



SCIENCE AND MATHEMATICS 2013 alumni news

Small fish creates big splash for NDSU conservation students

Without the 7-foot-tall chain link fence, barbed wire and security cameras, Devils Hole would likely go unnoticed – blending into the vast desert in Death Valley National Park.

Surrounded by rocky terrain and scattered brush, the road – little more than a trail at some points – winds its way up the valley side to a high, brown ridge. Not much indicates the area’s ecological diversity. But soon the fence comes into view. Inside is a limestone cavern holding a living treasure, the rare and endangered Devils Hole pupfish.

Access to the site is extremely limited even among experts in the field, said Craig Stockwell, professor of biological sciences at NDSU. But due to his expertise on two scientific panels concerning the pupfish, he was able to take 10 students in his Advanced Conservation Biology course there for a rare learning experience last fall.

“I told the students this was my second time at the site in 20 years,” Stockwell said. “You are very unlikely to find many people who have been there more in a career. It has iconic status for people who study conservation of aquatic species.”

A classroom like no other

A uniformed National Park Service officer welcomed the students and unlocked the gate. Students climbed down a steep decline covered with bits of rock. Be careful not to kick any of it into the hole, they’re told. That would disturb the habitat.

A giant boulder provided a prime viewing spot of Devils Hole’s water-filled cavern, which is accessible because a portion of its roof collapsed. The opening provides a window to the pupfish’s only natural habitat, a small shelf covered by rubble and three feet of water, which stays a consistent 93 degrees Fahrenheit. The edge of the shelf drops into an abyss whose bottom has yet to be found.

The pupfish, which are iridescent blue and the size of a thumb at their largest, get their name for resembling puppies at play. The fish and their home offered an immersive learning environment for Samantha Skinner, a senior majoring in zoology from Hazen, N.D. “It was touching ground that people don’t get to walk on.”

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Skinner, under the guidance of doctoral student Shawn Goodchild, conducts research on pupfish in Stockwell's NDSU lab. She used the trip to trap, study and release samples of the Amargosa pupfish at a pool near Devils Hole. This species, which also is highly endangered, occurs only in a few habitats. Her work helped determine the impact of non-native and invasive mosquitofish on the pupfish.

"I had been doing work on these sites, but hadn't actually seen it," Skinner said. "I got to actually see what I had been working on – a true hands-on experience."

Rare resources

Conservation biologists have been working to save the pupfish and its relatives scattered throughout isolated sites in the valley. Some fish have found new homes at the Ash Meadows Fish Conservation Facility, a refuge site created after ranching activities threatened the fish's future. Students toured the facility before attending a special symposium at the Desert Fishes Council Meeting, which Stockwell co-organized.

They later visited Rancho Santa Ana Botanic Garden, the San Diego Zoo and the zoo's Institute for Conservation Research during the nine-day trip.

How did the fish get there? The pupfish's habitat once was covered with water – a remnant of a Pleistocene lake. Most are believed to have been isolated thousands of years ago as the water receded. "As lake levels dropped, the Devils Hole pupfish was isolated at a higher elevation," Stockwell said. "The last two species in the bottom of the valley were isolated 2,000 years ago. It's an example of rapid diversification."

While their numbers fluctuate, only about 100 pupfish remain in Devils Hole. In the 1960s, irrigation and urban development tapped into groundwater in the area, lowering the aquifer level and threatening to expose the cavern's shelf, which is the fish's only natural breeding habitat. A legal battle wound its way to the Supreme Court and biologists have since erected the fence to prevent intruders from intentionally harming the fish.

Now protected by the National Park Service, access is limited to a lucky few. For the NDSU students who visited the area, it was a chance to experience the ultimate irony – driving into the middle of a desert to study a fish.

PHYSICS FACULTY MEMBER RECEIVES AMBASSADORS AWARD

Landon Bladow positively transforms the way students learn about the challenging topic of physics. For his efforts, the assistant professor of practice received the 2012 Ambassadors Excellence Award from the College of Science and Mathematics' Ambassadors sponsored by the college.

"He has a really good way of presenting material at the right level," said Daniel Kroll, professor and head of the physics department. "He is exceptional in that regard."

"Overall, I would like to personally thank Dr. Bladow for transforming the way many other students and I think about the subject of physics."

Derek Miller

Bladow earned bachelor's and doctoral degrees from NDSU before becoming an assistant professor of practice in physics in 2009. His primary duties involve teaching a variety of introductory physics courses. He also is adviser for first-year

physics majors because of his knowledge of the curriculum, Kroll said.

Derek Miller, president of the college's Bison Ambassadors, nominated Bladow. "Although I, like many other physics students, was initially apprehensive, I realized very early in the semester that Landon has an uncanny ability to both motivate and engage his students," he said. "Overall, I would like to personally thank Dr. Bladow for transforming the way many other students and I think about the subject of physics."



Bladow

The Bison Ambassadors is a student organization sponsored by the Alumni Association that is actively involved with prospective, current and past NDSU students. The award is the only one in the college awarded by students.

"The opinions of the students are important to me, and it is quite amazing to realize that I have impacted their academic lives," Bladow said.

UNDERGRADUATE WINS NATIONAL SCHOLARSHIP

David Lukudu considered a pencil an amazing gift when he was growing up in what is now known as South Sudan. A pencil meant he could take notes at school and get an education. And being educated meant anything was possible.

Lukudu, a senior majoring in geology at NDSU, felt like a kid getting a pencil when he learned he was selected for a 2012 Subaru Minority Student Scholarship. The program is for undergraduate minority students considering a degree in the geosciences. Lukudu was one of six U.S. students awarded a scholarship.

Bernhardt Saini-Eidukat, associate professor of geosciences, told Lukudu the good news when he came to a final exam spring semester. Lukudu jumped. He whooped. He gave Saini-Eidukat a big hug.



Lukudu was one of six U.S. students to receive the Subaru Minority Student Scholarship.

“David works 40-plus hours per week at a local manufacturing company to support his family while carrying a full load to complete his geology degree at NDSU,” Saini-Eidukat said. “He has a vision of working in petroleum exploration back in his home country of South Sudan if political conditions there improve. I was very pleased to nominate him for the Subaru Minority Student Scholarship Program, and he very much deserves the award.”

