SUMMER 2011

# Engineering

CHEMICAL CIVIL ELECTRICAL GEOLOGY GEOLOGICAL MECHANICAL PETROLEUM

UND THE UNIVERSITY OF NORTH DAKOTA

# INSTITUTE FOR ENERGY STUDIES

**Integrating discovery, research, education, outreach, and innovation to educate the next generation of energy experts and to produce solutions and new technologies to address energy challenges.**

***"We're not focusing on one energy solution: We are looking at a diversified portfolio of energy solutions—from fossil-based to all forms of renewables to improvements in energy efficiency."***

***– Hesham El-Rewini***

**A Premier Energy University**

THE UNIVERSITY OF NORTH DAKOTA

## TABLE OF CONTENTS

# MESSAGE FROM THE DEAN—Singapore

It has been the custom that the "Message From the Dean" columns enumerate accomplishments and activities. While we have had a phenomenal year, as you will see when you glance through the magazine, I thought that I'd use this space to share with you a success story from Southeast Asia.

Singapore is a tiny country with an area that is slightly more than 3.5 times the size of Washington, DC. In less than 50 years since its independence, Singapore has soared from being a third world country with poor infrastructure to becoming one of the most prosperous countries in the world. The per capita GDP is comparable to the leading nations in the west and higher than that of most developed countries. Despite its limited natural resources, Singapore has recorded substantial economic growth and maintained rapid industrialization.

In 2005, Singapore displaced the United States as the top economy in information technology competitiveness, according to the World Economic Forum's annual Global Information Technology Report of that year. It also ranked first in a number of subcategories used to determine the overall ranking, including the quality of math and science education. Students from Singapore are consistently ranked by the Trends in International Mathematics and Science Study (TIMSS) as top performers in mathematics and science.


Science Watch publication (May/June 2011 issue) reported a remarkable increase of Singapore's presence on the world's research stage in recent years. The publication tracked the output of research papers in all fields for the last two decades in Singapore. While the overall number of research publication jumped by 900% in all fields, the largest increase during the last 5 years of the study was in engineering fields, including computer science and materials. It was also reported that the impact of the published papers (measured by the number of cites per paper) in engineering fields is on trajectory that is well above the world average. In addition to the high productivity in research, a rise in technical entrepreneurship activities has been a noticeable trend in Singapore. Many local startups have demonstrated tremendous successes, which have attracted reputable companies to acquire them.

Singapore's remarkable performance has been the result of a number of factors. In my opinion, two of the most essential factors are the following: 1) the quality of the educational system at all levels and 2) the government's consistent and continuous support of education, research, and innovation.

Well-known for its academic rigor, the educational system in Singapore has been designed to promote universal access, encourage innovation and learner-centered approaches, and emphasize mathematics, science, and technical topics. The latest plan by the Ministry of Education in Singapore (2009–2014) stresses the importance of a greater level of technological integration in curriculum, assessment, and pedagogy. The goal is to equip students with critical competencies needed for success in a new and changing world, such as self-directed learning, creativity, and collaboration skills. Singapore's focus on key technological fields, and the overall impact of its research and development, suggests that resources have been allocated wisely to emphasize and target areas with the highest return on economic development. In addition to encouraging research and innovation, the Singaporean government and universities have been partnering to actively advance entrepreneurship by launching programs, offering training, and encouraging ventures in technology-related knowledge-based businesses.

One of the important lessons we could draw from Singapore's experience is that being small can be an advantage. With the right vision, thorough preparedness, focus on niche areas, and smart resource allocation, opportunities are endless for small organizations to assume prominent places among the best of the world. The experience from Singapore also highlights the increasingly central role played by engineering and technology as an engine of economic growth and competitiveness.

Finally, I thank our alumni and friends for their interest and continuous support of the School of Engineering and Mines. I eagerly invite you to visit us to learn more about the exciting endeavors that our students and faculty are pursuing day in and day out.

Hesham El-Rewini, Ph.D., P.E.
Dean and Professor

FROM THE DEAN

# BENEDICT AND DOROTHY GORECKI

Ben and Dorothy Gorecki have been a team for more than 60 years. Ben was married, had already begun a family, and was working for Bell Systems Communication full-time when he was admitted to UND. He continued to work for Bell as a technician while he attended UND and earned a B.S. in Electrical Engineering in 1962 and a B.S.B.A. in 1963. While a student, he and Dorothy managed to find time to build a home near campus for their family. Many nights, Ben would return home from classes with fellow students joining him for study sessions. According to Ben, Dorothy put him through school. For her part, Dorothy recounts many times during North Dakota winters when she battled the wind as she removed snow in the late evenings before Ben returned home from classes—just to turn around and have to do it again. That was the early teamwork.

After graduating, Ben was employed as a rate engineer for Northern States Power Company, a design engineer for Horty-Elving and Associates in Minneapolis, MN, and an engineering manager for Twin City Arsenal. In 1967, Ben and Dorothy founded Gorecki Manufacturing in Ben's hometown of Milaca, MN. Over the years, the company has expanded as a diverse contract manufacturer, providing light manufacturing, product assembly, and services to companies such as 3M and Dow Chemical Company. The company has also expanded beyond Milaca, with additional plant locations in both Pierz and Foley, MN.

The Goreckis have been generous supporters of the School of Engineering and Mines. Their spirit of philanthropy has also led them to give substantially to fund the Gorecki Family Theater and the Gorecki Dining and Conference Center, both located at the College of St. Benedict, St. Joseph, MN, and the Gorecki Care Center at St. Benedict's Senior Community, St. Cloud, MN.

Most recently, Ben and Dorothy have made another imprint on the map of UND by contributing a significant portion of the funds to build the new Gorecki Alumni Center to be located on the west end of campus.

Ben and Dorothy continue to reside in Milaca, MN.

# THOMAS M. HAMILTON

Tom Hamilton earned his M.S. in geology in 1967, his Ph.D. in geology in 1970, and received an Honorary Degree in 1993, all from UND.

Tom made his career in the oil and gas industry, with particular emphasis on international business and strategic restructuring of oil companies. He began with Exxon and later joined Aminoil, the second largest independent U.S. oil company, as its executive vice president. From 1985 to 1988, he held the position of Senior Vice President of Exploration at Standard Oil Company prior to its merger with British Petroleum, and Tom was moved to London. Within BP, Tom took on new challenges, becoming Chief Executive Officer of the Frontier and International Operating Company of BP Exploration and later General Manager for East Asia/Australia/Latin America.

Tom was approached by Pennzoil, found that its business philosophies matched his, and joined the Pennzoil management team. From 1992 to 1997, Tom served as Executive Vice President of Pennzoil Company and as President of Pennzoil Exploration and Production Company.

He then joined Enserch Exploration Inc. as Chairman and Chief Executive Officer, leading the company until December 2002.

Since 2003, he has co-owned Medora Investments, a private investment firm.

Tom is an involved volunteer and advocate for work in mental health, often giving speeches in various parts of the world as well as at the state and federal levels. He has been a trustee of the Mental Health and Mental Retardation Authority of Harris County, Texas since 2000.

Tom has participated in national alumni leadership council events, the UND Foundation's "Thank you Tom" campaign upon President Tom Clifford's retirement, and on the UND Alumni Association and UND Foundation board of directors for nine years, leading as president of the Foundation in 2002-03. He received the Arthur Gray Leonard Medal by the UND Geology Department in 1998 and was elected a member of the founding class of the School of Engineering and Mines Academy in 2003.

Tom and his wife Carolyn have been generous supporters of the School of Engineering and Mines, committing to carrying their support for the school long into the future.

Tom and Carolyn live in Houston, TX.

# PROUD TO BE UND

Sherine Talaat (dean's wife), Susan (Rhodes) Lang '75, Wally Lang BSEE'74, and Dean Hesham El-Rewini

UND President Robert Kelley and First Lady Marcia Kelley enjoy the evening

## UND HOCKEY SOCIAL

Danny White '05, Dan Muus, Wayne White, and Arlen Nordhagen BSChe'78

Dan Muus, Eunice (Axvig) MacFarlane '63, John MacFarlane BSEE'61

Brad '86 and Gayle (Berge) Aafedt BSChE'88, and Deb Austreng

On November 2, 2010, in conjunction with the Annual Meeting of the Geological Society of America (GSA), we brought UND Engineering to Denver! More than 40 alumni, students and faculty gathered to connect, some for the first time. It was a chance for others to recall great times together at UND!

