

Agricultural and Biosystems Engineering

Department Information

- **Department Web Site:**
www.ndsu.edu/aben/ (<http://www.ndsu.edu/aben/>)
- **Credential Offered:**
B.S.A.B.En.
- **Official Program Curriculum:**
catalog.ndsu.edu/undergraduate/program-curriculum/agricultural-biosystems-engineering/ (<http://catalog.ndsu.edu/undergraduate/program-curriculum/agricultural-biosystems-engineering/>)

The Agricultural and Biosystems Engineering (ABEN) program prepares students for careers in:

- Machine Systems Engineering – for mechanical equipment and power units such as tractors and other equipment
- Process Engineering – for food, feed, fiber, biofuels, and other bioproducts
- Natural Resources and Environmental Systems Engineering – for soil, water, air, waste, and other areas

Graduates design machines, processes, and natural resource systems. They solve problems using mathematics and applying physical, biological and engineering sciences. Agricultural and biosystems engineers address society's challenges in food, energy and water.

The Program

Agricultural and biosystems engineers are uniquely qualified to use their knowledge of mathematics, biological and physical sciences, and engineering principles to solve problems relating to the:

- design, testing and production of machine systems
- production, handling and processing of crops and biological materials for food, feed, fiber and fuel
- building environmental design
- utilization and conservation of natural resources
- protection of the environment

A major in Agricultural and Biosystems Engineering can serve a broad range of career interests and can provide excellent career opportunities for students from diverse backgrounds.

The Bachelor of Science in Agricultural and Biosystems Engineering program is accredited by the Engineering Accreditation Commission of ABET, <https://www.abet.org> (<https://www.abet.org/>), under the General Criteria, the Agricultural and Similarly Named Engineering Programs Program Criteria, and the Biological and Similarly Named Engineering Programs Program Criteria. Agricultural and Biosystems engineering students are well-qualified for and encouraged to take the national Fundamentals of Engineering examination. This is the first step in the process of registration as a professional engineer.

Agricultural and Biosystems Engineering integrates engineering topics, engineering design and biological sciences in a single program with two concentrations: Agricultural Engineering and Biosystems Engineering.

ABEN class size is usually fewer than 25 students, which allows for close faculty-student interactions. Student advising for classes and career planning takes place in one-to-one meetings between a student and her or his faculty adviser, and complemented by a student support professional in the department.

Internships

Although not required by the curriculum, students are strongly encouraged to take advantage of paid internships, which allow students to spend a summer or, more typically, a summer and a semester doing engineering work. There are also opportunities to work as a research assistant in projects conducted by faculty. The intern and research assistant positions help students gain hands-on experience in engineering and open doors for employment upon graduation.

Career Opportunities

Position titles of graduates for both concentrations may include design engineer, test engineer, project engineer, plant engineer, quality control engineer, process engineer, energy adviser, consulting engineer and environmental engineer. Starting salaries are among the highest of all college graduates and are comparable to those in other fields of engineering. Recent starting salaries range from \$55,000 to \$75,000 per year with an average of \$60,000 per year. The placement of graduates has been at or near 100 percent for many years.

Agricultural Engineering Concentration

Career opportunities for graduates in agricultural engineering are numerous and diverse. Graduates are employed by companies and agencies that:

- design, develop, test and manufacture agricultural power and machine systems;
- develop electrical and electronic applications for agricultural problems.
- handle, store, process and enhance or protect the quality of agricultural commodities and processed products;
- design environmental control and housing systems for plant and animal production;
- design equipment and systems for processing, manufacturing, distribution and quality protection of food products;
- manage air, land and water resources; and
- design and manage irrigation, drainage, and agricultural waste management systems.

Graduates with an agricultural engineering concentration may also pursue graduate degrees in areas such as engineering, business or law.

Biosystems Engineering Concentration

Graduates in biosystems engineering integrate engineering, biology and chemistry in a variety of applications. Graduates are working in companies and agencies that:

- convert bio-based resources to food, feed, fuel and other renewable products;
- design new generations of devices or systems for biological systems;
- control biological systems for natural resource protection, waste remediation and ecosystem restoration;
- manage air, land and water resources;
- create new and improved processes through the innovative use of microorganisms, plant and animal cells and enzymes; and
- develop sensors, control systems and computer models to monitor and control biological processes.

Graduates with a biosystems engineering concentration may also pursue an advanced degree in engineering, medicine, veterinary medicine, management or law.

Scholarships

Several Departmental, College of Engineering, and NDSU scholarships are competitively awarded to students in the ABEN program each spring. There are scholarships for freshmen who apply for the ABEN program. The departmental scholarships range in value from about \$500 to \$4,000. Scholastic achievement, financial need and extracurricular activities are considered. Scholarships are provided by industry, faculty and alumni.