Claiming his education

Lukudu was born in a mountainous area in South Sudan where his interest in geology developed. He collected rocks. He played with rocks. He was captivated by rocks that emanated light during nighttime hunts with his father.

At a young age, he knew he wanted an education and that it would not be handed to him. He would have to pursue it. Claim it.

Lukudu remembers getting one pencil a year for school. He sharpened it just a little, just enough to write. He didn’t want to break the lead. That would be a waste when he needed to copy an entire book from the chalkboard. Only the teacher had a book.

Lukudu left his village to attend high school in the city. Instead of continuing his education after high school, he left his country to escape political unrest and violence. He lived in Egypt for 13 years, delivering flyers to make a living.

In 2000, the United Nations resettled Lukudu and his wife in Fargo. He secured a job at a local manufacturing company and settled into life in a new country.

He remembered hunting with his dad and the glowing rocks. He thought about what his illiterate uncle said when he visited a city: “If I had eyes, I would see stuff.”

His uncle was referring to signs he couldn’t read. “If you have an education, you have eyes,” Lukudu explained. “You can see through mountains. You can see anything.”

Lukudu started researching colleges and geology programs.

Choosing NDSU

Lukudu ultimately chose to pursue his geology degree at NDSU. He remembers Saini-Eidukat showing him the labs and introducing him to professors. The next day he applied to NDSU.

After graduation, Lukudu plans to work for a petroleum company, perhaps in South Sudan.

Lukudu said he will always remember Subaru for awarding the scholarship. “If someone helps you with your education, that is big,” he said. “An education is more valuable than anything in this world.”

NDSU STUDENTS WIN BRONZE IN INTERNATIONAL BASKETBALL AND PHYSICS COMPETITION

Three physics students at NDSU received the equivalent of a bronze medal in the international University Physics Competition.

The students had just 48 hours to solve a physics problem involving three-point shooting in Olympic basketball, using math and physics to determine what initial ball velocities and spins would result in a successful shot from the three-point line, using international basketball rules. Senior physics majors Marne Johnson from Rugby, N.D., Brandon Johnson from Hazen, N.D., and Ahis Shrestha, a junior in physics and math from Nepal, dedicated a weekend to crunching numbers and formulating calculations for the contest.

It is the first time NDSU students participated in the competition since it began two years ago. During the contest, students work in teams of three at their home colleges and universities all around the world, analyzing a real-world scenario using the principles of physics and submitting a formal paper about their work.

Sylvio May, associate professor of physics at NDSU, said the competition was a good fit, since the problem was an application of classical mechanics, a class all three of the students studied in fall semester. “I hope they like the intellectual challenge and the opportunity to work as a team on a problem that has no simple solution,” May said.

The students said the competition benefited them in different ways. “I was surprised by the amount of heavy computation that can go into something as simple and intuitive as throwing a basketball,” Brandon Johnson said. “I chose to partake in the competition because I wanted to test my current knowledge against a real life application. Through the competition, I learned some of the value of teamwork in physics. The time limit was intense, to say the least.”

Marne Johnson said she participated because the competition sounded fun and challenging. “I would be working with classmates I knew and trusted, and it would be good exposure to real-life physics problems. I was surprised by the difficulty we experienced mathematically modeling a moving projectile,” she said. “Physics such as this in such a short time window is stressful but exciting, because you know you have a deadline to meet.”

The students also learned lessons in time management. “I received an extremely abbreviated lesson in typesetting and graphing

in Mathematica,” said Marne Johnson, who used the software program for the first time. “But it is the best program out there for writing physics and math papers, so learn I did.”

Shrestha found the crash course in solving physics problems useful as well. “I am usually a pen-and-paper person, but because of the limited time, we had to use Wolfram Mathematica for faster calculations and, as a result, I ended up learning the convenience of computational methods while solving a problem,” he said. “Of course, this was possible with the help and cooperation of Brandon and Marne.”

“I was surprised by the amount of heavy computation that can go into something as simple and intuitive as throwing a basketball.”

Brandon Johnson

The students spent most of the weekend doing calculations, covering everything from a three-point shot with nothing but net, to rim shot, bank shot, spin or no spin on the ball.

The NDSU physics team was among 77 teams from around the world, including squads from China, Singapore, Mexico and the United Kingdom. Of those competing, 3 percent of the teams were ranked as gold medal winners, 18 percent were ranked as silver medal winners and 27 percent were ranked as bronze medal winners for their work. The American Physical Society and the American Astronomical Society sponsored the competition.

The three NDSU students don’t think their fascination with physics will end anytime soon. “Most behavior we observe in the physical world can be described in terms of physics, whether it may be shooting a basketball, launching a rocket, ripples on a lake or motion of a planet,” Shrestha said.

Both Marne and Brandon plan to attend graduate school, and Shrestha plans to pursue graduate studies in mathematical physics and work on scientific research.

LAB TRIP PROVIDES INSIGHT TO X-RAY SCATTERING RESEARCH

A trip to two nationally renowned laboratories provided sophisticated hands-on knowledge for an NDSU graduate student.

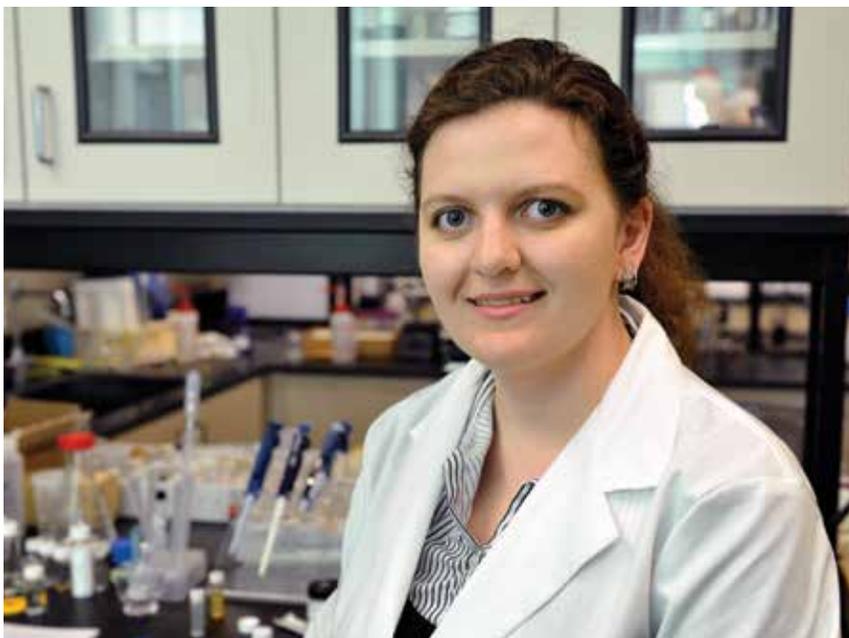
Olena Kudina was one of 65 graduate students from 47 states to attend the 14th National School on Neutron and X-ray Scattering in August 2012. The school, a joint project of Argonne National Laboratory and Oak Ridge National Laboratory, was designed to help introduce graduate students to the capabilities available at neutron and X-ray user facilities in the United States.

