

AGRICULTURAL & BIOLOGICAL ENGINEERING: AGRICULTURAL ENGINEERING, BS

for the degree of Bachelor of Science in Agricultural & Biological Engineering, Agricultural Engineering Concentration

Agricultural Engineering Concentration

Students pursuing B.S. Degree in Agricultural and Biological Engineering choose from one of two concentrations, one of which is the concentration in *Agricultural Engineering*. This concentration includes the integration of physical and biological sciences as a foundation for engineering applications in agriculture, food systems, energy, natural resources, the environment, and related biological systems. Students pursuing this concentration are involved in the design of systems for renewable energy, off-road equipment, water quality, and the utilization and protection of soil and water resources. Important design constraints are economics, conservation of materials and energy, safety, and environmental quality. Within this concentration, students are strongly encouraged to select a set of coherent courses that constitutes a specialization in their area of career interest either from the following list or a customized area chosen in consultation with an advisor.

- Bioenvironmental Engineering
- Renewable Energy Systems
- Off-Road Equipment Engineering
- Soil and Water Resources Engineering

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Graduation Requirements

Minimum Overall GPA: 2.0

Minimum hours required for graduation: 128 hours

General education: Students must complete the Campus General Education requirements including the campus general education language requirement. One of the SBS courses must be an introductory economics course (ECON 102 or ECON 103 or ACE 100). ABE 469 will satisfy a technical core course and the Campus General Education Advanced Composition requirement. Orientation and Professional Development

Code	Title	Hours
ABE 100	Intro Agric & Biological Engrg	1
ENG 100	Grainger Engineering Orientation Seminar (External transfer students take ENG 300.)	1
Total Hours		2

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
For Both Concentrations:		
ABE 141	ABE Principles: Biological	2
ABE 223	ABE Principles: Machine Syst	2
ABE 224	ABE Principles: Soil & Water	2
ABE 225	ABE Principles: Bioenvironment	2
ABE 226	ABE Principles: Bioprocessing	2
ABE 430	Project Management	2
ABE 469	Capstone Design Experience (satisfies the general education advanced composition requirement)	4
CS 101	Intro Computing: Engrg & Sci	3
ECE 205	Electrical and Electronic Circuits	3
SE 101	Engineering Graphics & Design	3
TAM 211	Statics	3
TAM 212	Introductory Dynamics	3
Total Hours		31

Concentration

Code	Title	Hours
Student chooses 1 of 2 Concentrations listed below.		35-36
Agricultural Engineering		35-36
Biological Engineering		35

Free Electives

Code	Title	Hours
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/)		10-11
Total Hours of Curriculum to Graduate		128

Agricultural Engineering Concentration Requirements

Code	Title	Hours
Required courses for the Agricultural Engineering Concentration Core:		14-15
ABE 340	Thermodynamics for Agricultural and Biological Engineering	4
TAM 251	Introductory Solid Mechanics	3
Select one of the following:		3-4

