New precision ag major offered
NDSU to offer new precision ag major and minor

The use of new and emerging technology is transforming the agriculture industry, and NDSU will soon offer a new program so students can stay at the front edge of the curve.

From drones and sensors collecting highly detailed information about crops and livestock to using Global Positioning System data to pinpoint herbicide or insecticide applications, precision agriculture is revolutionizing how producers go about their business. Computers and high-definition screens are commonplace on today’s farms and ranches.

Beginning in January 2019, NDSU will offer a new precision agriculture major and minor to educate the farmers, ranchers and ag technologists of tomorrow.

“Precision agriculture is the future of agriculture. Big data and artificial intelligence will play a major role in making farm management decisions,” explained Sreekala Bajwa, professor and chair of agricultural and biosystems engineering, who is spearheading the effort to establish the new major.

Because North Dakota is a major agricultural state, and the industry is a huge enterprise across Northern Plains, the new major is a natural fit for the College of Agriculture, Food Systems, and Natural Resources.

“The program will have a strong experiential learning component. We are working with Microsoft and other industries in the region to develop a curriculum with field experience in sensor installation, data collection, mapping, cloud computing and other high-tech areas,” Bajwa said.

“Technology is going to be critical to understanding what is happening in every part of the farm and ensuring that resources are managed with the highest efficiency,” Bajwa said. “If we are going to feed 9.5 billion people by 2050, farming needs to be efficient, sustainable and socially attractive. The newest and coolest technologies that are driving precision agriculture will play a big role in achieving all of this.”

According to Bajwa, the benefits of precision agriculture go far beyond the farm. Machinery companies, seed and fertilizer firms, agronomy businesses and agriculture insurance companies will be directly impacted. Also, technology companies involved with software; sensors and robotics; unmanned aerial system companies; and cloud computing and data science companies also will benefit.

One of those students is Aaron Dean, a freshman from Velva, North Dakota, who calls the program the right choice for many students. He plans to change his major to precision agriculture as soon as the program is offered.

“I firmly believe this new precision agriculture program will help not only me but all students with similar interests get a stronger grasp on the new and improved ways of the agricultural industry. It will give me a solid chance at a wide array of jobs upon graduating from college,” Dean said. “I live on a farm and ranch, and I see this degree not only helping me in my career but also helping our family operation keep up with all the new techniques and technologies of farming and ranching, if I choose to return to it after achieving my degree.”
Alumna keeps tabs on efficient Army spending

At her desk in the Pentagon, NDSU alumna Kate Oliver keeps a watchful eye on how the Army spends your taxes. And, in her spare time, she seeks out adventures across the globe.

The 2007 graduate, who majored in economics in the Department of Agribusiness and Applied Economics, is a senior operations research analyst for the Deputy Assistant Secretary of the Army for Cost and Economics’ Programs and Strategies Division.

“I'm on a team of people looking to make the Army’s use of taxpayer dollars more efficient,” explained Oliver, who is a civilian Army employee. “I also work on Lean Six Sigma initiatives to update and streamline policies and processes.”

Oliver began her career with the Army in 2010, as a civilian financial management analyst intern in Kaiserslautern, Germany. By 2012, she was a budget analyst for the 21st Theater Sustainment Command where she managed funding for high-profile projects like the 70th anniversary of the D-Day landing in Normandy, France.

She then earned graduate degrees from Syracuse University as part of the Defense Comptrollership Program, and she received the Lt. Col. Thomas Belkofer Award for being at the top of her class.

“Serving alongside the great men and women who defend our country is very fulfilling,” she said. “The most challenging part of my job involves meeting the needs and requirements of our service members while complying with frequent changes to processes and policies.”

Oliver credits her NDSU experience for laying a solid foundation for her career.

“I am grateful for the outstanding education I received at NDSU,” she said. “It was a privilege to study with many exceptional and dedicated professors who actively encouraged intellectual curiosity. Their commitment to my development as a student and as a person has paid enormous dividends in my career and completing graduate school.”