As part of the school, students attended lectures from speakers representing academia, industry and national laboratories. Students then conducted a series of short experiments using instruments at neutron and synchrotron sources at Argonne's Advanced Photo Source and Oak Ridge's Spallation Neutron Source and High Flux Isotope Reactor facilities.

The two-week trip gave Kudina a chance to further two research projects she is conducting in NDSU's Department of Coatings and Polymeric Materials.

Her current research includes developing pH-responsive magnetic capsules for enhanced delivery and recovery of cellulases for biomass hydrolysis. The National Science Foundation-funded work develops new carriers with which to encapsulate enzymes used as a catalyst to create biofuels from cellulosic material.

Another project focuses on creating smart polymeric materials for drug delivery. Kudina used the Argonne and Oak Ridge facilities to learn how to use the neutron and X-ray scattering techniques to characterize the formation of the polymer-based drug delivery vehicles. The techniques can provide the exact dimensions and shapes of the vehicles, allowing the researcher to see where a drug



Kudina spent two weeks at the 14th National School on Neutron and X-ray Scattering.

is located in the polymeric carrier and determine the carrier capacity in terms of loaded cargo.

"We can see where the drug is in the assembly," Kudina said. "Is it in the core or the shell? It is important to know in-depth."

Kudina said the work could allow for delivery of water-insoluble drugs, decreasing drug dosage, and, thus, its toxicity and side effects. The end result is increased drug effectiveness. "Mayo Clinic is testing formulations in vivo to determine if smart polymeric carriers can be applied for osteosarcoma (bone cancer) treatment," she said.

HERP DAY RAISES AWARENESS OF REPTILES, AMPHIBIANS

Mary Jo Kenyon says most people have misgivings about "herps," a term for reptiles and amphibians. They think the animals are slimy and creepy. "If it's a furry animal, everyone loves them," she said. In an effort to correct the misperception, Kenyon, senior lecturer of biological sciences, and the 19 students in her herpetology class hosted Herp Day on the afternoon of Oct. 25, 2012.

More than 200 students, faculty and staff congregated in Stevens Hall to learn about and hold snakes, lizards, bearded dragons, a leopard gecko and turtles. The purpose of the event was to promote appreciation and raise awareness about the animals and the environmental challenges they face.



AIDING AGRICULTURE: COMPUTER SCIENTISTS HELP IN THE FIELD



Denton, right, leads two data mining projects involving Red River Valley sugar beet production.

Agriculture is continually evolving. In today's world, farmers are required to do much more than buy seeds, plant them and harvest a crop to stay competitive. Acquiring and analyzing data is becoming a high-tech tool in the industry.

Anne Denton, James A. Meier Junior Professor of computer science, is leading two separate but related projects that use data mining techniques to improve agricultural production in the Red River Valley. Both projects involve sugar beets – one of the area's biggest cash crops.

For the past three years, researchers have been partnering with American Crystal Sugar Co., John Deere and RDO Equipment Co. to determine and predict the expected sugar beet harvest yield while the crop is still in the ground. The project is part of the Department of Computer Science's Industry-University Consortium Program.

American Crystal Sugar, the region's largest sugar beet cooperative, already collects and maintains data from its growers' several thousand fields. The problem is making the data understandable and functional. Traditionally, Denton said, predicting sugar yield was a statistics regression problem. However, data mining techniques have helped researchers discover and analyze the most important attributes. "That was the key breakthrough," Denton said. "We've been able to analyze information with data mining techniques rather than statistical."

Denton and two other professors from the computer science department also were awarded a \$599,722 National Science Foundation – Partnership for Innovation grant. It marks the first time a North Dakota institution is the lead institution for the this type of grant. Denton is the principal investigator along with David Franzen, Extension soil specialist; John Nowatzki, agricultural machine systems specialist; Kambiz Farahmand, professor of industrial and manufacturing engineering; Phillip Boudjouk, retired vice president for research and creative activity; and Dean Knudson, associate professor.

The Smart Farm project includes a data-driven decision support system incorporating sensor data, satellite images and weather information to allow farmers to respond flexibly to production and environmental needs. In the initial phase, sugar beets are the prototype application thanks largely to the previously established industry-university consortium partnerships.

Techniques and results from either project might one day aid other crops, such as corn and soybeans. It's an interesting application for Denton, who remains involved in both ongoing projects. Her research is largely comprised of developing data mining techniques for diverse problems, ranging from bioinformatics to optical luminescence.

"I didn't have an agriculture background," Denton said. "I jumped into whatever was needed. Data mining holds it all together."

MATHEMATICS, COMPUTER SCIENCE MAJOR RECEIVES GOLDWATER SCHOLARSHIP

NDSU student Zechariah Andersen was among 282 awardees nationwide selected for the prestigious Barry M. Goldwater Scholarship for the 2012-13 academic year.

The scholarship is awarded annually to college sophomores and juniors and covers the cost of tuition, housing, books and fees up to \$7,500 per year. Students are nominated by faculty members and selected through an independent review process. Andersen was the sole North Dakota University System student to receive the scholarship in 2012.

“I’m honored to receive this scholarship,” Andersen said. “The best feeling was seeing myself on a list of students from top-tier universities like MIT and Stanford.”

Andersen is a native of Velva, N.D., majoring in mathematics and computer science, with plans to pursue a graduate degree. He is vice chair of the NDSU Association for Computing Machinery.

In addition, Andersen participates in the Ronald E. McNair Scholarship Program, which is intended to help undergraduate



Andersen received the Barry M. Goldwater Scholarship.

students achieve academic success and increase the number of professors from traditionally under-represented populations.

