

# AGRICULTURAL & BIOLOGICAL ENGINEERING, BS AND AGRICULTURAL & BIOLOGICAL ENGINEERING, BSAG

*for the dual degree of Bachelor of Science in Agricultural & Biological Engineering and the Bachelor of Science in Agriculture in Agricultural & Biological Engineering*

## Dual Degree – Five Year Academic Program

Students who successfully complete this five-year academic program receive the Bachelor of Science with a major in Agricultural and Biological Engineering from The Grainger College of Engineering as well as the Bachelor of Science in Agriculture with a major in Agricultural and Biological Engineering from the College of ACES.

Students enroll in the College of ACES and then transfer to The Grainger College of Engineering after two years. Students then complete the ABET-accredited degree program in Agricultural and Biological Engineering in The Grainger College of Engineering while taking additional coursework in ACES to complete the requirements for the Bachelor of Science in Agriculture in Agricultural and Biological Engineering degree program in ACES. The suggested program of study that follows fulfills the additional graduation requirements for the second degree, which requires completion of the Grainger College of Engineering degree.

Agricultural and biological engineering is the application of mathematics, physical and biological science, and engineering to agriculture, food systems, energy, natural resources, the environment, and related biological systems. This program has special emphasis on environmental protection and the biological interface of plants, animals, soils, and microorganisms with the design and performance of environments, machines, mechanisms, processes, and structures. Graduates are employed by industry, consulting firms, and government for research, education, and manufacturing.

*for the degree of Bachelor of Science 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-](http://catalog.illinois.edu/undergraduate/eng_aces/agricultural-biological-engineering-bs/bioprocess-engineering-industrial-biotechnology/)

[biological-engineering-bs/bioprocess-engineering-industrial-biotechnology/](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/](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/](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/](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/](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/](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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While completing the Agricultural & Biological Engineering, B.S. the student takes additional classes in ACES for the BSAG degree. The student is in ACES in years 1 and 2, transferring to The Grainger College of Engineering for years 3 through 5. The curriculum for the additional classes to complete the BSAG degree is as follows:

## Graduation Requirements

Minimum hours required for B.S. graduation: 128 hours.

Minimum hours required for B.S. + BSAG graduation: 158 hours.

Minimum Overall GPA: 2.0

## University Requirements

Minimum of 40 hours of upper-division coursework, generally at the 300 and 400 level. These hours can be drawn from all elements of the degree. Students should consult their academic advisor for additional guidance in fulfilling this requirement.

The university and residency requirements can be found in the Student Code (<https://studentcode.illinois.edu/article3/part8/3-801/>) (§ 3-801) and in the Academic Catalog (<http://catalog.illinois.edu/general-information/degree-general-education-requirements/>).

## General Education Requirements

Follows the campus General Education (Gen Ed) requirements (<https://courses.illinois.edu/gened/DEFAULT/DEFAULT/>). Some Gen Ed requirements may be met by courses required and/or electives in the program. The General Education Requirements shown below are taken as part of the **Agricultural & Biological Engineering, B.S.** (<http://>

[catalog.illinois.edu/undergraduate/eng\\_aces/agricultural-biological-engineering-bs/#degreerequirementstext](http://catalog.illinois.edu/undergraduate/eng_aces/agricultural-biological-engineering-bs/#degreerequirementstext)

Code	Title	Hours
	Composition I	4-6
	Advanced Composition fulfilled by ABE 469	3
	Humanities & the Arts (6 hours)	6
	Natural Sciences & Technology (6 hours) fulfilled by CHEM 102, CHEM 104, PHYS 211, PHYS 212	6
	Social & Behavioral Sciences (6 hours) fulfilled by ECON 102, ACE 100, ACE 210, ACE 251, or ACE 255 and one other course approved as Social and Behavioral Sciences	6
	Cultural Studies: Non-Western Cultures (1 course)	3
	Cultural Studies: US Minority Cultures (1 course)	3
	Cultural Studies: Western/Comparative Cultures (1 course)	3
	Quantitative Reasoning (2 courses, at least one course must be Quantitative Reasoning I) fulfilled by CS 101; MATH 221; MATH 231; MATH 241; MATH 285; PHYS 211; and PHYS 212	6-8
	Language Requirement (Completion of the third semester or equivalent of a language other than English is required)	0-15

