wynn said.

Wynn accepted a summer 2014 internship at Polaris Industries, where he worked as a system engineer in the small vehicles division. His focus was on suspension and brake systems.

While testing vehicles on a track, Wynn got the call he never expected.

On the other end was a Tesla executive who offered Wynn an internship that would last through the fall semester. After informing his family and his fiancée that he'd be taking one semester longer to graduate, Wynn accepted the offer and headed to California.

"I think Tesla was more impressed with the research and development I did," Wynn said. "They make automobiles, first, but they are powered by electrical systems and it helps to have that knowledge."

Wynn's work at Tesla gave him experience in a burgeoning field within the American automotive industry – craftsmanship. Essentially, it's engineers working on all design aspects of the car to improve a consumer's subconscious impression of a car through sight, touch and smell. It's something Wynn said European giants like Rolls Royce, Bentley and Mercedes Benz have been doing for decades.

After four months as an intern, Wynn knew he wanted his immediate future to be at Tesla. And Tesla wanted Wynn, too. Before leaving, Wynn worked out a plan with Tesla that will have him working an internship this coming summer and he hopes to return as a full-time employee after he finishes his bachelor's degree at UNL.

"With this internship experience, I could probably work for almost any automaker. The future innovation in the industry will be with electric power," Wynn said.
With an 8.5 percent growth in first-year student enrollment this semester, one might expect it to be easy for students to get lost wandering the halls of Nebraska Engineering’s facilities.

The College of Engineering, however, has put new classes, programs and people in place to give students both a top-notch education and a foundation that will make them more well-rounded engineers in today’s professional world.

“We are getting more help for students and faculty and it’s of a high quality. We are getting professionals who are engaged and that’s a big difference,” said David Jones, associate dean for undergraduate studies. “We would not be seeing this transition if not for the professionalism of the folks coming on board.

“We’re doing this because we want our students to be successful and well-rounded, complete engineers and people. But particularly at the early level, we want them to be good consumers of their academic environment, and that includes the academics and the industries and companies we have through here on a regular basis. If we have students locked in their dorm rooms playing video games, they are the ones missing out. They can do that anywhere else at any other time. There is so much for them to take advantage of here and turn this into a launching pad for the rest of their life.”

The molding of future engineers begins with a new sequence of four classes that emphasize essential non-technical skills beneficial in the professional world.

Before reaching their senior-year capstone class, students can take three classes that will help them learn to set personal and professional goals, to function in team settings and to take leadership roles.
“We want them to be good consumers of the opportunities around them,” Jones said. “That goes back to that first-year course, knowing what their values, goals and plans are so we can help them with those choices.”

To help keep students on track, advisers from Engineering Student Services in both Lincoln and Omaha will have access to the goals students set in the freshman-year class. Jones said it’s more than integrating the academic and advisory roles of the college.

“We’re going to promote our ideal that ‘Your Success Matters.’ One of the things that’s new on the list is that we’re modernizing our advising. We want to get students with the people who have the right information,” Jones said. “To that end, we’re using more professional advisers for many of our programs.”

With the increase in student enrollment comes a need to increase the staff who support and advise those students.

“We put a career services coordinator, Jen Skidmore, in Omaha, and it’s making a big difference,” Jones said. “Before we had one person in Omaha – Alma Ramirez-Rodgers. She would do everything, but she was spread so thin she couldn’t focus on any one thing. Now, people have a little more bandwidth to have more of an impact.”

In Lincoln, Engineering Student Services shares space with the Engineering Library on the second floor of Nebraska Hall, where a special glass-walled room, funded by Olsson Associates, has been constructed to be both a gathering place for students and a meeting room for student organizations.

A plan to upgrade classrooms and commons areas has begun, including installing modernized seating areas in Othmer Hall featuring booths and benches with imbedded electrical outlets to allow students continued use of computers and other electronic devices.

“The real theme is we are here to serve, and in this case serve our students,” Jones said. “We’re always in constant upgrade mode with facilities, tools and equipment and opportunities. That’s what you see in the library.”

An increase in engineering learning communities, Jones said, is another part of the college’s plan to support students and give them a foundation for their entire collegiate experience.

Focused at the freshman level, learning communities bring students together in both academic and living environments. They live in the same dormitories and are grouped together in most of their classes, including those outside the college.

Faculty members join learning community students in cocurricular and extracurricular activities, Jones said.

“Learning communities have a long history, but the newness here is the sharpness and the functionality of the program,” Jones said. “This has been much more purposeful with structure. There are outcomes we are looking for.

“We want our students to understand that it is their job as well. We do not create engineers just so they can go off and be rich. We create engineers so they can serve others. That’s part of the message that we want them to readily identify with.”
Building Better Engineers

New sequence of classes teaches students essential non-technical skills to help them become well-rounded professionals.

Molding the next generation of engineers has been the goal of every engineering college.

Industry executives, however, are saying that while recent engineering graduates have the technical knowledge and experience to do the work, they often don’t have those “softer” skills needed to thrive in the workplace.

The College of Engineering began to address that need in the fall semester with the debut of a sequence of four classes that teach students many of the non-engineering skills they need to become successful engineers.

Those skills have long been popular buzzwords in the workplace – such as self-awareness, teamwork, leadership and entrepreneurship. David Jones, associate dean of undergraduate programs, said those handle too narrow the focus too much.

“When Dean (Tim) Wei and I were talking about this, we had a list of about 300 things we felt were important, so we called it ‘Leadership 300.’ That was confusing because everyone thought it was a 300-level class,” Jones said. “Now we call it the essential non-technical skills. That sounds rudimentary and basic, and it is, but that’s intentional.”

The sequence has become necessary, Jones said, to help Nebraska Engineering deliver on its mission to give back to the state and the world by producing well-rounded engineers.

“Undergraduate students are what we deliver to society and, quite candidly, if all we do is keep our talents, skills and gifts in academia, then we fail society,” Jones said. “The students of today are so talented academically, much more than I ever was. They come to college thinking they know how to do these things, but when they try to put it into practice there’s really a gap between what they know and what they think they know.”

The first class – a freshman-level course called Engineering 100 – is designed to help students focus on their personal goals and values, as well as professional and personal objectives.

“We want them to be able to lead themselves because the hardest person in the world to lead is yourself,” Jones said.

To accomplish that, Carmen Zafft was hired to teach Interpersonal Skills for Leadership. A sister course to ALEC 102, which has been offered for more than 40 years, the curriculum focuses on creating the foundations for leadership through the development of interpersonal skills.

Zafft, associate professor of practice in collaboration between the College of Engineering and ALEC (agricultural leadership, education and communication), is teaching two sections and oversees 12 lab sections. She said her goal isn't to produce successful engineers, but rather to develop students who can become successful people.

“Leaders are not born, they are made, and everyone has the potential to lead,” Zafft said. “My class isn't too concerned about what they (students)
do professionally. That’s the other classes in this curriculum. That’s their focus. Let’s just first figure out who you are and how you can best communicate and how that’s going to influence you the rest of your time here.”

