EXPLORE | DISCOVER | ACHIEVE

The College of

SCIENCE & MATH

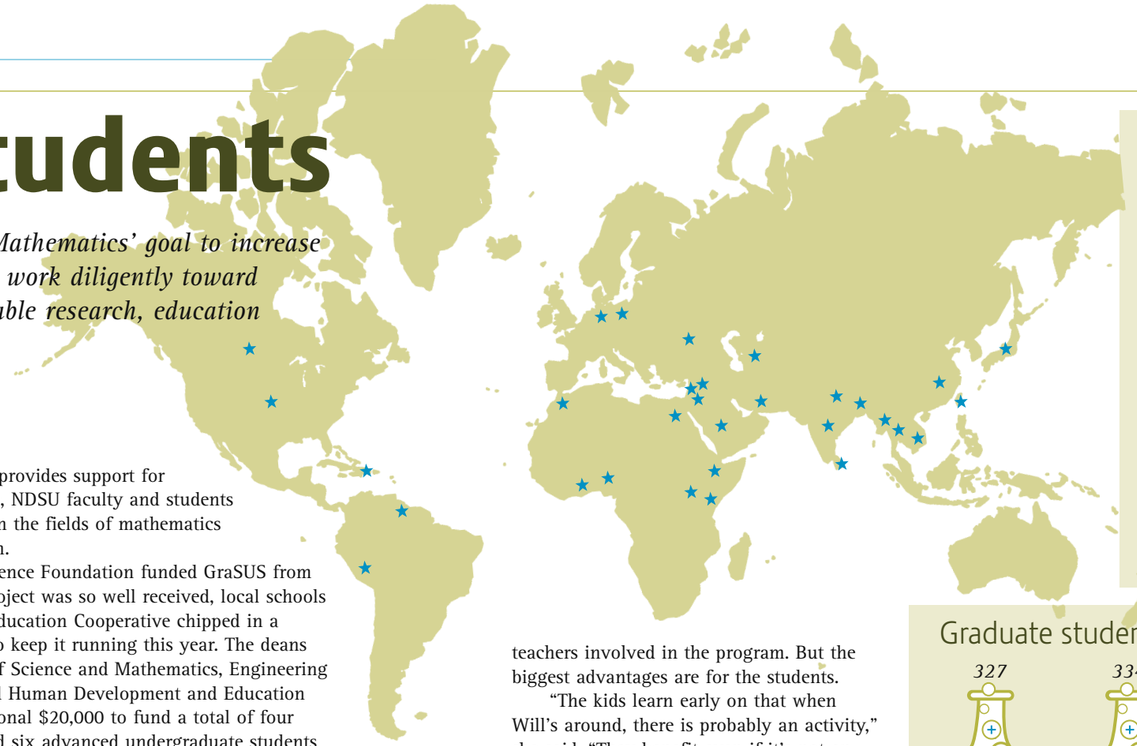
2010

North Dakota State University, Fargo

Knowledge, ideas and diversity: Our graduate students

Our graduate students

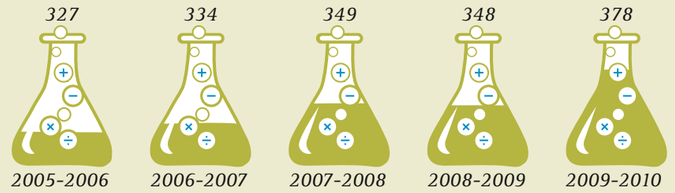
Graduate students are a vital part of the College of Science and Mathematics' goal to increase knowledge, ideas and diversity on campus. Our graduate students work diligently toward their own educational goals. At the same time, they provide valuable research, education and experiences for others on and off campus.



Countries of origin for graduate students in the College of Science and Mathematics

Bangladesh
Canada
China
Dominican Republic
Egypt
Ethiopia
Germany
Ghana
Guyana
India
Iran
Japan
Jordan
Kenya
Lebanon
Morocco
Myanmar
Nepal
Nigeria
Peru
Poland
Saudi Arabia
Sri Lanka
Syria
Taiwan
Thailand
Uganda
Ukraine
USA
Uzbekistan
Vietnam

Graduate students in science and math



GraSUS fellows bring NDSU to area classrooms

A student uses tweezers to gather nut fragments in a class exercise to simulate natural selection.

High school students scamper between the four lab tables in Cindi Bondy's classroom at Fargo South High School. The game they are playing is a tactile example of natural selection and evolution.

They scramble for the small assortment of nuts – pistachios to Brazils – resting on the tables. Wooden blocks on the tables resemble pencil holders, but instead hold small bits of licorice. The students hold standard or needle-nose pliers or forceps that resemble large tweezers. The students with pliers crack nuts since they cannot reach the licorice in the wooden blocks. The students with forceps gather as much licorice as they can since they cannot crack nuts with their weak instruments. In this game, their life depends on gathering enough food to live and reproduce.

How they pair off to "breed" will affect what sort of tool the next student will use to play. The students gather again in the middle of the room waiting anxiously for the game's organizer to start the next round.

"Will, you're killing me," says one student eager for the game, and the learning, to continue.

Will Clark is a doctoral candidate in biological sciences and a GraSUS fellow at NDSU. GraSUS (short for Graduate Student-University-School) has the overall goal of enhancing student learning in math and science classrooms while providing in-class professional development opportunities to science and math teachers. Teams of NDSU graduate and advanced undergraduate students, faculty and Fargo-Moorhead area math and science teachers are involved. They conduct activities that focus on inquiry-based learning, problem-solving skills, creative thinking and teamwork.

The project also provides support for participating teachers, NDSU faculty and students to conduct research in the fields of mathematics and science education.

The National Science Foundation funded GraSUS from 2001 to 2009. The project was so well received, local schools and the South East Education Cooperative chipped in a combined $110,000 to keep it running this year. The deans of NDSU's Colleges of Science and Mathematics, Engineering and Architecture, and Human Development and Education contributed an additional $20,000 to fund a total of four graduate students and six advanced undergraduate students

> "The GraSUS project was so well received, local schools chipped in funding to keep it running this year"

known as fellows. Each fellow is paired with a local teacher. Together, they plan class activities, lectures, and develop units that enhance student learning.

Clark is on his third round as a GraSUS fellow. He first participated in 2005 and continued in 2008 and 2009. Each year he has been paired with a different teacher.

"It's a good opportunity to hone your skills on teaching or lecturing to different audiences," Clark said. "I've lectured and taught at the university and it's different than teaching at a high school. It's a good skill to have especially since I'm going to go into teaching."

Graduate fellows put in about 20 hours a week or more developing activities and working in the classroom.

"It gave me a new appreciation for high school teachers," Clark said. "You don't realize how much work it is to be a high school teacher and a teacher in general."

Fellows bring in an enriched curriculum, technology and equipment that students are not ordinarily exposed to, said Kim McVicar, GraSUS project manager. For example, Clark was able to do a unit on DNA extraction and replication using NDSU resources at his disposal.

Except for one year, Fargo South High School biology teacher Cindi Bondy has been involved with GraSUS since the program began. She enjoys the professional development she gets from the university, talking with professors and other teachers involved in the program. But the biggest advantages are for the students.

"The kids learn early on that when Will's around, there is probably an activity," she said. "They benefit even if it's not an activity day to have us both in the room for discussions or help with questions that come up."

While GraSUS isn't necessarily a program for teachers in training, several former GraSUS fellows have gone on to teach in high schools or at the university level. Classroom units developed by fellows are archived and distributed to other teachers upon request. Area students also gain a connection in science education at NDSU, which can influence their decisions in choosing NDSU and science fields of study. Dogan Çömez, professor and chair of mathematics as well as principal investigator of the GraSUS project, plans to keep the program going as long as funding is available.

"We get more applications than we can accept," he said.

Ethiopians study physics at NDSU

Students from all over the world come to NDSU for their graduate studies. Sometimes, they even come in groups.

This year, three Ethiopian graduate students are working toward their advanced physics degrees at NDSU. All of them are funded by a research assistantship through the National Science Foundation. The first student, Demmelash Mengistu, arrived in August 2007 and works under Sylvio May, associate professor of physics. The other two, Bekele Gurmessa and Alemayehu Gebremariam, came in 2008 and work under Thomas Ihle, assistant professor of physics.

Demmelash Mengistu, Alemayehu Gebremariam and Bekele Gurmessa all traveled to NDSU from Ethiopia to pursue advanced degrees in physics.

All the students have a master's degree in physics from Addis Ababa University in Ethiopia and worked under professor Mulugeta Bekele, a well-known physicist in the field. Ethiopia has one university that grants doctoral degrees in physics, yet they have a greater need for physics teachers in the country than one university can supply. This demand and a desire to have an international experience drove the students to look at NDSU for their education. Mengistu also noted that scholarships are scarce in Ethiopia.

Mengistu found out about NDSU through the university's website. Mengistu contacted May, who sent him several publications, and the connection grew from there.

Fellow students back in Ethiopia began to contact Mengistu after he arrived at NDSU. He told them about everything the university had to offer.

"I told them that the research program is good, and especially the professors are easy to work with," he said.

The next year, two other students came to NDSU for their advanced degrees. Mengistu plans to go on to

postdoctoral research, then return to Ethiopia to have his own research facility and become a professor.

Because of the contacts generated through the students, NDSU has created a memorandum of understanding with Addis Ababa University to foster student exchanges at the undergraduate level, collaborate on work and advising at the graduate level, and share available resources.

> "I told [fellow students in Ethiopia] that the research program is good, and especially the professors are easy to work with"
>
> *– Demmelash Mengistu*

The Ethiopia connection is rather unique in the physics department, although May said they are looking for connections with other countries as well.

Rewarding research

In addition to teaching undergraduates and studying, graduate students are involved in many aspects of research at NDSU. What follows are some quick looks at a few of these researchers.

Bobbi Jo Merten opens a coffin-like chamber in the Research 1 building. Wispy clouds of salt steam stir about a few dozen metal plates with white coating. She's testing sensors she devised and embedded in the coatings to determine how much corrosion has taken place.

Bobbi Jo Merten uses a weathering chamber in her coatings research.

The silver wire electrodes are the width of a human hair. If they work, they will be able to detect corrosion – indicating that the coating has started to fail. Right now, the standard procedure is to re-coat planes, boats and other surfaces every few years. However, this method doesn't allow for efficient uses of coatings, nor does it guard against defects that lead to catastrophic failures – bridges collapsing or planes falling apart midflight.

"Those are things you can't see, but there's testing you can do to tell if severe corrosion is occurring," Merten said.

Merten is in her fourth year of studies working toward her doctorate at NDSU. She first found out about NDSU during undergraduate school. She had to find a summer research experience to complete her studies since her school was not large enough to support undergraduate research. She found that opportunity through Gordon Bierwagen, professor of coatings and polymeric materials. Merten worked in his lab for the summer and found an interest in coatings science. She decided to pursue her graduate studies at NDSU and plans to finish her doctorate in 2011. Merten is still open to future options in academia or industry.

Also in the coatings and polymeric materials department is Ivan Hevus, a second-year doctoral student.

Ivan Hevus came from Ukraine to research amphiphilic polymers.

Hevus, a Ukraine native, is working under Andriy Voronov, assistant professor of coatings and polymeric materials, who recruited him soon after seeing one of his poster presentations at a conference in Dresden, Germany.

Hevus is working with amphiphilic polymers, which are compounds that have both polar and non-polar fragments. Non-polar and polar molecules are as different as oil and water. In fact, oil is a non-polar molecule, and water is a polar molecule. Amphiphilic compounds, however, can mix with both (like soap does) and respond to changes in polarity or other external stimuli. For this reason, they are often called "smart" materials.

"This field of study is a pretty hot topic right now," Hevus said.

Hevus enjoys his research and finding unexpectedly good behavior in new materials.

Emilie DeKrey earned her doctorate in biochemistry in May, working under Glenn Dorsam, assistant professor of chemistry and molecular biology. DeKrey, a native of Fairmont, Minn., came to NDSU after graduating from Concordia College and working at the U.S. Department of Agriculture, where she met Dorsam and was impressed by his research.

Emilie DeKrey studied biochemistry to research human disease.

DeKrey is interested in human disease and researched protein regulation and T-cells for cancer effects. Her first few years at NDSU were spent in collaborative research and teaching. Grants helped to keep her in the lab more often. She plans to work again for the USDA in a position that works with diabetes and obesity studies.

Joel Hagen

DEAN'S MESSAGE

We are nearing the end of our strategic planning for the college and are developing important, difficult-but-possible and measurable goal statements for the next three to five years. As part of that process, we already have completed new mission, vision and value statements. Although we quibbled over wording, in the end I believe our faculty members are pleased with the results.