ABE 440	Applied Statistical Methods I (the extra 1 credit hour may be used towards free electives.)	4	FSHN 481	Food Processing Unit Operations I	2
CEE 202	Engineering Risk & Uncertainty	3	FSHN 482	Food Processing Unit Operations I Lab	1
IE 300	Analysis of Data	3	FSHN 483	Food Processing Unit Operations II	2
STAT 400	Statistics and Probability I (the extra 1 credit hour may be used towards free electives.)	4	FSHN 484	Food Processing Unit Operations II Lab	1
Select one of the following:		4	GEOL 107	Physical Geology	4
ME 310	Fundamentals of Fluid Dynamics	4	GEOL 380	Environmental Geology	4
TAM 335	Introductory Fluid Mechanics	4	GGIS 379	Introduction to Geographic Information Systems	4
Electives		21	HORT 100	Introduction to Horticulture	3
From Departmentally Approved List of Electives, to include: 6 hours of Biological and Natural Sciences Electives and 15 hours of Technical Electives.			HORT 341	Greenhouse Mgmt and Production	4
Biological and Natural Sciences Electives (at least 3 hours at 300 or 400 level)		6	HORT 344	Planting for Biodiversity and Aesthetics	3
ANSC 100	Intro to Animal Sciences	4	HORT 360	Vegetable Crop Production	3
ANSC 221	Cells, Metabolism and Genetics	3	HORT 361	Small Fruit Production	2
ANSC 350	Cellular Metabolism in Animals	3	HORT 362	Tree Fruit Production	2
ANSC 350	Cellular Metabolism in Animals	3	HORT 363	Postharvest Handling Hort Crop	2
ANSC 363	Behavior of Domestic Animals	4	HORT 421	Horticultural Physiology	4
ANSC 400	Dairy Herd Management	3	HORT 435	Urban Food Production	3
ANSC 401	Beef Production	3	IB 103	Introduction to Plant Biology	4
ANSC 402	Sheep and Goat Production	3	IB 150	Organismal & Evolutionary Biol	4
ANSC 403	Pork Production	3	IB 151	Organismal & Evol Biol Lab	1
ANSC 404	Poultry Science	3	IB 203	Ecology	4
ANSC 406	Zoo Animal Conservation Sci	3	IB 329	Animal Behavior	3
ANSC 450	Comparative Immunobiology	4	IB 335	Plant Systematics	4
ATMS 201	General Physical Meteorology	3	IB 411	Bioinspiration	3
ATMS 307	Climate Processes	3	IB 420	Plant Physiology	3
CHEM 232	Elementary Organic Chemistry I	3 or 4	IB 439	Biogeography	3
CHEM 233	Elementary Organic Chem Lab I	2	IB 444	Insect Ecology	3 or 4
CHEM 312	Inorganic Chemistry	3	IB 452	Ecosystem Ecology	3
CHEM 332	Elementary Organic Chem II	4	IB 482	Insect Pest Management	3
CHEM 360	Chemistry of the Environment	3	IB 485		
CHEM 460	Green Chemistry	3 or 4	IB 486		
CPSC 112	Introduction to Crop Sciences	4	MCB 100	Introductory Microbiology	3
CPSC 261	Biotechnology in Agriculture	3	MCB 101	Intro Microbiology Laboratory	2
CPSC 265	Genetic Engineering Lab	3	MCB 150	Molec & Cellular Basis of Life	4
CPSC 270	Applied Entomology	3	MCB 151	Molec & Cellular Laboratory	1
CPSC 352	Plant Genetics	4	MCB 244	Human Anatomy & Physiology I	3
CPSC 414	Forage Crops & Pasture Ecology	3	MCB 245	Human Anat & Physiol Lab I	2
CPSC 415	Bioenergy Crops	3	MCB 250	Molecular Genetics	3
CPSC 418	Crop Growth and Management	3	MCB 251	Exp Techniqs in Molecular Biol	2
CPSC 431	Plants and Global Change	3	MCB 252	Cells, Tissues & Development	3
CPSC 437	Principles of Agroecology	3	MCB 253	Exp Techniqs in Cellular Biol	2
CPSC 473	Mgmt of Field Crop Insects	3	MCB 300	Microbiology	3
FSHN 101	The Science of Food and How it Relates to You	3	MCB 301	Experimental Microbiology	3
FSHN 414	Food Chemistry	3	MCB 314	Introduction to Neurobiology	3
FSHN 416	Food Chemistry Laboratory	3	MCB 316	Genetics and Disease	4
FSHN 471	Food & Industrial Microbiology	3	MCB 450	Introductory Biochemistry	3
			NRES 201	Introductory Soils	4
			NRES 219	Applied Ecology	3
			NRES 348	Fish and Wildlife Ecology	3
			NRES 351	Introduction to Environmental Chemistry	3
			NRES 419	Env and Plant Ecosystems	3
			NRES 420	Restoration Ecology	4