On this path to self-awareness, students must participate in service-learning projects, write two journals about their experiences and, for the final, create their own personal leadership philosophy. Through this, Zafft said, students not only come to realize their own goals but become better students by finding a path to achieving their goals, even if that doesn’t include becoming an engineer.

“What’s going really well is having a class that they perceive deals with real-life issues. They can be a little disconnected with calculus, chemistry or physics because those tend to be very analytical and quantitative, and they have to get through that to progress toward their degree,” Zafft said. “This class becomes a place where they’re able to let their guard down and be themselves – be honest about the good and bad about what’s going on in their lives and their experiences on campus.”

Jones said the college plans to offer expanded support based on the goals, values and objectives identified by each student.

“That is translated to our advisers, so they are better able to interact with students in impactful ways,” Jones said. “We envision it more as a coaching scenario to get students to the right co-curricular and extracurricular activities, including but not limited to student organizations, research experience, internships and co-ops.”

The sophomore-level course, Engineering 200, is about functioning within the framework of a team. The junior-level course, Engineering 320, builds on teamwork skills to teach students how to be leaders.

Karen Stelling, a 1987 UNL mechanical engineering graduate and a former vice president of Burns & McDonnell’s aviation and facilities division in Kansas City, Missouri, was hired to help develop the two middle classes in this sequence.

Being a professional engineer for 25 years, Stelling said, she could understand the industry as a whole calling for graduating engineers to be better prepared for real-world working environments.

“Based on my experiences, even though you hear students need to learn how to lead, what we also heard was that first they need to learn how to be good team members,” said Stelling, professor of practice in mechanical and materials engineering. “Very often we expect people to know how to lead or be good team members, but we don’t teach them how to do it.

“To me, the logic was, if the freshman course is self-awareness, the next logical step is learning teamwork skills, then the next logical step is the leadership, project management, ethics piece and then the capstone.”

After teaching a senior ethics course last year, Stelling is now immersed in this curriculum. She teaches sections of Engineering 200 in Lincoln and Omaha and is preparing for the debut of the junior-level class.

In the sophomore class, students learn about how to function in teams by regularly working as teams.

“It’s easy to spend a class lecturing, but it’s a lot more difficult to come up with meaningful team-based activities to get the ideas to stick,” Stelling said. “I have had a strong focus on trying to have at least one team-based activity, if not more, every class period to give them the opportunity to practice.”

The other topics addressed include workplace expectations and learning how to work within the frameworks of sustainability and etiquette, both in the U.S. and abroad.

But, Stelling said, one of the most important skills being taught is how to deal with conflict and adverse situations.

“We go through the dysfunctions of a team and what those norms are, and we also go through crucial conversations,” Stelling said. “One of my favorite things is looking at how to have uncomfortable conversations in a constructive way, rather than avoiding them. The chronic problems in organizations happen when those conversations aren’t happening, and you can have a great deal of influence if you can handle that well.”

The junior-level course, which will be offered for the first time in the fall of 2015, will focus on leadership, management and ethics. Stelling said many engineering graduates, regardless of what school they are from, are not equipped for those demands in the workplace.

So, in addition to learning the basics of scheduling, estimating, budgeting and contracts, students will also look at risk management and ethical challenges.

“We’ll be going through case studies to help them see that every day there are ethical challenges you may not think you are touched by. Every day there are small challenges, and in engineering, sometimes there can be some really big ones. When deadlines are tough and when you’re trying to get things done and the budget is tight, there can be some unexpected challenges. How do you respond?”

Finally, the senior-level capstone course, Jones said, gives students “the venue to actually exercise all of what they’ve learned throughout their college careers.”

The next steps taken by the college in this curriculum, Jones said, will be revamping the capstone course and likely creating a certificate program to recognize students who have taken all four courses.
With enrollment numbers climbing and the reach of the college expanding, the fundamental missions of the college— as outlined by Dean Timothy Wei—gain added importance: “serving students, the state, and society as a whole.”

The focus of this issue is on student success. Important to that goal are the many faculty members who are creating and enhancing student experiences.

Department chairs were asked to suggest faculty who have unusual impacts on their students. We expected to be regaled with tales of teachers who have popular classes or unusual approaches to teaching, who present unique research opportunities for students and who impart valuable knowledge with their work outside the classroom.

The responses were all that and more. An email from Jeff Shield, department chair of mechanical and materials engineering, stood out despite being only nine words:

“Professor Szydlowski may be the most interesting man alive.”

I considered it a challenge to meet this man and find something to make Dr. Shield’s assertion stand up.

Only a few minutes after knocking on the door to his Nebraska Hall office, Wieslaw Szydlowski had me on the edge of my seat, weaving tales seemingly straight out of a Hollywood producer’s office:

- Growing up in Poland and narrowly escaping death during World War II when a Soviet bomb destroyed his childhood home.
- Longing to become an artist and turning to engineering only after having that dream dashed.
- Becoming one of Poland’s first champion bodybuilders.
- Living through cold-war intrigue that could rival the suspense on TV’s “The Americans.”
- Enduring plenty of personal and professional struggles.

After hours of him talking and me mostly listening, the 77-year-old associate professor sighed, leaned back in his chair, slid the bifocals off his nose and rubbed his forehead.

“I don’t know why anyone would want to write about me,” he said. “I’m almost 50 years in teaching. I’m not that interesting. I don’t do anything unusual.”
There's no doubt that Szydlowski teaches some of the most popular classes among MME students, but this is not a recent development. From his start as a teaching assistant at Technical University of Warsaw, Szydlowski has been well-liked.

"To do anything well you have to have many things that happen. You must have a model and you know what a good teacher looks like. I was very lucky. My role model was my professor from the university in Poland," Szydlowski said.

Szydlowski was looking for a graduate degree and accepted the professor's offer of employment for the 6½-year master's program in aeronautical engineering. During that time Szydlowski learned the discipline of preparation he carries through to this day.

"That was a very tough thing for me because he requested for me to be at every lecture that he gives so I would know what he would talk about and I could answer students' questions. What was worse, I had to take all the quizzes and examinations with the students," Szydlowski said.

"I was never working harder on the material and on statistics and at the same time I would watch how he teaches and I thought 'This is really wonderful. He prepares it so well.' He would tell me, 'You know, I don't come to the class and I know everything. For every hour I spend in the class for a lecture, I spend four or five hours before in preparation.'"

In these classes, Szydlowski developed a predilection for creating the materials for classes he teaches – this time out of necessity.

"When I was a student he was teaching the theory of machines and mechanisms and I had my notes, we didn't have any books at that time. It was the 1950s, it was aeronautical engineering and there were no books on the design of engines," Szydlowski said.

Though in the middle of a communist nation in the 1970s, the students at Technical University exercised a form of Western democracy by voting for the best teachers on campus. In both of the last two years before he first came to the United States, Szydlowski was the clear winner.