I share them with you here. I especially like the values we embrace. Note that one of those values lists "connections." This newsletter is one way to fulfill that value by making connections to you. Please feel free to return the favor by visiting us online, contacting us directly, or visiting whenever you would like.

Thanks for your support,
Kevin D. McCaul
www.ndsu.edu/scimath

Our Mission:

Through teaching, research, service and outreach, we provide knowledge, skills and insight to a world increasingly dependent on science and mathematics.

Our Vision:

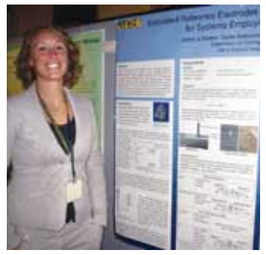
A dynamic environment offering premier opportunities to explore, discover and achieve.

We value:

- **Quality** – High standards and continual improvement apply to all that we do.
- **Engagement** – Strong student-faculty relationships foster engagement, individual development and learning.
- **Scholarship** – Original, creative research contributes new knowledge, solves problems and improves quality of life.
- **Connections** – Service to students, colleagues and the community enhances the common good.
- **Collaboration** – A supportive environment for faculty and students fosters collaborative, interdisciplinary research and learning.
- **Life-Long Learning** – Contributions to public appreciation of science and mathematics expand knowledge and improve critical thinking.
- **Diversity** – Intellectual and cultural diversity fosters respect for different ideas and recognizes the value of individuals.

FEATURES

Student presentation sessions provide important experiences



Bobbi Jo Merten and Subramanyam Kasisomayajula presented at the 16th annual Research Poster Session of the Department of Coatings and Polymeric Materials.

They are a chance to learn and an opportunity to shine. College of Science and Mathematics students took part in three significant poster sessions and meetings during fall semester.

The fifth annual Northwest Regional Undergraduate Affiliate Network Meeting of Undergraduate Research in Molecular Sciences was held Oct. 31, while the third annual Undergraduate Research Poster Session for the NDSU physics department was held Oct. 8 and the NDSU coatings and polymeric materials department's 16th annual Research Poster Session was Sept. 30-Oct. 2.

From presentations about the latest research to a chance to meet industry leaders, the sessions offer students a wealth of opportunities.

For example, at the coatings and polymeric materials event, 18 students presented research posters, while 10 Industrial Advisory Board members attended, representing such companies as 3M, Valspar, CertainTeed, PPG Industries, Corning, Sherwin-Williams, Sioux Manufacturing, Tecton Products and Taminco.

"There are various opportunities to interact with board members during this meeting. This is an important issue, and in the past years many students have explored numerous career possibilities with committee members," explained Andriy Voronov, assistant professor of coatings and polymeric materials. "Also, a major part of scholarship money usually comes from the companies represented on the board."

During the physics session, 12 undergraduate students presented posters and heard the presentations "Modeling and Simulation of the Behavior of Heat-Shrinkable Thin Films" by Pavel Belik, associate professor of mathematics at Augsburg College, and "Wrinkling and Strain Softening in Nanotube Membranes" by Erik K. Hobbie, NDSU professor of physics and director of the materials and nanotechnology program.

"The event was an excellent opportunity to see the extracurricular research of my classmates, as well as learn more about the research efforts of other institutions," said Aaron Feickert, a senior majoring in physics and mathematics. "It was wonderful to see the research opportunities available to undergraduate students."

And the meeting drew rave reviews from colleagues at other institutions. "I look forward to the NDSU Research Poster

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Session every year," said Benjamin Stottrup, assistant professor of physics at Augsburg College, who has brought four to five of his students to each of the annual sessions. "It gives my students the opportunity to discuss their results with scientists and I learn a lot in the process. I will be there next year."

In the meantime, NDSU hosted the regional meeting on molecular sciences. Held in collaboration with Minnesota State University Moorhead and Concordia College, the event attracted about 90 students and faculty from North Dakota, Minnesota and South Dakota. The meeting was sponsored by the American Society for Biochemistry and Molecular Biology and the American Chemical Society.

"It was a smashing success," said Glenn Dorsam, assistant professor of chemistry and molecular chemistry and meeting co-organizer. "NDSU offered a great venue for the students."

About a third of the participants were from NDSU, as students gave poster and oral presentations. The top award winner was NDSU student Jarrett Failing, a senior majoring in biochemistry and molecular chemistry.

Expert presenters included Michel Sanders, a steroid researcher from the University of Minnesota, who presented "Fat Fighters to the Rescue," and Robert Volkmann of SystaMedic Inc., who presented "Chemistry and Medicines: Providing Healthcare Solutions, Surprises and Challenges."

According to Dorsam, while students learn from respected researchers and meet their counterparts from nearby institutions, NDSU's doctoral program and expertise receive important publicity.

"We use molecular sciences in the title to be as big a draw as possible for the life sciences. If you deal with molecules, your undergraduates can come and present at the meeting – it accommodates biochemistry, chemistry, zoology, microbiology and immunology," he said. "There's no question, this meeting is going to grow."

Steve Bergeson

Students balance NDSU and military service

Military service is one of many paths students take to NDSU. Veterans can earn funding through the GI Bill and tuition waivers as well as transferrable skills that help them in their studies. Some students continue to serve in the National Guard while attending college and find that skills learned at NDSU help them as they serve their country.

Justin Fisher

Dan Montonye

What follows are profiles of two College of Science and Mathematics students who juggled service and education to reach their goals.

Justin Fisher, a native of Jamestown, N.D., joined the Army National Guard in 1999 while he was still in high school. He joined with his friends, and he joined for the education benefits. Now a graduate student in environmental and conservation sciences, Fisher was a sergeant when he retired from the guard in 2008. Two tours of duty in Iraq interrupted his college career, but did not affect his determination.

An 18-month tour in Iraq began after his sophomore year at NDSU. He jumped back into his zoology studies once the tour ended.

"The weirdest thing is that you deploy and you come back and things don't stop for everybody else," Fisher said. "Everybody you're with moves on."

His second tour in Iraq lasted 14 months and came after finishing his senior year. He cleared roadside bombs for both tours and was nearly blown up eight times. The last explosion earned him a Purple Heart. He also earned a Bronze Star among other commendation medals.

The time off from school did require some time to brush up on some basics, but Fisher enjoyed the idea of returning to his studies. He found help from friends who spent time helping him recall academic skills that were out of practice.

"When you have the attitude that it's something you want to do, it makes it so much easier," he said.

Serving helped him understand the importance of time management as well as prioritizing, which came in handy during his studies at NDSU. He doesn't let stress bog him down. NDSU also helped him in the service. He said his communication skills gained at NDSU helped him become a leader by knowing how to relate to people on different levels.

Fisher hasn't ruled out academia once he has finished his college career, but plans to work in research.

Unlike Fisher, Dan Montonye's studies at NDSU weren't interrupted by a deployment, but further education has been put on hold as he served the past year in Iraq for the Army National Guard.

Montonye, a native of Dumont, Minn., joined the Army after high school and served for two years. After his two years in the Army, Montonye joined up with an older brother and friends who had enrolled at NDSU. He also enlisted with the Army National Guard in 2005 and served while he was working toward his zoology degree.

After graduation in 2008, he was accepted to veterinary school at the University of Minnesota. They held a spot for him while he deployed to Iraq, where he ran convoy security from July 2009 to April 2010.

Balancing school and service was easy for Montonye. His professors would understand when essential three-day weekend training drills took him from classes. Likewise, his military superiors understood that school came first when important tests were scheduled.

An NDSU degree has helped Montonye in the service. Beyond the promotion points, he has become something of an admissions counselor for fellow guardsmen.

"A lot of them come to me with questions about college," he said. "So many of them I encourage to go. They say 'I don't know what I want to do.' I say, 'It doesn't matter. There are people there who will help you.' "

Joel Hagen

2009 Red River high waters inspire scientific research

Aside from an irrepressible sense of volunteerism that seems to rise with the water, it's hard to think of any good that comes from a flood. Backbreaking sandbagging, shut-down schools and businesses, costly damages to homes and businesses and months of cleanup are some of the usual negative connotations that come to mind.

But professors in the College of Science and Mathematics have found a way to extract something constructive from last spring's record crest – knowledge.

Examining the relationship between floods, stress and pregnancy outcomes

When a flood strikes a community, all the aftereffects seem readily apparent. Damaged buildings and ripped up land tell the story all too vividly. But as with all natural disasters, some of the aftermath can't be seen.

Clayton Hilmert, assistant professor of psychology, is interested in the underlying psychological impact created by floods. He used last spring's record crest to study how stress caused by a flood affects pregnancy outcomes.

According to Hilmert, negative pregnancy outcomes like low birth weight and pre-term birth are becoming more prevalent around the world and especially in the United States. "It is really important for us to gain an understanding of how psychological variables are playing a role in determining variance in pregnancy outcomes," he said. "We know stress affects pregnancy, we just don't always know exactly why or how it's doing it."

In April 2009, about a month after the Red River peaked at a record 42 feet in Fargo, Hilmert and his team of graduate students, Lexi Kvasnicka and Cali Anicha, and five undergraduate students began collecting data from more than 200 women in different stages of pregnancy and with varying proximity to the flood.

Hilmert and his team administered surveys and reviewed participants' medical records from Innovis and MeritCare clinics. To determine cortisol levels, 170 women submitted saliva samples. Cortisol, known as the "stress hormone" is involved with the body's response to stress and anxiety. Furthermore, in pregnant women cortisol is known to play a role in determining the timing of birth.

"We think cortisol might have something to do with how the baby grows in the womb, and so it's important if that gets thrown out of whack perhaps because of the stress of the floods. That could give us an answer as to why stress and why these natural disasters might affect these pregnancy outcomes," Hilmert said.

A similar research study in California analyzed the effects of earthquakes on pregnancy. It revealed that women furthest along with pregnancy were less affected by stress. "The thinking is that the more the mother's body has invested in the pregnancy, the more likely it protects the mother and fetus. Psychologically and physiologically, she doesn't respond to the stress as strongly in the third trimester which protects the fetus by not allowing the stress to affect it," Hilmert said.

Hilmert predicts his flood studies will reveal similar results and a better understanding of how stress impacts pregnancy outcomes. He expects the closer the women were to the flooding, the greater the impact on psychological and physiological stress, and, therefore, greater chance of negative pregnancy outcomes.

Learning the history of the Red

While residents of the Fargo-Moorhead community may feel as though they are too familiar with the Mighty Red,

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little is actually known about the geologic history of this meandering, north-flowing waterway. According to Kenneth Lepper, associate professor of geosciences, only about one percent of the river's roughly 10,000-year history is known and is based on historical accounts. His mission, along with assistant professors of geosciences Adam Lewis and Peter Oduor, is to gain a deeper understanding of the Red River based on its geological history.

"A lot of decisions right now are being made about what we should do about the future, based on one percent knowledge of the past ... we want to get a longer record to see if we can see patterns, cycles of flooding that go back further in time," Lepper said.

To determine the river's past, the team plans to take sediment samples from areas where the river has changed its channel. He said because the river meanders, sometimes the water cuts off or abandons channel loops as it flows north. When a flood occurs, water flows into these abandoned channels, leaving a package of sediment behind, which can create distinctive layers. Lepper and his team will date the samples of sediment using either radiocarbon dating or optical dating. So, for example, if they find a sample that dates back 5,000 years and shows 20 layers, they can infer something about the flooding frequency during that time.

"A lot of people say the flooding frequency is increasing. That may be true in a 120-year snapshot, but over a 10,000-year period, we don't know ... the data isn't there for a geological context," Lepper said.

The team also plans to analyze environmental and topographical aspects of the river. They will examine the sediment deposits for agrichemicals, metals and other signatures of mankind and will do a landscape analysis to review how the river has changed over time.

The team currently is seeking funding. Lepper said to his knowledge no one has looked at the flooding history in the valley in terms of the geologic record. He believes this information is crucial to people in the area even though it may come too late to assist with flood diversion plans.

"We may have no influence on what happens," Lepper said. "But one way or another, the information on how the flood frequency and intensity of the river have changed over geologic time should be of interest and available to people in this area."

Studying the source, fate and transport of Cryptosporidium

More than 400,000 people in Milwaukee fell ill to a diarrheal disease called cryptosporidiosis in 1993. The culprit – a microscopic, waterborne parasite called Cryptosporidium – had found its way into a municipal water treatment plant due to an inadequate filtration process.

