

AGRICULTURAL & BIOLOGICAL ENGINEERING, BS

for the degree of Bachelor of Science Major in Agricultural & Biological Engineering

Agricultural and Biological Engineers apply fundamental engineering principles to problems relating to agriculture and biology. ABE students learn to design technological solutions to problems in agricultural, food, bioenergy, water, and other biological systems.

The Bachelor of Science in Agricultural and Biological Engineering (ABE) equips graduates to address grand challenges related to food, water, energy, and the environment. The program offers an ABET-accredited, flexible curriculum.

The ABE program comprises six concentrations. Students pursuing this major select one of the following concentrations:

- Bioprocess Engineering and Industrial Biotechnology Concentration (http://catalog.illinois.edu/undergraduate/eng_aces/agricultural-biological-engineering-bs/bioprocess-engineering-industrial-biotechnology/)
- Off-Highway Vehicle and Equipment Engineering Concentration (http://catalog.illinois.edu/undergraduate/eng_aces/agricultural-biological-engineering-bs/off-highway-vehicle-equipment-engineering/)
- Renewable Energy Systems Engineering Concentration (http://catalog.illinois.edu/undergraduate/eng_aces/agricultural-biological-engineering-bs/renewable-energy-systems-engineering/)
- Soil and Water Resources Engineering Concentration (http://catalog.illinois.edu/undergraduate/eng_aces/agricultural-biological-engineering-bs/soil-water-resources-engineering/)
- Sustainable Ecological and Environmental Systems Engineering Concentration (http://catalog.illinois.edu/undergraduate/eng_aces/agricultural-biological-engineering-bs/sustainable-ecological-environmental-systems-engineering/)
- Synthetic Biological Engineering Concentration (http://catalog.illinois.edu/undergraduate/eng_aces/agricultural-biological-engineering-bs/synthetic-biological-engineering/)

Each concentration (30 hours each) has its own unique body of knowledge and engineering tools and builds upon engineering fundamentals from the first two years of the program.

Current Program Educational Objectives (<https://abe.illinois.edu/undergraduate/abe-program-objectives/>)

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Graduation Requirements

Minimum Overall GPA: 2.0

Minimum hours required for graduation: 128 hours, to include a minimum of 40 hours of upper-division coursework generally at the 300 and/or 400 level. These hours can be drawn from all elements of the degree.

General education: Students must complete the Campus General Education requirements including the campus general education language requirement. One of the Social and Behavioral Sciences (SBS) courses must include one of the following economics courses: ECON 102, ACE 100, ACE 210, ACE 251, or ACE 255. **ACE 251 and ACE 255 will also meet a Cultural Studies requirement in addition to the Social Behavioral Sciences requirement.** ABE 469 will satisfy a technical core course and the Campus General Education Advanced Composition requirement.

Orientation and Professional Development

Code	Title	Hours
ABE 127	Introduction to Agricultural & Biological Engineering	2
ENG 100	Grainger Engineering Orientation Seminar (External transfer students take ENG 300.)	1
Total Hours		3

Foundational Mathematics and Science

Code	Title	Hours
CHEM 102	General Chemistry I	3
CHEM 103	General Chemistry Lab I	1
CHEM 104	General Chemistry II	3
CHEM 105	General Chemistry Lab II	1
MATH 221	Calculus I (MATH 220 may be substituted. MATH 220 is appropriate for students with no background in calculus. 4 of 5 credit hours count towards degree.)	4
MATH 231	Calculus II	3
MATH 241	Calculus III	4
MATH 257	Linear Algebra with Computational Applications	3
MATH 285	Intro Differential Equations	3
PHYS 211	University Physics: Mechanics	4
PHYS 212	University Physics: Elec & Mag	4
Total Hours		33

Agricultural and Biological Engineering Technical Core

Code	Title	Hours
ABE 128	Applied Biology for Agricultural and Biological Engineers	3
ABE 227	Computer-Aided Problem-Solving for ABE I	3
ABE 228	Computer-Aided Problem-Solving for ABE II	3
ABE 340	Thermodynamics for Agricultural and Biological Engineering	3
ABE 430	Project Management	2
ABE 469	Capstone Design Experience	4
CS 101	Intro Computing: Engrg & Sci	3
ECE 205	Electrical and Electronic Circuits	3
SE 101	Engineering Graphics & Design	3
IE 300	Analysis of Data	3
or STAT 400	Statistics and Probability I	
TAM 211	Statics	3

TAM 212	Introductory Dynamics	3
Total Hours		36

Code	Title	Hours
Concentration required. Choose one below.		30

Bioprocess Engineering and Industrial Biotechnology (http://catalog.illinois.edu/undergraduate/eng_aces/agricultural-biological-engineering-bs/bioprocess-engineering-industrial-biotechnology/)