The popular teacher also caught the eye of a visiting engineering professor from the University of Nebraska – J.R. Baumgarten, who while working in Poland on a National Science Foundation grant in 1975, suggested that Szydlowski come to Lincoln to teach the classes Baumgarten would be missing.

"I was finishing my Ph.D. at the time and I didn't want to go because I think I don't speak English very well," Szydlowski said. "In Poland, only communists were traveling to the West. I didn't want to, but Prof. Baumgarten's wife was pushing on my wife that this is really an opportunity of lifestyle.

"For one semester here, I could earn enough to go back to Poland and buy a large lot of land and a house and still have some for a car. It convinced me that this, it is a material thing but it won't be repeated."

Szydlowski came for the fall semester of 1975 and, by his own admission, "performed well." When his visa expired and it came time to leave for Poland, Nebraska engineering students did their best to keep "Dr. Syd" in Lincoln.

"I had terrible problems with immigration. They didn't want to give me a green card," Szydlowski said. "The students started collecting signatures, I didn't even know about it then, that they wanted me to stay. They collected 500 signatures and immigration didn't want them, so I had to leave."

Szydlowski returned to UNL in 1981, and his appointment was not without more politically charged drama.

The night before leaving Poland, Szydlowski was contacted by a member of the Polish secret police, who urgently pressed for a meeting.

"It was almost like in a movie – rainy, dark, 11 o'clock at night and the café was the one place open for blocks," Szydlowski said.

"I was nervous that he would tell me I cannot go. But, he said he only came to warn me that the Americans would try to make me a spy," Szydlowski said. "I never saw him again."

A few years later, Szydlowski received a series of letters from Poland, asking him to procure a list of electronic parts that would somehow be smuggled out of the U.S. An FBI agent visited Szydlowski in the next couple of days and asked if he had been contacted by anyone from Poland. Szydlowski denied knowing anything.

Worried about being arrested, Szydlowski told his department chair what had happened. He heeded his chair's advice and told the FBI about the letters.

The next day, the Polish government told Szydlowski he was to return home immediately. It was something he wasn't certain he could bring himself to do. The timing turned out to be serendipitous.

"I decided that I would stay here as long as I could and see. It looked like communism was collapsing, it was in a very sickly state," Szydlowski said. "Immigration told me to call the Polish consulate and ask them to let me stay. I didn't know that there was a purge of
Professor Shield counts himself one of Szydlowski’s legion of fans, and he said enrollment numbers are a good way to measure the esteem that students have for “Dr. Syd.”

“As far as student evaluations go, he’s always one of the highest-rated teachers we have,” Shield said. “He’s always been popular with the students because he’s an effective teacher.

“In fall of 2008, the rumor among the students was that he was taking the buyout and retiring and that the spring would be his last semester,” Shield said. “Usually our elective classes have enrollments of about 20 students. He had over 40 in his elective class that spring because all the students thought it was the last chance to take a class from Syd.”

Because he no longer does research, Szydlowski has taken on a large teaching workload. This past fall, he taught six sections of classes, one of the heaviest workloads among UNL engineering faculty.

“He’s been teaching a kinematics lab forever. When a lot of faculty who are in charge of the lab will use TAs to cover the sections, he teaches the sections,” Shield said. “His contact hours in a week with students have got to be close to 20 hours a week, which is huge for a faculty member. And that doesn’t count office hours, that’s in the classroom or the lab.”

Szydlowski acknowledges the amount of teaching work he does is a heavy load and said his family has said he should cut back.

“The weekends, it’s non-stop. I have 120 students and I grade everything,” Szydlowski said. “Sometimes I put them in stacks of three, three, three.” Szydlowski said, leaning over his desk and using his hands to show how he sorts papers. “I take three and listen to music. Take three and have a cup of coffee…”

The rest of his work outside the classroom is spent preparing for lectures. That includes spending hours organizing each daily lecture, from deciding what material to cover to which stories to tell to drive his points home.

“They call me a storyteller, but I do it with a purpose,” Szydlowski said. “These stories cannot be about just anything. They must have a moral, a point that pertains to the subject.”

And while Szydlowski certainly has plenty of stories to tell his students, it’s the materials he utilizes in his classes that set him apart from many of his teaching colleagues and create lasting and endearing relationships with his students.

Instead of relying solely on mass-produced textbooks, Szydlowski has prepared nearly all of the instructive materials for the 10 different courses he has been called to teach. For each class, there is a huge, three-ring binder filled with hundreds of sheets of paper. These sheets are arranged much like a standard textbook, with chapters, text and subtitles and replete with his custom, hand-drawn illustrations.

“When I draw on the screen or on the board at the front of the room, they see the progression and they have time to draw it themselves and they understand much better.”

The connection between the teacher and his former students isn’t confined to the classroom or the lab. Szydlowski said the most gratifying part of his 30-plus years at UNL is not the many teaching awards and honors he has received; rather, it is hearing how much his classes have meant to his students.

“Such is the life of an instructor – usually there is nothing tangible to show the effect of your work, but I know that the students are somewhere and they function very well and their life is happy,” Szydlowski said.

“There is one guy, I forgot about him until one year at Christmas he sends me a package from the United Kingdom. He said he thinks about how much my classes have helped him since he graduated and sent me a pudding. I haven’t seen him in 15 years, but every Christmas the pudding is here.”

Those connections are part of the reason Szydlowski keeps teaching and keeps himself in excellent condition. The septuagenarian has a daily exercise regimen that includes lifting weights, something he’s done since his bodybuilding days, and he doesn’t smoke or drink alcohol.

That vibrancy resonates with his students.

“Even when he was in his 60s, students would come up after he graded a test and ask if he could give them a few more points or a better grade,” Shield said. “So he would say, ‘If you could beat me arm wrestling, I’ll give you the points.’

“They never beat him.”

Recently, when another university buyout was offered, Szydlowski gave serious thought to retiring. But not being able to interact with students proved to be the deciding factor in his staying.

“I’m coming to the dusk of my professional life, but I don’t want to make that choice,” Szydlowski said. “I belong to this environment. This is my identity. This is something I like, something that is contributing to other people.”

Instead of retiring, Szydlowski is carrying another daunting load of classes for the spring and summer semesters.

Shield said he’s thankful that Szydlowski stayed on and is grateful he will be on the faculty for the foreseeable future.

Szydlowski, too, appreciates the opportunity to keep teaching.

“In Poland, there’s a curse, ‘May you teach other people’s children,’” he said. “For me, I don’t see teaching as a curse. Being with young people gives you that vitality, helps you to live longer, feel younger.”
In some college classes, students can easily feel stressed with heavy workloads, complex subjects and rigorous tests and quizzes.

One bad score and you might Press Your Luck and put a whole semester’s grade-point average in Jeopardy.

That’s why Durham School associate professor of architectural engineering Terri Norton uses easily recognizable games, such as the formats from television game shows and carnival contests, as teaching platforms for her structural dynamics classes.