Away from her Army office, Oliver’s many diverse hobbies are quite a departure from budget sheets, policies, procedures and ledger analysis.

She is an avid SCUBA diver, exploring reefs and sea life at destinations around the world. She also has completed marathons in four countries, plays the cello in her church orchestra, teaches piano lessons and takes part in 5K mud runs.

“I love a challenge,” said Oliver, who grew up with nine siblings on a family farm near Pelican Rapids, Minnesota. “It’s very rewarding to set a goal and then achieve it through hard work, persistence and sacrifice.

“I enjoy discovering new things and experiencing life to its fullest. If I had to sum it up in a life philosophy it would be: When a door of opportunity opens, walk through it ... and if none open on their own, start knocking.”

Oliver lives in Arlington, Virginia.
Doctoral student researches deadly respiratory microorganisms

There are thousands of microorganisms in the air we breathe. Most are harmless, but some aren’t. Doctoral student Breanne Steffan is discovering how the respiratory system is affected by damaging microorganisms.

She is researching what happens when two common respiratory microorganisms interact. The microorganisms are a bacterium called Pseudomonas aeruginosa and a mold called Aspergillus fumigatus. Lungs can handle the bacteria or mold when encountered separately, but when breathed in together the microorganisms can be deadly.

“The microorganisms actually have to be interacting somehow to cause severe disease for an animal,” Steffan said. “We see hemorrhages in the lungs, so the animals are bleeding out. When they have both of these microorganisms they have a greater risk of severe disease and death. We see an increased disease progression within 24 hours so then the animals do die.”

When the Pseudomonas and Aspergillus are breathed in together there is a large immune response, which is much worse if the host is allergic to the mold.

“This finding has major implications for patients who have other underlying health issues, such as cystic fibrosis or persistent fungal asthma, but also for farmers and ranchers who routinely encounter and become allergic to environmental molds,” said Jane Schuh, Vice President for Research and Creative Activity and Steffan’s adviser.

Steffan is in the molecular pathogenesis doctoral program at NDSU. She completed her undergraduate degree in microbiology at NDSU, where she also began her research in immunology as an undergraduate.

Steffan’s research is new in this field. All the previous work that’s been done have been clinical studies identifying the Pseudomonas aeruginosa and Aspergillus fumigatus in different respiratory conditions together, but none have ever looked at an animal model to see what’s actually occurring.

A tuberculosis outbreak in her first-grade class sparked Steffan’s interest in the relationship between microorganisms and the respiratory system.

“That’s what got me interested in respiratory disease because I didn’t get TB but most of my class did,” Steffan said. “I wanted to understand why that was, so it got me interested the respiratory field and in understanding how microorganisms interact with our immune system.”

Steffan’s graduate research began when she looked at Aspergillus in relation to allergic asthma and how that particular microorganism causes the immune system to respond. Steffan consulted with Schuh about potential risks associated with having allergies, one of which is a bacterial infection. This led Steffan to ask what happens when these two microorganisms interact.
“My hope is we can figure out why you need to have those two microorganisms together to cause this inflammatory response and then whether or not that inflammatory response is helping or hurting the host,” Steffan said.

Going forward, Steffan aims to determine if the microorganisms are producing something that is causing the inflammatory response or if it is the immune cells themselves that are causing the damage.

“We want to continue with this research to find ways to come up with therapies in a hospital setting because people with cystic fibrosis have both of these microorganisms,” Steffan said. “When they have both of these microorganisms they have a greater risk of severe disease and death. We want to help find a way to stop the problem.”

Steffan’s research is funded through the North Dakota Agricultural Experiment Station, conducted in laboratories housed in the microbiological sciences department.

“The people who I’ve interacted with at the university and everyone in my department is super supportive of seeing students progress, seeing students find their own niche and students learning how to be a scientist,” Steffan said of her NDSU experience.

After earning her doctorate, Steffan would like to enter a clinical setting and is looking at different children’s and research hospitals to continue to research the respiratory tract. She also wants to teach at some point.