NRES 429	Aquatic Ecosystem Conservation	3	CEE 434	Environmental Systems I	3
NRES 439	Env and Sustainable Dev	3	CEE 437	Water Quality Engineering	3
NRES 471	Pedology	3	CEE 440	Fate Cleanup Environ Pollutant	4
NRES 475	Environmental Microbiology	3	CEE 442	Environmental Engineering Principles, Physical	4
NRES 487	Soil Chemistry	3	CEE 443	Env Eng Principles, Chemical	4
NRES 488	Soil Fertility and Fertilizers	3	CEE 444	Env Eng Principles, Biological	4
PLPA 405	Plant Disease Diagnosis & Mgmt	3	CEE 446		
Technical electives chosen in consultation with an advisor. At least 8 hours must be Agricultural and Biological Engineering courses.		15	CEE 447	Atmospheric Chemistry	4
ABE 341	Transport Processes in ABE	3	CEE 449	Environmental Engineering Lab	3
ABE 361	Functional Analysis and Design of Agricultural Machine Systems	3	CEE 450	Surface Hydrology	3
ABE 425	Engrg Measurement Systems	4	CEE 451	Environmental Fluid Mechanics	3
ABE 426	Principles of Mobile Robotics	4	CEE 452	Hydraulic Analysis and Design	3
ABE 436	Renewable Energy Systems	3 or 4	CEE 453	Urban Hydrology and Hydraulics	4
ABE 446	Biological Nanoengineering	3 or 4	CEE 457	Groundwater	3
ABE 450	International Water Project I	3	CEE 458	Water Resources Field Methods	4
ABE 451	International Water Project II	3	CEE 461	Reinforced Concrete I	3
ABE 452	Engineering for Disaster Resilience	3 or 4	CEE 463	Reinforced Concrete II	3 or 4
ABE 454	Environmental Soil Physics	3	CEE 465	Design of Structural Systems	3
ABE 455	Erosion and Sediment Control	2	CEE 470	Structural Analysis	4
ABE 456	Land & Water Resources Engrg	3 or 4	CEE 483	Soil Mechanics and Behavior	4
ABE 457	NPS Pollution Processes	2	CEE 484	Applied Soil Mechanics	3 or 4
ABE 458	NPS Pollution Modeling	2	CS 466	Introduction to Bioinformatics	3 or 4
ABE 459	Drainage and Water Management	3 or 4	ECE 206	Electrical and Electronic Circuits Lab	1
ABE 463			ECE 333	Green Electric Energy	3
ABE 466	Engineering Off-Road Vehicles	3	ECE 468	Optical Remote Sensing	3
ABE 474			ECE 470	Introduction to Robotics	4
ABE 476	Indoor Air Quality Engineering	4	ECE 481	Nanotechnology	4
ABE 482	Package Engineering	3	ENG 471	Seminar Energy & Sustain Engrg	1
ABE 483	Engineering Properties of Food Materials	3	SE 320	Control Systems	4
ABE 488	Bioprocessing Biomass for Fuel	4	SE 423	Mechatronics	3
BIOE 416	Biosensors	3	IE 431	Design for Six Sigma	3
BIOE 461	Cellular Biomechanics	4	ME 320	Heat Transfer	4
BIOE 467	Biophotonics	3	ME 330	Engineering Materials	4
BIOE 476	Tissue Engineering	3	ME 340	Dynamics of Mechanical Systems	3.5
CHBE 221	Principles of CHE	3	ME 370	Mechanical Design I	3
CHBE 422	Mass Transfer Operations	4	ME 371	Mechanical Design II	3
CHBE 424	Chemical Reaction Engineering	3	ME 400	Energy Conversion Systems	3 or 4
CHBE 471	Biochemical Engineering	3 or 4	ME 402	Design of Thermal Systems	3 or 4
CHBE 472	Techniques in Biomolecular Eng	3 or 4	ME 403	Internal Combustion Engines	3 or 4
CHBE 473	Biomolecular Engineering	3 or 4	ME 461	Computer Cntrl of Mech Systems	3 or 4
CHBE 475	Tissue Engineering	3	ME 483	Mechanobiology	4
CHBE 476	Biotransport	3	MSE 280	Engineering Materials	3
CHBE 478	Bioenergy Technology	3	MSE 401	Thermodynamics of Materials	3
CEE 300	Behavior of Materials	4	MSE 470	Design and Use of Biomaterials	3
CEE 330	Environmental Engineering	3	MSE 473	Biomolecular Materials Science	3
CEE 350	Water Resources Engineering	3	MSE 474	Biomaterials and Nanomedicine	3
CEE 360	Structural Engineering	3	MSE 489	Matl Select for Sustainability	3 or 4
CEE 380	Geotechnical Engineering	3	NPRES 201	Energy Systems	2 or 3
CEE 430	Ecological Quality Engineering	2	NPRES 470	Fuel Cells & Hydrogen Sources	3
CEE 432	Stream Ecology	3 or 4	NPRES 475	Wind Power Systems	3 or 4