Established by Congress in 1986, the Barry M. Goldwater Scholarship and Excellence in Education Program was created to encourage outstanding students to pursue careers in mathematics, the natural sciences or engineering to foster excellence in those fields.

NEW LEARNING ASSISTANT PROGRAM BENEFITS STUDENTS

A new initiative within the College of Science and Mathematics is helping students in a variety of classes receive extra assistance in the classroom.

Beginning with the 2012 academic year, the Learning Assistants Supporting Science Instruction program began partnering talented upper-level undergraduates with faculty who teach large-lecture introductory courses to create learner-centered classrooms.

The learning assistants’ primary responsibilities include working with teams of students, either within a large-lecture class, in recitation or during office hours. They meet regularly with faculty instructors to plan instruction and analyze student assessment data.

Warren Christensen, assistant professor of physics, said the program was initiated by an interdisciplinary group of faculty within NDSU’s Collaborations in Discipline-based Education Research program.



Christensen

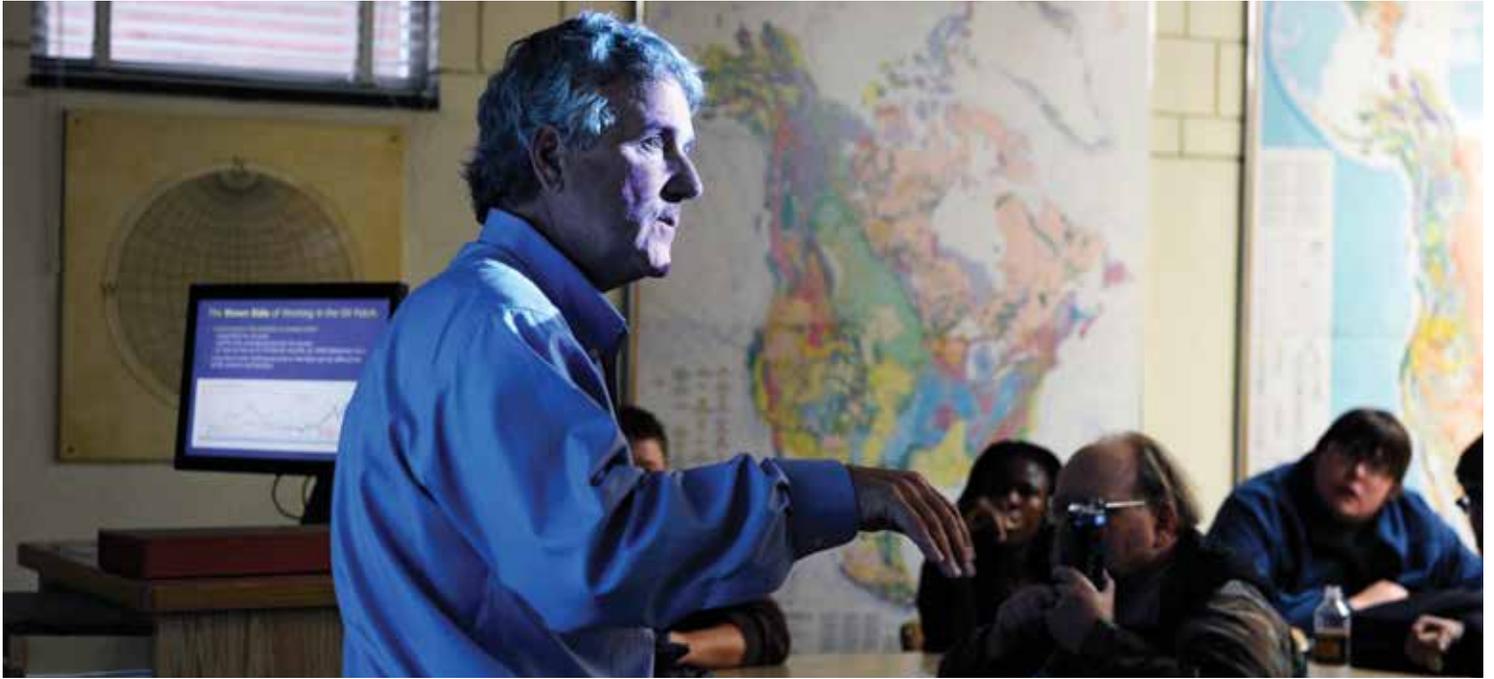
Christensen said the 14 assistants help students by creating an active learning environment.

Brandon Johnson, a senior from Hazen, N.D., who is majoring in physics, mathematics and music, helped Christensen teach an introductory physics course each semester. Johnson said his ultimate goal is to become a professor at a research university. Being a learning assistant helped prepare him for graduate school.

“Having to instruct students is a great learning experience,” Johnson said. “I benefit from the teaching experience and having to really know the material. The students benefit from the collaboration and having another resource.”

Visit www.ndsu.edu/cider/lassi for more information about the program.

DISTINGUISHED ALUM FINDS A CAREER IN OIL INDUSTRY



Fischer shares advice about the oil industry as 2012 distinguished alumnus.

For someone whose sights were never set on the oil business, David Fischer has made quite the career out of it. He has been actively involved in the petroleum industry as a Williston Basin geologist and explorationist since June 1980.

The Fargo native came to NDSU interested in archaeology, paleontology and geology. In fact, his master's thesis was focused on fossilized beetles. However, after earning a bachelor's degree in soil science from NDSU and a master's degree in geology from the University of North Dakota, he took a job with Gulf Oil Corp. in Casper, Wyo., as an exploration geologist. He was tasked with wildcat exploration in the North Dakota portion of the Williston Basin.

Fischer's first experience in the industry went so well, he never looked back. In October 2012, he detailed his career path and dispensed advice to students in the College of Science and Mathematics as the college's distinguished alumnus.

"Knowing my background in subsurface geology was not strong, I was nervous," Fischer said of his first job in the field. "I had the basics. One day I could be out doing dirty work monitoring drilling on a well, the next exploring for oil in the office. I wanted to succeed and after a while gained some confidence that I could. Through my education I knew I could grow and achieve."

In 1981, Fischer joined Supron Energy as a staff geologist in Denver, where he again worked in the Williston Basin, responsible for wildcat exploration efforts and supervising the company's development program and active drilling rigs. It was during the time of North Dakota's last oil boom, and staff geologists were focused on finding new accumulations of oil and developing new discoveries.