Last March, Mark Clark, assistant professor of biological sciences, and John McEvoy, assistant professor of pathogenic microbiology, used the flooding of the Red River as an opportunity to better understand Cryptosporidium in North Dakota and Minnesota watersheds. They received funding from the USDA to research the source, fate and transport of this prevalent and obscure microorganism. Their primary objective was to determine the relationship between Cryptosporidium in wildlife and surface water.

Both Clark and McEvoy are quick to point out that Fargo's water treatment facility is second-to-none and eliminates all the Cryptosporidium from the water. "We are not really concerned in that way, really we are just interested in understanding how Cryptosporidium moves around from the dead of winter to spring," McEvoy said. "A lot of our interest is really just understanding a parasite and how it interacts with its host."

That relationship is important because Cryptosporidium adapts to each host. As a result, there are many species and genotypes associated with all classes of vertebrate animals. Most types do not cause significant disease in humans or agricultural animals.

The 2009 flood helped reveal how this parasite might be getting around. According to McEvoy, heavy rainfalls are known to transport Cryptosporidium, but little is known about the impact of spring thaws or floods. They hypothesized that the overland water flow could be an opportunity for Cryptosporidium to move.

> "I'm starting to think these pulses of water that come through and push this stuff around may be a key to how [Cryptosporidium] is transported to different populations."
>
> *– Mark Clark*

In the spring of 2009, during the height of the flood, Clark and McEvoy collected 20-liter samples of water at different points in the Red River and tributaries. "I remember at the time we were doing it saying, 'this is like a needle in a haystack.' At that point I was thinking these are all going to be negative because of the dilution factor," Clark said.

Both were surprised to find that 14 of the 15 samples were positive for Cryptosporidium.

The primary species they identified was Cryptosporidium andersoni which is particularly adapted to adult cattle. One sample, taken from a ditch, had a deer mouse genotype, which they expected. Neither kinds are human pathogenic.

Their findings illustrate that the contamination in the Red River comes from agricultural waste, travels quite a distance and is substantial.

"There's a lot of Cryptosporidium out there. Certainly I think the flood is capable of moving it around ... I'm starting to think these pulses of water that come through and push this stuff around may be a key piece of how this is transported to different populations," Clark said.

In 2010 the duo began sampling the river water again. This time they were looking for more specific information – whether the Cryptosporidium is dead or alive and the amount of it located in the riverbed sediment. They collected their last samples in mid-March and plan to publish their findings.

Linsey Davis

Queeni Puhakat: one who carries eagle medicine

Grier (left) receives his Comanche name at the Numunuh ceremony at Sia. He is holding a beaded, golden eagle-feathered historic ceremonial hunting lance. William Voelker (center) is holding ceremonial incense while Troy (right), an adopted Comanche, is piping on the eagle-bone whistle.

In the Comanche nation, a Numunuh ceremony is connected to the purification of an eagle following its death. The Comanche people believe the golden eagle holds more power than other eagles. Numunuh traditions teach that great pain or sacrifice, such as mourning the death of a loved one, brings a blessing or gift.

Professor emeritus James Grier has been climbing into eagles' nests for 51 years. During childhood fishing trips with his father, instead of fishing, he stayed on land exploring wildlife surrounding the water. "The first eagle nest I ever saw was on a fishing trip. My dad dropped me off near the nest and I'd watch the birds all day. That is how I started learning about them and from there, it got out of hand," he joked.

Grier conducted his dissertation research on avian thermal regulation and physiology at Cornell University in Ithaca, N.Y. As an extracurricular project, he borrowed four adult imprinted golden eagles. "An imprinted bird thinks it is a person or people are eagles. It identifies with our species," Grier said.

Working with two males and two females, Grier's previous research taught him how to interact with the eagles in ways to encourage breeding behavior. Using artificial insemination and an incubator, three eaglets were hatched.

Grier found a nest in Colorado to release two of the chicks into the wild. While transporting all three of the birds to his home in Iowa, the shipping container over-heated and Grier lost two of them. "We almost lost the third one, but I managed to rehabilitate him. That was Ithaca," Grier said.

Eagles were a family affair at the Grier home. Joyce, Grier's wife, and his children, Karlene and Dean, helped with his fieldwork. "Ithaca was raised with the family (and vice versa – the kids were raised with Ithaca) where he lived at our home," Grier said.

Grier's bird, Ithaca, was a local celebrity.

Ithaca and his six-foot wingspan made several appearances in Grier's classroom at NDSU and several other schools in the area. "I estimate that somewhere between 10,000 and 15,000 students and persons were able to see him up close and touch him," Grier said. "He was a local celebrity and regional mascot."

Ithaca gained worldwide attention, making an appearance before an estimated 21 million people on the "Tonight Show," hosted by Johnny Carson, in 1977. He also was featured in numerous television segments, magazines and newspaper articles through the years.

Because Ithaca was making fewer classroom appearances due to Grier's research overseas, he was moved to the Chahinkapa Zoo in Wahpeton, N.D., in 2002. Ithaca was well taken care of, placed on display, used in traveling presentations and was again seen by many thousands of people.

At the age of 37, after a long battle with the West Nile Virus, Ithaca was euthanized on Sept. 29, 2009.

The Comanche nation called upon Numunuh, offering prayer for Grier and his family during their time of mourning. They also honored Grier by giving him the name Queeni Puhakat, which means one who carries eagle medicine. "Eagles of the world benefit from your work and accomplishments. We thank you for sharing your 'eagleness,' " said William Voelker, director and founder of Sia ("Sia" means "feather" in Comanche), the Comanche Nation Ethno-Ornithological Initiative in Cyril, Okla.

"The gift of the Numunuh name bestowed on me is one of the highest honors I have received in my 51 years of working with eagles," Grier said.

Grier could not be present for the initial Numunuh ceremony in Cyril, so Waipe, a female golden eagle, stood in Grier's place. At 4 p.m. on Oct. 4, 2009, with the offering of Waatu (sacred smoke), the Commanche people faced north and called out Queeni Puhakat four times while simultaneously piping on a whistle made of an eagle's wing bone.

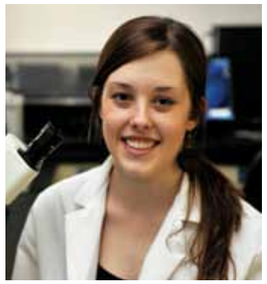
To reminisce, on the same day at the same time, Grier took some of Ithaca's feathers and his gauntlet out to the shed where Ithaca used to stay at night and during severe weather. "I recalled the details of the project that produced him, his hatching and early challenges and routinely standing outdoors freezing in 20 below zero temperatures and even colder wind chills while I waited for him to leisurely finish his food," he said. "We were all enriched by his life."

Grier later traveled to Cyril to complete his naming ceremony.

Grier is still active in the NDSU Department of Biological Sciences assisting with classes, writing and continuing his research.

Sadie Anderson

The next step – students work toward medical professions


Kathryn Jackson


Tanner Ferderer


Kimberly Lindner


Jenna Nelson

Since she was eight, Kathryn Jackson has wanted to be a dentist. She grew up helping in her mother's dental office and quickly decided to follow in her footsteps. Jackson is a third-year student at NDSU finishing up her undergraduate course work and prepping to take the biggest test of her life – the Dental Admissions Test. She will then proceed to the lengthy application process and find out whether or not she is accepted.

Kathryn is one of thousands of students going through the rigorous and nerve-racking process of applying to a professional program. Each year many of the best and brightest college students compete for coveted spots in medical, dental, optometry and other professional schools. It's a competitive, stressful and time-consuming process, but to the ambitious students who are enduring it, the reward is well worth the effort.

According to Julie Schroer, adviser and lecturer for biological sciences, applying to a professional program takes about a year. Students prepare for the standardized test, fill out applications and essays, request letters of recommendation and interview. But the application process is just the final sprint; getting into a professional program is more like a marathon, starting freshman year.

Schroer encourages first-year students to job shadow and advises students at all levels to work in a health-care facility, volunteer in the community, participate in school activities and work in a research laboratory. "Schools are looking at the applicant and their experiences. A student's score on the entrance exam is important, but a very close second is how well the individual understands the profession," Schroer said.

She also recommends cultivating relationships with faculty members. "Underclassmen underestimate how difficult it is to get to know people well enough so they can write good letters of recommendation. If they would get going on that earlier rather than waiting until they are juniors that would be better."

Tanner Ferderer, a junior from Dickinson, N.D., majoring in zoology, is preparing to undergo this process. He plans to take the Medical College Admission Test this summer. He says being a pre-med student takes desire and hard work, but it's worth it. "The recognition and the sense of accomplishment that come with completing a successful semester are second-to-none; it really makes you feel good."

Like many students, Ferderer isn't relying on getting in the first time around. His backup plan is to earn a master's degree.

Schroer agrees that having a backup plan is critical. She said students can consider various health-related graduate programs, earn their master's in public health or take some time to correct weaknesses.

When a student isn't accepted, she says the first thing he or she needs to do is contact the school and find out why. "Most schools will be willing to say you need more health-care experience or you need to raise your grade-point average or you need to retake the MCAT or you really blew your interview."

Schroer says there are several resources to improve in these areas. Adjacent to her office in Geosciences Hall is a resource room where students can review materials for the various standardized tests. She also suggests students participate in mock interviews at the NDSU Career Center or enroll in enrichment programs.

Kimberly Lindner, a zoology major from Sioux Falls, S.D., applied to Sanford School of Medicine at the University of South Dakota in October. "It's stressful for someone like me who has always dreamt of being a doctor since I was like 10, to know it all comes down to this application," Lindner said. She is thankful for help along the way – from the NDSU Center for Writers to friends and family. [Editor's note: Lindner was not accepted to Sanford, but will be starting graduate school at NDSU to earn a doctorate in zoology. She will be studying immunology with hopes of becoming a professor.]

Jenna Nelson is on the other side of the application process. In October she found out she was accepted into her first choice of optometry schools, the University of Missouri at St. Louis.

Nelson said due to stress she was sick while applying. "It was terrifying because I'm only 20 and I'm going to be moving away ... super intimidating, but at the same time, I'm reaching my goal, so it's good."

Her top advice to students hoping to get in to medical school is to work or intern at a clinic to get exposure to the field. Observe an optometrist and build a relationship.

She has interned at the same clinic for two years and has gained wonderful mentors. She also says to go prepared to your interview and be yourself. "They are not looking to see you fail. They are looking to see you succeed and that you can be personable."

She is nervous for the next step but is ready for the challenge. "I'm not scared for my classes, and I'm not scared that I won't do well. I'll be fine; NDSU has more than prepared me."

Linsey Davis

NDSU students use X-ray beams to conduct research at national laboratory


Haleigh Eubanks prepares a caterpillar for X-ray imaging at the Advanced Photon Source at Argonne National Laboratory. The caterpillar is in a respirometry chamber so they can measure expired carbon dioxide and synchronize that to X-ray videos.

Getting hands-on research experience is invaluable for college students. Kendra Greenlee, assistant professor of biological sciences, says the experience enables her students to apply principles they learn in the classroom to real problems. For the past two summers, Greenlee has taken several undergraduate students to Argonne National Laboratory in Chicago to conduct research on insect respiratory physiology using tobacco hornworm caterpillars.

Managed by the U.S. Department of Energy, Greenlee and her students conduct their work with Wah-Keat Lee, physicist and sector coordinator of beam line XOR 32ID, at the Advanced Photon Source. The facility is a particle accelerator that provides the brightest X-ray beams in the Western Hemisphere to more than 5,000 scientists worldwide. Researchers have to apply for beam time on a competitive basis.

As soon as Greenlee was hired at NDSU in 2007, she applied for beam time. She says studying insects is important because they are the most numerous animals on the planet. "We know very little about how their basic physiology works. We are just now learning how oxygen delivery to their tissues changes throughout development," she said.

Greenlee and the students collect images and data on gas exchange. "We measured carbon dioxide emission to get an idea of how they are breathing," Greenlee said.

The students learn specific research techniques and radiation safety. "They learn a lot about the nature of science and how science research is actually done," Greenlee says. "Being able to get this hands-on experience is really important so the students can solidify what they have learned in class by actually participating in and getting some hands-on experience."

Haleigh Eubanks, who recently graduated from Mississippi Valley State University, has accompanied Greenlee to the laboratory for the past two summers. Eubanks met Greenlee when she came to NDSU in 2008 as part of a Summer STEM Program, sponsored by the Division of Equity, Diversity, and Global Outreach. "Working at Argonne required diligence. Working there verified my desire to obtain a career in the biology and medical field. I am addicted to science now," she laughed.

Eubanks, who plans to pursue a master's degree in biology, presented the results of her research at the Historically Black Colleges and Universities Undergraduate Research Symposium in Washington, D.C. Greenlee says Eubanks also will be an author on the research paper once it is published.

