



NDSU AGRICULTURAL AND BIOSYSTEMS ENGINEERING

2024 UPDATE

INSIDE:

- Message from the chair 2
- ABEN enhances courses 4
- Ag Tech Expo winners 6
- ABEN history 8
- Professional advising added 11
- PAG graduate makes history 13
- Scholarship winners 14
- And more



MESSAGE FROM THE CHAIR

■ **LEON SCHUMACHER, Ph.D., department chair**

I hope and trust you are well. The Agricultural and Biosystems Engineering (ABEN) Department team has once again proven to be great problem-solvers for ABEN, North Dakota State University and for all of agriculture.



Hard work by the team organized a new program for the College of Agriculture: the precision agriculture technology and management degree program. Within that program, we have organized two focus areas: agricultural technology management and precision agriculture. We continue with the agricultural and biosystems engineering

degree with various emphasis areas.

In 2023, we moved our offices into remodeled space in Ladd Hall, the building immediately north of the Agricultural Engineering Building, which is where we were previously located. Now, many of the renovations planned for the second and third floors have been completed. We have moved all the teaching aids and research equipment out of the Agricultural Engineering Building and into either the respective area in Ladd Hall or to the Pilot Plant/Service Center. The last move was completed by Sept. 15, 2023.

And, although some minor modifications are being contemplated for the Pilot Plant/Service Center, we have been focusing on an even larger project, which is new space for the ABEN Department in the NDSU Richard Offerdahl '65 Engineering Complex. In December, most of the plans will be finalized for the center.



The bioengineering/processing activities currently in the Pilot Plant will move to the Peltier Complex on the west side of 18th St. N. in June or July. The Peltier Complex will be the new home for NDSU's food science, meat science and cereal science programs, and biosystems and bioprocessing engineering, along with the North Dakota Trade Office, U.S. Department of Agriculture and the Northern Crop Institute.

The space currently housing the existing Pilot Plant will be repurposed as the Ag Engineering Lab. We are looking for a new name for this facility and would welcome your ideas. Research project

Faculty and staff

Faculty

Leon Schumacher
Igathinathane Cannayen
Clairmont Clementson
Sulaymon Eshkabilov
Xiaoya (Iris) Feng
J. Paulo Flores
Ademola Hammed
Kenneth Hellevang
Xinhua Jia
Zhulu Lin
Ewumbua Monono
Matthew Olhoft
Rob Proulx
Scott Pryor
Ahmed Harb Rabia
Dean Steele
Xin (Rex) Sun

Adjunct faculty

Thomas Bon
Brian Gregor

Postdoctoral research associates

Ibukunoluwa Ajayi-Banji
Sunil GC
Nitin Rai

Support staff

Ademola Ajayi-Banji
Julie Bietz
Jana Daeuber
Susan Finneseth
Tayler Johnston
Dongqing Lin
Niloy Sarker
Emily Schwengler
Ramita Shah
Sheldon Tuscherer

Faculty and staff announcements

Departures:

- **Dr. Thomas Scherer** – Retired.
- **Mohammed Ahmed** – Took position as digital agronomy and sustainability analyst at Black Gold Farms.

New faculty and staff:

- **Dr. Ahmed Harb Rabia** – As a research assistant professor, Dr. Rabia's primary responsibilities revolve around his extensive expertise in precision agriculture, soil science, GIS and remote sensing, and applications of unmanned aircraft systems/drones in agriculture, machine learning, deep learning and climate change.
- **Emily Schwengler** – Emily serves the NDSU Agricultural and Biosystems Engineering Department as an administrative assistant. ■



www.ndsu.edu/aben

Like and follow NDSU Agricultural and Biosystems Engineering on Facebook

North Dakota State University does not discriminate on the basis of age, color, disability, gender expression/identity, genetic information, marital status, national origin, public assistance status, gender, sexual orientation, status as a U.S. veteran, race or religion. Direct inquiries to the Vice President for Equity, Diversity and Global Outreach, 205 Old Main, 701-231-7708.

construction, senior design, capstone activities and precision agriculture will be organized in this area.

Student recruitment and retention have gone well. Although student numbers had slipped during the COVID-19 pandemic, we feel this is on a rebound. We have organized ways to attract students for our two degree programs.

Recruiting activities were held at the State FFA Convention in Fargo, the Career Technical Expo in Bismarck, the Minot Area Career Expo and the Health, Tech & Trades Career Expo at the Fargodome. Information about ag technology, precision agriculture and ag engineering was shared with high school teachers, students and clients who were assisting with the recruiting event.

We were able to hire an Extension faculty to focus on precision agriculture. Rob Proulx immediately began representing agricultural engineering NDSU Extension at events in North Dakota and Minnesota. Rob previously was teaching precision agriculture at the University of Minnesota-Crookston.

Dr. Ahmed Rabia has joined the faculty with a focus in precision agriculture. He will be launching and conducting research for the USDA Agricultural Research Service project at NDSU. Rex Sun and Paulo Flores now have another team member to help with this project!

Tom Scherer, a longstanding water engineer, retired in May 2023. We will all miss Tom. He was always able to share so many ideas to facilitate irrigation, drainage, water quality and more. We were immediately directed to begin searching for a water engineering person to lead these efforts once again at NDSU.

As some of you learned, Emily Schwengler joined the ABEN team as one of our administrative assistants. She is managing so many duties, including the keys, card swipe and moving logistics as well as camaraderie.