John & Jessica (Phillips BS'07) Frame

Neil Sherrod '63, John Reid, and Trent Hubbard '02

Tom Heck '79 and Joni Lerud-Heck '71

Wally Griffen '62

J. Mark Ericson '71 and Dean Hesham El-Rewini

Neil Sherrod, Mark McDonald, and Steve Benson

Mary Scott '72

Deb Austreng, Josh Crowell, Anna Crowell, Betty Wilson, Dean Hesham El-Rewini, Wally Griffin '62, Garth Wilson '64

PROUD TO BE UND

# PROUD TO BE UND


Roger French and the UND Flag that now hangs in the Fieldhouse, a favorite sports hang-out for UND alumni

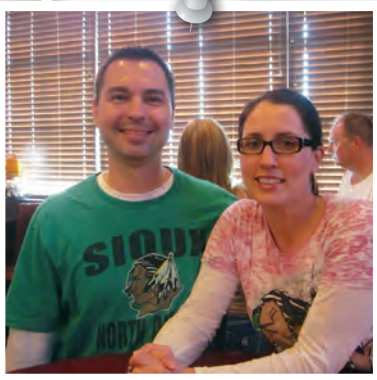
Rod Thorpe '59 and Carmen Bergstrom Thorp '60

Brent Ihringer, BSME'99, Dan Muus, and John French, BSEE'78, Principal Engineering Manager, CS Engineering Outsourcing, Commercial Systems, check out 3D imaging

John Thoreson, BSME'84, Manager, Environmental Effects Engineering, Engineering and Technology

Future alumnus Darren Heyd

Paul Heyd, BSEE'95, Principal Program Manager, Training and Information Solutions, Government Systems



Brent Ihringer and wife Lisa (French) Ishringer, '97

Jon Lovseth, MSEE'05, Manager, RF Circuits Technology, Advanced Technology Center, Engineering and Technology

*A special thank you to Nicole Heyd, '95, Sr. Subcontracts Program Manager, Flight Information Solutions, for her help in organizing the social. Nicki moves too fast for a photo!*

Rockwell Collins in Cedar Rapids, Iowa, employs approximately 140 UND graduates and has been a consistent support of UND Engineering in the form of student scholarships, student group support, internships, and co-op experiences. Their enthusiasm and pride in UND shows throughout the halls and offices of our alumni. During a plant tour and social held in May, Deb Austreng, Director of Alumni, Corporate and Public Relations, UND SEM, and Dan Muus, Director of Development, UND Foundation, were fortunate enough to visit with and highlight a few of those alums of whom we are so proud.

# Engineering Grads Reach High Places—345 Feet UP!

What started out as an intern opportunity turned into much more for UND Engineering's Matthew Hadsell, BSEE'06., Bismarck, ND.

"During my final year at UND, I ended up interning for a company that was constructing a lot of wind farms. They were just starting their electrical division. I was warned walking in the door that the first couple years would be a 'work in progress,' but if I was up for it, the ride would definitely be interesting. They shipped me straightaway to Texas in my dilapidated station wagon to get some on the job training. I ended up spending much of my time out in the field. Being very dissimilar to the classroom/office setting, I enjoyed it immensely, a fact that most of my past professors would whole-heatedly agree with. I took away a love for this industry that was in its infancy." (Despite existing for many decades, the large-scale wind turbine industry, beginning in the United States with the Smith-Putnam Turbine in 1941, had not yet coalesced upon a set of standards that suited widespread construction projects).

Matt's first couple of years were spent in Texas and Iowa, where his primary focus was supervision of electrical subcontractors and resource management. The current pace of the industry is arguably break-neck and is driven largely by government spending in the form of tax credits. It's a pace that Matt understood well when he took the position, thanks to the internship experience. His work has taken him throughout Texas, Illinois, Iowa, Pennsylvania, Minnesota, and Alberta, Canada, with additional traveling with the company's safety committee to Oregon and Washington for week-long stints.

Matt was recently promoted by Blattner Energy Incorporated to Senior Power Systems Engineer. His promotion announcement states, "His electrical knowledge, leadership skills and abilities have allowed us to rely on him as an electrical subject matter expert." This recognition is proof that UND Engineering meets its mission to produce graduates who move to the top. And that's just where Matt is sitting—on the top!

# Down UNDer

*The Team: David Dvorak, St. Cloud, MN; Wyatt Shallbetter, Corcoran, MN; Jesse Sorum, Grand Forks, ND; Kaci Lemler, Buxton, ND; Danny Hajicek, Fargo, ND; Keith Strang, Sauk Rapids, MN; Adam Gabbert, Bismarck,ND; Advisors Dr. William Semke, associate professor, UND Mechanical Engineering(pictured) and the late Dr Richard Schultz, professor and chair, UND Electrical Engineering.*

On September 21, 2010, a team of students from the UND School of Engineering and Mines Unmanned Aircraft Systems Engineering Laboratory set out to compete in the 2010 Australian International UAV Outback Search and Rescue Challenge in Kingaroy, Queensland, Australia. The competition required students to fly an unmanned aircraft to locate "Outback Joe," a dummy simulating a person stranded in the Outback. Once they located "Outback Joe," the team had to drop a liter bottle of water from the aerial unit to within 100 meters (about 330 feet) of Joe's location and return the aircraft safely to the airfield and land.

The UND team planned to use two search patterns to fly over the eight-square-mile area where Outback Joe was hidden. The first, called "the Hail Mary," was a straight line down the middle of half the search area and then a straight line up the other half. The other was the lawnmower pattern, a methodical back-and-forth track. As luck and skill would have it, with just one leg of the Hail Mary, the team found the dummy in only 5 minutes, 25 seconds after takeoff, not far from his pickup. (The team had honed its spotting skills over some 10 flights during the summer at the National Guard's Camp Grafton near Devils Lake, once finding the target within 4 minutes.)

The next step to winning the $50,000 first prize was to drop the water bottle within 100 meters of Outback Joe. For that, the team devised a computer program that used wind speed, aircraft velocity, and even the drag coefficient of the bottle, to decide when to release it. They dropped a bottle within 11 feet of the target from 1,000 feet up.

In the competition, Murphy's Law had something to say about that. According to grad student Adam Gabbert, the drop mechanism didn't work in synch, so that when the team armed it, instead of being ready to release the bottle, it actually released the bottle. The bottle ended up 551 meters away from Outback Joe, too far to win the full prize, but enough for a $15,000 consolation prize, the best any team had done in the four-year history of the competition.

UND's BTE Super Hauler, a 50-pound remote-control aircraft with a 12-foot wingspan included a video camera mounted on a gimbal, a GPS receiver, a radio to transmit the moving pictures and the coordinates, a system to drop a bottle of water near Outback Joe, and an autopilot and fail-safe system. All these are off-the-shelf components never designed explicitly to work together. Thus, the team had to construct a machine that had not existed yet.

*Giving the GO to search for OUTBACK JOE are Wyatt Shallbetter and Jesse Sorum.*

# A Trip to the Bottom of the World

This past December, a team led by geomorphologist Jaako Putkonen, assistant professor of geology and geological engineering, spent six weeks in one of Antarctica's most desolate and least explored regions, the Ong Valley and Moraine Canyon. Accompanying him was his team of research assistants, Ph.D. student Theodore Bibby (Jacksonville, FL), geology junior Colin Giusti (Chanhassen, MN), and biology junior Holly Westad (Parkers Prairie, MN). The purpose of the trip, funded by the National Science Foundation, was to dig into the evolution of the Antarctic landscape in one of the continent's most remote and least understood regions. "We actually know very little about these very cold environments. There is a renewed interest in them because of all the research that's going on related to Mars," Putkonen said. "It turns out that these regions are the closest thing to a Martian landscape here on earth."

There were no luxuries on this trip—no showers or heaters, and tents just big enough to crawl into, with a larger one used for cooking. Most of the supplies were shipped ahead. The first stop on the journey was Christchurch, New Zealand, where the NSF's U.S. Antarctic Program has facilities. The team picked up their cold weather gear, hopped a military plane (a LC-130 equipped with skis), and headed for Antarctic training at McMurdo Station.

The experience was a camping trip unlike any other, a life-changing experience, in which they were pushed harder than


STUDENTS

anyone could ever have imagined. Ten hours a day of hiking left even their basic motor skills taxed. Ted described hiking up rugged rock terrain where one missed step could cause a rockslide that would "flow like water down the slope, leaving the big boulders surfing the rockslide." Imagine camping on top of a glacier where possibly only five others had been before.

In no time, the ice floor under the tents melted and turned the tents into waterbeds, and they had to be moved. The real problem came when the most important tent of all, the kitchen, filled with water from the ice melted by the heat of cooking. However, Ted and Colin agreed the biggest problem came when Holly started a fire on one of her cooking shifts—"halibut they think it was, an oil fire from the halibut!" Meals became less elaborate as time passed. "They evolved into cheese in some form," Colin recalls. They all remember the wind, lots of wind, and listening for the sound of the helicopter (either imagined or real), a welcomed sign of mail or more food. Yes, it was a camping trip unlike any other, yet all would return if given the opportunity.

# UND Engineering Students Start a New Chapter

Officially recognized in November 2010, the University of North Dakota Student Chapter is one of the newest members of Engineers Without Borders-USA (EWB-USA). After over a year of hard work and with the support of members of the School of Engineering and Mines faculty, staff, and administration as well as local engineers, a group of students within SEM received the good news. Since its approval, the Chapter has been busy organizing, recruiting, and searching out potential projects.

EWB-USA's mission is to "support community-driven development programs worldwide by collaborating with local partners to design and implement sustainable engineering projects, while creating transformative experiences and responsible leaders." Projects are at the heart of what EWB does and range from sanitation systems and wells, to a new community center or backup energy system, to educational programs and eco-system rehabilitation. Many projects require numerous visits for proper assessment, implementation, and follow-up, and costs range from a few thousand dollars to hundreds of thousands. Project timelines—from inception to implementation—are in years, not months, and EWB-USA requires a five-year commitment to each community with which a chapter works. While the time, planning, and resources needed to make a project happen can be daunting obstacles to overcome, the need for this type of work is evident, and the members of UND-EWB are eager to take on their first project and apply technical knowledge and skills gained at UND to real-world problems across the globe.

There are many roles for individuals to take to get involved with Engineers Without Borders at UND, whether a student, a Grand Forks community member, or SEM alumni. For more information or to help further the mission of UND-EWB, please email ewbund@gmail.com.