The students are trained on laboratory use on their arrival. "They get to do everything I do," Greenlee said. "We go through how to turn the beam on and off. They go through radiation safety training. They handle the caterpillars and they get them ready to put them in chambers."

Kathryn Jackson, an NDSU junior majoring in zoology with an emphasis on health sciences, cell biology and human physiology, attended the laboratory with Greenlee during the summer of 2009 and this past April. "It's amazing how well undergraduate research enriches your studies. It really helps instill a lot of the classroom aspects I've learned and been tested on," she said.

Jackson was impressed by the vastness of the research being conducted, which, in addition to biology, included fields such as engineering, chemistry and pharmaceuticals. She also was amazed at the size of the particle accelerator and the many beam lines in the facility. "The circumference of the particle accelerator is a mile and a half long. They have giant tricycles that you can use to get around."

Jackson, who also is minoring in chemistry and health communication, plans to apply to dental schools this summer and hopes her experience at Argonne National Laboratory will help her get into the school of her choice.

Greenlee and the students work in shifts during each visit, which usually lasts three days with the beam running 24 hours. Jordan Boe, an NDSU graduate, accompanied Greenlee during the summer of 2009. "There were times during our research where we would work overnight and long-hour shifts in order to gather as much data as possible during our limited time," Boe said. "I've learned to become more diligent in what I am doing and increasingly analytical – two things research requires. I thank Dr. Greenlee for a research experience I'll never forget."

A recipient of the National Science Foundation's Faculty Early Career Development Award in the amount of $800,000, Greenlee will continue to take students to the Argonne National Laboratory. Because this technology is new to studies of insect respiration, she says there is a lot of work to be done. "This is the first time we have been able to see inside a living, breathing insect without having to dissect it open, which really disrupts the natural physiological processes," Greenlee said.

Sadie Anderson

Students from NDSU traveled to the dry areas of California and Nevada to study water conservation and management issues in a part of the country where water decisions can be contentious.

Students study conservation out West

Seven graduate students in Craig Stockwell's advanced conservation biology class got a close look at how water management or mismanagement affects biodiversity during a field trip to California and Nevada from Nov. 16 to 23, 2009. Stockwell, associate professor of biological sciences, has been working in the southwest United States since the mid 1980s.

"Some of these issues are relevant to us here as we talk about moving water across the state," Stockwell said. "Water diversions have been a major source of conflict in the western United States with important impacts on local economies and biodiversity."

The class started at Ash Meadows National Wildlife Refuge, which is home to a large number of species that occur nowhere else on the planet. Devils Hole, a small pool within the refuge, holds the world's most endangered vertebrate, the Devils Hole pupfish. There are very few left, and the students had the rare opportunity to see them in person.

Sujan Henkanaththegedara, a doctoral candidate in environmental and conservation sciences, said "This is the best class I ever had. We learned so many different aspects of conservation biology by visiting places, interviewing people and attending talks. I do not think that we could gain this experience and knowledge from a conventional textbook-based class."

The class also visited Big Dune Recreation Area, Walker Lake and Mono Lake – all sites that have seen conservation issues play out between environmentalists, tourism businesses, farmers, Native Americans and Los Angeles, Calif. Each group has an interest, and when these conflicts aren't sorted out, they can have devastating effects on the ecosystem. While Walker Lake served as an example of competing interests destroying a lake, Mono Lake showed students that even a city like Los Angeles can be stopped from drawing water at the expense of a local ecosystem.

"I think I gained a better sense of understanding about how human practices change the landscape," said Megan Klosterman, a graduate student in zoology. "Humans have been pumping water from deserts and their surroundings for years. By seeing how low Mono and Walker lakes have gotten and experiencing the dust storms in Bishop, Calif., it is easy to see that pumping water has had a drastic effect on the natural habitats."

The students on the trip were assisted with funding from the NDSU Development Foundation through the College of Science and Mathematics. Funding also came from the Department of Biological Sciences and the Environmental and Conservation Sciences Graduate Program.

Joel Hagen

Learning in the lab: students take on research

For students interested in research, working in a lab on campus is a great way to get real world experience.

Heather Bergan

From studying to be an athletic trainer to researching cell culture of rainbow trout may seem like a huge leap, but it was a natural progression for Heather Bergan, a senior majoring in zoology from Bismarck, N.D. Originally interested in the healthcare profession, she took a job in the athletic training field during her junior year and realized it wasn't what she thought it would be. Her friends and classmates suggested she talk to Mark Sheridan, Jordan A. Engberg Professor in biological sciences. She did just that and discovered that maybe a profession in research was more up her alley.

"Working in the lab has helped in my understanding of course materials, and it applies the knowledge you learn in lectures and textbooks," she said. "It's been an absolutely wonderful experience and something I really enjoy; it really doesn't feel like work to me."

Bergan says spending 20 to 25 hours a week in the lab has helped her discover a career path in research. She will continue working in Sheridan's lab next year as she pursues her doctoral degree in cellular and molecular biology.

Erin Loeb

Proteins, heme and bacteria aren't a usual part of everyday life, but for Erin Loeb, a sophomore majoring in biochemistry and molecular biology, it's all in a day's work. Loeb works in Kent Rodgers' chemistry lab and tries to find out how certain bacteria use heme, which is related to iron.

Erin Loeb

Loeb didn't necessarily plan on working in a lab during her college years, but last spring after taking Chemistry 151 from Rodgers, professor of chemistry and molecular biology and touring the lab, she realized it was an opportunity she couldn't resist. "Dr. Rodgers asked if I was doing any research and if I would consider working for him," Loeb said. "I thought it would give me a good taste for what I might do in a career after college."

She's been in the lab for a year, plans to continue working there until she goes to graduate school and is interning there this summer.

Nathaniel Cross

Nathaniel Cross, a zoology sophomore from Maple Grove, Minn., always knew he wanted to work with animals; he just wasn't sure in what capacity. He started as a volunteer and then completed a summer internship through the Noyce scholars program in the lab of Wendy Reed, assistant professor of biological sciences. This year he is researching hormone effect and stress response in quails.

"I thought working in the lab would be a good way to learn more outside of lectures and classes," said Cross. "I'm more focused now in the kind of research I want to do; it's been a good way to get more hands on."

He says most of what he's done in the lab has given him a head start on what he'll learn later in some of his classes. He plans to continue with graduate school and pursue a career in research.

Nicole Scherweit

Aaron Marback

Graduate student in computer science

Aaron Marback recently was awarded the Microsoft Graduate Fellowship for his research on software security testing at North Dakota State University. Originally from Bismarck, N.D., he earned his undergraduate degree in science and math from the University of North Dakota and is a graduate student in computer science at NDSU.

What is the Microsoft Graduate Fellowship?
It's a scholarship sponsored by Microsoft for $15,000 and awarded to a graduate student for tuition and living expenses. I'm thankful to Microsoft for making this program available.

What did you have to do to apply? I wrote an essay. After being selected as a finalist, I went to the Microsoft campus with one other applicant and gave a presentation to a group on what my research is about. It went well, but it was a little nerve-racking to present to seasoned veterans in my field. They asked some questions, and it was a little intimidating, but a great experience.

What does it mean to be awarded this prize?
The experience of applying for the award was interesting. Giving my presentation was helpful because the Microsoft team gave me some suggestions on the research that I'm doing. Also, this award gives me a chance to concentrate on my research instead of trying to come up with the money to pay for school.

What does your research focus on? Web application security – basically dealing with trying to keep data and other information safe in Web applications.

‘Packrat Guy’ finds clues to North Dakota’s past

John Fielding smiles when someone describes him as the “The Packrat Guy.”

“That’s what some in the department call me. It’s a distinctive nickname, and it’s related to my interest and my science,” said the 45-year-old NDSU senior who is majoring in geology. “I prefer to be referred to as ‘The Packrat Guy’ over ‘The Midden Man,’ though I’ve been called both.”

Midden is a seldom-used term at the center of Fielding’s rather unusual research as an NDSU McNair Scholar. Middens are the waste piles produced by packrats. They are smelly, urine- and excrement-laced collections of items the little scavengers bring to their dens.

“Packrats have an incessant collective behavior. They take anything they can carry,” Fielding explained. “Food, plants, bones, feathers – they will take your watch if you leave it out at a campsite.”

Most people think of middens as unappetizing, useless garbage, but they can hold clues to the past. Generation after generation of the animals add to the middens, making them an evolving environmental record.

“Packrat urine has a very sticky quality. If kept in a dry environment away from high humidity or water, it will basically mummify the whole pile and will crystallize it as hard as rock,” Fielding said. “It intrigues me to see how much information can come from them. Middens fill a historical niche in dry areas like western North Dakota where there isn’t a lot of tree ring data, pollens, lake sediments or ice cores. They provide data for missing paleo-history.”

Fielding collected his samples during the summer of 2007. He and his teenage son, Michael, found middens in the Little Missouri National Grasslands south of Medora in a place called the Moody Plateau.

Packrats like southwest - to southeast-facing exposures located in hard rock surfaces near some type of juniper. Armed with that knowledge, they discovered middens almost everywhere they looked for them.

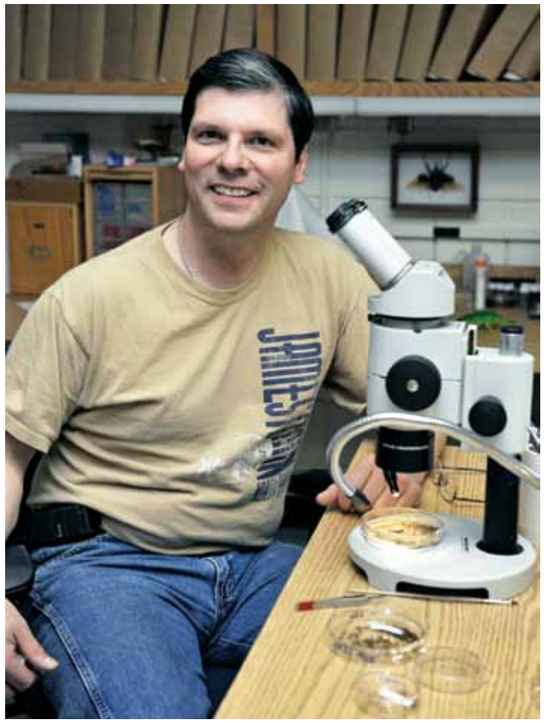
“It’s dirty work. You can often smell middens before you see them,” Fielding said. “I crawled on my belly into small caves and crevices to get to a few of them. I sure felt like I needed a good shower at the day’s end.”

Back in the lab at NDSU’s Stevens Hall, Fielding carefully mixed the samples with water to separate the sediments. After drying the material in an oven, he used optical and radiocarbon dating equipment to determine geological dates. He found insects and plants going back 200 to 240 years, with two samples possibly much older.

“My research project stinks up the whole building,” he grinned. “Let’s face it, I play around in packrat poop.”

Fielding first became interested in this uncommon research during a spring break 2007 geology class taught by NDSU professor Don Schwert that journeyed to Death Valley in California. One subject area was packrat middens.

“I had never heard of a midden before,” said Fielding, who earlier in life had studied pre-veterinary biology. “That experience in Death Valley rekindled my love for biology and living systems. I’m glad I’m now a geosciences major, but to see it all tie together intrigues me.”



McNair Scholar John Fielding studies well-preserved packrat waste to determine insights into North Dakota’s past.

His inquisitive spark led to a McNair Scholarship. McNair Scholars are a select group of undergraduate students who demonstrate strong academic potential and show an interest in research. Named after Challenger space shuttle crew member Ronald E. McNair, the NDSU program is one of the original 14 McNair programs in the country.

Fielding’s work is drawing interest. In October 2009, he presented a paper, “Occurrence and Age of Packrat Middens from Western North Dakota,” at the annual national meeting of the Geological Society of America in Portland, Ore. “John has a genuine and driving curiosity,” said Ken Lepper, associate professor of geosciences and Fielding’s academic adviser and research mentor. “As a result of his McNair Scholarship, he has added field and laboratory work to his set of research experiences. In addition, his presentation before the Geological Society is a significant career-building step. John’s background knowledge and passion for the subject made his talk a success.”

Fielding said graduate school and more study of middens are real possibilities.

“This research is so off-the-wall. Who would think you could get information from something so apparently trivial?” he said. “For me, it was a drive to find out something new. I really wanted to add a little piece of scientific knowledge to what we know about North Dakota, and I’m stubborn. When I have a goal, I’m hard to dissuade.”