The NSF Engines Program resulted in much collaboration between the Fargo Area Chamber of Commerce, the Grand Farm team, North Dakota's tribal nations and NDSU. The goal for this effort was to foster the adoption of ag technology. More specifically, to provide training for the workforce, so this technology could easily be adopted and used by farmers, maintained by the respective dealerships/vendors and bring new business to the region.

This part of the United States has become a thriving mecca for agricultural technology, as John Deere, AGCO, CNH, Amity, Horsch, Vaderstadt, Doosan Bobcat and others have established thriving agricultural technology centers.

Precision livestock farming is another effort, as ABEN has teamed with the Department of Animal Sciences to share the value of digital technology to the livestock/animal industry across North Dakota. Guillermo Scaglia (chair of Animal Science) and I shared this message with the State Board of Agricultural Research and Education.

Basically, more than 30 years of research has developed systems such as auto-steer and more, yet a collective effort for the animal industry has seen limited research. We noted several states have yet

to focus on this effort, including Montana, South Dakota, Minnesota, Idaho, Louisiana and more across the region. Pennsylvania, California, South Carolina, Michigan, Indiana, Nebraska, Iowa and Ohio are beginning to establish a focus team for precision livestock farming, and we believe NDSU should be one of the first in the Upper Midwest to focus on precision livestock farming.

We are focusing on yet another effort, the 100-year celebration of ABEN at NDSU, from 1924 to 2024. We currently are planning events to reflect on the work NDSU agricultural engineers have accomplished over the last 100 years.

Historical beginnings, images, accomplishments and fellowship will be planned. We have organized some ideas around the May 2 spring picnic that typically is held at the Service Center/Pilot Plant, and a tailgate at the Sept. 7 football game. We plan to organize tours of the newly remodeled Ladd Hall and share the plans for the new space that will be organized for the Richard Offerdahl '65 Engineering Complex at NDSU.

Digital agriculture is changing the face of agriculture across the state and nation, so Xin (Rex) Sun, Paulo Flores and I are organizing a workshop to provide an update for high school teachers. Matt Olhofs will be on hand to help the high school teachers organize lesson plans to minimize the time needed for teachers to prepare precision agriculture lesson plans for their students. Please contact Julie Bietz at 701-231-7273 with questions you might have about this workshop.

This has been a productive year for the ABEN Department at NDSU. Much teaching and research has been accomplished. New hires were introduced and yet another is anticipated. A total of six recruiting events were staged during 2023. All this took place while relocating into newly remodeled facilities in Ladd Hall and planning for new space.

Feel free to reach out with any questions you might have, as the ABEN team has once again proven to be a great set of problem-solvers for ABEN, NDSU and all of agriculture! ■



NDSU AGRICULTURAL AND BIOSYSTEMS ENGINEERING

Alumni!

Help us share information about our great department!

Alumni who receive the Department of Agricultural and Biosystems Engineering's newsletter are asked to share it with any high school students you might know.

ABEN

The graphic features a vertical green bar on the left with the word 'ABEN' in white, bold, sans-serif font. The background is a photograph of a man in a green polo shirt and blue jeans standing in a field of yellow corn, looking out over the landscape. A drone is flying in the sky above him. In the top left corner, there is a small inset photo of a building with a large elephant sculpture in front of it.

A commitment to STUDENTS

ABEN evolves to enhance student experiences

With restructured degree options and new technology enhancing hands-on learning opportunities, the North Dakota State University (NDSU) Agricultural and Biosystems Engineering Department (ABEN) is keeping pace with the dynamic changes occurring in agriculture and engineering.

ABEN is enhancing course content by now offering two restructured degree options:

- A Bachelor of Science in precision agriculture technology and management
- A Bachelor of Science degree in agricultural and biosystems engineering

Within the precision agriculture technology and management degree, students can select an emphasis in ag technology management or precision agriculture. With the agricultural and biosystems engineering degree, students can select an emphasis in machinery engineering, natural resources, processing engineering or general agricultural engineering.

The precision agriculture technology and management degree is a new degree in the department, providing students with both technical and business management skills needed by today's modern agriculture, food and natural resource industries. It combines the former degree offerings in agricultural systems management and precision agriculture.

The department emphasizes the precision agriculture degree is still very much in place.

"One of the things that comes with the new restructuring is being able to retain the training that's really needed to manage precision agriculture technology," says ABEN Department Chair Leon Schumacher. "We're providing people in precision agriculture with a stronger foundation."

Courses from the former agricultural systems management degree that are integral to precision agriculture will still be available. A strong team in precision agriculture will continue to instruct the courses and the future workforce needed to fully utilize precision agriculture.

"We're going to see more people needing a background that combines the digital aspect with the hardware aspect," Schumacher says.

"We're going to be in the position to give them the background they need to manage a farm or step into an agribusiness facility and

provide the assistance needed by the clientele," he says.

Two-year-bound college students are encouraged to consider a transfer to NDSU to obtain a four-year degree to obtain more information management skills related to precision agriculture.

The ABEN Department has also acquired a \$250,000 grant from the CHS Foundation that is being used to purchase much-needed teaching aids for the ABEN programs and to assist with student recruitment by informing students of career opportunities for graduates.

Specifically, the grant will enhance educational opportunities for the next generation of precision agriculture, ag technology and agricultural and biosystems engineer practitioners.

The CHS Foundation grant will allow the program to deliver more and better hands-on activities for students in all majors.

"As we move forward, we need to be sharing the kind of technology the farmer is using today. This grant allows us to do that," Schumacher says.