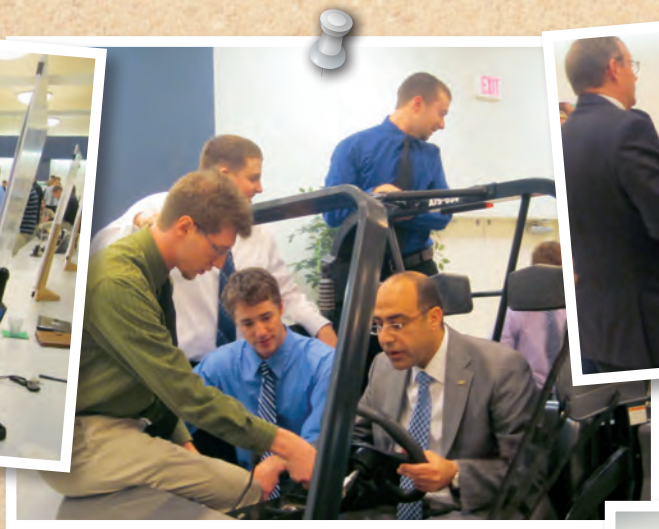
# Engineering Design Exposition

## April 26, 2011

Community members participate.

Hydraulic Assisted Wheel Chock (HAWK). Justin Redding, Brian Nybo, Bjorn Ahlberg, and Paden Fetting explain their project to Dean El-Rewini.

Students from Manvel, ND.



The Arctic Cat Prowler Steering Adjuster eliminates radial and axial play of the steering wheel and allows for adjusting the steering wheel to accommodate a variety of situations entering, exiting, and driving the UTV.

Students from Red Lake Falls, MN.

Tru Shot is intended to enable a user to shoot a bow more accurately and safely. Cassius Hartl, Katy Younglove, Matt Fossen, and Josh Johnson with engineering alums, Luke Erickson, BSME'04, and John Roche, BSME'84, from Emerson-Rosemont (sponsors).


Marvin Windows water weight quality control test team members are Joseph Hogberg, Matthew Brown, Lance Leinen, and Ryan Rusk.

Celebrating a project completed are Karl Williams, Paul Wollmuth, Jeremy Baranko, and Jeramey Nagy.

# Freeman Design Award May 11, 2011

Since 2004, Minnkota Power Cooperative, Inc., has sponsored the Andrew Freeman Design Innovation Competition. The competition, which honors UND Engineering alumnus and former general manager of Minnkota Power, Andrew Freeman, recognizes innovation and excellence in senior design. It requires individuals or teams of engineering students to present their senior design projects to a panel of judges comprised of UND Engineering alumni and faculty and a representative from Minnkota. This year, the annual competition was held on May 5. Six teams participated in the competition, and the winning teams were recognized at a ceremony held on Wednesday, May 11.

**First Place: LaserComm:** The LaserComm project aims to address and resolve the growing problems associated with traditional Radio Frequency (RF) communication methods—mainly, limited bandwidth, spectrum crowding, and security. **Award:** $1,650. **Team Members:** Brian Adkins (EE), Michael Link (EE), Jennifer Meyers (ME), Michael Locke (ME), and Brock Setness (ME)

**Second Place: System Combination of Renewable Energy by Alternative Methods (SCREAM):** SCREAM supplies power to a RTK (Real Time Kinematic) DGPS (Differential Global Positioning System). RTK allows for location tracking of agricultural equipment. **Award:** $1,000. **Team Members:** Nathan Hillerud (EE), Casey Hansen (EE), and Derek Clark (EE)

**Third Place: Extraction of Fatty Acids from Thermally Cracked Crop Oil:** The team designed a process by which crop oils, such as canola oil and soybean oil, can be converted into liquid transportation fuels. **Award:** $750. **Team Members:** Raymond Aslesen (ChE), Benjamin Jones (ChE), Joshua Knutson (ChE), and Shane Emineth (ChE)


*Pictured: Brian Adkins, Michael Link, Brock Setness, Jennifer Meyers, Michael Locke, Wally Lang, (VP, Transmission, Minnkota Power), Dean Hesham El-Rewini, Casey Hansen, Nathan Hillerud, Derek Clark, Benjamin Jones, and Shane Emineth*

# Engineering Team Receives Top Honors at 5th Annual Innovate ND

A UND Engineering student team's idea to use remotely piloted aircraft to help farmers improve crop yields was one of five winning business ideas that received $15,000 in cash and statewide recognition at the fifth annual Innovate ND awards ceremony and social held May 24, at the Ralph Engelstad Arena.

From UND Engineering's Class of 2011, David Dvorak, (M.S. Mechanical Engineering), St. Cloud, MN, and Jonathan Alme, (M.S. Electrical Engineering), Eden Prairie, MN, received the award for their business idea of using remotely piloted aircraft to take high-resolution images of crops in the field, information that could help farmers increase yields and profits. Their company is Field of View, LLC.


Innovate ND is a statewide North Dakota economic development initiative designed to assist entrepreneurs with turning business ideas into successful businesses. It is coordinated by the North Dakota Department of Commerce, UND's Center for Innovation and NDSU's Research and Technology Park. Innovate ND brings together entrepreneurs, investors, and educators. Entrants in the program receive advice from experienced entrepreneurs and can also receive additional help in setting up their businesses. This year's Innovate ND drew 58 applicants.

## 2010 People's Choice Award

Theratainment, a medical device company designing and selling a hardware and software computer gaming interface package geared towards muscular rehabilitation patients, won the 2010 People's Choice Award with a $500 prize and a glass trophy. It creates a fun and trackable way to identify muscular rehabilitation progress by merging physical therapy exercises with a computer gaming environment.


*Ashley Putnam, BSEE 2010, MSEE 2011*

STUDENTS


Leadership from **Otter Tail Power Company**, Fergus Falls, MN, held an information luncheon in the Jodsaas Center for Engineering Leadership and Entrepreneurship, located within the School of Engineering and Mines, for a select student group chosen by their department chairs. Pictured are Rick Johnson, Steve Wevley, and Jan Rudolf.

# UND Team Wins NASA Competition

Competing with 46 teams from universities around the world, the University of North Dakota Robotics team, consisting of 10 engineering students and two computer science students, brought top honors back to UND from the NASA Lunabotics Competition held May 23-28 at the Kennedy Space Center, Florida. The team received the Joe Cosmo Award for Excellence, the top over-all honor, which combines the scores (points earned) from all competition categories. This award carries with it a school trophy, an invitation to a Kennedy launch, and a $1,500 cash award to each team member and one advisor for travel to NASA's Desert R.A.T.S. to develop new technologies for lunar exploration. The team also placed second in the on-site mining competition, earning a $2,500 cash award.

The Lunabotics Mining Competition is a university-level competition designed to engage and retain students in the study of science, technology, engineering, and mathematics (STEM). The challenge is for students to design and build a remote controlled or autonomous excavator, called a lunabot, that can collect and deposit a minimum of 10 kilograms (22 lbs.) of lunar simulant or regolith—a sand-like material made up of dust, soil, broken rock, and other related materials.

The UND team designed and extensively tested the robot months before the competition. During the competition, the robot was able to move around the arena and collect 172 kg of regolith. This was no small feat, as only 1 of 45 universities exceeded UND's performance.

NASA directly benefits from the competition by encouraging the development of innovative lunar excavation concepts from universities, which may result in clever ideas and solutions that could be applied to an actual lunar excavation device or payload.

An additional component to the competition also requires the teams to conduct outreach activities for K-12 students to increase the public's understanding of NASA's importance and to generate interest in math and science among K-12 students. The UND team excelled in their outreach activities, which included presentations, mentoring, and providing learning activities to elementary, middle, and high school students.

Some of the venues for these activities were the FIRST LEGO League, the ND Science Fair (both held on UND's campus), and the Three-Day Space Series at Ben Franklin Elementary School.

Team members included mechanical engineering students Daniel Bason, Andrea Dickason, Michael Gereszek, Benjamin Gunvalson, Jacob Hultberg, and Kaylein Tradup; electrical engineering students Jason Eisenzimmer, Craig Kennedy, Joshua Rogers, and Chul Ho Yang; computer science students Sanchit Goyal and Bharat Kulkarni. Faculty advisors for the team are Dr. Jeremiah Neubert (ME) and Dr. Naima Kaabouch (EE).

As a result of their work, Joshua Rogers and Benjamin Gunvalson will be offered NASA fellowships.

This UND project was sponsored by NASA, North Dakota Space Consortium, Autodesk, Boise Paper, Bobcat Corporation, Bobcat of Grand Forks, Otter Tail Power Company, Rydell Chevrolet, UND School of Engineering and Mines, Dean's Office, Department of Electrical Engineering, Department of Mechanical Engineering, Department of Computer Science, Office of the Vice President for Academic Affairs & Provost and Student Organization Funding Agency (SOFA).

# UND Hosts North Dakota State Science and Engineering Fair

The next generation of North Dakota scientists and engineers were on campus to compete in the 61st Annual North Dakota State Science and Engineering Fair. The 160 students filled the Memorial Union Ballroom to compete in either the junior or senior division. First-place winners in the senior division advanced to compete in the International Science and Engineering Fair in Los Angeles: the world's largest pre-college science competition, where students from over 60 countries, regions, and territories will showcase their independent research. The Intel ISEF is the foremost global science competition for students in grades 9–12.

UND Engineering overwhelmingly supported the North Dakota fair. Student organizations in civil, electrical, mechanical, and chemical engineering hosted the visiting high school students during an afternoon of science and engineering "hands-on" activities. Teams of faculty and graduate students served as judges for the fair. Student engineering design projects were also demonstrated during an evening banquet held for the fair presenters, their teachers, and parents. UND Engineering and academic departments also supported many awards for top engineering projects.

National, regional, and state organizations recognized the efforts of the 160 competitors with numerous awards given in special areas of science and engineering, as well as with scholarships, including four-year scholarships to attend UND.