Off-Highway Vehicle and Equipment Engineering (http://catalog.illinois.edu/undergraduate/eng_aces/agricultural-biological-engineering-bs/off-highway-vehicle-equipment-engineering/)

Renewable Energy Systems Engineering (http://catalog.illinois.edu/undergraduate/eng_aces/agricultural-biological-engineering-bs/renewable-energy-systems-engineering/)

Soil and Water Resources Engineering (http://catalog.illinois.edu/undergraduate/eng_aces/agricultural-biological-engineering-bs/soil-water-resources-engineering/)

Sustainable Ecological and Environmental Systems Engineering (http://catalog.illinois.edu/undergraduate/eng_aces/agricultural-biological-engineering-bs/sustainable-ecological-environmental-systems-engineering/)

Synthetic Biological Engineering (http://catalog.illinois.edu/undergraduate/eng_aces/agricultural-biological-engineering-bs/synthetic-biological-engineering/)

Code	Title	Hours
Free Electives		10

Additional course work, subject to the Grainger College of Engineering restrictions to Free Electives, so that there are at least 128 credit hours earned toward the degree. (<https://go.grainger.illinois.edu/FreeElectives/>)

Total Hours of Curriculum to Graduate		128
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Sample Sequence

This sample sequence is intended to be used only as a guide for degree completion. All students should work individually with their academic advisors to decide the actual course selection and sequence that works best for them based on their academic preparation and goals. Enrichment programming such as study abroad, minors, internships, and so on may impact the structure of this four-year plan. Course availability is not guaranteed during the semester indicated in the sample sequence.

Students must fulfill their Language Other Than English requirement by successfully completing a third level of a language other than English. This sample curriculum plan makes the assumption that the foreign language graduation requirement has been satisfied by completing three years of study of a single foreign language in high school. See the corresponding section on the Degree and General Education Requirements (<http://catalog.illinois.edu/general-information/degree-general-education-requirements/>).

Free Electives: Additional course work, subject to the Grainger College of Engineering restrictions to Free Electives (<https://go.grainger.illinois.edu/>)

FreeElectives/), so that there are at least 128 credit hours earned toward the degree.

First Year				
First Semester		Hours	Second Semester	Hours
ABE 127		2	ABE 128	3
ENG 100		1	PHYS 211	4
MATH 221 (MATH 220 may be substituted)		4	MATH 231	3
CHEM 102		3	CHEM 104	3
CHEM 103		1	CHEM 105	1
Composition I or General Education course (Humanities or Social & Behavioral Sciences course with Cultural Studies designation)		4	Composition I or General Education course (Humanities or Social & Behavioral Sciences course with Cultural Studies designation)	3
		15		17

Second Year				
First Semester		Hours	Second Semester	Hours
ABE 227		3	ABE 228	3
CS 101		3	PHYS 212	4
MATH 241		4	MATH 285	3
SE 101		3	MATH 257	3
TAM 211		3	TAM 212	3
		16		16

Third Year			
First Semester	Hours	Second Semester	Hours
ABE 340		3 IE 300 or STAT 400	3
ECE 205		3 Concentration Course	4
Concentration Course		3 Concentration Course	3
Concentration Course		4 Concentration Course	4
Free Elective course		3 Choose one course from Social & Behavioral Sciences Course list: ECON 102, ACE 100, ACE 210, ACE 251, ACE 255	3
		16	17

Fourth Year			
First Semester	Hours	Second Semester	Hours
ABE 430		2 ABE 469	4

Concentration Course	3 General Education course (Humanities or Social & Behavioral Sciences course with Cultural Studies designation)	3
Concentration Course	3 Free Elective course	3
General Education course (Humanities or Social & Behavioral Sciences course with Cultural Studies designation)	3 Concentration Course	3
Free Elective course	4 Concentration Course	3
	15	16

Total Hours 128

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Agricultural and Biological Engineering Website (<https://abe.illinois.edu/undergraduate/>)

Agricultural & Biological Engineering Faculty (<https://abe.illinois.edu/directory/faculty/>)

College of Agricultural, Consumer & Environmental Sciences (<https://aces.illinois.edu/>)

Grainger College of Engineering (<https://grainger.illinois.edu/>)

The Agricultural and Biological Engineering BS is accredited by the Engineering Accreditation Commission of ABET, Inc (<https://www.abet.org/>).

In accordance with the ABET educational criteria, the program has been developed so that graduates will have:

1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
2. An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
3. An ability to communicate effectively with a range of audiences.
4. An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.
5. An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.
6. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
7. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

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