A Gator will be used as a teaching tool for students to learn about field technology.

Using those grant funds, the ABEN Department has acquired a new John Deere Gator from RDO Equipment, an area John Deere dealership. This isn't a standard Gator, however. It is equipped with all the latest field technology included in the newest John Deere

tractors, sprayers and combines and will be used as a teaching laboratory for students.

“The Gator comes in a much smaller package that can easily be used on campus,” says Matthew Olhoft, a senior lecturer in the ABEN Department. The self-driving Gator can be used in parking lots to simulate fields. Students in every class that deals with the technology will be using the Gator to put what they learn into practice.

The Gator is equipped with auto-steer capabilities and a 4630 display, and hardware will be mounted to it to make it a functional variable rate sprayer.

“We are very appreciative of the great support in teaching our students the latest in ag technology,” Olhoft says.

ABEN also purchased robot technology that allows it to provide an innovative way to help students learn how automation, artificial intelligence and engineering can contribute to the field of precision agriculture. The “Introduction to the Precision Agriculture” lab class will demonstrate equipment, such as robots, drones and other automation technologies, showing students how they can be applied in agricultural operations.

“The students will also have the opportunity to gain hands-on experience by assembling certain parts of the robots to achieve different application goals,” says Associate Professor Dr. Xin (Rex) Sun.

The department also acquired a planter with grant funds. The main frame of the planter is made by Harvest International, but the planter itself is a custom-built six-row planter with many precision planting components. The planter is equipped with a 20/20 Gen 3

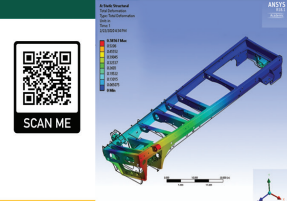
display, which is mounted in the tractor’s cab, Delta Force vSet2 seed meters with kits for both soybean and corn (with additional sets for dry edible beans, canola and sugar beet), a SpeedTube to support high-speed planting and Reveal row cleaners, describes Assistant Professor Dr. Paulo Flores.

Learning opportunities could include:

- working on the software, creating prescription maps for the planter or the Gator.
- students at the tractor receiving and implementing the prescriptions for a given field.
- after the planting or water application (as a replacement for chemicals) tasks are over, students can sync the data to the department’s John Deere Operations Center or Climate FieldView accounts to display the data and perform basic analysis.
- students will have the opportunity to set up the equipment in both John Deere Operations Center and FieldView accounts to collect and transfer data.
- students can change settings on both the planter and the sprayer to see the impact on the intended outcome.
- students can check the impact of planting speeds on singulation and seed spacing by planting corn at 4 and 10 miles an hour, for example, and digging seeds out and taking measurements.
- students can change the planter’s meter plates disk and see the impact of the same speeds on crops such as soybean or dry beans.
- students can check the impact of different downforce settings on seed depth placement. ■

ABEN


Where your future starts



Agricultural and Biosystems Engineering

Learn problem solving and the design of machines and structures with a combination of engineering, and biological and physical sciences. Also learn how to produce, handle and process biological materials for food, feed, fiber and the management of natural resources and the environment


EMPLOYMENT RATE* 100%
MEDIAN STARTING SALARY*
\$61,620 + \$7,000 bonus



Precision Agriculture Technology and Management

Ag Technology Management
Combine agriculture, biological and physical sciences with economics, managerial and technical skills. Develop your schedule based on your interests, whether it’s precision agriculture, machinery systems, soil, crop and animal science, or agribusiness. Minor available.

EMPLOYMENT RATE* 100%
MEDIAN STARTING SALARY*
\$42,880



Precision Ag

Receive a focused, in-depth education in sciences, technologies and practices. This includes unmanned aerial systems (drones), sensors, robotics, variable rate application, cloud computing and big data management. Minor available.

EMPLOYMENT RATE* 100%
MEDIAN ANNUAL EARNINGS*
\$51,000

* From the 2022 NDSU Career Outcomes Report

Mauch wins Agricultural Technology Expo

Hosted by the North Dakota State University (NDSU) Agricultural and Biosystems Engineering Department, the 76th annual Agricultural Technology Exposition named Isaac Mauch as the grand champion this year.

The freshman presented his project, “Beneath the Soil Surface,” during the Feb. 10 event.

Mauch is pursuing a double major in precision agriculture and biotechnology at NDSU. He is a graduate of Lincoln High School in Thief River Falls, Minn., who decided to attend NDSU because of its program offerings.

“I toured NDSU and I fell in love with the program,” he says.

During the Agricultural Technology Exposition, students present on a topic related to technology within the agricultural industry.

As ABEN celebrates its 100th anniversary in 2024, Mauch wanted to explore technological advancements in soil nutrient testing over the past 100 years.

“I’ve done some work in the past with some soil labs, sending my soil samples into the lab to get tested, using your basic soil probes,” he says. “So, I asked the question, ‘What technology is used in those soil labs?’”

Soil labs use UV spectroscopy to detect molecule structures, so Mauch obtained a UV spectroscopy soil probe from Assistant Professor Dr. Paulo Flores to explore the technology further. The probe performs UV spectroscopy onsite for real-time soil data without the need for a lab.

Then, Mauch explored how to improve upon that technology, using a micro soil probe permanently placed in the soil for five to 10 years, depending on the lifespan of the battery, basically inventing a new concept for soil nutrient testing.

“Using drone data in conjunction with soil probes through AI software would provide accurate diagnosis and treatment plans to truly further precision agriculture management,” Mauch’s project display board states.