A special award for excellence in an engineering project was presented in honor of Clifford Thomforde, former chair of electrical engineering, by his former students, Glenn I. Lykken, BSEE '61 and Lowell O. Lykken, BSEE '58. Emme Hulm of Strasburg, ND, won the award for her project titled "Heat Loss vs. Roof Types."

# Engineering Meets Medicine for LEGO® Robotics Teams Competing at UND

Over 30 teams from North Dakota and Minnesota traveled to UND to compete in the "Body Forward" FIRST® LEGO® League (FLL) Robotics Competition. In addition to programming a fully autonomous robot to complete missions on a competition field, the teams had to research a problem related to the cutting-edge world of biomedical engineering and discover innovative ways to maximize the potential of technology to help people. They then had to organize, plan, and give a creative presentation regarding their projects to an esteemed panel of judges. The teams were judged on their teamwork skills, adherence to the FLL Core Values, and demonstration throughout the tournament of "gracious professionalism."

The Champions Trophy was awarded to "ECMgineers," a team from Miller Elementary, Bismarck, ND, which earned them the opportunity to represent North Dakota at the FLL World Festival in St. Louis, MO. The "Thermionix" team from Moorhead, MN, took second place, giving them the opportunity to compete in the World Open Invitational FLL tournament at LEGOLAND® in San Diego.

Volunteers from local industry, the UND engineering student body, and sponsors who provide monetary and in-kind support made this event a success. Our sponsors include University of North Dakota Engineering, University of North Dakota Memorial Union, Basin Electric Power Cooperative, HB Sound & Light, Cargill, Xcel Energy, Bobcat Company, Otter Tail Power Company, Advanced Engineering and Environmental Services, Inc. (AE2S), Laserlith Corporation, and S&S Promotions.


*Thermionix team from Moorhead, MN*


*ECMgineers from Bismarck Miller Elementary School*

# ND Planning Expansion of FIRST® Robotics Programs Across K-12 Curriculum

For students aged 6-18, FIRST® Robotics is the hardest fun they'll ever have. For team mentors, coaches, and volunteers, it's the most rewarding adventure they'll ever undertake. For sponsors, it's the most enlightened investment they could ever make. FIRST is a 501(c)(3) not-for-profit organization devoted to helping young people discover and develop a passion for science, engineering, technology, and math. The FIRST® family of programs includes Jr. FLL, FLL, FIRST® Tech Challenge (FTC), and FIRST® Robotics Competition (FRC).

Jr. FLL introduces younger children to the exciting world of science and technology. This program features a real-world challenge to be solved by research, critical thinking, construction, teamwork, and imagination. Guided by adult coaches, teams use LEGO® bricks to build models with motorized parts and develop coordinating posters to illustrate their journeys.

FTC is designed for those who want to compete head-to-head using a sports model. Teams of up to 10 students are responsible for designing, building, and programming their robots to compete in an alliance format against other teams.

Dubbed a "varsity sport for the mind," FRC combines the excitement of sport with the rigors of science and technology. Under strict rules, limited resources, and time limits, teams of 25 students or more are challenged to raise funds, design a team "brand," hone teamwork skills, and build and program a robot to perform prescribed tasks against a field of competitors. It's as close to "real world" engineering that a student can get.

A variety of interested individuals, educators, school districts, science centers, and corporate sponsors in North Dakota are striving to expand FIRST robotics offerings to include Jr. FLL, FTC, and FRC-sanctioned competitions for kids in the tri-state area. With the FLL program already established, developing the other programs will assure that the region's young people will have the best opportunities to connect with and experience science and engineering throughout their youth.

On Saturday, April 2, 2011, more than 40 girl scouts from Fargo, Crookston, Pembina, and Grand Forks converged on UND campus to attend a one-day event coordinated and managed by the UND Society of Women Engineers (SWE) and Girl Scouts Dakota Horizon. SWE uses hands-on activities to engage young girls' curiosity and increase their motivation to learn science, engineering, and math.

This event provided a fun and exciting educational engineering opportunity for local Girls Scouts. It also provided Girl Scouts the opportunity to earn a fun patch by experiencing and enjoying simple engineering activities.

OUTREACH

# SEM Professors Benson and Seames Represent UND at the Legislative Higher Education Showcase

On March 9, the North Dakota University System held a showcase in the Great Hall of the North Dakota Capitol in Bismarck. UND President Kelley asked chemical engineering department professors Steve Benson, director of SEM's new Petroleum Engineering program, and Wayne Seames, director of ND SUNRISE (the Sustainable Energy Research Initiative and Supporting Education program) to prepare a display and represent UND at the showcase. The theme was "UND's School of Engineering and Mines, Serving North Dakota's Energy Industries." Drs. Benson and Seames are two of UND's foremost researchers in the field of energy technologies. Their display included banners highlighting research, education, service, and outreach activities associated with energy—both fossil energy (petroleum and coal) and new renewable energy technologies (biofuels, wind, solar, and geothermal).

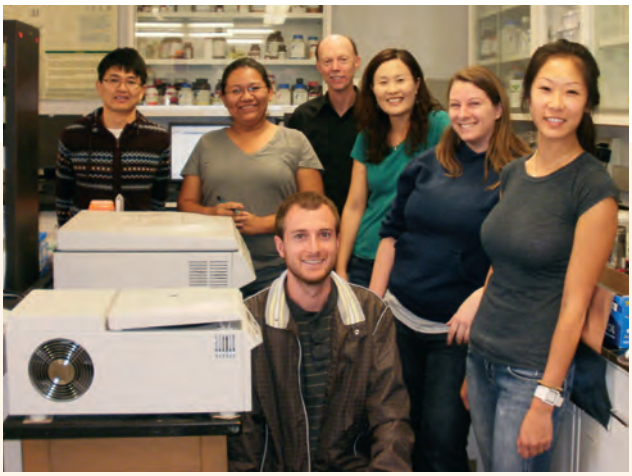
*Dr. Wayne Seames explains aspects of UND's energy programs to a group of Bismarck high school students.*


*Dr. Steve Benson discusses the new Petroleum Engineering program with a member of the North Dakota legislature.*

# SEM Expands California State University Outreach Program

Four years ago SEM Professor Wayne Seames conceived an innovative outreach program to encourage undergraduate students from non-doctoral universities in the California State University system to consider enrolling in graduate school in general and at UND in particular. Five of the 17 schools in this system offer chemical engineering programs, and all were contacted to determine if they were interested in participating. Two schools, San Jose State (SJSU) and California Polytechnic at Pomona (CPP), agreed to partner in this effort. The program includes recruiting trips by UND faculty to the SJSU and CPP campuses, working with SJSU and CPP faculty and students in research projects, providing opportunities for SJSU/CPP undergraduates to participate in UND summer undergraduate research, and providing a combined degree program that allows students to double count classes at both the undergraduate school and UND. To date, two SJSU and two CPP chemical engineering students have enrolled in UND's Masters of Science in Chemical Engineering program.

Due to the success of the program, UND and CPP have expanded it this year to include mechanical (ME) and aerospace engineering (AE) at CPP, partnered to UND's Mechanical Engineering program. In addition, Dr. Seames facilitates initiation of a similar partnership between CPP's Plant Sciences department and the Plant Sciences department at NDSU. In February, Dr. Matt Cavalli, chair of Mechanical Engineering, and Dr. Yun Ji, assistant professor of Chemical Engineering, joined Dr. Seames in a series of meetings at CPP. The two schools agreed to initiate joint senior design projects beginning in the 2011/12 academic year for the ME and AE students. Chemical Engineering recruited juniors for participation in the SUNRISE research experiences for the undergraduate program and seniors for the combined BS/MS program.



*CPP plant science students with Dr. David Still. Dr. Still collaborates with UND's Wayne Seames in the development of agricultural practices that will allow renewable fuel and chemical feedstock to be produced with minimal impact on food production in California's Imperial Valley as part of the UND-Cal State partnership program. CPP students spend the summer working at NDSU agronomy plots in North Dakota in this program.*

# Homecoming 2010

On October 8, 2010, UND Engineering inducted two new members into its Alumni Academy with a ceremony and reception held in the Jodsaas Center for Engineering Leadership and Entrepeneurship. The homecoming celebrations began with the dedication of the newly renovated Academy Hall of Fame in the foyer of Upson II and ended with an alumni social honoring all SEM academy members.

**Donald J. Ehreth**, born in Mandan, ND, received his B.S. in Chemical Engineering from UND in 1961 and a Masters in Engineering Administration from George Washington University, Washington, D.C., in 1971. After graduating from UND, Don began a career with Hercules Chemical Corporation in ballistic design and test engineering of solid rocket fuels for the Minuteman program and later went on to work for Atlantic Research Corporations. In 1972, he began a 15-year career with the Environmental Protection Agency (EPA), serving as Deputy Assistant Administrator as well as Acting Assistant Administrator of the Office of Research and Development.

His accomplishments of great pride include developing propellant formulations that contributed to the success of the U.S. Minuteman program and missile control systems; developing the initial version of the Integrated Risk Information System (IRIS), providing technical assistance to the Government of India, Prime Minister Gandhi, to clean up the Ganga River; assisting the Hashemite Kingdom of Jordan and Israel to identify opportunities to conduct joint environmental projects prior to the Landmark Treaty between the two countries; and serving as the Delegation Lead for approximately 20 projects with several former Soviet Union Republics.