Extra-Curricular Activities

Varied extracurricular programs are available to students majoring in Agricultural and Biosystems Engineering. Students are involved with the International ¼ Scale Tractor Student Design Competition, North Dakota Student Engineering Branch of the American Society of Agricultural and Biological Engineers, and the Society of Women Engineers.

A Well-Equipped Teaching Facility

Laboratories are furnished with equipment used in industry and research. Computer labs have specialized software used in engineering such as Creo, ANSYS, ArcGIS, and AutoCAD. Most courses include labs where students get hands-on experience with data acquisition systems, analytical tools, biomaterials handling and processing equipment, environmental measurement equipment, controllers, and analog and digital test equipment.

Sample Program Guide

IMPORTANT DISCLAIMER: A Sample Program Guide provides an unofficial guide of program requirements and should be used by prospective students who are considering attending NDSU in the future. It is NOT an official curriculum and should NOT be used by current NDSU students for official degree planning purposes. Note that the official curriculum used by current NDSU students can vary from the Sample Program Guide due to a variety of factors such as, but not limited to, start year, education goals, transfer credit, and course availability.

To ensure proper program completion, enrolled students should utilize Degree Map (<https://www.ndsu.edu/registrar/degreemap/>) and Schedule Planner (<https://www.ndsu.edu/onestop/degree-map-and-planning/>) in Campus Connection and consult regularly with their academic advisor to ensure requirements are being met.

Freshman			
Fall	Credits	Spring	Credits
ABEN 110		3 ABEN 348	1
CHEM 121		3 ME 212	3
ENGL 110		3 ME 221	3

MATH 165	4	CHEM 122	3
CHEM/BIO Elective	3	ENGL 120	3
		MATH 166	4
16			17

Sophomore			
Fall	Credits	Spring	Credits
ABEN 255		3 ABEN 263	3
COMM 110		3 PHYS 252	4
ME 222		3 PHYS 252L	1
ME 223		3 MATH 266	3
MATH 259		3 ME 350	3
MATH 128		1 Computer Elective	3
Gen Ed Elective - Wellness		2	
18			17

Junior			
Fall	Credits	Spring	Credits
IME 460		3 ABEN 377	3
CE 309		3 ABEN 391	1
ABEN 358		3 ABEN 482	3
ABEN Elective		3 ENGL 321 (ENGL 320, 321, 324, or 459)	3
CHEM/BIO Elective		3 ABEN Elective	3
		Gen Ed Elective - Soc/Beh/Global	3
15			16

Senior			
Fall	Credits	Spring	Credits
ABEN 486		2 ABEN 487	2
IME 440		2 Tech Elective	3
ENGR 327		3 CHEM/BIO Elective	3
ABEN Elective		3 Gen Ed Elective - Hum/Fine Arts/Div	3
Tech Elective		5 Gen Ed Elective - Soc/Beh	3
		BUS/COMM Elective	3
15			17

Total Credits: 131

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Freshman			
Fall	Credits	Spring	Credits
ABEN 110		3 ABEN 348	1
CHEM 121		3 ME 221	3
CHEM 121L		1 CHEM 122	3
ENGL 110		3 CHEM 122L	1
MATH 165		4 ENGL 120	3
BIOL 150		3 MATH 166	4
		Computer Elective	3
		17	18
Sophomore			
Fall	Credits	Spring	Credits
ABEN 255		3 ABEN 263	3
CHEM 240		3 PHYS 252	4
COMM 110		3 PHYS 252L	1
MATH 128		1 MATH 266	3
MATH 259		3 Gen Ed Elective - Soc/Beh Sci/ Global	3
ME 222		3 CHEM/BIO Elective	3
		16	17
Junior			
Fall	Credits	Spring	Credits
CE 309		3 ABEN 391	1
IME 440		2 ABEN 444	3
IME 460		3 ABEN 482	3
ENGL 321, 324, or 459		3 ME 350	3
ENGR Elective		3 Gen Ed - Wellness	2
CHEM/BIO Elective		3 Gen Ed Elective - Hum/Fine Arts/Div	3
		17	15
Senior			
Fall	Credits	Spring	Credits
ABEN 486		2 ABEN 487	2
ENGR 327		3 ABEN Elective	6
ABEN Elective		3 ENGR Elective	3
ENGR Elective		3 Gen Ed Elective - Soc/Beh Sci	3
Tech Elective		3 Tech Elective	3
		14	17
Total Credits: 131			