

# AGRICULTURAL & BIOLOGICAL ENGINEERING: SUSTAINABLE ECOLOGICAL AND ENVIRONMENTAL SYSTEMS ENGINEERING, BS

for the degree of Bachelor of Science in Agricultural & Biological Engineering, Sustainable Ecological and Environmental Systems Engineering Concentration

Graduates design, manage, and restore sustainability and resilience in natural and urban environments, integrating automation and environmental control while applying principles of ecology and conservation.

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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. 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
<b>Total Hours</b>		<b>3</b>

## 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
<b>Total Hours</b>		<b>33</b>

## 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 or STAT 400	Analysis of Data Statistics and Probability I	3
TAM 211	Statics	3
TAM 212	Introductory Dynamics	3
<b>Total Hours</b>		<b>36</b>

**Concentration Requirements: complete a minimum of 30 hours from courses below**

Code	Title	Hours
<b>Required courses</b>		
ABE 341	Transport Processes in ABE	3
ABE 425	Engrg Measurement Systems	4
TAM 335	Introductory Fluid Mechanics	4
CEE 330	Environmental Engineering	3
IB 150	Organismal & Evolutionary Biol	4
<b>Total Hours</b>		<b>18</b>

Code	Title	Hours
<b>Select one of the following:</b>		
ABE 450	International Water Project I	3
ABE 451	International Water Project II	3
ABE 452	Engineering for Disaster Resilience	3
ABE 456	Land & Water Resources Engrg	3
<b>Select one of the following:</b>		
ABE 436	Renewable Energy Systems	3

ABE 457	NPS Pollution Processes	2
ABE 458	NPS Pollution Modeling	2
ABE 459	Drainage and Water Management	4
ABE 476	Indoor Air Quality Engineering	4
CEE 434	Environmental Systems I	3
CEE 440	Fate Cleanup Environ Pollutant	4

**Code Title Hours**

**Select at least two courses from one of the following sets (Ecological, Horticultural or Animal):**

**Ecological Systems**

IB 452	Ecosystem Ecology	3
NRES 219	Applied Ecology	3
NRES 348	Fish and Wildlife Ecology	3
NRES 362	Ecology of Invasive Species	3
NRES 418	Wetland Ecology & Management	3
NRES 419	Env and Plant Ecosystems	3
NRES 420	Restoration Ecology	4
NRES 429	Aquatic Ecosystem Conservation	3
NRES 439	Env and Sustainable Dev	3
NRES 485	Stream Ecosystem Management	4

**Code Title Hours**

**Horticultural Systems**

HORT 100	Introduction to Horticulture	3
HORT 341	Greenhouse Mgmt and Production	4
HORT 435	Urban Food Production	3

**Code Title Hours**

**Animal Systems**

ANSC 100	Intro to Animal Sciences	4
ANSC 363	Behavior of Domestic Animals	4
IB 329	Animal Behavior	3

**Code Title Hours**

**Total Minimum Concentration Hours**

**30**

**Code Title Hours**

**Free Electives**

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/>)

**10**

**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
	<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	ABE 425	4
CEE 330	3	ABE 341	3
TAM 335	4	IB 150	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
<b>16</b>		<b>17</b>

**Fourth Year**

First Semester	Hours Second Semester	Hours
ABE 430	2 ABE 469	4
ABE 450 (or ABE 451 or ABE 452 or ABE 456)	3 Choose one of two courses from the same set (Ecological Systems, Horticultural Systems or Animal Systems)	3
Choose one of two courses from the same set (Ecological Systems, Horticultural Systems or Animal Systems)	3 Select one of ABE 436, ABE 457, ABE 458, ABE 459, ABE 476, CEE 434, or CEE 440	3
General Education course (Humanities or Social & Behavioral Sciences course with Cultural Studies designation)	3 General Education course (Humanities or Social & Behavioral Sciences course with Cultural Studies designation)	3
Free Elective course	4 Free Elective course	3
<b>15</b>		<b>16</b>

**Total Hours 128**

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- 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 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/>)

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