Don entered a semi-retired state in January of 2004 from the EPA and founded Don Ehreth Consulting, a business improvement consulting practice responsible for over $53 billion in new contracts. His service awards include the Bronze Medal for Development of the first Municipal Wastewater Solids Management Strategic Plan, the Gold Medal for Exceptional Service to Environmental


*Dan Muus (UND Foundation), General Bernard Randolph, Matthew Cavallli (Chair, ME), Donald Ehreth, and Michael Mann, (Chair, ChE)*

Research and Development as the Acting Assistant Administrator, 1986-87, and the Distinguished Federal Career Award. Don resides in Herndon, Va.

**General Bernard P. Randolph**, born in New Orleans, LA, graduated magna cum laude from UND, receiving his B.S. in Electrical Engineering in 1964, M.S.E.E. in 1965, MBA from Auburn University, and Honorary Doctorate of Engineering from UND in 1969. General Randolph had a 35-year career in the United States Air Force. His numerous assignments included Strategic Air Command at Lincoln Air Force Base, NE; instructing and evaluating KC-97 and B-47 flightcrews; Los Angeles Air Force Station, CA, as Chief, On-Orbit Operations, Space Systems Division and Assistant Deputy Program Director for Launch and Orbital Operations; Airlift Operations Officer, Republic of Vietnam at Chu Lai and Airlift Coordinator at Tan Son Nhut Air Base, responsible for the total operation of about 50 C-7 and C-123 airlift sorties daily from Chu Lai and later coordinated the operations of all airlift control elements throughout the Republic of Vietnam; 1970 assigned to Air Force Systems Command Headquarters as Chief of Command Plans in test evaluation, and then as the Executive Officer to the Deputy Chief of Staff for Operations; Los Angeles Air Force Station as Director, Space Systems Planning, for the Space and Missile Systems Organization; served as Vice Commander of the Warner Robins Air Logistics Center, Robins Air Force Base, Ga.; Director of Space Systems and Command, Control and Communications, Office of the Deputy Chief of Staff, Research, Development and Acquisition, Headquarters U.S. Air Force, Washington, D.C.; Commander, Air Force Systems Command, Andrews Air Force Base, Maryland. His military decorations and awards include the Distinguished Service Medal, Legion of Merit with oak leaf cluster, Bronze Star Medal, Meritorious Service Medal, Air Force Commendation Medal and Presidential Unit Citation.

After his retirement in 1987, he became a senior consultant for SAIC. He currently resides in Long Beach, CA.

*The Arthur Gray Leonard medal was presented to Mr. Milton Lindvig (BSGE '61) for Teaching, Educational Development, and Leadership; and to Dr. Frank Schulte (BS'65; Ph.D.'72) for Exploration, Development, and Entrepreneurship at the GGE annual banquet.*

*Academy members: (foreground) Larry Jodsaas (BSEE'62), Ben Gorecki (BSEE'62), (background l-r) LeRoy Kuta (BSME'64), Curtis Orr (BSEE'53), and John MacFarlane (BSEE'61)*

*Alumni enjoy the academy evening social and dinner.*

# Worldwide Entrepreneur Interested in UND

Harold Hamm, cited by Forbes as the richest oilman in the United States and listed by Forbes.com as 136th on the list of world's billionaires, visited the University of North Dakota December 3, 2010. Hamm, founder and chief executive of Oklahoma-based Continental Resources, owns more oil and gas than any other American—including oil in the Bakken, which covers much of western North Dakota. Estimates of reserves in the Bakken have more than doubled to more than 8 billion barrels.

While at UND, Hamm was hosted by President Robert Kelley, visited with area legislators, lunched with area business and government leaders, and toured the UND School of Engineering and Mines. He presented "A Conversation with Harold Hamm" to students, focusing his talk to engineering, business, and entrepreneurship students, although all students were welcome.

"Hamm is interested in UND because the University—home to the world-renowned Energy & Environmental Research Center and the School of Engineering and Mines—is developing an even greater energy and environmental emphasis to strengthen UND's already strong service to the state of North Dakota, particularly the energy industry," said President Kelley. He pointed to UND's addition of a new Bachelor of Science degree in Petroleum Engineering, a new Master of Science degree in Energy Engineering—the nation's first graduate degree in Sustainable Energy Engineering—and a new customizable Ph.D. in Chemical Engineering, which join an already existing Ph.D. in Engineering with an energy track.

Kelley also recognized the new UND Petroleum Research, Education, and Entrepreneurship Center in the School of Engineering and Mines. The center is designed to help improve the understanding of petroleum geology, geophysics, and engineering of the Williston Basin; develop enhanced recovery techniques for the Bakken Formation; develop techniques for carbon sequestration (an internationally recognized area of expertise at the EERC) in the Williston Basin; and more.

Another example touted by President Kelley was the creation of the UND Institute for Energy Studies, which was approved earlier this year by the North Dakota Board of Higher Education.

PETROLEUM


*While visiting UND, Harold Hamm toured the Wilson M. Laird Core Sample Library. Pictured are Mark Fliginger '74, President, Cody Oil and Gas Company; Loren Kopseng, President, United Energy Corp., both of Bismarck, ND; and UND Faculty Zheng Wen Zeng, Lance Yarbrough, Harold Hamm, Steven Benson, Michael Mann, and Scott Korom.*

# Educating the Next Generation

North Dakota now is the country's fourth largest petroleum producing state. Output from the state's oil reservoirs, buried 5,000 to 10,000 feet down in the Williston Basin, has increased close to threefold, up 276 percent, since 2008.

"It's really amazing," said Dr. Steve Benson, professor in the University of North Dakota Department of Chemical Engineering and director of the brand new UND Petroleum Engineering degree program. Benson is part of a team of three other faculty members from Geological Engineering—Dr. Scott Korom, Dr. Zheng-Wen Zeng, and Dr. Lance Yarbrough—who are involved in initiating the program.

"Our Petroleum Engineering degree is all about educating the next generation of students to be experts in this field," said Benson, a native of Twin Valley, MN, who spent over 25 years as a Senior Researcher Manager and Associate Director for Research at the UND Energy & Environmental Research Center.

Benson said the new degree program is a timely and practical addition to UND's already significant energy and environment related degrees, including the country's first master's degree in sustainable energy engineering as well as a doctoral degree in engineering with an emphasis in energy.

The petroleum engineering degree together with UND's extensive geology and geological engineering program and other energy and environmental studies options aim to prepare experts to deal with the world's growing energy demands while minimizing the impact on the environment.

"I'm a fuel scientist with experience in energy resource properties and their behavior in fuels refining and energy generating systems. That's the expertise I bring to this new program," said Benson, who pioneered novel ways to decrease emissions and improve efficiency in plants that utilize biomass, coal, or petroleum as fuels.

"We will help our students develop an understanding of not only the science and technology associated with petroleum engineering but also business and economics, policy and regulations, and society and behavior that are necessary to develop globally evolving energy systems," Benson said. "Our students will be grounded in ethics and safety with an appreciation for system scale and complexity."

"We already have eleven students signed up as majors and several more who have indicated they will declare petroleum engineering as their major. Plus freshmen coming next year have expressed an interest," Benson said.

# Building a Multifaceted Foundation for North Dakota's Energy Future

Crude oil and its myriad products have been making—and breaking—fortunes ever since a German mineralogist coined the term "petroleum" back in the 16th century. Today, North Dakota is again part—a much bigger part—of the international oil economy.

With UND-based skills, research, and know-how, North Dakota is reaping a big economic boost from its petroleum resources. Dozens of UND alums are working in the oil business; the University also is helping the energy industry capture more oil at lower cost, and it's working on solutions to petroleum-related challenges such as environmental impacts, carbon capture, water resource management and transportation.

"Our scientists and engineers have helped the energy industry make North Dakota the fourth-largest oil producer in the country, after Alaska, California, and Texas," said Steve Benson, a fuel scientist and professor in the UND Department of Chemical Engineering and director of UND's brand new petroleum engineering degree program.

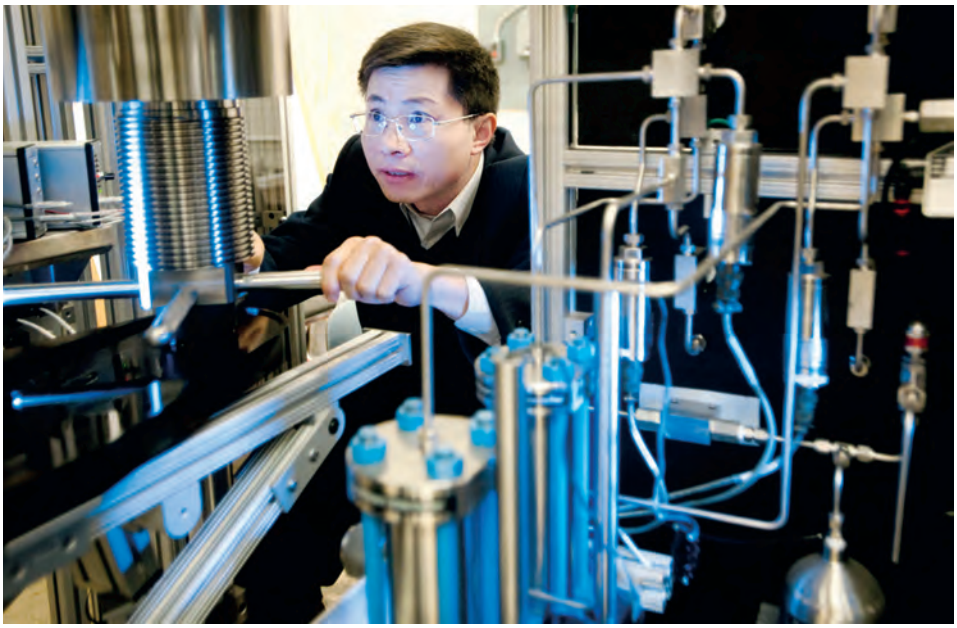
The University's widespread energy efforts involve not just petroleum but also wind, biodiesel, and other renewables.