Steve Bergeson

NDSU mathematical standout attends prestigious institute

Mark Spanier is a numbers enthusiast. His favorite number is four because it has “strange” properties. “No one’s favorite number ever seems to be four. It’s always two or seven or 11. Four is always getting left out,” he said. “Essentially, it is the first non-prime number apart from one. It also has other weird properties like two times two is four. Two squared is four. Two plus two is four.”

In high school, Spanier worked on mathematics homework first because it was his favorite subject. When planning for the future, he wasn’t sure how to make a career out of mathematics so he declared a major in civil engineering. During his first semester at NDSU, he started hanging out in the mathematics department getting to know several faculty members. A Sauk Centre, Minn., native, Spanier graduated from NDSU summa cum laude in May earning a Bachelor of Science degree in mathematics with minors in computer science and psychology.

Mathematics faculty Cristina Popovici and Marian Bocea quickly noticed Spanier’s talent in mathematics. “Throughout my interaction with Mark, he has shown outstanding mathematical maturity, excellent analytical skills and a genuine talent (and a remarkable desire) to study advanced mathematics,” Bocea said.

For the past two summers, Spanier participated in a seven-week Summer Undergraduate Applied Mathematics Institute at the Center for Nonlinear Analysis at Carnegie Mellon University in Pittsburgh. A prestigious program for undergraduates considering research careers in mathematical sciences, the institute allows only 12 students from across the nation to participate each year.

Spanier was thinking about becoming a high school mathematics teacher when he met Popovici, who was his adviser. Popovici knew he would be a perfect candidate for the summer institute. She advised him to apply for the program because it would give him a good idea about what graduate school is like. “When he returned from the first institute, he was absolutely convinced that he wanted to go to graduate school to further improve his mathematical skills, and to pursue a career in academia,” she said.

Mark Spanier was one of 12 students to participate in the Summer Undergraduate Applied Mathematics Institute.

Participation in the institute is fully funded by the National Science Foundation and National Security Agency. The institute offers two courses and participants attend seminars given by leading mathematical research professionals, conduct research and give a presentation of their findings.

Spanier studied mathematical finance during the 2008 institute and returned in 2009 to study calculus of variations, the topic he chose for his senior thesis paper. Under supervision of Carnegie Mellon faculty, he also worked on research projects about queuing theory and algorithms for discrete Ricci flow.

Not only was the institute a great opportunity for his paper, it has opened doors for him. He will begin pursuing a doctorate at Carnegie Mellon University in fall 2010. His dream job is to become a professor. “Working at a university also will allow me to express my creative abilities,” he said. “And I really enjoy teaching. I have been a teaching assistant for three years.”

Spanier attributes his success to getting involved in campus activities and getting to know the people in the mathematics department. He says other students can achieve the same success if they “Apply for things. Be a tutor or a teaching assistant. Get to know your adviser and the faculty in your department – they have unlimited resources.”

Sadie Anderson

NDSU student receives Goldwater Scholarship

Katrina Gellerman

Katrina Gellerman seems genuinely embarrassed when she hears herself described as “one of the best and brightest.” But, that, indeed, is what she is.

Gellerman is the recipient of the prestigious Barry M. Goldwater Scholarship for the 2009-10 and 2010-11 academic years. Established by Congress in 1986, the Goldwater Scholarship and Excellence in Education Program was created to foster excellence in mathematics, the natural sciences and engineering by encouraging outstanding students to pursue careers in those fields.

“It’s been fantastic. It was a real honor for me because I know how steep the competition is,” said the junior from Bismarck, N.D., who is majoring in biochemistry and molecular biology. “I was surprised to be one of the finalists here at NDSU, but to be selected as a national Goldwater Scholar was really a big shock.”

Humility aside, Gellerman’s field of specialization is some heady stuff. She focuses on human and bacterial genetics, with plans to pursue a doctorate and a career in medical research.

Since her sophomore year, Gellerman has worked in the research laboratory of Kenton Rodgers, professor of chemistry and molecular biology. She spends much of her time dissecting the interplay between the structure and function of a protein on the outer membrane of Shigella dysenteriea, a rod-shaped bacterial pathogen.

continued on page 14

"We are working on different methods of antibiotic treatment," Gellerman explained. "Since there have been a lot of cases of antibiotic resistance, we are looking at how they get the hemes from the hemoglobin and use that as a source of the iron necessary for growth. We are trying to figure out how they are doing that, what mechanism it takes. That way, we may be able to block its access to iron."

The work, while often fascinating, can have its setbacks.

"It's really helpful to see how the entire research process goes. But, it has also been an eye-opener to see all the obstacles there are to overcome. I never realized how many roadblocks there are before you get a sliver of hope," she said.

According to Rodgers, Gellerman's efforts have given her experience and expertise in an array of research methods, including computer-based genome searching and alignment, isolation and purification of integral membrane proteins and instrumental methods of analysis that can be used to understand the structural basis of protein and enzyme function.

"Katrina and her fellow Goldwater Scholars constitute an elite group of the most promising science, mathematics and engineering students from across our nation," said Rodgers. "In addition to her hard work in the laboratory, Katrina is a kind and considerate co-worker. She is a talented person, and I have high hopes and expectations for her future in biochemical and biomedical research."

Considered by colleagues to be organized, detailed and task-oriented, Gellerman carries a 4.0 grade-point average. She is active in the Intervarsity Christian Fellowship and the Pink House, a welcoming place for NDSU's international students.

Gellerman's childhood dream was to become a concert pianist. However, that changed in high school when she took part in the Science Olympiad. "Delving deeper into different areas of science really interested me, especially a genetics event called 'Designer Genes.' That was really fun, and I knew that was what I wanted to pursue," Gellerman said, noting she manages to find some time to play piano and take lessons as she studies, works and prepares for her career.

She is the daughter of Donald and Carla Gellerman of Bismarck.

Steve Bergeson

Kilen receives Noyce Scholarship

Junior in chemistry and chemistry education

Bridget Kilen, a junior majoring in chemistry and chemistry education, was awarded a Robert Noyce Teacher Scholarship, which encourages talented science, technology, engineering and mathematics (STEM) majors and professionals to become K-12 mathematics and science teachers.

The $12,000 national scholarship provides funds to institutions of higher education to support scholarships, stipends and academic programs for undergraduate STEM majors and post-baccalaureate students holding STEM degrees who earn a teaching credential and commit to teaching in high-need K-12 school districts. Kilen has a two-year teaching commitment.

Hometown: New Salem, N.D.

NDSU activities: Secretary of Chemistry Club
Anticipated graduation date: May 2012

On receiving the scholarship: It really is an honor that they see me as a good potential teacher and someone worth investing money in.

Undergraduate research: I do research in Professor [Kenton] Rodgers' lab. We work on heme uptake mechanisms in gram-negative bacteria. What we are looking to do is inhibit the uptake of heme (oxygen carrying pigment from our blood) that contains iron, a food source for bacteria. We are conducting the research because of the growing resistance to antibiotics.

Favorite element on the periodic table: Cobalt, it forms a variety of colorful compounds (Pink!).

People would never guess: I love ice fishing!

Favorite thing about NDSU: It's not too big and it's not too small. You get to meet a lot of people and there are many opportunities to participate in intramurals.

Most meaningful achievement: Being accomplished in college, producing and displaying undergraduate research results and earning scholarships.

Influences: My mom and my older sister. My mother is my main role model because she started her own seamstress business from scratch and worked her way up. My sister got her PharmD – first doctor in the family.

Advice for underclassmen: Get involved in undergraduate research. You will get a grasp for what you like. It will help you determine if you want to go to graduate school and what sort of research you'd like to do. Plus, it's all hands on. You get to apply the science yourself.

NDSU Team Sweeps Computer Programming Competition

For most people, calculating mind-boggling math and programming problems in a competition against other people and a ticking clock sounds more torturous than having a tooth pulled.

But for a group of select students, this type of environment is fun. There are no cheerleaders, no media crews and only a handful of spectators, but none of these are needed in the fierce battle of the brain. In the Digi-Key programming competition, the glory of victory is enough.

Members of team Forseth Forever pose with their first-place trophy. From left: Nick Laney, Shane Ewert, Austen Dicken, Adam Helsene (adviser) and Nathan Ehresmann.

It proved to be NDSU team Forseth Forever's playground during the tenth annual competition on Oct. 16 in Thief River Falls, Minn. The team composed of Nick Laney, Shane Ewert, Austen Dicken, Nathan Ehresmann and adviser, Adam Helsene, took first in each of the three rounds, making it the second time in three years that an NDSU team has won.

The three sessions consist of short programming problems, math and logic problems and long programming problems. This year 20 teams from regional universities entered the competition.

Forseth Forever scored a total of 329 points, 80 points ahead of their closest rival. The University of North Dakota placed second and St. John's University third with 238.5. Other competitors included Bemidji State University, St. Cloud State University, Dickinson State University, University of Minnesota Morris and Concordia College. NDSU's second team, Aftermath, placed eighth with team members; Edin Alic, Geoff Timm, Lucas Bremseth and Joe Bredahl.

The team's take-home was the Digi-Key Medallion and $3,000, which typically helps fund future competitions. They also each received a $200 Best Buy gift card.

Members of Forseth Forever interact like brothers as they excitedly talk about their triumph.

"I love sitting at the competition with a giant clock, working feverishly. My blood pressure has never been higher. When we're done and feel we have done well, we are so wired," Dicken said. "It's a challenge you don't get anywhere else. It's not like the classroom where you don't have any time constraints."

They practiced twice a week for three weeks prior to the competition. But they say it's not possible to really prepare for the questions, it's more about organization and method. "It's more how you are going to sift through the information and prioritize which problems to do," Dicken said.

Each member takes on a specific role, because some members are stronger programmers and others are better problem solvers. "No one person could make or break the team," Ehresmann said.

After the Digi-Key competition, the team drove 15 hours overnight to Urbana, Ill., to compete in the Mechmania Competition. They didn't receive first place but were satisfied with their effort. "These competitions are really quite a bit of fun," Laney said.

Linsey Davis

A letter from the college ambassadors

It's been a great year. The College and Science and Mathematics Ambassadors started it out with recruitment at the NDSU Student Organization fall fair. We met with our peers and convinced a few amazing students to join our group of ambassadors. Along with recruitment, we interacted with many prospective students during Discover Days and helped with local science fairs.

The college ambassadors raised money for Haiti relief this year.

We also have kept our adopted parking lot next to Stevens Hall fairly clean and volunteered as bartenders for Club NDSU. Club NDSU is funded by the university programming board, Campus Attractions, which offers students an alternative to alcohol. The ambassadors had a great time serving mocktails and getting to know each other while serving students. We were given $250 to donate, and we chose to give to Haiti Relief.

Besides promoting an alternative to alcohol, the group continues helping with the college-sponsored Science Cafés, a program that connects science and mathematics with members of the community. This year's topics have included brain research, corrosion and evolution.

At our last meeting, Marian Bocea was chosen to receive the College of Science and Mathematics Ambassadors' Award of Excellence for 2010. Bocea, assistant professor in the Department of Mathematics, has inspired many students to pursue a career in mathematics. His research is based on analysis of partial differential equations, calculus of variations and application to materials science. We are honored to recognize Bocea with the award. A new leadership position also was created. The role of that person will be to update and maintain a reference list of students who would be excellent representatives of their major in the college. This list will be available to all prospective students so they can ask questions peer to peer.

Ambassadors are in the process of recruiting new members. Qualifications are based on a minimum 3.00 GPA, an essay on how they plan to advance the College of Science and Mathematics, and a letter of recommendation from a person in the college. We are looking for about 10 new members from a wide range of majors and are excited to see who applies.

- Kong Kit Wong, president

Research Highlights

Faculty in the College of Science and Mathematics are constantly working to expand our knowledge. Here are a few highlights.

Shining a light on Mars

Ken Lepper, associate professor of geosciences, and his students work on projects close at hand, like the shorelines of Glacial Lake Agassiz, but at the same time dream of exploring the surface of Mars. What links these distant places? A geologic dating technique based on luminescent properties of sediment grains. While there are many ways to determine the formation age of a mineral or rock, few tell us when sediments were deposited. The technique, known as optical dating, has been used reliably for 25 years on Earth. Lepper hopes to use it on Mars.

NASA is interested in finding out the ages of landscapes on Mars. They want to know when water deposits occurred, when beaches formed, and when sand dunes were mobile on Mars. Many of these questions could be addressed with optical dating. Such information would provide a clearer picture of Mars' climate system, a climate system not influenced by humans. However, the technique has to go through a battery of studies before it could be used on a Mars mission.

