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 ABET-accredited 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.

The Department of Agricultural and Biological Engineering offers programs through the College of ACES and The Grainger College of Engineering.

Students pursuing the B.S. Degree in Agricultural and Biological Engineering choose from one of two concentrations, one of which is the concentration in Biological Engineering. This concentration integrates biology and engineering to provide solutions to problems related to living systems (plants, animals, and microorganisms). Engineered biological systems vary widely in scale. At the molecular level, nanometer-scale devices consist of a few biomolecules inside individual cells. At the other extreme, regionally-scaled complex ecosystems depend upon multiple species of interacting living organisms. Such systems are becoming increasingly important in areas such as bioenergy, bioprocessing, nanotechnology, biosensing, bio-informatics, and bioenvironment. 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
- Ecological Engineering
- Food and Bioprocess Engineering
- Nanoscale Biological Engineering

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

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<tr>
<th>Code</th>
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<td>ABE 100</td>
<td>Intro Agric &amp; Biological Engrg</td>
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<td>Grainger Engineering Orientation Seminar</td>
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<td>(External transfer students take ENG 300.)</td>
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Foundational Mathematics and Science

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<tr>
<td>CHEM 102</td>
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<td>CHEM 103</td>
<td>General Chemistry Lab I</td>
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<td>General Chemistry II</td>
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<td>CHEM 105</td>
<td>General Chemistry Lab II</td>
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<tr>
<td>MATH 221</td>
<td>Calculus I (MATH 220 may be substituted.</td>
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<tr>
<td></td>
<td>MATH 220 is appropriate for students with</td>
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</tr>
<tr>
<td></td>
<td>no background in calculus. 4 of 5 credit</td>
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</tr>
<tr>
<td></td>
<td>hours count towards degree.)</td>
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<tr>
<td>MATH 231</td>
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<td>MATH 241</td>
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<tr>
<td>MATH 257</td>
<td>Linear Algebra with Computational</td>
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<tr>
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<td>Applications</td>
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<td>MATH 285</td>
<td>Intro Differential Equations</td>
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<td>PHYS 211</td>
<td>University Physics: Mechanics</td>
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<td>PHYS 212</td>
<td>University Physics: Elec &amp; Mag</td>
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Agricultural and Biological Engineering Technical Core

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

Information listed in this catalog is current as of 10/2023
Concentration

Student chooses 1 of 2 Concentrations listed below.

- Agricultural Engineering: 35-36
- Biological Engineering: 35

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/)

Total Hours of Curriculum to Graduate: 128

Biological Engineering Concentration Requirements

Required courses for ABE Biological Engineering Concentration Core: 14

- ABE 340 Thermodynamics for Agricultural and Biological Engineering: 4
- ABE 341 Transport Processes in ABE: 3
- CHEM 232 Elementary Organic Chemistry I (may be taken for 4 credit hours; the extra hour may be used to help meet free elective requirements): 3
- MCB 150 Molec & Cellular Basis of Life: 4

Electives: 21

From Departmentally Approved List of Electives, to include: 6 hours of Biological and Natural Sciences Electives and 15 hours of Technical Electives.

Biological and Natural Science Electives. Three of the six credit hours must be at the 300 or 400 level. Must include one course with a lab component.