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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. The curriculum sequence can also be viewed via dynamic and static curricular maps (<https://grainger.illinois.edu/academics/undergraduate/majors-and-minors/abe-ag-engr-map/>), which include prerequisite sequencing.

Students must fulfill their Language Other Than English requirement by successfully completing a third level of a language other than English. See the corresponding section on the Degree and General Education Requirements (<http://catalog.illinois.edu/general-information/degree-general-education-requirements/>). One of the SBS courses must be an introductory economics course (ECON 102 or ECON 103 or ACE 100). ABE 469 will satisfy a technical core course and the Campus General Education Advanced Composition requirement.

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 100		1 ABE 141	2
MATH 221 (MATH 220 may be substituted)		4 MATH 231	3
CHEM 102		3 CHEM 104	3
CHEM 103		1 CHEM 105	1
ENG 100		1 PHYS 211	4
Composition I course or SE 101		4-3 SE 101 or Composition I course	3-4
		14	16

Second Year

First Semester	Hours	Second Semester	Hours
ABE 223		2 ABE 225	2
MATH 241		4 MATH 285	3
ABE 224		2 ABE 226	2
TAM 211		3 TAM 212	3
CS 101		3 PHYS 212	4

ECON 102 or ECON 103 or ACE 100 (Counts as General Education Elective)	3-4 General Education course (choose a Humanities or Social/Behavioral Science course with Cultural Studies designation)	3
	17	17

Third Year

First Semester	Hours	Second Semester	Hours
ABE 340		4 CEE 202, IE 300, ABE 440, or STAT 400	3
MATH 257		3 Biological and Natural Sciences Elective course	3
Agricultural and Biological Engineering Technical Elective course		3 Agricultural and Biological Engineering Technical Elective course	3
TAM 335 or ME 310		4 TAM 251	3
ECE 205		3 Free elective course	4
		17	16

Fourth Year

First Semester	Hours	Second Semester	Hours
ABE 430		2 ABE 469	4
Biological and Natural Sciences Elective course		3 Technical Elective course	3
Agricultural and Biological Engineering Technical Elective course		3 Technical Elective course	3
General Education course (choose a Humanities or Social/Behavioral Science course with Cultural Studies designation)		3 General Education course (choose a Humanities or Social/Behavioral Science course with Cultural Studies designation)	3
Language Other Than English (3rd level) course		4 Free elective course	3
		15	16

Total Hours 128

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Agricultural & Biological Engineering

Agricultural & Biological Engineering Website (<https://abe.illinois.edu/>)
1304 W. Pennsylvania Ave.
Urbana, IL 61801
217-333-3570
Email: 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
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ABE Advising Website (<https://abe.illinois.edu/academics/advising/>)

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