“It’s a conscious effort. I do problems that are in the textbook, but I want to make it more practical,” said Norton. “Dynamics can be a complicated subject when you think about all the principles of classical mechanics, but if you can relate it to something you’re used to, that makes it easier to learn. That’s what I try to do in my class. Sometimes we play games, like Press Your Luck or a Dynamics Jeopardy to prepare for a test.”

The lower pressure felt in the class, Norton said, helps keep her students involved and interested. The idea for developing carnival games grew from resource materials that Norton uses in her class.

“We were studying collision impacts and I was showing them the games with the hammer. I showed a video of someone who wins all the time at carnival games and he was showing all the tricks behind winning. We talked about projectile motion as it pertains to the ball toss,” Norton said. “It kept coming back, so I thought we should do something like that for our project because it would allow them to think about dynamics and have fun.”

Last spring, Norton split the students in both sections of her dynamics class into teams, which picked from a list of carnival games Norton provided – among them: Skee Ball, Putt N Win, High Striker, Ring Toss and Swing Bowling.

The teams then learn the principles of dynamics by learning how the games work, explaining the dynamics at play in the game and the best strategies for winning.

“If they were using this High Striker game, they had to explain how much force the hammer has to apply to the surface for the impact, how far or how fast the collar moves before it hits the bell,” Norton said. “If they did a pinball machine, they had to talk about the impact of the levers, about how the ball would travel around the game.”

When the projects were completed, Norton’s classes made carnival games and set up a makeshift Midway in the atrium at The Peter Kiewit Institute in Omaha and invited the faculty, staff and students to play the games.

The event was so well-received that Norton is looking to expand on it in the spring semester of 2015.

“We got so many good reviews from the carnival that I want to make it a little bigger this year,” Norton said. “Since I have two sections, maybe I can reserve our big event space and try to do all the projects on one day and encourage the whole college to participate. We can also invite folks from outside the College of Engineering to play.”

Norton’s students learn structural dynamics are not a game, but still can be fun.
Melander putting children at forefront of engineering education

By her own estimation, a lot of Jenny Melander’s work day is focused on her kids.

Nearly 80 percent of the time, those kids are K-12 students from across the state. Melander, assistant professor of biological systems engineering, reaches out in her role as a science literacy expert through Nebraska Extension.

In the other 20 percent of her job, Melander teaches current Nebraska Engineering students some of the basics of the profession of biological systems engineering.

Running through both aspects of her work is also teaching both sets of students the importance of learning life lessons and having fun along the way.

“One of the things I talk about with K-12 teachers, one of the biggest reasons that their students should be doing engineering, is that it gives us a way to celebrate creativity and failure,” Melander said. “That sounds weird, but being able to help kids learn to accept failure and learn from it is a good thing. Along with creative thinking, valuing failure is a huge part of engineering.”

Her work with young students includes problem solving through robotics, building with Legos and creating their own wearable technologies.

“We’ve really focused on the fourth-to-sixth grade range, kind of late elementary-early middle school,” Melander said. “That’s where the research shows you have to be catching these kids early so they get those technical paths in high school so they can follow into the technology fields.”

To help reach in younger children, Melander has involved the students in her Introduction to Biomedical Engineering (BSEN 317) class at UNL.

Working with Krista Adams, assistant professor of Teaching, Learning and Teacher Education, Melander breaks up her class into teams that work in Lincoln Public Schools’ 21st Century CLCs (Community Learning Centers). The focus is on after-school programs for children of lower socioeconomic backgrounds.

Melander said her UNL students teach science and engineering to the kids and learn many important lessons.

The 40 or so students who pack into a medium-sized classroom in Chase Hall also get a one-semester overview of the biomedical engineering field and how enjoyable an engineer’s work can be.

“It’s a junior-level survey class, but it’s a fun class. It’s cool,” Melander said. “Typically, the kids like it because we do field trips around town to places like Nebraska Heart Hospital, and we bring in lots of guest speakers to give a real-life perspective.”

“I think students learn more when they enjoy themselves and when they know what they’re doing really does matter,” Melander said. “I think there’s a mix on them seeing the benefits. We’re not always going to communicate with just engineers or management or clients and patients. Engineers solve problems and make the world better.”
Khalid Sayood enjoys leading teams that are doing detective work, just not the glamorous investigations you might see on a TV drama or the process that leads to closing a cold case.

Instead, the students working in Sayood’s Occult Information Lab are using data compression to pore through large and varied databases in hopes of solving many of the world’s problems.

In doing that, Sayood has opened up horizons for those students – many of them undergraduates – by offering unique, individualized research opportunities.

“I don’t put them in a typical lab. Most labs take undergraduates and add them to an existing project. I want them to do individual work, so it’s their project that they’re doing the work on,” said Sayood, Heins Professor of Electrical Engineering. “They might work with somebody, but they’re not cogs in the machine. I like them to have more ownership in what they’re doing.”

The work the students are doing encompasses many different disciplines, and the research is often part of other projects that require specialized attention.

“They’ll have a question, not necessarily an entire project but a question. How does this relate to this? We can do that pretty rapidly for them,” Sayood said. “It gives us connections with other people in other parts of the university and introduces students to the research process by giving us projects these students can do and that are useful for the researchers.”

These individualized research projects are shorter-term, Sayood said, allowing students to quickly meet their goals and gain valuable experience.

Garin Newcomb, who soon will graduate with an electrical engineering degree, has been working with Audrey Atkin, associate professor of biological sciences, on a project to document the DNA sequences of yeast. He said the opportunity to do individualized research might be an advantage when applying to graduate programs.

“I know more about the specifics of this project than anyone. Having that much responsibility to myself, I think it suits me well,” Newcomb said. “I have a leg up on other applicants in terms of being able to apply different ideas, approach things from different ways and understand and communicate better with a wide range of people.”

Austin Riffle, a fifth-year electrical engineering student, is working with an algorithm that will eliminate redundancies in DNA data to decrease the size of stored files. This individualized project is the first foray into research for Riffle, who plans to enter the work force after graduating in May.

“Immediately, this looks amazing on a resume. I will have published data that says I did this. I took on this huge project, broke it down into small pieces and figured it out,” Riffle said. “Even if you don’t use this research to help you get more projects or grad school, it’s still something for an employer to look at and say, ‘You’ve done something pretty amazing.’”

This all creates a world of opportunities that Sayood said too many undergraduates don’t get to experience.

“It’s a good, good thing, and it’s a direction that we should go,” Sayood said. “What I’d like to do is focus more on our undergraduates. Giving them opportunities to do research like this is a form of education that can be so valuable to the whole undergraduate experience.”
Lisa Gilmore has an army of robots at her disposal, and the associate professor of practice in Electrical and Computer Engineering never has to worry about finding recruits to program them.

Because the mobile robotics class she teaches at the college’s Omaha campus builds on the training that students receive in their freshman-year curriculum, it has become a popular elective and reaches enrollment limits quickly.