“I do like that aspect to be able to interact with people and engage them and really cultivate that enthusiasm for science,” Steffan said. “I hope to be an ambassador for science.”

Distinguished alumnus offers sage advice

The advice to students is straightforward and heartfelt – “Have fun, but take advantage of NDSU’s research opportunities and get involved in student organizations.”

That statement comes from Kelly Swanson, the 2017 distinguished alumnus for the NDSU College of Agriculture, Food Systems, and Natural Resources. Swanson, an internationally recognized nutrition researcher, is the Kraft Heinz Co. Endowed Professor in Human Nutrition at the University of Illinois at Urbana-Champaign.

“I met with Saddle and Sirloin club members, and I told them to certainly go to class, but get involved in other ways,” Swanson said during a Feb. 14-15 visit to the NDSU campus. “Be active in clubs, internships and work with your professors on the research side outside of class.”

That’s much the same advice he gives his own students, including his research group comprised of eight graduate students and post-docs, five or six undergraduate students and a visiting scholar. Lessons learned at NDSU have become part of his approach to teaching.

“I worked in the NDSU Beef Unit the last summer I was here, and I should have done more than that,” said Swanson, BS ’97, animal and range sciences. “I had an inquisitive mind and the professors at NDSU took the time to help students and apply the material. The faculty stimulated my interest, and they fostered that outside of class with their guidance. Now, I do what the NDSU faculty do; I try not to treat people as a number but listen and provide guidance based on the specific interests or questions students have.”

Swanson currently works closely with private industry, with such entities as ingredient suppliers and pet or human food companies. Much of his nutrition testing involves rodent models, dogs, cats and some human subjects.

“We examine how different diets impact the expression of genes, and we link that to health – things like obesity or blood cholesterol,” explained Swanson, who grew up on a farm near Thief River Falls, Minnesota, and earned his master’s degree and doctorate at the University of Illinois, Urbana-Champaign. “We’re trying to find the mechanisms that make that happen.”

During the past decade, his lab has earned about $12 million in research grants, and he has been invited to give more than 100 lectures worldwide. In addition, Swanson has published more than 150 peer-reviewed articles and received 12 research and teaching awards.

He credits his experience at NDSU for laying the groundwork for his personal success and outlook on life.

“The best things about my time at NDSU were the comments and advice the faculty gave me,” Swanson said. “I was in some clubs, but it really was the people in the department that I now try to model myself after.

Swanson lives in Monticello, Illinois, with his wife of 20 years, Lisa; daughters Olivia, Hannah and Alice; and Kaiser, the family dog.
Gentleman Farmer receives Alumni Achievement Award

Alumnus Gregg Halverson has been recognized with the 2018 Alumni Achievement Award by the NDSU Foundation and Alumni Association.

Halverson, BS ’71, animal science, honorary doctorate ’12, is president and board chair of the Grand Forks-based Black Gold Farms. The family-owned business produces potatoes and other crops on 12 company farms in 11 states.

“I feel very honored to be recognized by NDSU as their Alumni Achievement Award recipient. However, I am merely a representative of the many graduates of NDSU who have made a positive impact in their respective fields,” Halverson said. “I have always loved agriculture, and my time at NDSU served as a catalyst to give me many of the additional tools necessary for me to grow in my career. Furthermore, I am proud that all three of my children attended NDSU and to this day we all continue to celebrate the NDSU culture we know as ‘Bison Pride.’”

As an NDSU student, Halverson was a member of the Gold Star Marching Band and was active in Greek life and student government.

In 1982, he was named the North Dakota Outstanding Young Farmer, and other honors include the National Potato Growers Award for Environmental Stewardship, the 2010 NDSU Harvest Bowl Agribusiness Award and the World Potato Congress Industry Award.

Halverson was elected to the North Dakota Agriculture Hall of Fame in 2011.

Halverson’s children, John, Eric and Leah, are all active at Black Gold Farms. He and his wife, Dr. Yvonne Gomez Halverson, have eight granddaughters.