**Agricultural & Biological Engineering, BSAG  
Requirements in addition to completion of Agricultural &  
Biological Engineering, B.S. ([http://catalog.illinois.edu/  
undergraduate/eng\\_aces/agricultural-biological-  
engineering-bs/#degreerequirementstext](http://catalog.illinois.edu/undergraduate/eng_aces/agricultural-biological-engineering-bs/#degreerequirementstext))**

Code	Title	Hours
<b>Required coursework:</b>		
	Communication	3
	CMN 101 Public Speaking	
<b>Additional Biological Sciences Coursework. Choose an additional 4 hours from the list below:</b>		
	ANSC 100 Intro to Animal Sciences	
	ANSC 221 Cells, Metabolism and Genetics	
	ANSC 350 Principles of Biochemistry in Animals	
	ANSC 363 Behavior of Domestic Animals	
	ANSC 400 Dairy Herd Management	
	ANSC 401 Beef Production	
	ANSC 402 Sheep and Goat Production	
	ANSC 403 Pork Production	
	ANSC 404 Poultry Science	
	ANSC 406 Zoo Animal Conservation Sci	
	ANSC 450 Comparative Immunobiology	
	ATMS 201 General Physical Meteorology	
	ATMS 307 Climate Processes	
	CHEM 232 Elementary Organic Chemistry I	
	CHEM 233 Elementary Organic Chem Lab I	
	CHEM 312 Inorganic Chemistry	
	CHEM 332 Elementary Organic Chem II	
	CHEM 360 Chemistry of the Environment	
	CHEM 460 Green Chemistry	

CPSC 112	Introduction to Crop Sciences
CPSC 261	Biotechnology in Agriculture
CPSC 265	Genetic Engineering Lab
CPSC 270	Applied Entomology
CPSC 352	Plant Genetics
CPSC 414	Forage Crops & Pasture Ecology
CPSC 415	Bioenergy Crops
CPSC 418	Crop Growth and Management
CPSC 431	Plants and Global Change
CPSC 437	Principles of Agroecology
CPSC 473	Mgmt of Field Crop Insects
FSHN 101	The Science of Food and How it Relates to You
FSHN 414	Food Chemistry
FSHN 416	Food Chemistry Laboratory
FSHN 471	Food & Industrial Microbiology
FSHN 481	Food Processing Unit Operations I
FSHN 482	Food Processing Unit Operations I Lab
FSHN 483	Food Processing Unit Operations II
FSHN 484	Food Processing Unit Operations II Lab
GEOL 107	Physical Geology
GEOL 380	Environmental Geology
HORT 100	Introduction to Horticulture
HORT 341	Greenhouse Mgmt and Production
HORT 344	Planting for Biodiversity and Aesthetics
HORT 360	Vegetable Crop Production
HORT 361	Small Fruit Production
HORT 362	Tree Fruit Production
HORT 363	
HORT 421	Horticultural Physiology
HORT 435	Urban Food Production
IB 103	Introduction to Plant Biology
IB 150	Organismal & Evolutionary Biol & IB 151 and Organismal & Evol Biol Lab
IB 203	Ecology
IB 329	Animal Behavior
IB 411	Bioinspiration
IB 420	Plant Physiology
IB 439	Biogeography
IB 444	Insect Ecology
IB 452	Ecosystem Ecology
IB 482	Insect Pest Management
MCB 100 & MCB 101	Introductory Microbiology and Intro Microbiology Laboratory
MCB 150 & MCB 151	Molecular & Cellular Basis of Life and Molec & Cellular Laboratory
MCB 244 & MCB 245	Human Anatomy & Physiology I and Human Anat & Physiol Lab I
MCB 250 & MCB 251	Molecular Genetics and Exp Techniqs in Molecular Biol
MCB 252 & MCB 253	Cells, Tissues & Development and Exp Techniqs in Cellular Biol