“It’s an elective for our program, and it fills up fast. We are supposed to have 15 students, but we go up to 20 sometimes,” Gilmore said. “It’s a junior-level class, but since seniors register first it inevitably fills up with seniors, and a lot of students who want to take the class can’t get in.”

“Last year, we added a CMU (Carnegie-Mellon University) camera, a self-contained vision system that you can interact with and train to see certain colors. Based on those colors, students program commands to the motors to move the robot in response to where the colors are in the environment,” Gilmore said.

Mobile robotics students design an intelligent agent architecture called behavior-based programming and program the robot to do more advanced tasks than encountered in earlier classes, Gilmore said. That includes making the robots “think” and make decisions based on data received from sensors.

In a lab, students assemble the robots, choosing from a large suite of sensors – infrared, ultrasonic, light-detecting, to name a few. The robots are then programmed to behave in a certain manner, such as following a line, going toward or avoiding a light, or following a moving shadow.

“The students build off the same platform they receive freshman year in the CEENBoT™ program. We encourage them to push the envelope by giving them a foundation in mobile robotics history, architecture and new technologies, so they can later apply many of those concepts outside the classroom,” Gilmore said.

“Even though they’re thrown into the picture the last two days of the event, most of our students get a lot out of being there and seeing the younger kids. There’s not a lot of training for this, but that’s a good preparation for real life because you don’t always have training,” Gilmore said.

Gilmore, who previously worked as a control systems engineer in a factory, hadn’t worked in robotics before joining the faculty, but had experience with many of the components. Now, she’s seeing how the robots are a valuable teaching tool.

“I love to learn, and I love to teach,” Gilmore said. “The expo is where it comes together. It’s not geared to be a gender-specific event, but we’re starting to get more girls, sometimes full teams of girls, and they’re getting awards and getting excited. The great thing is it gets students who have different interests an entry into STEM fields. That, ultimately, is what this is all about.”
Curtis Tomasevicz relishes the athletic career that took him from his small hometown of Shelby, Nebraska, to playing football for the Huskers and, finally, to Olympic glory.

But after earning a bronze medal at the 2014 Winter Olympics in Sochi as part of the U.S. four-man bobsled team, Tomasevicz began looking forward to the next chapter of his life.

“In the back of my mind, I knew I was done after last February,” Tomasevicz said. “I didn’t know whether I wanted to get a full-time job or work on my Ph.D. I thought, maybe, I’d do some coaching: bobsled or even football.”

That search, however, took an unexpected turn and led Tomasevicz back to another home, the College of Engineering, where he received bachelor and master’s degrees in electrical engineering in 2003 and 2006. Tomasevicz has joined the faculty as a full-time lecturer and, starting in January, is teaching a new introductory engineering class (BSEN 492, Intro to Engineering: Athletics) that he and David Jones, associate dean for undergraduate programs, have developed.

Despite the senior-level number, Jones said the class is targeted to first-year engineering students.

“The real meat of it is that we want to get these freshmen to be sophomore engineers,” Jones said. “To do that they need to have the skills, habits and practices that engineers have and we want to make sure they get that as soon as they get here so they can use that skill set and be successful in their classes.”

Jones said this class addresses a need for the college – a way to teach the fundamentals of engineering to new students to prepare them for a college career and the professional world.

“I want our freshmen, through this class, to learn how to be more receptive to everything that’s going to come,” Jones said. “They also need a baseline skills set and habits in the engineering problem-solving process and interpretation of data. We need to make sure they get that very foundation, for whatever their future holds. It transcends all majors.”

Olympic bobsled medalist Tomasevicz returns to UNL to teach new class, pursue doctorate

The class introduces students to the basics of engineering and touch on all disciplines offered at UNL, but it is presented with a focus that draws on Tomasevicz’s unique strengths and experiences.

“The college really wants an introductory class that teaches critical thinking concepts, basic engineering and problem-solving techniques that will help them improve as students and, later on, become quality engineers,” Tomasevicz said. “From a student’s perspective, the hook of the class is that everything we do is based on sports and athletics – real-world applications, in that sense.”

Tomasevicz knows those applications firsthand. He used his education to help USA Bobsledding and its engineers develop some of the fastest sleds in the world.

“I was in kind of a unique situation. That was my full-time job, being an athlete, but you know, we need to have the best equipment on the track to be competitive,” he said. “Our bobsled engineers are not athletes. They’ve never been in the sport much, so they rely on our feedback and our ideas. I was able to approach that feedback with an engineer’s perspective. I think a big part of what I did for the last 10 years was to use engineering to help us win.”

To reinforce that perspective, one of the many guest speakers coming to the class will be USA Bobsledding engineer Bob Cuneo.

Students also take field trips, including to the weight room at Memorial Stadium where cutting-edge EliteForm software is employed. Nate Lowry, a UNL alumnus and code writer for Nebraska Global, helped develop the program that employs video recordings and sensors to record multiple types of data that Husker strength-training coaches use to assess the progress of football players.

Tomasevicz didn’t expect to be on this path and he doesn’t know where it will lead him, but for now he’s happy to be back home.

“I’ll be getting my Ph.D. in the area that I’m also going to be teaching, something related to sports and engineering,” Tomasevicz said. “Like it has been this summer in developing the introductory class, we’ve been working out the details. I guess you could say I’m still a work in progress.”
Jim Goedert wasn’t expecting to make much of a difference for the people who live on the mountains outside of Hinche, Haiti, when he made his first trip there in 2009. The professor of architectural engineering had been asked by his wife, Martha Hoffman Goedert, to join her on one of her many trips to help the Haitian people improve their healthcare through Midwives for Haiti.

“I didn’t have a preconceived notion of what I could do,” Jim Goedert said. “My construction skills are better than my engineering skills, so it’s pretty easy to find something to do to help people. I could fix almost anything if I have the tools and parts, so I figured I’d go with Martha and just piddle around.”

But Jim got more than he expected.
I installed a solar water pump for an orphanage. They had the pumps but didn’t know how to install them,” Jim said. “I was helping around with things like that, but then we started getting involved with the people and, like Martha, I fell in love with them and knew that this wasn’t going to be my last trip.”

In the five years since, the Goederts have helped to improve the lives of the people who live in an impoverished region and forged relationships that keep them longing for their next trip to the tiny Caribbean nation.

Martha, who has a doctorate in health education and is working for UNMC’s College of Public Health. In 2005, she began working with Midwives for Haiti, which tries to improve prenatal care for pregnant women and decrease one of the world’s highest infant-mortality rates.

She had convinced James to join her on a trip to Haiti in 2009, but that was before a series of earthquakes – the first and biggest registering at 7.0 on the Richter scale – devastated the nation.

More than 50,000 people died, most of them from injuries received when poorly constructed buildings were leveled by the quakes. The Haitian government, which has no building codes, estimated that the quakes severely damaged or demolished at least 250,000 residences and 30,000 commercial structures.

Complicating matters was a prolonged drought that hit the region and made the growing of food and starvation even more prevalent.