"There's probably not a whole lot more new oil to discover," Benson said. "What we are doing is figuring out more efficient ways to extract what's there, better ways to use it, and ways to reduce the environmental impacts. UND also is exploring a wide range of alternative, sustainable, and clean sources of energy, including diesel fuel based on soybeans and other oilseeds."

UND is reasserting its position as a premier university in energy education, research, policy, and outreach activities by establishing the UND Institute for Energy Studies, approved earlier this year by the North Dakota State Board of Higher Education.

"We believe that this institute will address several of the 'Grand Challenges' identified by the National Academy of Engineering as major areas of concern to the nation," said Hesham El-Rewini, professor and dean of the UND School of Engineering and Mines (SEM). "One of the challenges is how to respond to the nation's need for clean, affordable, reliable energy. When I came to UND, I quickly learned that UND has been a pioneer in energy-related research for more than 50 years. I proposed this Institute as an umbrella organization to coordinate, enable, facilitate, and support interdisciplinary educational and research programs in energy-related fields.

"Now we're in the process of getting $6.75 million in federal appropriations through the much-appreciated efforts of (U.S.) Sen. Byron Dorgan and our congressional delegation, $2.75 million from the Department of Energy, and $4 million from the Department of Defense," El-Rewini said. SEM also has garnered key financial support from several alums, including Bob Solberg and Tom Hamilton, two well-known names in the oil and gas industry.



*Zheng-Wen "Zane" Zeng, assistant professor of geology and geological engineering and deputy director of UND's Center of Excellence in Petroleum, combines lab work with mathematical modeling to more clearly understand the oil-rich Bakken Formation and stresses within its geological structure.*

"In addition to offering interdisciplinary degree programs and certificates, the Institute aims to encourage students to get involved in research directly as part of their education," El-Rewini said. "We would like this Institute to contribute to energy-related policy-making and regulations. We will also pay great attention to outreach and public awareness; we would like to contribute to educating the public about energy issues and changing people's habits as far as energy is concerned."

"This isn't just about engineering," he continued. "This is a campus-wide effort

involving all colleges. When we said this is a UND institute, that's what we mean. With the oil boom in the western part of the state, social problems have emerged that are not technical or engineering problems. These are issues that need to be studied by social scientists. When it comes to regulations and policies, we need lawyers and law researchers. We can't do technology while neglecting social issues and policies."

"The Institute for Energy Studies will help the University teaching and research community focus on the big challenges," El-Rewini said.

"A big challenge is how to diversify our energy portfolio and how to ensure that our energy options are environmentally friendly, also, how to educate the next generation of energy experts. We are working with our colleagues from all colleges to help North Dakota find solutions."

*Juan Pedraza, Staff Writer*

*UND President Robert Kelley and Dean Hesham El-Rewini visit western ND.*

# Mining Professionals Needed: We Have Them!

On average, the amount of new minerals required per U.S. citizen is 40,000 lbs. per year, with some of the most common materials being sand, stone, salt, iron, copper, and lead. Moreover, each person requires approximately 12 pounds of zinc and over 2.5 tons of coal per year. Mining industry growth has accelerated all the more due to the retirement rate and the growth in the minerals industry. However, there are few mining engineering programs in the U.S., and current geological engineering programs will need to double their efforts in order to produce more graduates to meet this increasing demand.

In response to these opportunities and to provide a more diverse skillset to our engineers, Dr. Lance Yarbrough, assistant professor in Geology and Geological Engineering, has developed a new course—Introduction to Mining Engineering—geared to provide engineers with knowledge of the most common mining methods and technology. During the course, students complete group projects that require them to calculate ore reserves, overburden ratios, and open pit and sand mining. They are also required to design an entire mining operation.

The diverse mining operations in the upper Midwest offer the opportunity for the course participants to visit the North American Coal Corporation's Falkirk Mine in Underwood, ND. The mine began production in 1978 and delivers approximately 7 million tons of coal per year. The operation utilizes two Marion 8750 draglines for overburden removal and reclaims about 400 acres of land annually. During last semester's visit, students met UND graduates Gerald Goven (BS Geology, 2001), geologist of the mining operation at Falkirk, and Falkirk's Engineering Manager, Matt Broderick (BSME, 1982). Renee Schultz, Short-Range Mine Planner, escorted the group to the pit floor where students viewed up-close the mammoth machinery used in daily operations of the lignite mine. Later, Falkirk's Long-Range Mine Planner and Engineering Supervisor, Greg Dehne, treated students to a frank and open discussion about the challenges of the lignite reserve and balancing electrical power demand with environmental responsibilities.

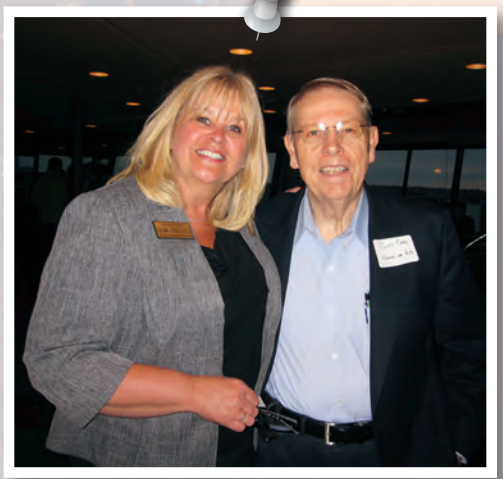
By providing mining-related courses, the University of North Dakota-SEM graduating geologists and geological engineers will possess the skills needed for entry-level positions at mining operations. Being able to diversify into related disciplines provides UND engineers with greater flexibility in employment options during their careers. With mining starting salaries only rivaled by their petroleum counterparts at upwards of $60–70K per year, and the option to travel the world or stay right here in state of North Dakota, the career choice is exceptional.

*The workhorses of an open cast lignite mine. Electric shovel loading coal (left), D-11 ripping the Hagel A coal seam (center), and the massive "Prairie Rose," Marion 8750 walking dragline removing overburden.*


*Faculty and students visit the Falkirk Mine near Underwood, North Dakota. The Caterpillar 793D mining truck can haul 240 tons of material. The fleet operates 24 hours per day, 6 days per week.*

MINING

On June 9, more than 100 UND alums gathered in the Space Needle to attend the Seattle Alumni Social.



PROUD TO BE UND

# Two Professors Awarded 2011 Chester Fritz Distinguished Professors

The Chester Fritz Distinguished Professorships were established with an endowment gift from the late UND benefactor Chester Fritz. The first Chester Fritz Distinguished Professor was named in 1973. Just 68 individuals, including this year's selectees, have been designated Fritz Professors.

**Joseph Hartman**

Joseph Hartman, professor of geology and geological engineering and department chair, is one of the world's leading experts on fossil freshwater mollusks. He often works with international teams that establish the fundamental knowledge base for their discipline. His research achievements are recognized regionally, nationally, and internationally. He has published 35 papers in major international peer-reviewed journals and done field research from the badlands of North Dakota and Montana to India and Madagascar. He has also conducted museum research in Chicago, Washington, D.C., and London. He is acclaimed as a passionate and meticulous instructor, who carries a teaching load well above average. Students have described Hartman's classes as creative and authoritative, brimming with imagination yet rooted in expertise. He serves as a student mentor and advisor and chairs four thesis committees. He has been active in University affairs and led the development of a multidisciplinary course, "Surviving on Planet Earth."

Hartman received his Ph.D. from the University of Minnesota. His collection of freshwater and terrestrial mollusk fossils, at about 500,000 specimens, is possibly the largest such collection gathered through the efforts of a single researcher.


**Wayne Seames**

Wayne Seames, professor of chemical engineering, excels in the areas of teaching, research, and service, involving students in all aspects of his pioneering and innovative biofuels research. He played a lead role in establishing the Sustainable Energy Research Infrastructure and Supporting Education (SUNRISE) program, which he now directs. It is a multi-university and multi-disciplinary research and outreach program with 36 participants, having received more than $32 million in funding since 2004. With three patent awards and five patents pending, Seames is the lead inventor of technologies to convert crop oils, algae oils, and animal fats into renewable fuel and chemical products.

Seames has been honored for excellence in both teaching and research and has been a leading force in the development and evolution of UND's chemical engineering curriculum. This has included the establishment of new graduate degree programs, ushering in the department's "across the curriculum" initiative to embed topics across core courses and updating the department's capstone design experience courses. His wide record of service activities include leading the development and administration of the Native American Freshman Research experience, an outreach program designed to expose tribal high school graduates and tribal college students to North Dakota's two research universities (UND and North Dakota State University) and the opportunities in the science, technology, engineering, and mathematics fields.

Seames received his B.S. and Ph.D. degrees in Chemical Engineering from the University of Arizona. He directs the Environmental Engineering Graduate Program at the School of Engineering and Mines.

# Faculty Honored at Founders Day 2011

The Chemical Engineering department received the Departmental Award for Excellence in Research. The department previously received this recognition in 1973 and 2005. Eligibility for the award is limited to once every five years.

The inaugural Award for Excellence in Interdisciplinary Collaboration in Research or Creative Work was awarded to the late Richard Schultz, professor, Electrical Engineering, and William Semke, associate professor, Mechanical Engineering.