"Being in exploration is a lot like being a weatherman," Fischer said. "Predictions of where to look are made using all data available, from existing oil and water wells, from surface geology and even satellite imagery, comparing those data to modern lake and ocean environments where sediments are accumulating today."

Fischer eventually became an independent subsurface geologist and consultant. He also taught in NDSU's geosciences department, sharing his industry experience. "Get to know the concepts and the principles behind the concepts," he said. "It's a hands-on science."

As the latest oil boom continues, Fischer remains an independent consultant, adding the area of carbon dioxide sequestration. He identifies and characterizes reservoirs as potential geological storage sites.

Fischer said the oil industry offers the ability to work independently. The industry has a bright future for new graduates, he said. He expects up to 60 percent turnover in the industry due to the age gaps created by previous booms and busts. However, the window won't be open forever in a cyclical industry.

"Some students will be friends and colleagues throughout their lives," Fischer said. "Education goes beyond teaching concepts. Many of my colleagues maintain it was the background received here that allowed us to develop professionally, allowed us to work and learn beyond the basics. It's strong enough where you can successfully apply it to any niche in geology. Find a niche that you love. Enjoy your career."

NYGARD NAMED JEFFERSON SCIENCE FELLOW

Kendall Nygard, professor of computer science and operations research, has been selected as a Jefferson Science Fellow for 2013-14. He was notified of the prestigious appointment by the U.S. Department of State March 25.

Jefferson Science Fellows serve as science advisers on foreign policy issues. Appointees spend one year at the State Department or the U.S. Agency for International Development in Washington, D.C., and also may have extended stays at U.S. foreign embassies or missions.

This year, 13 academic scientists, engineers and physicians from institutions of higher education were selected for the important positions.

“There are so many important policy issues for which the U.S. Department of State is responsible that are grounded in scientific and engineering areas in which I have an interest, including such things as energy, environment, security, arms control and the expanding role of communication and social media in shaping societies. I am very enthused about the opportunity and the trust placed in me to serve as a science adviser on such matters,” Nygard said. “I officially began my work on Aug. 19 and will work from Washington, D.C., for one year. Following the upcoming year, I will return to NDSU and be available for an additional five years on a consultant basis.”

The fellowship program was initiated in 2003, designed to engage American science, technology, engineering and medical experts from academia in the development and implementation of U.S. foreign policy.

“By any major research university measure, this is an outstanding recognition of Dr. Nygard’s nationally respected expertise, and it is a strong acknowledgment of the quality of our NDSU faculty,” said NDSU President Dean L. Bresciani. “He will be an outstanding science adviser as our nation sets critical foreign policy.”

NDSU Provost Bruce Rafert praised his distinguished record of teaching, research and service. “He is one of NDSU’s very best,” Rafert said. “His work spans a remarkably broad range of topics, from simulation to logistics, and artificial intelligence to distance education, and Petri Nets to software engineering. He has earned distinction by the breadth of thesis topics he has supervised and the range of graduate students he has seen through to graduation.”



Nygard

Nygard is one of two NDSU faculty members to be selected for the post. He joins Kalidas Shetty, associate vice president for global outreach and professor of plant sciences, who was a fellow in 2004.

“Jefferson Science Fellows provide our diplomats the scientific advice, rationales and tools to understand complex issues ranging from telecommunication technologies to food safety to biosecurity,” Shetty explained. “It is a great honor for Dr. Nygard and NDSU that he is among the select few chosen to serve as an adviser to help our diplomats navigate complex challenges to make our world better for all its citizens.

I am thrilled Ken has been chosen – he fully deserves this honor.”

Nygard joined the NDSU faculty in 1977, and served as the computer science department chair from 1996 to 2005. In 1994-95, he was director of the Scientific Computing Center at the University of North Dakota, Grand Forks. He previously was a visiting scientist at the Air Force Logistics Command at Wright-Patterson Air Force Base in Ohio and a research fellow at the Air Vehicle Directorate of the Air Force Research Lab.

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Dean L. Bresciani

Nygard’s research interests include combinatorial optimization methods involving management of networks and sensor networks, cooperative mission control for unmanned air vehicles, and bioinformatics.

He earned his bachelor’s degree at Minnesota State University Moorhead, his master’s degree in mathematics from Mankato State University and his doctorate in operations research from Virginia Polytechnic Institute and State University.

DOCTORAL STUDENT PULLS DOUBLE DUTY AT LOS ALAMOS LAB

For 70 years, Los Alamos National Laboratory in Los Alamos, N.M., has led scientific inquiry supporting nuclear deterrence, reducing global threats and fostering energy security.

An NDSU doctoral student recently helped further that important mission. Chris Olson, a graduate research assistant in NDSU's Center for Nanoscale Science and Engineering, spent three months each summer in 2011 and 2012 interning at the lab, where he worked side by side with the leading scientists in the field of computational quantum chemistry.

The Williston, N.D., native's interest in the field began in high school. Olson said his chemistry and mathematics teachers provided him with a "fledgling literacy" in physical science. "I settled on physics, drawn to the idea that the complex machinery of nature could be expressed, explored and understood symbolically," Olson said. "On a more pragmatic level, I also saw the study of physics as a path to developing a solid foundation for a career in science/engineering or advanced study."

While earning a bachelor's degree in physics at NDSU, Olson decided to attend Graduate School. He joined the Center for Nanoscale Science and Engineering as an undergraduate research assistant, becoming familiar with the diverse projects studied there. It sparked a desire to more deeply explore the subject matter.

He's now pursuing a doctoral degree in materials and nanotechnology under the guidance of Konstantin Pokhodnya, the center's senior scientist, and Svetlana Kilina, assistant professor of chemistry and biochemistry.

Olson's line of research focuses on the synthesis, characterization and modeling of a relatively new class of chemical complexes known as molecular magnets. "Despite the explosion of interest in these substances, open questions remain about some of their fundamental properties," Olson said. "My interest was sparked and is sustained by those open questions. Why do we know as little as we do in specific areas? How can I contribute to our collective understanding of complex phenomena in materials of potential technological relevance?"



Olson

To further his experience, Kilina recommended Olson for an internship at Los Alamos National Laboratory. He joined a group in the lab's theoretical division.