After arriving in Hinche, Jim quickly experienced how difficult life is for the mountain people.

“They took us 12 miles outside of town, and we had to drive through two rivers. Not over and not across the rivers, through them,” Jim said. “Then we get out and start walking, three miles through this gorgeous land to get to the school.”

“It’s rough, but the children had to make this walk every day.”

SEE MORE PHOTOS AT ENGINEERING.UNL.EDU/EMGMAG/

Their interpreters, Theard and Manno, had built the three-room Flower of Hope School, which was far enough from the epicenter to survive the earthquakes but was in rough shape.

Jim was asked to help figure a way for the school to provide water for the children and teachers. That was the beginning of a school construction project, which included the recruitment of the Goederts’ friends, colleagues and acquaintances.

When the Goederts returned in 2011, Flower of Hope had a building partially constructed with a rainwater harvesting system installed.

The first building needed secure doors to protect the food donated to the school by the World Food Program. Members of a Knights of Columbus council (including UNO construction engineering technology graduate Mike Downey) raised funds for the project through their church and provided doors that had been salvaged from a renovated Catholic church in Omaha. The team also built a composting latrine and left enough money to construct a kitchen.

UNL architecture graduate Christopher Lander worked up the conceptual plans for the addition of three rooms. Martin Janousek and Adam Andrews from Leo A. Daly led a team that completed the design and construction drawings.

An alternative to the typical concrete roof design was needed. Jim, with help from structural engineers at Leo A. Daly, devised a wood joist system that could be fabricated on site. Since they had never before built anything like this, the Goederts returned over Christmas break in 2013 to construct the roof. They each brought two bags filled to the 50-pound maximum with screws, glue, saws, and connectors.

Except for plastering the walls, construction on the classrooms is complete, but by no means are the Goederts ready to slow down. They have plans for more projects at Flower of Hope, including building four more classrooms, finding ways to help the school be more self-sustaining in creating energy and developing a small fish farm that would provide more protein to the children’s diet.

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“Being as how we’re both educators, we’d like to get some Nebraska students involved – the construction kids, the farm kids, the kids who work in their family businesses and know what hard work is and are open to experiencing other cultures,” Martha said.

And for Jim, the work continues to be a labor of love and something he not only looks forward to doing, but also, he said, something he needs to do.

“Meeting the people and doing all of this is good for my soul. It lifts me up. It’s why I’ve gotten hooked,” Jim said. “People think I go down there (to Haiti) to help others, but part of it is self-serving in that going there fills my soul. I don’t think anyone could go there and not have it change their life.”

The old school had a room with dirt floors and planks of wood for walls.

The new Flower of Hope School features a classroom with concrete walls and floors.
Engineering alumni forge 50-year friendship in Section 17

Jerry Miller and Tom Hamer have shared much in the last 50 years – they've seen each other's families grow with the births of children and grandchildren and swapped a few stories about their careers and their days as College of Engineering students.

And every time they meet, they do so in the very same place: Memorial Stadium, Section 17, Row 67 – Jerry in Seat 2 and Tom to his left in Seat 3.

When the Nebraska football team played Purdue on Saturday, Nov. 1, it marked the 331st Husker home game since Miller and Hamer first sat together.

The Huskers' 56-0 shellacking of South Dakota on Sept. 19, 1964 marked the unveiling of the first expansion of Memorial Stadium since it opened in 1923. The addition of 17,000 seats in the new South Stadium turned Nebraska's football home into a 48,000-seat venue.

It was also the day Miller and Hamer met.

“We picked out the seats we wanted independent of each other,” said Hamer, a 1963 agricultural engineering graduate, who lives in Tecumseh. “I went down to the ticket office and looked at the new seats. I wanted to sit in the very back row, which Row 67 was at the time. That way we could get up, walk around and not be in anybody's way.”

Miller, who earned a civil engineering degree in 1960, said he had no idea his decision to purchase football tickets would also provide him a lifelong friendship.

“Didn't think about it much in 1964,” said Miller, who is from Lincoln. “Bob Devaney had just come and Nebraska football just took off. We really didn't know what was going to happen in the future, let alone two years in. That's where I met Tom and we found out we were both engineers and both graduated from the college.”

At almost every home game since, the two engineers have reconnected in Section 17.

Hamer claims to have been to “almost all of them” and Miller says he missed only three, including one for his grandson's wedding.

“He claimed it was an open date when they planned the wedding, then they filled it in with Idaho,” Miller said. “He's still in my will.”

For eight years, they were together in the very top row of the South Stadium. Both remember putting blankets and tarps across a chain-link fence to break the cold October and November winds. Then in 1972, another 31 rows were added behind them, eliminating the need for makeshift shelter.

Through it all, they've weathered the highs and lows of the Husker football program. There were five national championship teams, three Heisman Trophy-winning players (Miller says Johnny Rodgers is the “best player I've ever seen on that field”) and the disappointment of down years under Devaney and Bill Callahan and the heartbreaking losses to Oklahoma in the 1970s.

For most of games, Miller’s wife, Alfreida, was in Seat 1 on the aisle and Hamer's wife, Karen, was in Seat 4. But it was always Jerry and Tom in the middle.

They are such a fixture in the South Stadium that they were in a poster commemorating the Huskers’ 200th consecutive home sellout. Hamer’s hat was easy to spot.

“We've got a picture upstairs from that game, and we're in the lower right-hand corner,” Hamer said. “You can see the back of our heads. I've got a duster on, so I kind of stick out there.”

But through it all, Miller and Hamer are there to the end of every game.

“We're not fair-weather fans. Neither of us has left a game early,” Miller said. “When I take my grandkids, I tell them we're not leaving early.”

Hamer said he can’t imagine having spent the last 50 years of Husker football games sitting next to anyone else and Miller feels the same way.

Now that both are retired, they realize that it's the fourth quarter of their Memorial Stadium friendship.

“He's been such a good friend over the years. I'd much prefer to sit beside someone I know than to sit beside a stranger,” Miller said.

When the final whistle blew for this year's final home game, Nov. 22 against Minnesota, the friends parted the same way they have every year for half a century.

“The last game of the season, we say, ‘See you next year,’ ” Hamer said. “We plan on them being there, and it's good to know they're going to be there.”
After submitting class notes updates online, Conrad Vogel and Claire Zhao were asked if they would provide more details (and photos) concerning their experiences at UNL and after. Below are their responses.

CONRAD VOGEL
Principal Mechanical Engineer
Large Binocular Telescope Observatory
Tucson, Arizona

Degrees from UNL: B.S. in Mechanical Engineering, 1995; M.S. in Mechanical Engineering, 2005.

At UNL, I took as many classes and electives as I could fit into my schedule. I even minored in a foreign language at a time when the college didn’t recognize minors. While not a stellar student, I worked hard and tried to become thoroughly involved in the courses that I took and always asked questions in class and office hours.