Through his project, Mauch also learned how to market a product.

“I learned a lot, but mostly about the feasibility of starting a company. If this is a startup company, what were the steps I’d have to take? How cheap is this going to be? That’s what farmers want to know. You have to know the technology in and out. I learned a lot about UV spectroscopy in the short amount of time. But I also learned how you get this prototype to fruition,” he says.

“I’ve taken part in science fairs in the past. So, this class was just perfect. I loved continuing my experience from the science fair. The whole class is very well built. It’s geared toward senior level, but I think it was perfect for freshmen, because it gets me thinking this is a job I could do in the future. It very much gets you thinking about your future and the future of ag, too,” he says.


Mauch appreciated being able to visit with the public during the



Isaac Mauch receives his award as grand champion of the Agricultural Technology Exposition from Assistant Professor Dr. Sulaymon Eshkabilov.


History of Soil Probes

- Franklin Hiram King (1904) – saw correlation between a concentrated nutrient solution and yield.
- Universities Extension Services
- Soils lab on the Northern Pacific train route



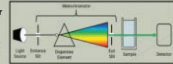
- Soil sample probes haven't changed much in 100 years
- Similarly nutrient recommendations haven't changed either
- Soil labs were limited and only for the fortunate


Beneath the Soil Surface



UV Spectroscopy

- Molecules absorption of electromagnetic energy
- Illumination of molecule structure
- Equation for molar absorptivity:
 $\epsilon = A / (c \cdot l)$





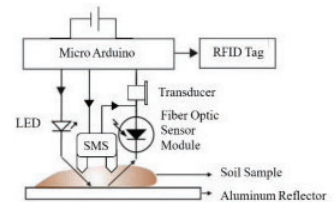
AI/Drone Integration

- Drones can only visually measure health in crops
- Soil probes measure specific health issues in the soil
- Using drone data in conjunction with soil probes through AI software would provide accurate diagnosis and treatment plans to truly further precision agriculture management

Isaac Mauch’s championship project, “Beneath the Soil Surface,” explored technology used for soil nutrient analysis.

Micro Soil Probes

- Biodegradable probes that last years
- Provides both nutrient and moisture data



expo, he says.

“Farmers would come in from the area and they were so interested in what us kids were doing. That really gave me hope, too, that people are interested in us and what we’re exploring and they want to learn more about it. And that’s kind of fun,” he says.

The Agricultural Technology Expo began in 1948 and was led by the student branch of the American Society of Agricultural and Biological Engineers and the Agricultural Systems Management Club. Today, this effort has evolved into a one-credit class at NDSU.

The class provides an understanding of how to show and explain the latest innovations in agricultural technology. Students practice communication skills and learn task management, as they prepare displays for public viewing and interaction. This is the largest student-led activity in the ABEN Department.

More than \$1,500 in scholarships are typically awarded during the event, with the funds obtained by the students from local industrial supporters. Scholarships are awarded to the grand champion project, division winners and best freshman project. ■

2024 Agricultural Technology Exposition champions

Grand Champion:

Isaac Mauch

Project: “Beneath the Soil Surface”

Award sponsor: Reichmann Land and Cattle

Reserve Champion:

Nathan Schultz

Project: “Do it All with NexAt”

Award sponsor: Red River ASABE

Freshman Champion:

Katelyn Kramer

Project: “Steiger 715 Quadtrac”

Award sponsor: NDSU Agricultural and Biosystems Engineering Department

Senior Design Champion:

Dan Leidner and Wyatt Thorson

Project: “Vaderstad Test Fixture”

Award sponsor: Dr. Thomas Bon

Machinery Division:

Nathan Schultz

Project: “Do it All with NexAt”

Award sponsor: NDSU College of Engineering

Precision Agriculture Division:

Isaac Mauch

Project: “Beneath the Soil Surface”

Award sponsor: NDSU Agricultural and Biosystems Engineering Department

Soil, Water and Environment Division:

Sophia Schomer and Andrew Caughey

Project: “Genetically Modified Crops for Pest Resistance”

Award sponsor: Dr. Thomas Bon

Structures, Electrical Power and Processing Division:

Lance Kjellberg and Aiden Pfeiffer

Project: “Livestock Confinement Barns”

Award sponsor: NDSU Agricultural and Biosystems Engineering Department

Power Division:

Katelyn Kramer

Project: “Steiger 715 Quadtrac”

Award sponsor: The Research and Technology Park

ABEN

100 years of ABEN



The Agricultural and Biosystems Engineering Department (named Agricultural Engineering until the fall of 1996) has a long history at NDSU. Records indicate E.S. Keene was appointed as an agricultural engineer with the Agricultural Experiment Station in 1892, two years after the North Dakota Agricultural College was established.

R.C. Miller organized the Agricultural Engineering Department as a degree-granting department in 1924-25. H.F. McColly served as department chair from 1926 to 1939. The first Bachelor of Science degree in agricultural engineering was granted in 1931. The first master's degree was awarded in 1933.

Faculty in this era focused their efforts on the mechanization of crop production. Rural electric cooperatives were being organized and department faculty provided early leadership in their development.

W. J. Promersberger was named chair in 1941 and served in this position for 36 years until his retirement in 1977. Department facilities and staffing were greatly improved and expanded in this time period, resulting in construction of the Agricultural Engineering Building in 1952 (with expansion in 1960).

Faculty in this period developed strong teaching programs in the four traditional subdivisions of the agricultural engineering discipline - power and machinery, soil and water, structures and environment, and rural electrification.