While at Los Alamos, Olson worked on computational modeling of semi-conducting nanosystems – polymers and quantum dots, specifically. "The main aspect of the project was the computational investigations of some extraordinary non-linear optical properties of quantum dots in order to gain a better understanding of the mechanisms involved," he said.

His research on this project was awarded by the Best Poster Presentation Award at the lab's 2012 student symposium. The multidisciplinary event highlighted lab-sponsored research from approximately 300 students throughout the world. Olson's poster focused on the first-principles simulation of two-photo absorption in small

quantum dots. "The exploitation of this kind of optical absorption phenomenon has the potential to revolutionize data-storage technology, among other applications," Olson said. "However, few first-principles studies have been performed to help elucidate the effect quantum dot's surface treatment may have on two-photo absorption."

Olson said the project helped him develop a greater understanding and appreciation of the experimental and theoretical aspects of photo-physics in nanomaterials.

Upon graduation he hopes to pursue a career in materials research in an industrial setting or with a governmental department or agency.

"At Los Alamos National Laboratory, I learned a great deal about the physics of light-matter interactions in nanoscale systems, how to stimulate these interactions computationally, and how to interpret the results of these studies," Olson said. "Although the research thrusts at the NDSU Center for Nanoscale Science and Engineering are somewhat different, the techniques I learned at Los Alamos National Laboratory will be invaluable to the continuation and expansion of my investigations at NDSU."

BLEIER REFLECTS ON 37-YEAR ZOOLOGY CAREER



During mammalogy lab, Bleier points to the structure on a skull that distinguishes a cottontail rabbit from a jackrabbit.

Will Bleier's boyhood dream was to be a veterinarian. That is, until one particular Sunday afternoon.

He and his parents had just returned from the animal clinic. The second of his two pet rabbits had gotten sick and couldn't be saved. The first rabbit died a month earlier following a similar visit.

Bleier declared he didn't want to be a veterinarian anymore. After all, veterinarians kill animals. Rather than correct his son, Bleier's father suggested something else, "How about becoming a zoologist?" After a short lesson on what that meant, the career-minded fifth-grader was sold. And he has been ever since.

In early January, Bleier retired after nearly 37 years as a zoologist at NDSU.

Developing a passion

After graduate school, Bleier interviewed at NDSU in 1975 and became the Department of Zoology's eighth faculty member when he accepted a position as assistant professor. He conducted bat research at NDSU for 15 years before switching to a focus on blackbirds.

The change happened partly by chance. Bleier's office was next door to doctoral student George Linz, who was studying how to alleviate the conflict between blackbirds and sunflower growers. Having experience capturing flying animals, Bleier offered to help with some of Linz's fieldwork. That kind gesture led to two

decades of working with his "blackbird students" as well as Linz, now a U.S. Department of Agriculture scientist.

Throughout his career Bleier has received numerous teaching awards and research grants. He has published dozens of articles and held various leadership positions including chair or head of the department for 17-and-half years.

He is most proud of helping others. "Regardless of what position I was in, I had an opportunity to help people do some things they hoped to do, whether that was teaching students and helping them along in their careers or advising students ... by in large, the most rewarding thing is working with people and trying to assist them with whatever I can help them accomplish."

Bleier started his zoology career working with bats in Central America. His international experiences were a critical part of his education. To honor his contributions to the Department of Biological Sciences, the department established a fund in his name for a new field study abroad course. Donations to the fund will provide NDSU biological sciences students with new international research and educational experiences in biology.

To donate, visit www.ndsualumni.com/NetCommunity/Will-Bleier-Honorarium.

Biological sciences

Will Bleier, professor, and Ted Esslinger, professor, retired and are now emeritus professors.

Two new faculty members, assistant professors Ned Dochtermann and Timothy Greives, joined the department. In addition, Ashley Anderson, account technician, and Karen Hansen, grant writer and coordinator, joined the department.

The department recognizes and honors the outstanding achievement of students from across the region. Nora Ulmer from Lake Park, Minn., received the 2013 Gary K. Clambey Scholarship; TJ Tran from Fargo, received the Ries and Startz Family Fellowship; Mari Goldade from Williston, N.D., received the A. O. Stevens Memorial Scholarship; Raymond Heinz from Cottage Grove, Minn., received the Dr. A. D. Stoesz Memorial Scholarship; Melissa Hull from Scandia, Minn., received the Warren C. Whitman Outstanding Botany Student Award; Alex Yellick from Lester Prairie, Minn., received the Harvey K. Nelson Scholarship; Mark Wiltermuth from Jamestown, N.D., received the Oliver LaVoy Memorial Scholarship; Kimberly Booth from Fargo, received the Shelia Kath Award; and Houda Abdelrahman from Fargo, received the G. Arthur Larson Scholarship.

Chemistry and biochemistry

Student enrollments have grown to unprecedented levels in the undergraduate and graduate degree programs. More than 120 chemistry and biochemistry majors and 66 graduate students were enrolled at the beginning of the 2012-13 academic year.

Svetlana Kilina, assistant professor, received a \$750,000 Career award from the U.S. Department of Energy to study quantum dots. Insights gained from this research will enable the progression of solar energy technology to help solve the world's energy challenges.

Stuart Haring, assistant professor, received a \$900,000 Career award from the National Science Foundation. His research will investigate cell cycle and repair mechanisms to provide fundamental understanding that will impact in medical research.

The department welcomed James Nyachwaya, assistant professor, to the faculty. He has a joint appointment with the School of Education and joins NDSU as the newest faculty member in the interdisciplinary STEM education graduate program. He is developing a research program aimed at clarifying student's conceptual understanding of chemistry.

Outreach and education continues to be a main mission of the Department of Chemistry and Biochemistry. A National Science Foundation-funded Research Experience for Undergraduates site grant began last summer bringing undergraduate students from around the country to do cutting-edge research at NDSU during the summer. The program, titled Research on the Prairies, offers students a 10-week research opportunity in chemistry and biochemistry.

The department also hosts a symposium dedicated to Excellence in Undergraduate Research. This symposium honors faculty from four-year undergraduate institutions who are doing outstanding research. Last spring the department welcomed seven faculty to present their research at NDSU.

In September, in cooperation with the college and several other departments, the department hosted a national symposium on Sustainable Materials and Light Driven Processes.

Coatings and polymeric materials

The department continues to maintain its high level of activity in teaching, research, publishing papers and traveling to national and international conferences to present research results and deliver keynote and plenary talks.