Student researches groundbreaking expandable material

NDSU graduate student Megan Ostrand is working on new ways to reclaim North Dakota mining sites. Her work focuses on the important issue of soil compaction. She is using a highly absorbent polymer to break up the compacted soil.

Ostrand is pursuing her master’s degree in soil science after earning her undergraduate degree in natural resources management at NDSU.

She is working with faculty adviser Tom DeSutter and co-adviser Aaron Daigh to conduct research on alleviating soil compaction on mined land reclamation sites.

“Compaction is a super big issue, probably the number one problem they face out west,” Ostrand said.

The researchers are working with the Falkirk Mine, located near Underwood, North Dakota. The mine produces an average of 7.5 million tons of coal annually and is currently experiencing issues regarding compaction, which degrades soil function and plant productivity.

In the past, it was believed problems associated with compaction would be alleviated through the natural freeze-and-thaw cycle. The thought was the soil would break up naturally when the water expands as it freezes and shrinks as it melts. But Ostrand noted that the layers of earth are now so compacted that the seasonal shrink and swell of water is no longer breaking it up.

“The main thing we are looking at is to see if we can put down a super absorbent polymer to alleviate compaction,” Ostrand said. “Essentially, what the polymer does is it takes on water and it grows 400 times its size. So that shrink-swell is amplifying the freeze-thaw cycle, and we are going to see if that breaks up compaction.”

DeSutter recruited Ostrand for the project, considering her an ideal candidate for the research.

“Megan is exceptionally bright, a dedicated student and an absolute joy to work with,” DeSutter said. “She will be doing field, laboratory and greenhouse studies looking at how a water-loving polymer can assist in increasing the ease at which plant roots penetrate the soil and also increase plant-available water during times of drought.”

“I think NDSU is definitely preparing me for where I want to go,” said Ostrand who is interested in environmental consulting. “I’m headed in the right direction.”
First recipient announced for Mode Professorship

The generosity of renowned genetic scientist and mathematician Charles Mode is leaving a lasting mark on his alma mater. The 1952 NDSU graduate established the Dr. Charles J. Mode Endowed Professorship of Genomics Research to help push the frontiers of crop research.

During a May 8 ceremony, Robert Brueggeman, NDSU associate professor and agricultural research scientist, was appointed the first recipient.

Brueggeman, who joined the Department of Plant Pathology in 2010, directs research that involves both undergraduate and graduate students. He is pursuing genetic resistance to a range of diseases that threaten the production of cereal crops. In 2013, Brueggeman received the National Science Foundation's most prestigious award in support of junior faculty.

“Dr. Mode's endowment will empower NDSU to help fill important knowledge gaps in agricultural research,” Brueggeman said. “His vision and support will have a lasting impact on genomics research at NDSU and beyond.”

NDSU President Dean L. Bresciani and Ken Grafton, vice president, dean and director for agricultural affairs, announced Brueggeman's appointment to a large crowd, including Mode, who gathered in the Loftsgard Hall atrium.

“Dr. Brueggeman is advancing promising, state-of-the-art research that has tremendous implications on the agriculture industry and the world food supply,” Bresciani said. “The Mode Professorship helps us solve complex problems, and greatly enhances our students’ educational experiences.”

Grafton said the endowed professorship will have a major impact on NDSU research programs. “The professorship will be a successful way for NDSU to retain its best and brightest, and to attract other highly qualified scientists,” he said.

Mode had a 41-year career teaching and conducting research at Montana State University, State University of New York and Drexel University's Department of Mathematics. “The work is so much more advanced and completely reinvented since I was at NDSU. I'm a real believer in research, and I like everything that is going on at NDSU,” he said.

Mode, who retired in 1998, lives outside Philadelphia and continues to pursue his research interests.
U.S. Agriculture Secretary Sonny Perdue met with NDSU students to discuss new opportunities in agriculture. His March 9 visit to NDSU’s Barry Hall included a lunch conversation with students pursuing degrees in agriculture and related fields.