SEM's North Dakota Spirit Faculty Achievement Award Recipients were Matthew Cavalli, associate professor, chair, Mechanical Engineering; Sukhvarsh Jerath, professor, Civil Engineering; and Scott Korom, associate professor, Geology and Geological Engineering, all pictured here with Dean Hesham El-Rewini.

*SEM faculty and staff were joined by university and community leaders and alumni at the ND Museum of Art for a reception to celebrate and recognize the full ABET accreditation of all SEM programs.*

## CIVIL ENGINEERING

- The student enrollment increased again this academic year to 228 undergraduates (107 of which are distance students) and 12 graduate students in Spring 2011. Fall 2010 enrollment was slightly higher at 252.
- Thirty-three BSCE degrees and two Master's degrees were or will be awarded in 2010-2011.
- Dr. Daba Gedafa will join the department as an Assistant Professor beginning this academic year.
- Dr. Harvey Gullicks was appointed to the Department Chair position in June 2010. Dr. Charles Moretti, who faithfully served in the chair position for 11 years, remains heavily involved in the department software, technology, internship program and senior design activities. Dr. Sukhvarsh Jerath was appointed to the Director of the Civil Engineering Department Graduate Program.
- The UND Student Chapter of the American Water Works Association/Water Environment Federation (AWWA/WEF), advised by Dr. Gullicks, competed in the National WEFTEC Student Design Competition and placed 3rd in the Environmental Design category.
- The UND Student Chapter of the American Society of Civil Engineers (ASCE), advised by Dr. Moretti, hosted nine universities for the Midwest Regional ASCE Student Conference and ASCE/American Institute of Steel Construction (AISC) Steel Bridge Competition. The UND Steel Bridge Team placed 5th.
- Dr. Howe Lim received promotion from Assistant Professor to Associate Professor.
- Dr. Iraj Mamaghani and Dr. Nabil Suleiman published books or book chapters this year.
- Drs. Mamaghani, Jerath, Moretti, Suleiman, Lim, and Gullicks and several of their students authored peer-reviewed journal articles, gave conference presentations, or participated in poster sessions.
- Drs. Lim, Gullicks, and Suleiman had externally-funded, active research projects or funded research proposals in 2010-2011.

## CHEMICAL ENGINEERING

- Chemical Engineering received the Departmental Excellence in Research Award, Founders Day 2011
- The program graduated its first BS ChE student with the new Concentration in Sustainable Energy Engineering option.
- Undergraduate AY 2010-11 Fall 168/ Spring 154

  Graduate Fall 24/Spring 25

  Ph.D. Fall 15/Spring 12

  (Distance students are not reflected in these figures.)
- A group of 12 students organized the first UND team to compete in the AIChE ChemE Car competition, placed second in the regional competition, and qualified for the national competition this fall.
- Dr. Gautham Krishnamoorthy has been appointed as the Ann and Norman Hoffman Assistant Professor of National Defense/ Energetics.

**Distance Engineering Degree Program (DEDP)** provides an access to education to students who would not otherwise be able to obtain a degree from the University. Fall 2010 enrollment was 387; spring 394. Among those were:

- Students from 22 states
- 3 countries (US/Canada/Nigeria)
- A husband and wife team both seeking their advanced degrees

- Dr. Frank Bowman is now the graduate director for four degree programs: PhD Chemical Engineering, MS Chemical Engineering, MS Environmental Engineering, and MS Sustainable Energy Engineering. Eight students are already enrolled in the new Chemical Engineering PhD program, which was approved last year. All total, ChE faculty advised 35 graduate students through these programs this year.
- Dr. Steven Benson was named Director of the new Petroleum Engineering program. He was also named the Director of the Institute for Energy Studies, a UND-wide initiative to coordinate research and education efforts related to all aspects of energy.
- Dr. Michael Mann was chosen to serve as the Marshall for the December 2010 Commencement Ceremony. Marshalls are chosen from the ranks of UND's active Chester Fritz Distinguished Professors as a means of honoring UND's most accomplished faculty.



***On April 29, 2011, NDSU hosted the first Engineering Research Summit. Engineering faculty from UND, SDSU, and NDSU came together to discuss each other's programs, create opportunities for faculty to discuss potential collaborations in research, and identify possible synergies as a result of a prior meeting of the three deans. Photos throughout this section were taken at that summit. UND will host the next summit in spring 2012.***

- Dr. Wayne Seames continued as the Director of the Sustainable Energy and Supporting Education (SUNRISE) research and education program. SUNRISE is a virtual academic supercluster with 35 faculty participants in 13 departments at UND, NDSU, and Mayville State.
- UND students associated with the PowerOn outreach program, sponsored by the SUNRISE program, are advised by Dr. Bob Wills. Over the past year, PowerON participated in eight regional events, providing engineering demonstrations to over 750 grade and middle school kids.
- ChE faculty helped administer and deliver other SUNRISE outreach programs: a Research Experiences for Undergraduates program that focused on sustainable energy topics, an Air Pollution workshop for high school students (over 170 attending this two day event in 2011), and a two-week Native American Freshman Research Experience.
- ChE's two newest faculty members, Dr. Yun Ji (March 2009) and Dr. Gautham Krishnamoorthy (November 2009), are off to a great start. In addition to favorable teaching evaluations, both have had great success in establishing their research programs. Combined, they have submitted 29 research proposals as PI or co-PI and been awarded 10 projects valued at over $1.2 million. They have published seven peer-reviewed papers and advise four graduate students and three undergraduate students in research.
- Dr. Frank Bowman was promoted to Associate Professor of Chemical Engineering and awarded tenure.
- Dr. Wayne Seames was the program chair for the Cleantech 2011 Workshop and Action Summit, a national conference sponsored by the NSF EPSCoR program and the Red River Valley Research Corridor Coordinating Center that was held in Grand Forks June 19-21.

## MECHANICAL ENGINEERING

- Undergraduate AY 2010-11 Fall 445/ Spring 480

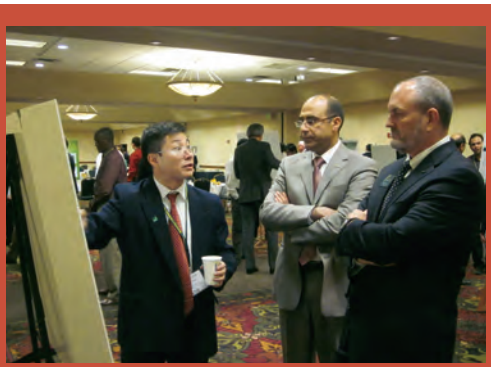
  Graduate Fall 29/ Spring 31

  Ph.D. Fall 4/Spring 3

  (Distance engineering students are not reflected in these figures)
- UASE team placed 1st in the Outback Challenge (please see article this issue)
- CNC (Computer Numerically Controlled) machining center and rapid prototype machine were recently upgraded
- Dr. Clement Tang will join the department as an associate professor beginning this academic year.
- The department is in the process of recruiting to fill one vacant faculty position.
- Dr. Forrest Ames was named ASME Fellow
- Dr. Matthew Cavalli was named SEM Outstanding Professor
- Dr. George Bibel, UND professor of Mechanical Engineering, was interviewed by Slate.com concerning the recent Southwest Airline plane that developed a hole in its fuselage. The feature, using stories from Bibel's book *Beyond the Black Box: The Forensics of Airplane Crashes* and other information provided by Bibel, explained why passengers were not blown through the hole.

## ELECTRICAL ENGINEERING

- The student population of the department increased to over 400 students (200 of whom are distance undergraduate students, with 30 MS and PhD graduate students) in the spring of 2011. The department has recently experienced a rapid growth in its undergraduate distance student population.
- Dr. Hossein Salehfar was appointed to the Department Interim Chair in October 2011. The former Chair of the Department Dr. Richard Schultz regrettably passed away in September 2010. Department students, faculty, and staff were extremely saddened by Dr. Schultz's passing and miss him greatly. A national search to fill the position is planned soon.
- Dr. Naima Kaabouch in collaboration with Dr. Jeremiah Neubert of Mechanical Engineering was awarded a National Science Foundation grant to increase Engineering Student retention.
- Dr. Naima Kaabouch was elected a 2010 Women's Institute in Summer Enrichment (WISE) Fellow.
- Dr. Naima Kaabouch was selected as one of the 2010 UND Faculty Stars.
- Dr. Saleh Faruque was awarded a Fulbright Faculty Scholarship to teach one year in Bangladesh.
- Dr. Saleh Faruque and Professor Prakash Ranganathan attended and presented technical papers on "smart grid" communications at a National Institute of Standards (NIST)-sponsored conference in Washington, D.C., in January 2011.





*UND Dean Hesham El-Rewini and NDSU Dean Gary Smith.*

- Dr. Sima Noghanian was selected to serve as the Journal Area Editor for the *Elsevier International Journal of Electronics and Communications (AEUE).*
- Drs. Sima Noghanian and Reza Fazel were awarded a mini-project grant to start a MATLAB Mathematics and Engineering (MAT-ME) summer camp for high school students that was held in August 2010. The camp will be held again this year in June 2011.
- Dr. Reza Fazel organized and held the Math Kangaroo competition for first to twelfth graders for the second time in North Dakota.