The department hosted a meeting of its industrial advisory board in fall 2012. Representatives from industry and other organizations attended the meeting to review programs of the department and provide feedback and input for future directions.

Gordon Bierwagen, professor, was presented with the Roy W. Tess Award in Coatings Science by the Division of Polymeric Materials: Science and Engineering of the American Chemical Society. He was presented with the award at the ACS

National meeting in Indianapolis in September where an award symposium and reception also was held in his honor.

Dean Webster, professor and chair, delivered the prestigious Mattiello Memorial Lecture at the CoatingsTech Conference, sponsored by the American Coatings Association, March 11-12, 2012, in Rosemont, Ill.

Also at the CoatingsTech conference, Niteen Jadhav, graduate student in Vicki Gelling's group, won first place awards for both his oral presentation and student poster presentation.

Andriy Voronov, assistant professor, is hosting a Fulbright scholar, Ihor Tarnavchyk, from the Organic Chemistry department of Lviv Polytechnic National University in Ukraine.

In the past year, graduate students Chavanin Siripirom, Hanzhen Bao, Ivan Hevus, Erik Sapper, Kiran Bhat Kashi, Erin Pavlacky and T.J. Nelson earned doctoral degrees and Drew Pavlacky earned a master's degree.

Computer science

Hyunsook Do, assistant professor, received a \$500,000 Faculty Early Career Development award from the National Science Foundation. She is the first member of the computer science department to receive a CAREER award.

Jun Kong, was awarded tenure and promoted to associate professor in the summer of 2012.

Rui 'April' Dai was hired as an assistant professor. Her research interests are wireless sensor networks, multimedia communications and smart sensor systems for rehabilitation engineering.

Geosciences

The oil boom is spurring interest in the geology program, with enrollment in introductory geology exceeding 550 students. The proportion of female majors has markedly increased, now up to 34 percent. Geomorphologist Stephanie Day, assistant professor of geology and geography, joined the department to expand offerings in the geospatial sciences.

With Bernhardt Saini-Eidukat, associate professor, completing his second term as chair, Donald Schwert, professor, has assumed the position on an interim basis.

Allan Ashworth, University Distinguished Professor of geology, maintains an active research in Quaternary insects, while phasing away from his teaching.

Ken Lepper, associate professor, continues to work on the chronology of shorelines of Lake Agassiz, plus as a collaborator in the Antarctic research of Adam Lewis, assistant professor.

Associate professor Peter Oduor's research focuses on biofilms and on resource assessments. Jessie Rock, lecturer, has reorganized the department's rock and fossil collections, plus extensively revised the introductory labs.

Mathematics

Sean Sather-Wagstaff, associate professor, was awarded a two-year grant "Homological Aspects of Module Theory" through the National Security Agency's Mathematical Science Program.

Josef Dorfmeister, assistant professor, was awarded a five-year collaboration grant from the Simons Foundation.

Dogan Comez, professor and chair, was awarded a North Dakota Experimental Program to Stimulate Competitive Research start-up grant, funds to continue GraSUS Project activities and funds for the third-year implementation of the North Dakota Problem Solving, Reasoning and Inquiry for Mathematics Educators project, known as ND-PRIME project.

Maria Alfonseca, assistant professor, received the College of Science and Mathematics teaching award.

Graduate student Erin Brownlee received the college's Student Teaching Award.

Two graduate students, Ben Anderson and Richard Hasenauer, were awarded doctoral degrees.

The department hired three new faculty on tenure-track positions. Abraham Ayebo, assistant professor, earned a bachelor's

degree from the Kwame Nkrumah University of Science and Technology, Ghana, in 1996. At the University of Nevada, Reno, he earned a master's degree in 2002 and a doctorate in 2010.

Indranil Sengupta joined the faculty as a tenure-track assistant professor. He earned a doctorate from Texas A&M University in 2010. He did his postdoctoral work at the University of Texas at El Paso from 2010-12.

Artem S. Novozhilov joined the faculty as a tenure-track assistant professor. He earned a doctorate from Moscow State University of Communication Means in 2002 and did his postdoctoral work at the National Institutes of Health, Bethesda, Maryland in 2004-09.

After long years of distinguished service at NDSU, Warren Shreve, professor, and Lonnie Hass, senior instructor, retired at the end of the 2012-13 academic year.

Physics

Alexander Wagner, associate professor, recently was appointed associate editor of the Physical Review E, an American Physical Society journal for research in statistical, nonlinear and soft-matter physics.

Recently funded grants include the National Science Foundation-Research Experience for Undergraduates grant, "REU Site: Interdisciplinary Research in Undergraduate STEM Education." Warren Christensen, assistant professor, is the principal investigator. A National Science Foundation-Division of Undergraduate Education grant for "Collaborative Research: Developing Metacognitive Activities and Assessments for Introductory and Upper-Division Physics" was awarded to principal investigator Mila Kryjevskaja, assistant professor.

Andrei Kryjevski, research assistant professor, received the Dell-Intel Award of the 53rd Sanibel Symposium.

Alan Denton, associate professor, received an NDSU Development Foundation Centennial Endowment Fund award for "Integrating Outreach into the Introductory Physics Curriculum." The award was used to incorporate outreach

activities, including science fun nights at local elementary and middle schools, into the physics recitation curriculum for physics majors.

Psychology

The department's newest faculty member, Leah Irish, was a postdoctoral fellow at the University of Pittsburgh Medical Center and joined the department in fall 2013.

Erin Conwell, assistant professor, won the Peter Jusczyk Award for Best Paper in the journal Language Learning and Development.

The Psychological Clinical Science doctoral program, now in its second year, is building relationships with research and training facilities including the Department of Veterans Affairs Hospital, Neuropsychiatric Research Institute and Sanford Health.

Centers of Biomedical Research Excellence/Center for Visual and Cognitive Neuroscience sponsored the 2012 IDEA States Mini-Conference on Visual and Cognitive Neuroscience in July. The conference drew attention to the excellent scientific work of Center for Visual and Cognitive Neuroscience faculty and students, and helped establish ties with prominent researchers in the IDEA states.

In April 2013, the NDSU Psych Club and Psi Chi hosted the 27th Annual Red River Psychology Conference, which promotes undergraduate research and attracts students and faculty from institutions in the Upper Midwest and Canada.