- ANSC 100 Intro to Animal Sciences: 4
- ANSC 221 Cells, Metabolism and Genetics: 3
- ANSC 350 Cellular Metabolism in Animals: 3
- ANSC 363 Behavior of Domestic Animals: 4
- ANSC 400 Dairy Herd Management: 3
- ANSC 401 Beef Production: 3
- ANSC 402 Sheep and Goat Production: 3
- ANSC 403 Pork Production: 3
- ANSC 404 Poultry Science: 3
- ANSC 406 Zoo Animal Conservation Sci: 3
- ANSC 450 Comparative Immunobiology: 4
- ATMS 201 General Physical Meteorology: 3
- ATMS 307 Climate Processes: 3
- CHEM 233 Elementary Organic Chem Lab I: 2
- CHEM 312 Inorganic Chemistry: 3
- CHEM 332 Elementary Organic Chem II: 4
- CHEM 360 Chemistry of the Environment: 3
- CHEM 460 Green Chemistry: 3 or 4
- CPSC 112 Introduction to Crop Sciences: 4
- CPSC 261 Biotechnology in Agriculture: 3
- CPSC 265 Genetic Engineering Lab: 3
- CPSC 270 Applied Entomology: 3
- CPSC 352 Plant Genetics: 4
- CPSC 414 Forage Crops & Pasture Ecology: 3
- CPSC 415 Bioenergy Crops: 3
- CPSC 418 Crop Growth and Management: 3
- CPSC 431 Plants and Global Change: 3
- CPSC 437 Principles of Agroecology: 3
- CPSC 473 Mgmt of Field Crop Insects: 3
- FSHN 101 The Science of Food and How it Relates to You: 3
- FSHN 414 Food Chemistry: 3
- FSHN 416 Food Chemistry Laboratory: 3
- FSHN 471 Food & Industrial Microbiology: 3
- FSHN 481 Food Processing Unit Operations I: 2
- FSHN 482 Food Processing Unit Operations I Lab: 1
- FSHN 483 Food Processing Unit Operations II: 2
- FSHN 484 Food Processing Unit Operations II Lab: 1
- GEOL 107 Physical Geology: 4
- GEOL 380 Environmental Geology: 4
- GGIS 379 Introduction to Geographic Information Systems: 4
- HORT 100 Introduction to Horticulture: 3
- HORT 341 Greenhouse Mgmt and Production: 4
- HORT 441 Planting for Biodiversity and Aesthetics: 3
- HORT 360 Vegetable Crop Production: 3
- HORT 361 Small Fruit Production: 2
- HORT 362 Tree Fruit Production: 2
- HORT 363 Postharvest Handling Hort Crop: 2
- HORT 421 Horticultural Physiology: 4
- HORT 435 Urban Food Production: 3
- IB 103 Introduction to Plant Biology: 4
- IB 150 Organismal & Evolutionary Biol: 4
- IB 151 Organismal & Evol Biol Lab: 1
- IB 203 Ecology: 4
- IB 329 Animal Behavior: 3
- IB 335 Plant Systematics: 4
- IB 411 Bioinspiration: 3
- IB 420 Plant Physiology: 3
- IB 439 Biogeography: 3
- IB 444 Insect Ecology: 3 or 4
- IB 452 Ecosystem Ecology: 3
- IB 482 Insect Pest Management: 3
- IB 485
- IB 486
- MCB 100 Introductory Microbiology: 3
- MCB 101 Intro Microbiology Laboratory: 1
- MCB 244 Human Anatomy & Physiology I: 3
- MCB 245 Human Anat & Physiol Lab I: 2
- MCB 250 Molecular Genetics: 3
- MCB 251 Exp Technqs in Molecular Biol: 2
- MCB 252 Cells, Tissues & Development: 3
- MCB 253 Exp Technqs in Cellular Biol: 2

Information listed in this catalog is current as of 10/2023
Technical electives chosen in consultation with an advisor. At least 8 hours must be Agricultural and Biological Engineering Technical Electives. Must include one course with a lab component.

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>MCB 300</td>
<td>Microbiology</td>
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<tr>
<td>MCB 301</td>
<td>Experimental Microbiology</td>
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<tr>
<td>MCB 314</td>
<td>Introduction to Neurobiology</td>
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<tr>
<td>MCB 316</td>
<td>Genetics and Disease</td>
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<tr>
<td>MCB 450</td>
<td>Introductory Biochemistry</td>
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<tr>
<td>NRES 201</td>
<td>Introductory Soils</td>
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<tr>
<td>NRES 219</td>
<td>Applied Ecology</td>
<td>3</td>
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<tr>
<td>NRES 348</td>
<td>Fish and Wildlife Ecology</td>
<td>3</td>
</tr>
<tr>
<td>NRES 351</td>
<td>Introduction to Environmental Chemistry</td>
<td>3</td>
</tr>
<tr>
<td>NRES 419</td>
<td>Env and Plant Ecosystems</td>
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<tr>
<td>NRES 420</td>
<td>Restoration Ecology</td>
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<td>NRES 429</td>
<td>Aquatic Ecosystem Conservation</td>
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<td>NRES 471</td>
<td>Pedology</td>
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<tr>
<td>NRES 475</td>
<td>Environmental Microbiology</td>
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<tr>
<td>NRES 487</td>
<td>Soil Chemistry</td>
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<tr>
<td>NRES 488</td>
<td>Soil Fertility and Fertilizers</td>
<td>3</td>
</tr>
<tr>
<td>PLPA 405</td>
<td>Plant Disease Diagnosis &amp; Mgmt</td>
<td>3</td>
</tr>
</tbody>
</table>