To do these studies, Lepper has students perform tests on terrestrial materials that are similar to what scientists expect to find on the surface of Mars. The work has been funded by the NASA Mars Fundamental Research Program and through NASA Space Grants awarded to undergraduate students. The students participate fully in the research, present their results at national meetings, and some have been included as co-authors on manuscripts. Such experiences have been rewarding for the students, Lepper said, and many have gone on to pursue graduate degrees.

While the use of optical dating techniques on Mars may be years away, "being part of a mission has become less important than continuing the process of letting NDSU students have a Mars-related research experience," Lepper said.

Ken Lepper is working toward a way to determine the age of sediments on Mars.

Angie Hodge and Christina Weber are using a grant to determine why certain students stick with math studies.

Adding gender equity to math

Sometimes, a good friendship and coffee can be the start of a research partnership.

Angie Hodge, assistant professor of mathematics and teacher education, always has been interested in gender equity issues. The issue would come up over cups of coffee with her friend, Christina Weber, assistant professor of sociology. Before long, the two decided to research the reasons some women pursue careers in science, technology, engineering and mathematics disciplines.

For their research, they received a $10,000 seed grant from the National Science Foundation FORWARD grant at NDSU.

The NDSU ADVANCE FORWARD group is committed to establishing a university culture in which all are nurtured and supported to develop to their fullest potential. They are working to demonstrate NDSU's commitment to gender equity through a record of accomplishment in recruitment, development and retention of women.

As part of that goal, Hodge and Weber are investigating what has helped women to succeed in science, technology, engineering and mathematics disciplines. Their main focus is on engineering.

"We're looking at why people chose those majors," Hodge said. "Why they choose them and what has helped them to succeed in that major."

Hodge and Weber are surveying students in differential equations, one of the last math classes engineering students must take, to see what factored in with students who made it that far. They found that students attributed their success to personal drive and an aptitude for math.

"You can undermine yourself pretty quickly if you don't think you're good at math," Weber said.

Students often did not say it was an interest, but simply drive that pushed them.

"I thought more people were going into it because they were interested in the discipline," Hodge said. "Most of them pointed to their own personal drive. It was very infrequently that people said a teacher or professor. I thought that would show up more."

Hodge and Weber plan to interview male and female students soon to look at gender differences and to elaborate on the data they already have collected.

"Men and women both claim it is a personal drive," Weber said. "It will be interesting to interview more men. We want to look at class and race as well."

Hodge and Weber hope to use their existing research to gain access to larger grants to continue the study.

Joel Hagen

Greenlee receives NSF CAREER Award

Kendra Greenlee

A major national grant received by a North Dakota State University biology researcher will help develop ways to effectively control insects and will bolster research opportunities for students to encourage careers in science. Kendra Greenlee, assistant professor of biology, received a Faculty Early Career Development award (CAREER) from the National Science Foundation (NSF). Greenlee will receive a five-year, $800,000 award from the NSF to conduct research outlined in her proposal, "Ontogenetic Changes in Tracheal System Structure and Function in Larval Insects." The grant is the largest of this type of CAREER award received by an NDSU faculty member in the past 14 years.

Greenlee's research program will focus on how the insect respiratory system works and how it has evolved as a high-capacity oxygen delivery system. The studies on respiratory capacity in developing insects have direct applications for the development of non-pesticide based methods of insect control. Understanding how respiratory capacity varies throughout development may identify susceptible stages in insect life cycles. Manipulation of atmospheric gas composition is a growing method for controlling insects in grain storage, greenhouses and museum collections.

The grant award from NSF also provides for significant research opportunities for undergraduate students, as well as further educational outreach. Through grant funding, four NDSU undergraduates will participate in Greenlee's research program. Students involved in NDSU's Research to Improve Diversity and Education (RIDE) program also will spend two summers conducting related research in NDSU labs. Currently, the RIDE program includes students from Mississippi Valley State University, Itta Bena, Miss. The program will be expanded to include students from Northern Arizona University, Flagstaff. Greenlee also will establish a social networking site for students in the program who will access research materials and receive mentoring.

As part of the program, one faculty member from Mississippi Valley State University will participate in research in Greenlee's lab. In addition, Greenlee will provide a research seminar at Mississippi Valley. A major goal of the outreach education plan is to increase the presence of underrepresented students in science careers. The grant also will fund collaborations between NDSU, Argonne National Laboratory, United States Department of Agriculture and Leloir Institute Foundation, Buenos Aires, Argentina.

"Kendra is the first faculty member in biological sciences at NDSU to receive a CAREER award," commented Will Bleier, chair of biological sciences. "This honor is testament to Kendra's research abilities, creativity, work ethic and diligence. Research startup funds from the department, College of Science and Mathematics and the North Dakota Experimental Program to Stimulate Competitive Research also have been critical to Kendra's success."

Since 1996, 15 faculty members at NDSU have received prestigious National Science Foundation CAREER awards. Greenlee joined NDSU in 2007.

"National Science Foundation CAREER awards to NDSU faculty reflect the institution's ability to attract the best and the brightest among new faculty researchers," said Philip Boudjouk, vice president for research, creative activities and technology transfer.

Overall, National Science Foundation CAREER awardees at NDSU have received more than $5.7 million in grants to conduct research in a variety of fields. Other NSF career award recipients in the College of Science and Mathematics include faculty members Gregory Cook, Seth Rasmussen, Wenfang Sun, Sivaguru Jayaraman and Uwe Burghaus in chemistry and molecular biology.

The National Science Foundation CAREER program recognizes and supports the early career-development activities of scholars who are likely to become the academic leaders of the 21st century.

Carol Renner

Azer Akhmedov

Assistant professor of mathematics

Education: bachelor's degree from Baku State University, Azerbaijan; doctorate from Yale University, New Haven, Conn.

Previous experience: visiting assistant professor at University of California, Santa Barbara; visiting assistant professor at NDSU

NDSU objectives: Teach both undergraduate and graduate courses offered by NDSU math department and perform research in geometric group theory. Akhmedov also serves on two department committees.

Landon Bladow

Assistant professor of practice in physics

Education: bachelor's degree and doctorate in physical chemistry from NDSU

Previous experience: adjunct instructor at Minnesota State Community and Technical College; taught a number of lecture and laboratory courses while a graduate student at NDSU

NDSU objective: Teach various courses in physics, including the development of online courses; continue research on the computational modeling of energy disposal in chemical reactions.

Julia Bowsher

Assistant professor of biological sciences

Education: bachelor's degree from Yale University, New Haven, Conn.; master's degree from the University of Canterbury, New Zealand; doctorate from Duke University, Durham, N.C.

Previous experience: postdoctoral fellow in research and teaching at the Center for Insect Science at the University of Arizona, Tucson

NDSU objective: Research the evolution and development of animal form, with a focus on insects. This research program will include graduate and undergraduate students. She will teach developmental biology and evolution.

Warren Christensen

Assistant professor of physics

Education: bachelor's degree from the University of Central Missouri, Warrensburg; doctorate in physics from Iowa State University, Ames

Previous experience: postdoctoral research associate for the Center for Science and Mathematics Education Research at the University of Maine, Orono

NDSU objective: Establish a well-funded research program at NDSU with multiple threads of inquiry. Chief among them are the development, implementation and assessment of research-based curriculum in upper-level university thermal physics courses, and assessing the extent to which conceptual difficulties in physics are the result of conceptual challenges in mathematics, specifically calculus.

Robert Hladky

Assistant professor of mathematics

Education: master's degree from the University of Oxford, England; doctorate in mathematics from the University of Washington, Seattle

Previous experience: John Wesley Young Instructor at Dartmouth College, Hanover, N.H., and a visiting assistant professor at the University of Rochester, N.Y.

NDSU objective: Continue to expand his research program in sub-Riemannian geometry and related fields while developing robust educational programs in geometry and topology at the undergraduate and graduate levels.

Erik Hobbie

Professor of physics/coatings and polymeric materials

Education: bachelor's degree and doctorate in physics from the University of Minnesota, Minneapolis

Previous experience: National Research Council Postdoctoral Fellow in polymer science at the National Institute of Standards and Technology in Gaithersburg, Md.; senior research scientist in the Polymers Division at the National Institute of Standards and Technology

NDSU objective: Create a nationally recognized program in materials and nanotechnology through outstanding teaching, research and outreach.

Angela Hodgson

Assistant professor of practice in biological sciences

Education: bachelor's degree from University of Minnesota, Minneapolis; master's degree from University of Nevada, Reno; doctorate in ecology from University of Minnesota, Minneapolis

Previous experience: worked for the Wildlife Conservation Society as assistant for North American programs and as a research biologist in Alaska and Papua New Guinea; was a visiting professor of biology at Vermillion Community College, Ely, Minn., and at the University of Minnesota, Morris

NDSU objective: Ensure NDSU is employing the most effective undergraduate biology teaching methods and curriculum that will help train students to be knowledgeable, creative, inquiring and successful scientists. She also will identify local ecological research needs, develop research projects that will address these needs and provide undergraduates with valuable research experience.

Tariq M. King

Assistant professor of computer science

Education: bachelor's degree from the Florida Institute of Technology, Melbourne; master's degree and doctorate in computer science from Florida International University, Miami

Previous experience: two appointments in Florida International University's School of Computing and Information Sciences. He was a research intern in software testing with the Service Building Technology Department of IBM's China Research Lab and was a research assistant to the faculty coordinator of Florida International University's School of Computing and Information Sciences software testing research group

NDSU objective: Create an environment for students and faculty members to perform new and innovative research in software testing; promote education and training of students in the area of software testing during the early stages of their academic development; and foster relationship and partnerships with software development companies, particularly in the Fargo-Moorhead area.

Muhammet Erkan Kose

Assistant professor of chemistry and molecular biology

Education: bachelor's and master's degrees from Bilkent University, Ankara, Turkey; doctorate in physical chemistry from University of Florida, Gainsville

Previous experience: postdoctoral fellow in Department of Chemistry at Clemson University, S.C. Kose was also a postdoctoral fellow and scientist at the National Renewable Energy Lab in Colorado.

NDSU objective: Leverage teaching experience to provide a real-world learning environment for students and to use research experience to further knowledge in new chemistry fields, especially in nanotechnology and optoelectronic devices.

Volodymyr Melnykov

Assistant professor of statistics

Education: master's degree from Bowling Green State University, Ohio; doctorate in statistics from Iowa State University, Ames

NDSU objective: Establish a research program in computational statistics. He is particularly interested in finite mixture models, clustering and applications of the EM algorithm. Melnykov also plans to further grow as an instructor and make a positive impact on programs in the Department of Statistics and the university.

Saeed Salem

Assistant professor of computer science

Education: master's degree in information technology and doctorate in computer science from Rensselaer Polytechnic Institute, Troy, N.Y.

Previous experience: research and teaching assistant at Rensselaer Polytechnic Institute; intern at Microsoft Corporation, Redmond, Wash.

NDSU objective: Salem's research interests are in bioinformatics and data mining. He is interested in extracting knowledge from the available biological data to understand complex systems and the analysis and evolution of social networks.

NEW FACULTY

Sangita Sinha

Assistant professor of chemistry and molecular biology

Education: bachelor's degree from Delhi University, Delhi, India; master's degree from the University of Poona, Pune, India; doctorate in biochemistry and molecular biology from Purdue University, West Lafayette, Ind.

Previous experience: Howard Hughes Medical Institute postdoctoral research associate at the University of Texas Southwestern Medical Center. Her independent research as an instructor and assistant professor at the university was funded in part by a National Institutes of Health grant.

NDSU objective: Continue to research the structure and function of proteins relevant to human health or economy; and develop courses to instruct graduate and undergraduate students about the structure and function of biological macromolecules responsible for all life processes, enabling students to understand the atomic basis of life.

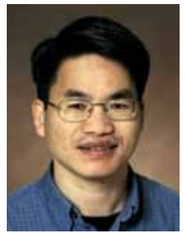
Gursimran S. Walia

Assistant professor of computer science

Education: bachelor's degree at Punjab Technical University, India; master's degree, information assurance professional, and doctorate in computer science at Mississippi State University, Starkville, Miss.

Previous experience: graduate researcher for the Department of Computer Science and Engineering at Mississippi State University

NDSU objective: Develop and expand collaborative research programs with other departments at NDSU and at other schools; improve undergraduate and graduate computer science programs to help students acquire learning experiences similar to activities they will be responsible for after they graduate; and develop research programs that will lead to innovative educational approaches in computer science and engineering.