Dr. George L. Pratt served as chair from 1977 to 1989. In 1980, an interdisciplinary Ph.D. program was established as a component of the College of Engineering and Architecture.

Research emphases were expanded in irrigation engineering, livestock waste management, and crop storage/post harvest technology. Some of the first studies in the United States were conducted on vegetable oils as diesel fuel extenders for use in agricultural tractors.

In 1989, the department hired its first food engineering faculty to begin collaborative/interdisciplinary studies in development of value-adding processes for traditional and nontraditional North Dakota agricultural commodities.

Dr. Earl C. Stegman was selected chair of the department in 1991. The department's academic programs were converted to a semester system in 1992. The name of the department's Agricultural Mechanization program was changed in 1993 to Agricultural Systems Management (ASM) to reflect the curricular objective of preparing graduates for careers focusing on application and management of

engineering or physical systems technology (with specialization/minor in an agricultural science and/or agribusiness/business administration) in the wide field of agriculture. The master's degree program in ASM was discontinued in 1997. In 2000, a partnership with John Deere Co. was begun to add a dealership management specialization option in the ASM curriculum.

In 1994, administrative restructuring in agriculture at NDSU resulted in the integration of the Agricultural Engineering Extension program into the department. This change made Agricultural Engineering Extension faculty administratively responsible to the department chair rather than to a section head.

The name of the department and its agricultural engineering program was changed to Agricultural and Biosystems Engineering (ABEN) in 1996. In 2007, the department went from one curriculum of agricultural and biosystems engineering to two curriculum concentrations of agricultural engineering and biosystems engineering. The ABEN program was reviewed by ABET with resulting re-accreditation to Next General Review (2018).

The department's request (in association with the College of Engineering to offer a Ph.D. program in agricultural and biosystems engineering) was approved in June 2002. Ph.D. programs at NDSU were also approved at this time for all other engineering departments/programs.

Leslie F. Backer was named interim department chair in 2003. He was appointed permanent department chair in 2004, and served until his retirement in 2010. The department relied on two interim chairs, Dr. James Venette (2010) and Dr. Francis Casey (2011-12). In 2012, Dr. Sreekala Bajwa was hired as the new department chair.

In 2006, the department hired its first female faculty member, Dr. Xinhua Jia. Dr. Jia has a split appointment which includes teaching and research. She brings expertise in the areas of evapotranspiration, irrigation and drainage, hydrology, and water quality.

In February 2012, Dr. Sreekala Bajwa was hired as the first female department chair.

Dr. Kenneth Hellevang served as interim chair from 2019 to 2022, when Dr. Leon Schumacher began serving as department chair.

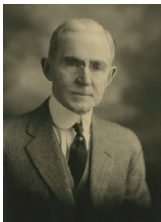
Last year, the department moved into Ladd Hall and reconstructed its degree programs. ■

ABEN TIMELINE

Historical records indicate E.S. Keene was appointed agricultural engineer with the Agricultural Experiment Station in 1892, two years after the North Dakota Agricultural College (NDAC) was established.

R.C. Miller organized the Agricultural Engineering Department as a degree-granting department at NDAC in 1924-25. The first Bachelor of Science degree in agricultural engineering was granted in 1931. The first master's degree in agricultural engineering was awarded in 1933.

A program in agricultural mechanization with a degree offered in the College of Agriculture was established in 1951.



E. S. Keene

1890 – North Dakota Agricultural College (now North Dakota State University) was established after North Dakota became a state.

1892 – E.S. Keene was appointed as first agricultural engineer for the Experiment Station.

1895-97 – H.M. Ash served in the School of Engineering as assistant in farm mechanics.

1899 – F.W. Warren was named instructor of steam engineering and mathematics. Phillip S. Rose also started in a similar position. Rose continued in this position for 10 years.

1903-04 – C.J. Zintheo was an early instructor in rural engineering in the College of Agriculture.

1906 – Robert M. Dolve began as an instructor in agricultural engineering, becoming professor in 1910. He served as an assistant professor and professor in mechanical engineering from 1912 to 1926, when he became acting Dean of the School of Mechanic Arts and Dean in 1929. Dolve Hall was named in his honor in 1954.

1907 – Robert Dolve and Phillip Rose attended the organizing meeting of the American Society of Agricultural Engineers in Wisconsin.

1912 – R.M. Dolve published Agricultural Experiment Station bulletins on potato warehouse and dairy barn planning.

1924-25 – R.C. Miller organized the Agricultural Engineering Department as a degree-granting department.

1926-39 – H.F. McColly served as department chair.

1928 – The first full-time Extension agricultural engineer, R.W. Oberlin, was hired in 1928 after working part time since 1924.



1929 – C.L Hamilton replaced Oberlin in 1929. In 1929, the primary focus areas were farm power and machinery, farm buildings and home conveniences.

1931 – First Bachelor of Science agricultural engineering degree was granted to Clarence Kelley.

1933 – First master's of agricultural engineering degree was granted.

1937 – Farm Folk School short course program was established.

1939 – "Professional" five-year ag engineering curriculum was established in the College of Engineering. This program was in addition to the four-year major in ag engineering in the College of Agriculture.

1940-41 – L.E. Holman served as acting department chair.

1941 – Arthur Schulz was appointed as an Extension agricultural engineer in 1941. Schulz contributed greatly to rural electrification. He was one of the organizers of the North Dakota Power Use Council. He had a Bachelor of Science and master's degrees in agricultural engineering from NDSU. He served as the Extension director May 1962 to 1972.