Statistics

The Department of Statistics welcomes two new faculty members – assistant professors Megan Orr and Yarong Yang. Orr earned a doctorate from Iowa State University and specializes in gene expression analysis and high dimensional data analysis. Yang earned a doctorate from Northern Illinois University and served as a post doc for two years at Stanford University before coming to NDSU. She specializes in machine learning, geostatistics and bioinformatics.

In fall 2012, the department received approval for a doctoral degree in statistics with emphasis in sports statistics.

Four graduate students held internships with an NDSU athletics team in fall 2012. Rhonda Magel, chair, and Sam Unruh, graduate student in statistics, appeared on Valley News Live to discuss significant factors to watch for during March Madness NCAA basketball games in March 2013. Magel and graduate students Joe Long, Joe Roith and Jennifer Johnson also appeared on Valley News Live in January to discuss significant factors to watch for in the Super Bowl.

Tatjana Miljkovic, lecturer, remains the department's actuarial adviser. In March 2013, she was invited to Carl Ben Eielson Middle School in Fargo to teach a lesson in probability to students.

Gang Shen, assistant professor, was invited to Worcester Polytechnic Institute in Worcester, Mass., in fall 2012 to present a talk on "The Change-Point Problem." Shen also facilitated a workshop on the Bayesian hierarchical Dirichlet process.

Ron Degges, assistant professor of practice, is supervising Introductory Statistics classes. He is on the Technology-Enhanced Science Education Group and periodically tests technology in these classes.

Seung Won Hyun, assistant professor, and his wife had a baby girl on Valentine's Day, Feb. 14, 2013. This was their first child. Hyun continues his work in biostatistics and has a new paper, which will soon appear in *Statistics in Biopharmaceutical Research*.

Dawn Halle, academic assistant, organized the department's efforts for the third annual Red River Valley Conference, which was held May 1 at NDSU. She collected the abstracts of the talks so they may appear online for reference.

HIGH SCHOOL STUDENTS SHOWCASE RESEARCH AT NDSU

Top students from Fargo high schools spent six weeks this summer conducting college-level research at NDSU. The Department of Chemistry and Biochemistry in coordination with the Department of Physics and Department of Coatings and Polymeric Materials hosted the students as part of the Parents Involvement with Children, Nurturing Intellectual Curiosity in Science program, also known as PICNICS.

The program aims to inform parents and their children about recent advancements in science and technology, and encourage students in grades nine through 12 to consider science as a career path.

Under the direction of NDSU faculty, six students from local high schools conducted a variety of research projects alongside graduate students and postdoctoral fellows. At the end of the program, the students presented a poster on the research in a poster session Aug. 2 hosted by the Department of Chemistry and Biochemistry.

Participants included Jesica Qian of West Fargo High School, Elizabeth Anderson of Fargo North High School, Gerrit Postema of Fargo South high school, and Ruiying Feng, Lucy Wang and Andrew Nawrot of Fargo Davies High School.

Each student was assigned to work on one independent project. The projects ranged from using light as a reagent to synthesize chemical compounds to using lasers and infrared spectroscopy to understand molecular interactions and developing low-cost detection of breast cancer using strip technology.

"Students learn how modern research techniques can be utilized for performing cutting-edge research and also can see how they impact our day-to-day life," said Sivaguru Jayaraman, associate professor of chemistry and biochemistry and director of PICNICS



Area high school students conducted undergraduate-level research at NDSU during a summer symposium.

program. "All have been top-notch students and essentially carried out research similar to undergraduate students who work in our labs. We also have a top-notch school system in our area that produces such high quality and exceptional high school students. It's a testament to our school teachers in our area."

Initiated in 2007 as part of Jayaraman's National Science Foundation Faculty Early Career Development program, PICNICS has developed into a summer internship program that typically hosts five or six high school students. NDSU faculty who hosted students in their research groups included chemistry and biochemistry faculty members Jayaraman, Mukund Sibi, John Hershberger, Guodong Liu; physics faculty member Alan Denton in collaboration with Daniel Kroll; and coating and polymeric materials faculty member Dean Webster.

GATE CITY BANK AUDITORIUM SERVES NEW GENERATION

Students within the College of Science and Mathematics, as well as the rest of the university, are enjoying the rewards of updated space on campus. A \$500,000 gift from Gate City Bank to the NDSU Development Foundation renovated the former Stevens Hall Auditorium and created an endowment for ongoing maintenance.

Improvements to the nearly 500-seat auditorium included new seats, lighting and carpet, easier access for people with disabilities and updated educational technology. The classroom debuted in fall 2012.

President Dean L. Bresciani said Gate City Bank stepped up once again for NDSU to improve one of the campus' largest and busiest auditoriums. "The breadth and results of Gate City Bank's gift are stunning and will impact students for a long time," he said.

A high school freshman when the auditorium was originally dedicated in 1968, Gate City Bank chair, president and CEO Steve Swiontek said he had several classes in the building upon entering NDSU in 1972. He said the partnership between the bank and NDSU supports the university's land-grant mission and status as



A \$500,000 gift from Gate City Bank funded renovations to the nearly 500-seat auditorium in Stevens Hall.

an economic engine of North Dakota. "This gift is another example of the importance Gate City Bank places on giving back to the communities we serve," Swiontek said.

DEAN'S MESSAGE



This is my first note to you as dean of the College of Science and Mathematics. Although I had five years of prior experience "deaning" at the University of Idaho before moving to NDSU, I had a fairly steep learning curve in terms of getting to know the college's faculty, staff, students, alumni and friends, as well as understanding policies, procedures and traditions that were new to me.

I started the learning process by asking each of our faculty and staff to provide a two-page curriculum vitae (I read more than 100) and then I visited each department in turn. I also met with numerous alumni, retired faculty and friends here in Fargo and in Seattle, Minneapolis and Phoenix.

Climbing the learning curve was made much easier due to efforts of my excellent staff, a group of great department chairs/heads and a group of convivial decanal colleagues.

So at the end of my first year, the verdict is in. I have landed in a college with talented, hard-working and dedicated faculty, staff and students who are unbelievably collegial in spite of significant challenges. And I marvel at the loyalty and accomplishments of our alumni and retired faculty.

This is a college of major importance to the mission and goals of the university. It is a college on a positive trajectory and with a very bright future. I am proud to have the opportunity to be at the helm.

Scott Wood

NDSU

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