Changhui Yan

Assistant professor of computer science

Education: bachelor's and master's degrees from Peking University, China; doctorate in computer science from Iowa State University, Ames

Previous experience: assistant professor of computer science at Utah State University, Logan

NDSU objectives: Apply data-mining techniques to explore the sequence-structure-function relationship in biological molecules; using support vector machine and hidden Markov model, he has developed innovative computational methods for the prediction of protein functional sites and the prediction of protein topology. Yan's recent projects focus on the molecular interaction networks in proteomics and semantic relationship among gene products.

Share your news with other college alumni by sending an e-mail to keri.drinka@ndsu.edu.

what have you been up to?

Here's what to include: Your full name, the year you graduated, your degree(s), your current e-mail address, work telephone number, the city/state/nation where you now reside, your current employer and position, plus any news you'd like to share, including promotions, honors, awards, major projects, volunteer activities, important family news, etc. Updates will be in next year's "class notes" section. And, if you've been doing something really big, exciting or unusual, we might contact you about appearing in a feature article.

FACULTY/STAFF AWARDS

Jayaraman honored for research

Sivaguru Jayaraman, assistant professor of chemistry and molecular biology, is the 2010 recipient of the College of Science and Mathematics Award for Excellence in Research.

Jayaraman's research interests lie in photochemical reactions. Jayaraman was the first to discover that photochemical reactions within cavities can be as efficient as those given by biological catalysts. Due to this discovery, he has been invited to give talks at different campuses and initiated collaborations with highly reputed labs.

He joined the NDSU faculty in 2006 and received a National Science Foundation Faculty Early Career Development Award in 2008. His CV lists 39 published papers, several of which are in the highly prestigious Journal of American Chemical Society.

His research also involves graduate, undergraduate and high school students. He initiated the Parents Involvement in Children Nurturing Intellectual Curiosity in Science program at NDSU to help educate high school students on recent advancements in science.

"In the past 20 years of my productive research career at NDSU, I have rarely found any young scientist of Siva's caliber in the area of photochemistry at this campus," said professor D.K. Srivastava in a letter of recommendation. "I am convinced that Siva's grantsmanship, publication record, and his desire to mentor students at various levels are the products of his motivation, enthusiasm and tenacity toward research."

Srivastava named to James A. Meier Senior Professorship

D.K. Srivastava, professor of biochemistry, has been named the James A. Meier Senior Professor. Srivastava has been at NDSU since 1989. In that time, he has published more than 70 papers in top tier chemistry and biochemistry journals (more than 100 in his career). He has a continuous record of funding with $3 million in research support from national agencies. He holds four patents and has taught a wide range of courses during his career at NDSU. Outside of the classroom and lab, he has served on numerous committees as well as performed as a reviewer for journals and other funding agencies.

"His broad range of knowledge and expertise has allowed him to tackle research problems that are difficult for any single lab to do, and he has attracted a lot of interest from others to collaborate with him," said professor and chair Gregory Cook in a nomination letter.

The James A. Meier Senior Professorship is one of only two professorships in the College of Science and Mathematics. James A. Meier, a 1959 mathematics graduate of NDSU, funds the endowed professorships. He earned his chemistry Ph.D. in 1971 and an honorary doctorate from NDSU in 2007.

Sather-Wagstaff added to Tapestry of Diverse Talents

Sean Sather-Wagstaff, assistant professor of mathematics, was inducted into the 2010 Tapestry of Diverse Talents. The tapestry, a program of the Memorial Union, is a pictorial mosaic that recognizes students, faculty, staff and alumni for the diversity and contributions they bring to NDSU.

Sather-Wagstaff was selected for being a consistent advocate for diversity, particularly as a voice for inclusiveness in NDSU policy. An advocate for the Gay, Lesbian, Bisexual and Transgendered (GLBT) community, he is a progressive voice of civility and respect in both University Senate and Senate Executive Committee meetings.

Leach earns service award

Wendy Leach, administrative secretary in the Department of Chemistry and Molecular Biology, was named the 2010 recipient of the College of Science and Mathematics Award for Excellence in Service.

She was noted for her commitment to the department, her positivity, her efforts to minimize waste and her consistency in going above and beyond her duties as a daily norm.

"She goes that extra mile with everyone, not just those who work or study in our department," said Gregory Cook, professor and chair, in a nominating letter. "Over and over again from everyone I have talked to, I hear all the same accolades ... Clearly she is highly regarded by all who work with her and those who visit."

Hilmert awarded for teaching

Clayton Hilmert, assistant professor of psychology, is the 2010 recipient of the College of Science and Mathematics Award for Excellence in Teaching.

Hilmert is well known as an instructor of Psychology 111, a wide-ranging introductory class required of majors and that serves as a general education class. He consistently gets "astronomical" scores from student evaluations in this course according to Paul Rokke, professor and department chair.

"I whole-heartedly believe he is one of the best instructors I have ever known," said Rokke in a nomination letter.

Hilmert's teaching also includes teaching higher-level classes, mentoring students in the lab, contributing to the curriculum and teaching workshops. Students routinely praise his health psychology courses.

"Dr. Hilmert truly engages the classroom in a way that makes the material not only interesting and easy to understand, but applicable beyond the classroom," said student Sara Wyman in a nomination letter.

Biological Sciences

Department matches university's growth

During the past 10 years, growth in virtually all areas at NDSU has been unprecedented. In a number of areas, our department's growth has paralleled the university's growth. With the end of the decade, it seemed like a good time to share these numbers.

- 501 majors in the fall semester (35 percent of the college's total)
- 271 female majors (54 percent)
- 66 undergraduate degrees awarded in 2009 (35 women and 31 men)
- 43 graduate students (19 women and 24 men)
- 16 tenure-track faculty members
- 8 assistant professors
- 3 associate professors
- 5 professors
- 7 women faculty
- 4 lecturers and advisers
- 1 professor of practice
- 1 research professor
- 1 postdoctoral fellow
- 4 support staff
- 38 children among faculty and staff (23 less than 10 years old)
- 6,934 students enrolled last year in all of our classes
- 188 course and lab sections taught last year
- 5 online courses taught last year
- $558,000 in total research expenditures last year

Note the number of assistant professors and children less than 10 years old. Our department is in a major transition as witnessed by the number of new hires. When you are in the region, we invite you to visit the department and see the excitement and enthusiasm among our students, staff and faculty.

Chemistry and Molecular Biology

Cook becomes department chair

The Department of Chemistry and Molecular Biology has undergone a lot of change this past year. After almost eight years as chair of the department, John Hershberger, professor, stepped down to pursue his research in combustion kinetics. Professor Greg Cook took over as chair July 1, 2009.

Three faculty members were hired this past year. Sangita Sinha, assistant professor, and Christopher Colbert, assistant professor, are structural biologists. They both came from the University of Texas Southwestern, Dallas. Sinha joined the department in fall 2009 and Colbert will arrive in fall 2010. Erkan Köse, assistant professor, arrived in fall 2009 from the National Renewable Energy Laboratory in Golden, Colo. Köse's research interests are synthesis and theory of conjugated materials for photovoltaic device applications. These new hires build on our core strengths of biomedical and materials research.

Recognition for world-class research done at NDSU grows every year. Recently, assistant professor Sivaguru Jayaraman received the prestigious 2010 laureate of the Swiss Chemical Society Grammaticakis-Neumann Prize for his work in photochemistry. Jayaraman also runs a very popular summer research program for local high school students funded by the National Science Foundation. He also received the College Research Award.

Extramural funding continues to grow for the department, due to the hard work of our graduate and undergraduate researchers. Graduate student Anoklase Ayitou received the highly competitive 2010 UNCF-Merck Graduate Research Fellowship. Barry Pemberton is this year's recipient of the College Graduate Student Research Award. Both work for Jayaraman. Undergraduate researcher John Schultz was awarded this year's ACS Division of Organic Chemistry SURF (summer undergraduate research fellowship) award. Only 16 students across the country received a SURF award. Schultz works in the labs of professor Cook.

Our staff is also integral to the operation of the department. We are delighted that Wendy Leach, our front office staff member and all-around facilitator, won this year's College Service Award.

The department will be changing its name next year to the Department of Chemistry and Biochemistry to better reflect the clientele we serve and avoid confusion with the NDSU molecular biology program. As always we appreciate hearing from our alumni. Please take a moment to drop us a line and let us know what you're doing.

Coatings and Polymeric Materials

Hobbie joins department

Professor Erik Hobbie has joined our department. He holds a joint appointment with the Department of Physics and is also director of the Materials Science Program. He is involved with designing and finishing laboratories in an NDSU Tech Park building that also is occupied by start-up company Appareo. Hobbie had a distinguished career at the National Institute of Standards and Technology in Washington, D.C. Hobbie is a polymer physicist and will fit very well in this joint appointment.

Faculty members have been traveling far and wide: to China (assistant professor Victoria Gelling), India (department chair Stuart Croll), Turkey (professor Dean Webster), Australia (research professor Dennis Tallman), and attended several conferences in Europe. Our annual Industrial Advisory Board meeting was well attended, despite the country's bad economic times. Our short courses were canceled due to curtailing of discretionary budgets in many companies that otherwise would have sent people to learn about coatings and polymeric materials or corrosion. We continue to look for good graduate students and held two open houses for NDSU undergraduates and local high schools. We also participated in the NDSU Graduate School's graduate studies fair.

Computer Science

Department hires four new faculty

With four new faculty hires, it has been a year of continued growth and excellence for the Department of Computer Science. It also has been another year of assessment as we examine curricular issues and plan a two-year study of accreditation.

Three new faculty joined the department in the beginning of the academic year. Two new assistant professors specialize in software engineering – Gursimran Walia, from Mississippi State University near Starkville, Miss., and Tariq King from Florida International University, Miami. Assistant professor Saeed Salem from Rensselaer Polytechnic Institute, Troy, N.Y., specializes in bioinformatics and data mining.

In January, assistant professor Changhui Yan joined the department from Utah State University in Logan. He also specializes in bioinformatics.

Xiaojiang "James" Du resigned in August to take a position at Temple University, Philadelphia, Pa. Associate professor John Martin announced plans to retire in May 2010 after 37 years at NDSU.

The department has won approval of the Master's of Software Engineering Program. This professional master's degree is taken entirely online with no requirement to visit campus, and can be accomplished in as little as 16 months. As a department we are hopeful this new program will relieve the pressure of rising enrollments and growth of the student body and create new revenue for important existing programs.

Geosciences

Faculty find new lab space in Geosciences Hall

The newly renamed Geosciences Hall is located in the center of campus. It most recently was the Engineering Technology Building and originally was the Dairy Building. While faculty offices remain in Stevens Hall, assistant professor Adam Lewis is establishing a sediment lab at the new location. Plans also are under way to create renovated geochemistry laboratory space in Geosciences Hall for assistant professor Peter Oduor. Odour continually is refining his experiments on behavior of clays as ultrafiltration membranes, along with his independent research program on remote sensing techniques in geographic information systems.

Ken Lepper was promoted to associate professor and carries on research on age dating using optically stimulated luminescence. Lepper and his students are investigating terrestrial quaternary sediments and the potential for using optically stimulated luminescence on Martian minerals. Distinguished professor Allan Ashworth and Lewis are planning another field season in Antarctica for 2010 and will be assisted by graduate and undergraduate students.

Department chair Bernhardt Saini-Eidukat continues his research on geochemical questions, both in ore deposits and in soils in North Dakota. Undergraduate students continue to be attracted to the department, and senior lecturer Elaine Hatzenbuhler is fully engaged with the introductory laboratories. For more information, visit www.ndsu.edu/geosci.

Mathematics

Çömez continues as chair

Two faculty members joined the Department of Mathematics on tenure-track positions in fall 2009. Assistant professor Azer Akhmedov earned his doctorate in 2004 from Yale University, New Haven, Conn., and was on a visiting position in the mathematics department the previous year. Assistant professor Robert Hladky came to us from the University of Rochester, N.Y. He earned his doctorate from the University of Washington, Seattle, in 2004. Professor Doğan Çömez resumed the position of department chair Aug. 15, 2009. Following the current academic year, he will serve another full term (three years) as department chair.

Assistant professor Angela Hodge (with Dr. Christina Weber from the Department of Sociology, Anthropology, and Emergency Management) received a FORWARD seed grant for a project dealing with gender equity issues in mathematics. Mathematics graduate student Bethany Kubik was awarded a two-year doctoral dissertation assistantship by North Dakota Experimental Program to Stimulate Competitive Research (EPSCoR).

Mathematics alumni Mark J. Kiemele, president and co-founder of Air Academy Associates, was named the 2009 College of Science and Mathematics Distinguished Alumnus. He visited the campus in October 2009 and met several students, faculty and administrators.