1941-77 – W.J. Promersberger served as department chair.

1948 – To clarify the differences between the two curriculums, the major in the College of Ag was renamed as mechanized agriculture.

1951 – Bachelor of Science and master's degree program was established in mechanized agriculture.

1952 – Construction began on the Agricultural Engineering building.

1960 – Agricultural Engineering building was expanded.





1976 – Mechanized agriculture program was renamed agricultural mechanization.
1980s-90s – Grain storage and drying has been a priority in North Dakota. During the 1980s and 1990s, Ken Hellevang developed guidelines for natural air-drying small grains and provided extensive education. As corn and soybeans became widely grown, his educational program focused on drying and storage in the North Dakota climate.



1977-89 – George L. Pratt served as department chair.
1989 – First food engineering faculty hired to begin collaborative/interdisciplinary studies in development of value-added processes.

1990 – Pilot Plant (Bioprocessing Lab) was constructed for research on food products from northern grown crops.

1991-2003 – Earl C. Stegman served as department chair.

1992 – Academic program was converted from quarters to the semester system.

1993 – Agricultural mechanization program name was changed to agricultural systems management.

1994 – Administration was restructured at NDSU, resulting in the integration of the Agricultural Engineering Extension program into the department.

1996 – Department/program name was changed to Agricultural and Biosystems Engineering.

1997 – Master’s degree program in ASM was discontinued.

2000 – Dealership management specialization was added to the ASM curriculum.

2002 – Ph.D. ABEN program was established.

2003 – Leslie F. Backer appointed interim chair. He served as department chair from 2004 to 2010.

2006 – First female faculty hired.

2007 – Two concentrations were established in the ABEN program, including agricultural engineering and biosystems engineering.

2008 – NDSU agreement with Ansal Institute of Technology results in 10 undergrad students from India joining the department

2009 – First faculty hired remotely (Bismarck) was Igathinathane Cannayen.

2010 – James Venette appointed interim chair.

2011 – Francis Casey appointed interim chair.

2012-18 – Sreekala Bajwa hired as department chair.

2014 – Precision ag major began.

2019-22 – Kenneth Hellevang appointed interim chair.

2022-present – Leon Schumacher serving as department chair.

2023 – Moved to Ladd Hall.

2023 – Degree programs reconstructed to include Bachelor of Science in precision agriculture technology and management and a Bachelor of Science degree in agricultural and biosystems engineering.

2024 – ABEN bioprocessing team will move into the Peltier Complex.

2026 – ABEN will be moving into the Richard Offerdahl ‘65 Engineering Complex.



First PAG graduate



Leon Schumacher



Ag Tech Expo participants 2023



Joel Hanson is advising those pursuing a Bachelor of Science degree in agricultural and biosystems engineering within the Agricultural and Biosystems Engineering Department (ABEN).

Professional advising helps students succeed

Whether it's scheduling a class, navigating a web of resources or steering through aspects of the college experience, a new advising program at North Dakota State University (NDSU) is a one-stop resource for students.

Launched this year under the NDSU Transform initiative, professional advising is now available to all freshmen and sophomore students as well as first-semester transfer students to help them navigate all the challenges of college.

Following admission to NDSU, each student is assigned an advisor from the college or department in which the student is majoring, along with a professional advisor for their first two years at NDSU. After two years, they then transition to only a faculty advisor.

Transfer students are assigned to a professional advisor for at least one semester and then transition to a faculty advisor in their department.

The new advising program adds to the traditional student advising by faculty by adding professional advisors at the Career and Advising Center.

The newly configured academic advising program at NDSU is designed to assist students in using university resources and to guide students in making informed choices regarding academic and career plans.

"I've been on campus for 25 years and this is very exciting,"

Joel Hanson says. "This advising model is really going to help all students utilize all the different resources across the board." Hanson is the lead advisor for the College of Agriculture, Food Systems and Natural Resources and the College of Engineering and is advising those pursuing a Bachelor of Science degree in agricultural and biosystems engineering within the Agricultural and Biosystems Engineering Department (ABEN).

Through the professional advising program, NDSU is offering another layer of support, helping students navigate college life, find resources and talk to the right person.

"I see ourselves like Spider Man, flinging those webs all around to pull in that support for the students," says Rob Glarum. "When freshmen come to the university, usually there's a lot going on. There's a lot of moving pieces, like figuring out financial aid or housing. Whatever those resources may look like, it's hard to navigate that. As professional advisers, we reach out and connect all of those resources. ... That's why we always encourage students to reach out to us. We're here as that extra layer of support to help them through their educational career." Glarum is an advisor for the College of Agriculture, Food Systems and Natural Resources and is advising those pursuing a Bachelor of Science in precision agriculture technology and management in the ABEN Department.

continued on next page

ADVISING: *continued from previous page*

Students have both a professional advisor and a faculty advisor, with the two working together on the student’s behalf.

“Along with the professional advising, our faculty members are a valued aspect in guiding students throughout their college career. Our faculty serve as mentors, and students treasure this aspect of the advising program as well,” says ABEN Department Chair Leon Schumacher.

“Faculty are great advisors and students will still have a faculty advisor assigned to them, while the professional adviser will work with students to help navigate learning about all the different resources on campus and helping students access everything they need, so they’re successful in their first year,” Hanson says.

The first step is working with students to review their transfer credits and help set the path to their end goal, as well as introduce them to department faculty, Hanson says.