When I secured my first engineering job after graduation, I think it helped that my transcript showed classes that were not strictly included in the curriculum for an engineering major. Perhaps it suggested to my future employers that I was “well-rounded”. I remain convinced that it was the little things on my resume and transcript that helped in this regard.

The education that I received from UNL has opened many doors for me. The range of opportunities available at UNL is quite broad. From the engineering co-op program to studying abroad through the program with affiliated universities overseas (I spent a year at Aberdeen University in Scotland), it’s remarkable what UNL has to offer to those interested in taking advantage of it.

I am currently employed as a Principal Mechanical Engineer at the Large Binocular Telescope Observatory on Mount Graham in Arizona. It is one of the largest telescopes in the world. The scale of engineering is staggering in many ways. The structure alone, built at 10,500 feet above sea level on a remote mountain top, presented many engineering challenges. It is a tall building with doors that open to expose the mirrors to the sky. These doors make up much of one wall and the roof of the structure is mobile. The entire building rotates with the telescope on giant bogies and circular rails. Construction of the telescope itself, and the mirrors that make it work, was a substantial international undertaking. The mirrors were from Arizona, structure to hold them was from Italy, and the instrumentation came from Germany.

"CLAIRE" YUE ZHAO
Senior Engineer
2H Offshore
Houston, Texas

Degree from UNL: B.S. in Civil Engineering, 2010.

After I graduated in 2010, I went to Europe for a one-year master’s degree program in Structural Analysis of Historic Monuments and Constructions.

I have been working at 2H Offshore, an offshore oil and gas engineering services company, for the past three years. My specialty is integrity management of offshore subsea systems. We support major oil and gas operators in managing the service life of subsea systems to improve reliability and minimize risk of failure. It’s an exciting and constantly evolving field and I learn something new every day. Surprisingly, much of the knowledge I learned for the assessment of historic structures applies to subsea structures, too.
In Memory

John E. Olsson

John E. Olsson, 88, who graduated from the University of Nebraska in 1951 with a degree in mechanical engineering and went on to found Olsson Associates, one of Nebraska’s most prominent engineering firms, died Jan. 28, 2015.

In 1957, speaking at an American Society of Mechanical Engineers (ASME) meeting, Olsson outlined his business philosophy and the hope that his fledgling firm would somehow survive.

“The engineering practice is built on the professional integrity and competency of the individuals who make up an organization,” Olsson said. “Time will only tell if my little organization can fulfill these requirements.”

In the nearly six decades since it started, Olsson’s “little organization” grew to include more than 900 employees and 24 offices. Today, Olsson Associates provides engineering, planning, landscape architecture, surveying and environmental services.

“John is one of the great pioneers in the construction industry,” said Timothy Wei, dean of the College of Engineering. “He turned a small local business into one of international prominence and impact. At the same time, he and his company were tremendous supporters and friend to the university and to the college in particular. His passing is a great loss to the community, but his name and legacy will continue to live on with us into the future.”

Olsson was born in Queens, New York, in 1926 and entered the New York State Maritime Academy after graduating from high school in 1944. He graduated first in his division in 1946 with a marine engineering degree.

After a few months of working for a shipping line, the Maritime Union went on strike and Olsson took advantage of the Naval commission he received from the academy and enlisted in the Naval Reserve.

When his commitment ended in June 1947, the Olssons visited family in Nebraska, where he wound up meeting with the chancellor at the University of Nebraska and being invited to enroll.

At Nebraska, Olsson was active in the student chapter of the ASME and worked part-time for a local engineering firm, Fulton & Cramer.

Olsson graduated in 1951 with a mechanical engineering degree and went to work full time for Fulton & Cramer.

In 1956, Olsson started his own consulting engineering firm – John E. Olsson Professional Engineering – as the only engineer in the company. His wife, Jean, performed clerical work and the firm’s first project was a cemetery plat for J. Township in Seward County.

Slowly adding staff members and projects, Olsson’s firm grew. And after mergers, splits and several name changes, the firm of 22 employees became Olsson Associates in November 1973.

Olsson later became a registered civil engineer and gained much early work through municipalities, with key projects including designing diesel power plants, water and sewage work for small communities, fallout shelters for the Army Corps of engineers, various work for the City of Lincoln, and designing a total energy plant for Saint Elizabeth’s Hospital in Lincoln.

Olsson led the firm until Carl Bodensteiner succeeded him as president in 1976. He retired in the early 1990s.

In addition to his 50-year involvement in the American Water Works Association, Olsson was involved with the American Society of Civil Engineers, ASME, ACEC of Nebraska (a past president), the National Council of Engineering Examiners, and the Nebraska Examining Board for Engineers and Architects.

Olsson was a staunch supporter of education and the University of Nebraska-Lincoln. He served on the College of Engineering and Technology Advisory Council, received the College’s Outstanding Alumnus Award in 1996 and in 2002 had a room named for his family in Othmer Hall. A new meeting room for student groups in the Nebraska Hall Engineering Library now also bears Olsson’s name.

Roger Severin, who later led Olsson Associates, said Olsson’s legacy lives on in those with whom he worked.

“For me, John was about integrity, honoring the engineering profession, supporting your community, and looking out for his employees. He was never too busy to find out if anything was new with your family,” Severin said.

“He also had an ability to see the potential in people that others may have missed. He held everyone to high standards, but he was there to help if you stumbled. I feel lucky to have been one of his early ‘projects.’ He will be missed.”

The College of Engineering would like to keep up-to-date with your career and your accomplishments. We have created an online form that will allow you to enter basic information about you and your career that we could publish in the Engineering@Nebraska magazine or in other publications.

Please go to engineering.unl.edu/alumni-updates/ and let us know where your career has taken you and what you are doing.
John O’Neill

John O’Neill, a University of Nebraska mechanical engineering graduate and key member of NASA’s space flight teams for 35 years, died August 18, 2014, in League City, Texas. He was 82.

O’Neill was born on November 26, 1931, in Jackson, Nebraska. After high school, he served in the Air Force, gaining a love for the aerospace industry by flying F86D Interceptor fighter jets. After leaving the Air Force, he enrolled at the University of Nebraska and graduated in 1960 with a Bachelor of Science degree in Mechanical Engineering. He earned a master’s degree in engineering at the University of New Mexico in 1963, while he worked as part of the Technical Development Program at the Sandia National Laboratories.

Later that year, O’Neill began his NASA career at the Johnson Space Center in Houston, Texas, working in various roles for the Gemini, Apollo, Skylab, Shuttle and Space Station programs. From 1967-74, O’Neill was Chief of the Flight Planning Branch and Crew Procedures Division, playing a key role in the flight plans for missions that included the Apollo 11 moon landing.

O’Neill was promoted four times before becoming NASA’s Deputy Director of Mission Operations in 1987. In 1994, O’Neill was appointed Director of Mission Operations when the legendary Gene Kranz retired. He was promoted to Director of Space Operations in 1996 and stayed in that position until his retirement in 1998.