Pi Mu Epsilon, the mathematics honor society, reactivated a chapter at NDSU. The society has 15 members and professor James Olsen is faculty adviser.

Physics

Four new faculty join department

Four new faculty members joined our department in 2009. Landon Bladow, a former student of Mike Page in NDSU's Department of Chemistry, joined the department as an assistant professor. Assistant professor Warren Christensen is our second faculty member (after assistant professor Mila Kryjevskaia) who specializes in physics education. Both Christensen and Kryjevskaia have been instrumental in introducing student-centered tutorial approaches to teaching physics. They enhance student learning and will contribute in a fundamental way to the success of our program.

Our two other new faculty members are experimental physicists with expertise in polymers and nanotechnology. Professor Erik Hobbie, 2009 recipient of the U.S. Department of Commerce Bronze medal, comes to NDSU from the National Institute of Science and Technology. He has a joint appointment in the Departments of Physics and Coatings and Polymeric Materials, and is also the new director of NDSU's materials and nanotechnology (MNT) doctoral program. Assistant professor Andrew Croll, whose appointment will begin in fall 2010, shares many of the same research interests as Hobbie. Their labs will be located in the new Appareo Building in NDSU's Research Park, where a $1 million Center of Excellence Award will help provide necessary infrastructure for experimentalists affiliated with the MNT program.

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Aaron Feickert, a senior physics/math major, was awarded a Science, Mathematics and Research for Transformation (SMART) scholarship in 2009. This scholarship was established by the Department of Defense (DoD) to support undergraduate and graduate students pursuing degrees in science, technology, engineering and mathematics disciplines, with the goal of increasing the number of civilian scientists and engineers working at DoD laboratories. Feickert is the first student at NDSU to receive this honor.

Physics alumna Christina Keller has been named the 2010 recipient of our college's Distinguished Alumni Award. She earned a bachelor's degree in 1984, master's degree in 1987 and doctorate in 1988 from NDSU. Keller is an associate dean for administration in the College of Arts and Science and associate professor of physics at the University of South Dakota in Vermillion.

Psychology

Faculty advance through building collapse

This past year has been a good one for the Department of Psychology. Linda Langley was tenured and promoted to associate professor. Professor James Council is associate dean of the College of Science and Mathematics and has focused in particular on mentoring activities to help shepherd younger faculty in the college toward tenure. Mark McCourt was awarded the Dale Hogoboom Presidential Professorship. Associate professor Michael Robinson received the College Award for Mentoring.

Our faculty members also are contributing to education of the public. Assistant professor Clay Routledge has a popular blog on Psychology Today, which is a great way to bring the science of social psychology to many everyday concerns. Assistant professors Brian Ostafin and Stephane Rainville were on sabbatical this year. Ostafin was in Bern, Switzerland, working on mindfulness-based interventions for substance use disorders. Rainville was at the University of Ottawa in Ontario, Canada, at the Center for Neural Dynamics. His primary goal was to develop a mathematical model for understanding how the brain makes sense of constantly changing perceptual information.

The only downside (literally) to this past academic year was the collapse of the north wall of Minard Hall during an extensive remodeling project. This closed down several offices and labs in Minard. Many people have moved to other locations and are coping reasonably well. We are definitely looking forward to the newly remodeled space, which is only a couple of years away.

Statistics

Faculty expand course offerings

The Department of Statistics welcomed three new assistant professors this year. Volodymyr Melnykov joined the department in August 2009. Originally from Kharkiv, Ukraine, Volodymyr earned his doctorate at Iowa State University, Ames. He is most interested in finite mixture models and their applications. Seung Won Hyun started in January 2010. Won earned his doctorate from the University of Missouri, Columbia. His interests in statistics include optimal designs, adaptive designs and clinical trials. Gang Shen also joined the department in January 2010. Gang completed his doctorate at Purdue University, West Lafayette, Ind., and is interested mathematical statistics, asymptotic theory, Bayesian analysis, and the change-point problem.

Ron Degges, senior lecturer, recently developed an online version of regression analysis and currently teaches it. A new course is being offered, Introductory Survival and Risk Analysis I, and is taught by Tatjana Miljkovic, lecturer, who has a graduate degree in actuarial science. The students in this class are working on a project to calculate proposed monthly premiums for life insurance, based on two different mortality assumptions. Students will be meeting with actuaries in the community.

Fu-Chih Cheng, assistant professor, recently spent an evening in Thompson Hall making sushi with the students. Unfortunately, the department did not get any sushi, but Cheng did bring in sticky rice cakes for everyone to celebrate the new year.

Dawn Halle, academic assistant, will celebrate her second anniversary with the department. This year, Halle and her husband are planning a long-awaited trip to Las Vegas, which was initially delayed due to her husband's deployment to Iraq.

Rhonda Magel, chair, continues her work in nonparametric statistics. She has several graduate students working on order restricted inference problems.

Alumnus leads R&D for ConocoPhillips


Merl Lindstrom

A big component of Merl Lindstrom's job is, in essence, to gaze into a crystal ball and predict the future.

"If I could do that really well, I'd be so rich I wouldn't be working," the NDSU alumnus said with a laugh from his office at ConocoPhillips in Bartlesville, Okla. As vice president for research and development at the worldwide energy company, his many duties include the weighty responsibility of envisioning what is to come.

"Part of what I do is look ahead, seeing what is coming down the pike in 15 to 20 years that will impact liquid fuels," Lindstrom explained.

When he imagines the future, Lindstrom starts by looking for something different, a nuance that could have an impact down the road. "I look at an idea back over in a corner that somebody is working on," Lindstrom said. "You see disruptive technology, and ask 'If that comes to fruition, what impact could that have on our business?' "

He has plenty of resources available to help him answer questions like that. Lindstrom manages a staff of more than 300 leading researchers and technicians with a budget in excess of $100 million.

While tomorrow is important, the researchers at ConocoPhillips also are very much involved in the emerging technologies of the present day. Lindstrom's organization explores innovations in such areas as biofuels, photovoltaics, nanotechnology, sustainability and refining operation optimization. All the while, they keep a watchful eye on environmental concerns.

Lindstrom's career path began in 1978, when he joined Phillips Petroleum after earning his bachelor's degree and doctorate in chemistry at NDSU. He has enjoyed remarkable success, holding such important positions as general manager of Research and Development Downstream Technologies; manager of the Chemicals Division Research and Development; director of Alloys, Blends and Compounds; and supervisor for the Advanced Materials Section.

Lindstrom points to two episodes of his career as his personal highlights.

One was helping to develop advanced thermo-plastic composite material for the F-111 stealth fighter in the early 1980s. "We were working with aerospace companies on the West Coast and the people at Wright Patterson Air Force Base," he said. "We'd be working in the lab, and my wife would call to ask if I'd be home for dinner. I'd tell her I'd be home at 6 p.m., and she'd say, 'It's already 9:30.' It was just so exciting and fun, and that hasn't gone away."

The other came during 1998 to 2001, when Lindstrom managed Woods Cross refinery in Utah, a small operation that had a history of safety issues. After he led a major overhaul, the Occupational Safety and Health Administration recognized the refinery as one of the safest in the country, and it also set net income records.

Lindstrom grew up on a family farm near Sheyenne, N.D., and credits his success to his Midwest work ethic and his education at NDSU.

"I was fortunate. As a student, I migrated toward polymers and coatings – fundamental research for a very applied purpose. That department at NDSU is highly rated in the world, so my background helped me fit right in when I got into industry. It was an extension of what I had been doing in graduate school," he said.

Lindstrom, who jointly owns the family farm near Sheyenne with his siblings, also has a summer home in Riverdale, N.D. He and his wife, Cheryl, live in Dewey, Okla.

Barry Mosbrucker, BS '82, computer science

Hometown: Dickinson, N.D.

Now: Vice president of development at Telvent DTN

What his company does: Telvent is a global IT solutions and information services provider that improves the efficiency, safety and securities of the world's leading companies. Telvent provides information services that allow businesses to make informed decisions. Mosbrucker is responsible for product development and product operations for agriculture, weather and energy products.

What he enjoys about his job: "I like the diversity and the technology in my job. The technical challenges that it takes to build systems that will satisfy the demand in our customer base is what drives me; solving real-world problems, doing it well and doing it at scale."

What he remembers about NDSU: "When I started at NDSU, we had about 115 people in the computer science program that year. By the time I graduated four years later, there were only 18 to 25 of us left. It was a very challenging but rewarding program for those of us who stuck it out. I have enjoyed meeting NDSU alumni throughout my career and I have been impressed with the quality of education that the NDSU computer science program has provided us."

Advice to recent graduates: "Don't be too selective in accepting that first job. Whatever job you take – become passionate about it in every way possible. Once you get your foot in the door, make the job 'yours.' If you love the job, it will show, and the rest will take care of itself."

Keller named 2010 Distinguished Alumna

Tina Keller grew up in Little Falls, Minn., the boyhood home of Charles Lindbergh. While Lindbergh grew up with an eye on the sky, Keller's main focus these days lies 4,800 to 7,500 feet underground.

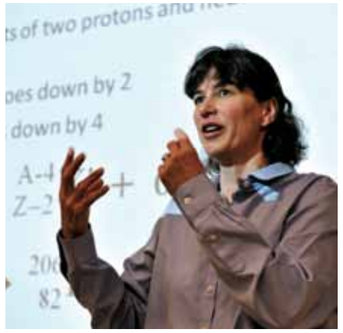
Keller is chair of the executive committee for the Center for Ultra-low Background Experiments at the Deep Underground Science and Engineering Laboratory (DUSEL), a multidisciplinary laboratory in the Homestake Gold Mine underneath Lead, S.D. At DUSEL, physicists hope to detect extremely rare events in the universe by using thousands of feet of earth and rock to shield their devices from cosmic rays.

Keller's research interests are in detecting rare events, a task that requires extremely pure instruments of measurement. Lately, she has been determining how to gather argon without radioactive isotopes. She wants to fill an underground room with clean argon in order to detect dark matter.

Keller originally came to NDSU on a basketball scholarship. When she graduated with her bachelor's degree in physics in 1984, she wasn't sure what she wanted to do. NDSU offered her an assistantship to stay and work on her master's degree, which she finished in 1986. She continued on to earn a doctorate in 1988.

"I always liked physics. I think physics answers some of the most fundamental questions of the universe," Keller said.

Soon after earning her doctorate, she took a temporary teaching position at the University of South Dakota, Vermillion. That position turned into a 21-year career that saw the growth of USD's Department of Physics and Keller become associate dean in the College of Arts and Sciences and director of physics. As the faculty athletics representative for USD, Keller played a key role in the institution's transition to Division I athletics.



Tina Keller visited campus to talk to students about the Deep Underground Science and Engineering Laboratory in South Dakota.

This year, she is the NDSU College of Science and Mathematics Distinguished Alumna. She visited campus to talk to students about DUSEL and the research today's physicists are conducting on dark matter and neutrinos. She lives in Vermillion with her husband, Gary Larson, and son, Alex.

Mark Kiemele, BS '69, MS '70, mathematics

President and co-founder of Air Academy Associates in Colorado Springs, Colo.
College of Science and Mathematics 2009 Distinguished Alumnus

Originally from Linton, N.D., Kiemele has trained, consulted or mentored more than 30,000 leaders, scientists, engineers and college students from more than 20 countries. He is world-renowned for his Knowledge Based KISS (Keep It Simple Statistically) approach to engaging practitioners in applying performance improvement methods. In addition to many published and technical papers and articles, he has co-written several books on using mathematics in business.

About his company: Kiemele started Air Academy Associates 20 year ago after leaving the Air Force, where he spent 20 years in research and teaching. Air Academy Associates is a for-profit business that trains companies on methodologies that eliminate waste and improve efficiency using math and statistics. They've done this for more than 100 companies.

What NDSU nurtured:

- a love and passion for math and science
- a disciplined process for solving problems
- a work ethic second to none

"I think the synergistic effect of those things helped me in my career. You put those three things together, you'll be competitive in the marketplace."

Career highlights: The best part of my job is seeing somebody say, 'I couldn't do that before, but now I can.' "

What surprises him in his profession: "We have this huge gulf between math-gifted people and some who are just really lacking in numeracy. We fought the battle of illiteracy in America, but the battle of innumeracy, the inability to take data and turn it into information, is really just beginning. The heart and soul of our business is to help people use facts and data to make better decisions."

Advice to recent graduates:

- Cultivate an ability to work with others in a team scenario.
- Be able to translate technical concepts into business language.
- Always be polite and thankful.

"I'm thankful for my education at NDSU. I've been the luckiest guy in the world – I get to apply every day what I learned many, many years ago at NDSU."

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