“Advising has traditionally been we’re going to help you pick classes, then you go register,” Hanson says. “This new advising model is designed for that relationship to be on a continuum. We want students coming in year-round, whether it’s a discussion about internships, whether it’s class options for the summer. What if I study abroad? What if I do an internship? Those conversations really should be had year-round in combination with the faculty that might have a connection to industry.”

The initiative is more of a holistic advising model, Glarum says.

“It goes deeper than just class registration. So, we work with students with a wide variety of concerns they may have. ... Holistic advising is breaking down that barrier that’s preventing that student from reaching their goals, being that voice for them and helping walk them through situations that might be challenging for them,” Glarum says.

Also under the new advising system, class progress is more close-



Julie Bietz

ly monitored.

“So throughout the semester, if we’re seeing patterns of a student isn’t going to class, isn’t turning in homework, it’s our job to monitor and catch those sorts of things and reach out to the student to try and get them to come in and individualize a plan that’s going to help them be successful,” Hanson says.

Bison Advise is a new system for advisors, faculty and students to monitor progress, so students who are struggling can be identified sooner.

“The system is going to allow us to touch points throughout the semester on many different fronts, rather than just looking at a grade, because a grade isn’t always the single indicator of success,” Hanson says.

Bison Advise also allows students to schedule an appointment with their advisor.

Hanson encourages students to embrace the new concept to start developing a valuable network of advisors and faculty to also help with future letters of recommendation for a scholarship, internship or job application.

“We’re their go-to person and if we can’t help them with that answer, then we connect them with those resources and make sure they are taken care of and being helped,” Glarum says.

And students are adjusting to the concept, he says.

“I do see an uptick in a lot of students that feel more confident. They feel more at ease as they know they’re not alone in this,” Glarum says.

The ABEN Department has other support for students as well. Student Coordinator Julie Bietz assists students in a non-official advising role, making sure they are on track for graduation or reviewing course options with them. ■





Melanie Hansen-Wright is the first female graduate from the precision agriculture program at North Dakota State University's Department of Agricultural and Biosystems Engineering.

PAG graduate makes history

As the first female graduate from the precision agriculture program at North Dakota State University's Department of Agricultural and Biosystems Engineering, Melanie Hansen-Wright has some advice for other young women pursuing a career in precision agriculture.

"I'd tell them to chase their dreams, no matter what. Don't listen to those saying you can't do it. They aren't living your life. Just focus on you, set your bar high and pave your own path," she said.

Hansen-Wright, a native of Longmont, Colo., tried other programs before deciding that obtaining a bachelor of science degree in precision agriculture was the path she wanted to pave.

As one of only a few universities in the United States offering a precision agriculture bachelor of science degree, NDSU was her choice after she obtained two-year degrees and certificates elsewhere.

She obtained an associate of science degree in agribusiness and an associate of applied science degree in production agriculture, along with certificates in precision ag, precision ag technology, ag business management, production agriculture-crops and production agriculture-mechanics. She gained minors in ag business and ag systems management as well.

"To be the first to graduate at NDSU with a bachelor's in precision ag as a female is pretty remarkable, because right now there are only four women between both the precision ag and ag systems managements majors enrolled," she said last spring. "Being a woman in precision ag is pretty unique, since it still is a male-dominated industry."

"Part of the reason I came here for a four-year degree was I was really interested in working for John Deere as an Intelligent Solu-

tions Group consultant, but they won't actually consider any applicants for the ISG position if they don't have a bachelor's degree," she said.

She now plans to take her skills back to her family operations.

She grew up on a farm in Colorado and her husband farms in Kansas, so she will be returning to help with both operations following graduation. In Kansas, she and her husband raise wheat and milo, while her family raises corn, alfalfa, barley and wheat in Colorado. The family spends time in both states, so she will be active in both operations.

"I think the knowledge from the classes that we have to take in addition to courses in precision ag truly is the bread and butter of the farm operations. And then, the technology we learned in the precision ag program helps to be able to know how to fix what's going on without having to call a dealership and having them send someone out. Especially on your own farm, to be able to work on your own monitor and be able to know exactly what's going on and how you can use every aspect is huge," she said.

She appreciated the opportunities she had at NDSU, where she was readily accepted, she says.

"There's so much technology that they have access to, and the knowledge all the teachers have, but also just the faculty in general. They're all so caring of each and every one of their students. I thought that was really amazing," she said of the ABEN program. "They care about you as a person and they want to see you succeed in whatever path you go on, not just as a grade in their class."

"NDSU is just an amazing school and the department is just amazing. The faculty, the staff, your peers, they make it worth the experience," she said. ■

Scholarship winners

Scholarship

Major

Recipient

College of Engineering

| | | |
|---------------------------------|------------|----------------|
| Ernie French | ABEN | Benjamin Bloom |
| Lawrance & Elizabeth Shaw | ABEN | Li Ian Koh |
| Lawrance & Elizabeth Shaw | ABEN | Maison Zimmer |
| Lawrance & Elizabeth Shaw | ABEN | Wyatt Thorson |
| Thoreson Engineering | ABEN | Reed Nelson |
| Thoreson Engineering | ABEN | Hannah Voigt |

College of Agriculture, Food Systems and Natural Resources

| | | |
|---------------------|-----------|-----------------|
| Vernon Lee | ASM | Connor Ruschen |
| Vernon Lee | ASM | Braden Anderson |
| Elton Solseng | ASM | Carson Hovelson |