## GEOLOGY AND GEOLOGICAL ENGINEERING

- Undergraduate AY 2010-11 Fall 53/ Spring 50

  Graduate Fall 15/Spring 12

  Ph.D. Fall 15/Spring 14

  (Distance engineering students are not reflected in these figures.)
- Scott Korom received the ND Spirit Faculty Achievement Award at Founder's Day 2011.
- Zhengwen Zeng was tenured and promoted to Associate Professor, effective in the fall of 2011.
- Dexter Perkins took on a new responsibility as Associate Editor for *TRENCHES*, the magazine of the National Association of Geoscience Teachers. He will continue as an associate editor of the *North Dakota Quarterly.*
- Hanying Xu, Director of EARL (Environmental Analytical Research Lab)—North Dakota EPSCoR (Experimental Program to Stimulate Competitive Research) Sunday Academy (SA) projects were conducted at tribal colleges, including Turtle Mountain Community College, Sitting Bull College, Fort Yates, and Cankdeska Cikana Community College in Fort Totten, ND. SA is a part of the Nurturing American Tribal Undergraduate Research and Education (NATURE) program to teach analytical chemistry skills.
- UND's first Ph.D. in Geological Engineering, Xuejun Zhou, defended his dissertation, "Geomechanical Stability Analysis for CO2 Sequestration in Carbonate Formation," and received his diploma at spring commencement.
- Zhengwen Zeng, UND is now equipped with state-of-the-art geomechanical/ petrophysical testing systems. Funded by the U.S. DOE and North Dakota Department of Commerce Center of Excellence Program, UND's Petroleum Engineering Research Lab successfully obtained two major testing systems—AutoLab 1500 (Triaxial testing system) and MTS 816 (Uniaxial servo-controlled rock testing system).
- Under the direction of Will Gosnold, students are participating in the 2010-2011 National Geothermal Student Competition sponsored by the National Renewable Energy Laboratory, in partnership with the U.S. Department of Energy's Geothermal Technologies Program. The first-of-its-kind intercollegiate competition will challenge students to advance their understanding of geothermal energy's potential as a significant contributor to the nation's energy portfolio in the coming decades. Eleven teams have been selected for a subcontract award to participate in the competition. Each team will conduct an assessment of the geothermal energy potential in the Rio Grande Rift area of southeastern Colorado and northeastern New Mexico during spring term 2011.
- Since 2007, in collaboration with The Nature Conservancy and U.S. Geological Survey, Phil Gerla has conducted hydrological research funded by the U.S. Fish and Wildlife Service Environmental Contaminants program in the Glacial Ridge area of Minnesota. The 25,000-acre prairie and wetland restoration project (now a new national wildlife refuge) is located about 40 miles southeast of Grand Forks. Defining the sources, paths, sinks, and fates of contaminants (e.g., fertilizers previously used) as native prairie redevelops is the goal of the research.
- Early in spring semester 2011, Phil Gerla was awarded $75,000 in an effort to better understand the effect of prairie recovery on hydrology and water quality at Glacial Ridge. The two-year study will track the ecohydrological recovery of fens (groundwater-dependent wetlands) and monitor the rate and processes related to diminishing contamination at an abandoned cattle feedlot. To secure funding and get research started, the feedlot site was used last fall as the field laboratory for GeoE 418 (Hydrogeological Methods).
- Dexter Perkins and four undergraduate students took a research trip to California and Arizona during spring break 2011, to collect mantle samples to serve as the basis of senior theses. The trip was supported in part by alumni donations.



- On October 16, 2010, a free family friendly event was open to the greater Grand Forks community and hosted by Sigma Gamma Epsilon, a national Earth Science honor society. About 150 children and parents attended the first GGE (Leonard Hall) "Night at the Museum." The very young to teenagers were shown the properties of rocks, minerals, and fossils, watched movies and exploding volcanoes, walked through geologic time, drew ancient landscapes, prepared fossils, dug for fossils and rocks, and talked with the students and faculty of GGE.
- Ph.D. student Matt Burton-Kelly helped design and develop the UND Paleontology Specimen Database, which is nearing a stage at which large amounts of fossil data can be uploaded to make access to knowledge of GGE's fossil collections.


*Members of the SEM Leadership team held their 3rd annual retreat on June 28/29 at Turtle River State Park. L-R: Charles Smith, Harvey Gullicks, Tammy Anderson, Joe Hartman, Hesham El-Rewini, Scott Korom, Forrest Ames, Matthew Cavalli, Steve Benson, and Mike Mann.*


*UND Dean Hesham El-Rewini and NDSU Dean Gary Smith.*

## Engineered Surfaces Center has a New Name and a New Director

In November 2010, the School of Engineering and Mines named Charles H. Smith to be director of the school's Advanced Engineered Materials Center (formerly known as Engineered Surfaces Center).n

Smith earned his doctorate in Materials Science and Engineering from Massachusetts Institute of Technology and his master's in Metallurgy from Georgia Institute of Technology in Atlanta.

In 2009, Smith co-founded Biotronics Inc., a MEMS (microelectromagnetic systems) start-up focused on commercializing cost-effective MEMS transducers for harsh environments. Before that, he was vice president of operations at Meggitt Sensing Systems.

He held positions at General Electric and was director of business development and science & technology at PPG Industries. He also taught at California Miramar University.

"I am delighted that Dr. Smith will be joining our Engineering leadership team as director of AEMC," Hesham El-Rewini said. "I am confident that he will not only help move our current research forward, but he will also lead the Center to pursue new opportunities in new areas."

*Get connected...*

# GET CONNECTED WITH UND ENGINEERING

The School of Engineering and Mines alumni and supporters represent the University across the nation and around the globe, demonstrating the limitless value of their UND education. Deb and Dan are anxious to hear your story.

A warm welcome to our lovely campus is a part of the University's great tradition. From prospective students and parents to athletic fans to alumni who may not have returned in decades, visitors, friends, and supporters will find a warm-hearted and hospitable "home." Our door is always open, and we hope you will return soon and often.

There are many ways to stay connected and support the School of Engineering and Mines: through contributing to the School and Foundation, becoming a leadership mentor who shares time and talents, and/or by joining us at one of our many events held throughout the year.

If it is your desire to support the School financially, gifts to the Engineering Excellence Fund from alumni and friends help sustain and enrich our programs. The unrestricted nature of the fund allows us to use it where it is needed most: to advance priority programs, solve short-term problems, or provide seed funding for outside-the-box ideas. In our effort to respond to the constantly changing landscape of engineering research and education, all gifts—regardless of size—are greatly valued.

During the North Dakota Spirit | The Campaign for UND capital campaign, we are especially focused on this important priority. A gift to the Engineering Excellence Fund is a meaningful way to participate for everyone—alumni as well as friends of the school who have an interest in engineering at UND.

We hope you have enjoyed this latest edition of *Engineering* and are as proud as we are of our students. From the tops of wind turbines to the Antarctic Circle, our students are covering the globe and it's with great pride that we hope to connect with all School of Engineering and Mines alumni in the coming year.

*Deb Austreng*

*Dan Muus*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# UPCOMING EVENTS...

## September 17, UND on Target with the TWINS

9:30am-11:30am **Pre-game Gathering**, Target Field Entrance #3, bring family and friends, go to: www.und.edu/ontarget.

12:10pm **MN Twins vs. Cleveland Indians**

## OCTOBER 17-23 UND HOMECOMING 2011

**Thursday October 20**

10:30am **Dedication** of the Electrical Engineering Chair's Office in honor of Dr. Richard R. Schultz
Upson II, School of Engineering and Mines

**Sioux Awards Banquet,** Sioux Award Recepient Norman N. Hoffman, BSChE'59—5:30 Social/6:30 Banquet and Program, Alerus Center, Grand Ballroom

**Friday, October 21**

10:30am Dedication of the Hoffman Energetics Collection Resource Center—Harrington Hall, Room 322

Noon Jodassa Center Leadership Seminar—"25 Years Since UND: From Disk Drives to Medical Devices," Mark Jesh, BSChE'86, Medtronic Corp., Harrington Hall 324

1:00pm Alumni Academy Induction Ceremony
Class of 2011: Wallace W. Griffin BSEE '62, Gary J. Hartz, BSCE'71
Jodsaas Center, Second Floor, 100 Harrington Hall—Reception following ceremony

**Academy Dinner**, Honoring all Academy members and open to all SEM Alumni—5:30pm Social/ 6:00pm Dinner, Alerus Center, Ballroom 3

**Arthur Gray Leonard Award Banquet**
Geology and Geological Engineering—5:30pm Social/6:30pm Banquet and Program, Alerus Center, Ballroom 1

7:00pm to midnight GET YOUR GREEN ON—UND/Grand Forks Community Homecoming Celebration
Alerus Center upper concourse

**ENGINEERING**
**Summer 2011**

Dr. Robert O. Kelley, President, University of North Dakota

Hesham El-Rewini, Dean, School of Engineering and Mines

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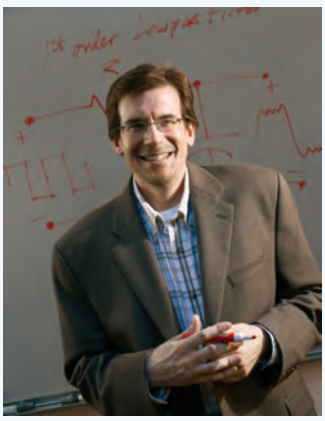
Cover photo credit:
George Dutton, Valley City, ND
Spanning the Red River and connecting Grand Forks, ND, to East Grand Forks, MN, is the Sorlie Memorial Bridge, the oldest documented through truss bridge using a Parker design and riveted connections in ND.

**www.engineering.und.edu**



# Announcing the Richard R. Schultz Memorial Engineering Endowment

Through generous donations, Christi K. (CK) Schultz has established the Richard R. Schultz Memorial Engineering Endowment to honor the memory of her husband. Allocations from this endowment will be used to fund interdisciplinary engineering projects and leadership programs, which could include student laboratory work, student travel, and affiliated competition.



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