MCB 300 & MCB 301	Microbiology and Experimental Microbiology	
MCB 314	Introduction to Neurobiology	
MCB 316	Genetics and Disease	
MCB 450	Introductory Biochemistry	
NRES 201	Introductory Soils	
NRES 219	Applied Ecology	
NRES 348	Fish and Wildlife Ecology	
NRES 351	Introduction to Environmental Chemistry	
NRES 419	Env and Plant Ecosystems	
NRES 420	Restoration Ecology	
NRES 429	Aquatic Ecosystem Conservation	
NRES 439	Env and Sustainable Dev	
NRES 471	Pedology	
NRES 475	Environmental Microbiology	
NRES 487	Soil Chemistry	
NRES 488	Soil Fertility and Fertilizers	
PLPA 405	Plant Disease Diagnosis & Mgmt	
<b>Agricultural Sciences Coursework (additional 15 hours of agricultural sciences with courses from at least two subject areas other than ABE and ETMAS and approval of advisers are required)</b>		<b>15</b>
<b>Free Electives (sufficient free electives selected to total minimum curriculum requirement of 158 hours. All requirements of the combined curriculum must be completed to satisfy the requirements for both degrees)</b>		
<b>Total hours required to receive an Agricultural and Biological Engineering, BS and an Agricultural Science, BSAG</b>		<b>158</b>

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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. For more information, see the corresponding section on the Degree and General Education Requirements page (<http://catalog.illinois.edu/general-information/degree-general-education-requirements/>).

First Year			
First Semester	Hours	Second Semester	Hours
ABE 127	3	2 ABE 128	3
ENG 100	4	1 PHYS 211	4
MATH 221	3	4 MATH 231	3

CHEM 102	3	CHEM 104	3
CHEM 103	1	CHEM 105	1
Composition I or General Education course	4	Composition I or General Education course	3
		<b>15</b>	<b>17</b>

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
		<b>16</b>	<b>16</b>

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
General Education course	3	General Education Course	3
		<b>16</b>	<b>17</b>

Fourth Year			
First Semester	Hours	Second Semester	Hours
ABE 430	2	ABE 469	4
Concentration course	3	Concentration course	3
Concentration course	3	Concentration course	3
General education course	3	General Education course	3
Language Other Than English 3rd Level	4	General Education course	3
		<b>15</b>	<b>16</b>

Fifth Year			
First Semester	Hours	Second Semester	Hours
CMN 101	3	Biological Sciences Coursework	4
Agricultural Sciences Coursework	3	Agricultural Sciences Coursework	3
Agricultural Sciences Coursework	3	Agricultural Sciences Coursework	3
Agricultural Sciences Coursework	3	Free elective	2

Free elective	3 Free elective	3
	<b>15</b>	<b>15</b>

**Total Hours 158**

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1301 West Gregory Drive  
 Urbana, IL 61801  
 217-333-3380  
 aces-academics@illinois.edu

### Advising

ABE Advising website (<https://abe.illinois.edu/academics/advising/>)  
 (217) 333-3570  
 tsm-etm-abe-advising@rt.aces.illinois.edu

### Admissions

ACES Undergraduate Admissions (<https://aces.illinois.edu/admissions/>)  
 University of Illinois Urbana-Champaign Undergrad Admissions (<https://www.admissions.illinois.edu/>)  
 (217) 333-3380  
 visitACES@illinois.edu

Agricultural & Biological Engineering 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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## Agricultural & Biological Engineering

Agricultural & Biological Engineering Department website (<https://abe.illinois.edu/>)  
 338 Agricultural Engineering Sciences Building  
 1304 West Pennsylvania Avenue  
 Urbana, IL 61801  
 (217) 333-3570  
 abe@illinois.edu

## College of Agricultural, Consumer & Environmental Sciences

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

## The Grainger College of Engineering

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

## ACES Office of Academic Programs

128 Mumford Hall