ABEN/ASM or PAG

| | | |
|--|------------|----------------------|
| A.R. Bon Memorial | ASM | Karson Matejcek |
| E.L. Bon Memorial | ABEN | Matthew Nepsund |
| E.L. Bon Memorial | ABEN | Ian Swenson |
| F.A. Bon Memorial | PAG | Tristen Uglem |
| M. Bon Memorial | ABEN | Ryan Doe |
| M. Bon Memorial | PAG | Jonah Steffl |
| Clarence & Irene Becker | PAG | Justin Roswick |
| Scott and Mary Handy | ABEN | Aiden Pfeiffer |
| Walter and Pearl Nyquist | ABEN | Alexander Nelson |
| Bill & Ann Promersberger | ABEN | Nicholas Popp |
| Dr. George & Patti (Jones) Pratt | ABEN | Haden Quittschreiber |
| Marvin and Doris Jensen | ABEN | Kyle Segner |
| Lundstrom Family | ASM | Connor Ruschen |
| Earl & Dotty Stegman | ABEN | Connor Alto |
| ABEN Dept. Scholarship | ABEN | John Otto |
| ABEN Dept. Scholarship | ABEN | Hunter Anderson |
| ABEN Dept. Scholarship | ABEN | Andrew Duchscher |
| ABEN Dept. Scholarship | ASM | Liam Satrom |
| ABEN Dept. Scholarship | ASM | Andrew Eikamp |
| ABEN Dept. Scholarship | ASM | Charles Bushinger |
| ABEN Dept. Scholarship | PAG | Jaxon Klegstad |
| ABEN Dept. Scholarship | PAG | Micah Lundblad |
| ABEN Dept. Scholarship | PAG | Jack Manstrom |
| ABEN Dept. Scholarship | PAG | Jacob Vogt |
| ABEN Dept. Scholarship | ASM | Joseph Ellison |
| ABEN Dept. Scholarship | ABEN | Lance Kjellberg |

ABEN Graduate Student

| | | |
|---|------------|----------------|
| Frank Bain Agricultural Scholarship | GRAD | Marlon Galad |
| Frank Bain Agricultural Scholarship | GRAD | Bhuwan Shah |
| Frank Bain Agricultural Scholarship | GRAD | Rehnuma Maisha |

Student clubs and officers

Bison Antique Tractor Club

| <i>Office</i> | <i>Name</i> |
|--------------------|------------------------------|
| President | Connor Blessum |
| Vice president | David Scheresky |
| Secretary | Garrett Anderson |
| Treasurer | Roman Steffan |
| CSO representative | Karson Matejcek |
| Advisors | Matt Olhoft, Tayler Johnston |



Bison Pullers/Quarter Scale Tractor

| <i>Office</i> | <i>Name</i> |
|-------------------|----------------------------------|
| President | Lawson Kraft |
| Vice president | Brandon Kasper |
| Secretary | Nicholas Kuhlmann |
| Treasurer | Evan Oberg |
| Marketing Manager | Cristhian Perdigon |
| Advisors | Matt Olhoft, Sulaymon Eshkabilov |



Alpha Epsilon

| <i>Office</i> | <i>Name</i> |
|----------------|-------------------------------|
| President | Cole Nissen |
| Vice President | Sai Sri Sravya Vishnumolakala |
| Secretary | Hannah Voigt |
| Treasurer | Maison Zimmer |
| Advisor | Ewumbua Monono |



ABEN Graduate Students Association

| <i>Office</i> | <i>Name</i> |
|------------------|-------------------------------|
| President | Sai Sri Sravya Vishnumolakala |
| Vice president | Muhammad Haris |
| Secretary | Humeera Tazeen |
| Treasurer | Tosin Oyewole |
| Public relations | Pa Tamba Jammeh |
| Advisor | Xinhua Jia |

Welcome

Welcome to the annual newsletter of the Department of Agricultural and Biosystems Engineering.

NDSU Dept. 7620
PO Box 6050
Fargo, ND 58108-6050

Phone: 701-231-7261
Fax: 701-231-1008
Email: nds.aben@nds.edu

<https://www.ndsu.edu/aben>

Join us on Facebook

Enjoy our newsletter?
Send your email contact information to nds.aben@nds.edu to be included in further email distributions.

Why donate?

For a program to stay current and relevant, our labs need to be continually updated to current technology. ABEN has been proactively updating our teaching labs, and your support is critical. Your contributions are also used to sponsor scholarships for Ag Tech Expo, recruiting, and other teaching and student activities. Lots of exciting things are happening at ABEN, and your contributions play a vital part in supporting ABEN activities. Thank you for your support of our great department!

Alumni contributions welcome!

Enclosed is my tax-deductible check, payable to: **NDSU Foundation & Alumni Association, with a memo indicating ABEN**, in the amount of

_____ \$25 _____ \$50 _____ \$100

_____ \$500 _____ \$1,000 \$_____ Other

Or, you may wish to help NDSU students majoring in Agricultural and Biosystems Engineering, Agricultural Systems Management and Precision Ag with a contribution of \$_____ to go toward the scholarship fund indicated below. Please be sure to check to see if your employer has a program to match your contribution

- _____ Ernie French Memorial Scholarship
- _____ Holmen-Breuer Memorial Scholarship
- _____ Elton Solseng Scholarship
- _____ ABEN Scholarship Fund
- _____ Undesignated



Return to:

NDSU Foundation & Alumni Association
Harry D. McGovern Alumni Center
1241 N. University Drive
Fargo, ND 58102

Or, contribute online at: www.ndsualumni.com/contribute

Thank you for your support!