AGRICULTURAL & BIOLOGICAL ENGINEERING: BIOPROCESS ENGINEERING AND INDUSTRIAL BIOTECHNOLOGY, BS

for the degree of Bachelor of Science in Agricultural & Biological Engineering, Bioprocess Engineering and Industrial Biotechnology Concentration

Graduates design and develop equipment and systems for the processing of food for human and animal use, biofuels, and other biological materials. Utilization of agricultural and biological materials presents unique engineering challenges to sustainably convert these natural resources into products needed by society. Examples include designing bioprocesses to convert cereal crops into food ingredients that optimize human and animal health and processing designs to convert biological materials into fuels and biochemicals while minimizing their environmental footprint.

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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 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
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 or STAT 400	Analysis of Data Statistics and Probability I	3
TAM 211	Statics	3
TAM 212	Introductory Dynamics	3
Total Hours		**36**

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

Code	Title	Hours
Required courses		
ABE 341	Transport Processes in ABE	3
ABE 425	Engrg Measurement Systems	4
ABE 483	Engineering Properties of Food Materials	3
ABE 488	Bioprocessing Biomass for Fuel	4
CHEM 232	Elementary Organic Chemistry I	4
MCB 100	Introductory Microbiology	3
Total Hours		**21**

Code	Title	Hours
Select 3 hours from the following:		
FSHN 471	Food & Industrial Microbiology	3
FSHN 481	Food Processing Unit Operations I	2
FSHN 482	Food Processing Unit Operations I Lab	1

Code	Title	Hours
Select an additional 6 hours from the following:		
FSHN 414	Food Chemistry	3

FSHN 471	Food & Industrial Microbiology	3
FSHN 472	Applied Food Microbiology	3
FSHN 481 & FSHN 482	Food Processing Unit Operations I and Food Processing Unit Operations I Lab	3
FSHN 483 & FSHN 484	Food Processing Unit Operations II and Food Processing Unit Operations II Lab	3
CHBE 471	Biochemical Engineering	3 or 4
CHBE 478	Bioenergy Technology	3

Code	Title	Hours
Total Minimum Concentration Hours		**30**

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	ABE 425	4
MCB 100	3	ABE 341	3
CHEM 232	4	FSHN 471 or 481 ***and*** 482	3
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		**16**

Fourth Year

First Semester	Hours	Second Semester	Hours
ABE 430	2	ABE 469	4
ABE 488	4	Choose 3 hours from 'Select 6 hours' list	3
Choose 3 hours from 'Select 6 hours' list	3	ABE 483	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
	16		**16**

Total Hours 128

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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 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/)