After his NASA retirement, O’Neill was a consultant to the United Space Alliance and a senior advisor to the University Space Research Associate (USRA). He also worked with the Project Management Development Program at NASA until 2013 and was a founding member and chairman of the board for Space Center Houston, the visitor’s center at the Johnson Space Center.

In 1971, during the latter stages of the Apollo program, O’Neill received the Presidential Medal of Freedom in addition to a NASA Exceptional Service Medal. He was honored as NASA’s Engineer of the Year in 1989 and was awarded a University of Nebraska Alumni Achievement Award in 1991.

He is survived by his wife of 58 years, Mary; daughters Mary and Peggy, sons Dan and Colin, 13 grandchildren and a great grandson.

Class Notes

1990s
Ryan Novacek, ’98 CM, is vice president with MMC Contractors in Omaha.
Jeff Sharp, ’99 MECH, is senior manager/technology for General Dynamics in Lincoln.

2000s
Ed Nadurata, ’02 CHME, is a lead process technology team leader with 3M in Nevada, Missouri.
Kevin Christiansen, ’04 MECH, is a project engineer for Royal Engineering Composites in Minden.
Hung Nguyen, ’04 MECH, earned his Ph.D. from the University of Texas in December 2013. He is a postdoctoral research assistant at the University Institute of Geriatrics in Montreal, Quebec, Canada.
Jon Arens, ’05 MECH, is a plant manager for Altec in St. Joseph, Missouri.
Devin Townsend, ’06 CIVE, is AASHTOWare Project Engineer, Materials & Research Division of the Nebraska Department of Roads in Lincoln.
Jeff Lopez, ’09 CHME, earned his master’s degree in chemical engineering from Stanford University in June 2014 and is pursuing his Ph.D. at Stanford.
Brian Watt, ’09 BSE, is a quality engineer with General Dynamics in Lincoln.

2010s
Reinaldo Alcalde, ’10 CIVE, earned his master’s degree in civil and environmental engineering from the University of Illinois at Urbana-Champaign in December 2014. He will begin his Ph.D. in civil and environmental engineering at the University of Texas at Austin in January 2015.
Andy Kocharov, ’11 MECH, is a development engineer for Veyance Technologies in Lincoln.
Maurice Kinsey II, ’12 EE, is an engineer in the Transmission and Distribution Planning department of the Omaha Public Power District in Omaha.
Micah Kreikemeier, ’12 CIVE, is a civil engineer at LJA Engineering in Houston, Texas.
Todd Ford, ’13 MECH, is a plant engineer for Valero in Albion.
Jason Volz, ’13 MECH, is an assistant construction engineer for the Nebraska Department of Roads in Lincoln.
Patrick Brown, ’14 BSE, is in the TPD Program with Hospira in McPherson, Kansas.
Michelle McGuire, ’14 CHME, is a product engineer for 3M in Nevada, Missouri.
Alumni Master

Voelte says future of Nebraska Engineering looks bright

In the nearly four decades since he was a civil engineering student at UNL, Don Voelte has traveled the world and has experienced just about every culture, but he’s always maintained close ties to his alma mater.

Voelte has been an executive for many international petroleum companies, including nearly eight years as CEO of Woodside Petroleum, and is currently managing director and CEO of Seven Group Holdings, a firm based in Sydney, Australia, where he now lives.

Voelte and his wife, Nancy Keegan, have returned to Lincoln often and have remained actively involved with UNL for years. He’s been on the College of Engineering Advisory Board and a trustee of the NU Foundation; Keegan has been chair of the NU Foundation board of directors; and the couple donated $5 million for a Nanoscience Metrology Facility, which bears their names and is at the corner of 16th and W streets, just west of the college’s three-building complex.

However, during Alumni Masters Week in November, Voelte was doing things he hadn’t done since his days as a student – sitting in on classes and interacting with students.

He said the more things change, such as new and renovated buildings and new technology, the more some things seem to stay the same.

“The students and professors have more technical depth and access to information than what we ever had, but they use the same general principles,” Voelte said. “Structural engineering hasn’t changed a whole lot in 40 years. The same basics hold true today, so the students are learning a lot of the same things.

“But I was especially impressed with a lot of the new professors here in civil engineering. I like what’s going on in (department chair) Dan Linzell’s group.”

From his interactions with students that week, both in classes and during luncheons, Voelte is encouraged for the future. And he was happy to be able to share his experience in international business.

“The questions they asked were everything from, ‘What was it like to go international?’ and ‘What prepared you for it?’ Well, nothing. I just kind of went,” Voelte said. “Most of the other questions they asked were around what to expect when they get out of college and what it’s really like in the working world.

“These kids are better prepared than we were when I was in school. There’s a lot more interaction between the UNL students and the companies who hire our graduates.”

Late in the afternoon on Friday, Voelte shared his experiences with the Senior Design class taught by Mohamed Dahab, professor of civil engineering.

He said his proudest accomplishment was having 11 of his managers at Woodside Petroleum move on to become CEOs of other companies.

But the most enjoyable moments, Voelte said, came from learning about other cultures and getting to know people around the world. That learning came immediately after graduating from UNL, and the lessons have helped carry Voelte through his life.

“When I got to Corpus Christi, Texas, for my first job, I realized that the world was different. I started meeting people from Oklahoma and Texas and I started traveling extensively internationally. I learned I didn’t know anything,” Voelte said. “My first big trip was spending four months in Sumatra. I learned about the culture, the language and all the things I learned by making mistakes.

“When you travel around the world, people are basically the same. You learn that if you treat people the way you expect them to treat you, things go just fine.”

Now in his mid-60s, and what his wife calls “a three-time failure at retirement,” Voelte admits his years of working could be done soon.

If the students he met at UNL are any indication, Voelte said, the future of engineering is bright.

“If you’re as old as I am, and I have to admit that I’m getting outmoded because the young guns are so good, it’s time for the next generation to run the businesses,” Voelte said. “I’m getting to the sunset of my career after nearly 40 years in the business, and it’s fascinating to see the new generation coming through. I think we’re all in very good hands. They’re bright, they’re smart, they’re industrious. They’ll do just fine.”
You’ve kept us very busy. To that we say, “Thank You.”

Because of you, Nebraska Engineering is reaching greater heights. The College is buzzing with activity. Through your generous support to the Campaign for Nebraska, more than 250 funds have been established, allowing us to provide more scholarships, attract distinguished faculty, and add and update classrooms and lab spaces.

Because of your investment in the College of Engineering, we are positioned for great growth in the coming years. We’re so grateful to have supporters like you who know the importance of giving back. Of creating possibilities. Of helping the next generation of students follow in your impressive footsteps.

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• Designed to be appropriate for engineers in all fields.

Format:
• Offered online with courses provided through the College of Engineering and the College of Business Administration’s online MBA program.
• Some in-class electives are also available at the college’s Omaha Campus (at The Peter Kiewit Institute).

Courses and Credit Hours:
The online master of engineering management degree requires 30 credit hours. Courses are three semester credit hours and held in accelerated eight-week sessions.

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