CHBE 473 | Biomolecular Engineering                                      | 3 or 4  |
CHBE 475 | Tissue Engineering                                            | 3       |
CHBE 476 | Biotransport                                                 | 3       |
CHBE 478 | Bioenergy Technology                                         | 3       |
CEE 300  | Behavior of Materials                                        | 4       |
CEE 330  | Environmental Engineering                                    | 3       |
CEE 350  | Water Resources Engineering                                 | 3       |
CEE 360  | Structural Engineering                                      | 3       |
CEE 380  | Geotechnical Engineering                                   | 3       |
CEE 430  | Ecological Quality Engineering                               | 2       |
CEE 432  | Stream Ecology                                              | 3 or 4  |
CEE 434  | Environmental Systems I                                     | 3       |
CEE 437  | Water Quality Engineering                                   | 3       |
CEE 440  | Fate Cleanup Environ Pollutant                              | 4       |
CEE 442  | Environmental Engineering Principles, Physical                | 4       |
CEE 443  | Env Eng Principles, Chemical                                 | 4       |
CEE 444  | Env Eng Principles, Biological                               | 4       |
CEE 446  | Atmospheric Chemistry                                        | 4       |
CEE 449  | Environmental Engineering Lab                                 | 3       |
CEE 450  | Surface Hydrology                                           | 3       |
CEE 451  | Environmental Fluid Mechanics                                | 3       |
CEE 452  | Hydraulic Analysis and Design                                | 3       |
CEE 453  | Urban Hydrology and Hydraulics                               | 4       |
CEE 457  | Groundwater                                                  | 3       |
CEE 458  | Water Resources Field Methods                                | 4       |
CEE 461  | Reinforced Concrete I                                        | 3       |
CEE 463  | Reinforced Concrete II                                       | 3 or 4  |
CEE 465  | Design of Structural Systems                                 | 3       |
CEE 470  | Structural Analysis                                         | 4       |
CEE 483  | Soil Mechanics and Behavior                                  | 4       |
CEE 484  | Applied Soil Mechanics                                       | 3 or 4  |
CS 466   | Introduction to Bioinformatics                                | 3 or 4  |
ECE 206  | Electrical and Electronic Circuits Lab                        | 1       |
ECE 333  | Green Electric Energy                                        | 3       |
ECE 468  | Optical Remote Sensing                                       | 3       |
ECE 470  | Introduction to Robotics                                    | 4       |
ECE 481  | Nanotechnology                                               | 4       |
ENG 471  | Seminar Energy & Sustain Engrg                               | 1       |
SE 320   | Control Systems                                             | 4       |
SE 423   | Mechatronics                                                | 3       |
IE 431   | Design for Six Sigma                                        | 3       |
ME 320   | Heat Transfer                                                | 4       |
ME 330   | Engineering Materials                                        | 4       |
ME 340   | Dynamics of Mechanical Systems                               | 3.5     |
ME 370   | Mechanical Design I                                          | 3       |
ME 371   | Mechanical Design II                                        | 3       |
ME 400   | Energy Conversion Systems                                   | 3 or 4  |
ME 402   | Design of Thermal Systems                                   | 3 or 4  |
ME 403   | Internal Combustion Engines                                 | 3 or 4  |
ME 461   | Computer Cntrl of Mech Systems                               | 3 or 4  |
Agricultural & Biological Engineering: Biological Engineering, BS

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-bio-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.

Suggested Sequence

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<th>First Year</th>
<th>Hours</th>
<th>First Semester</th>
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<td>CHEM 104</td>
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Information listed in this catalog is current as of 10/2023
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<th>General Education course (choose a Humanities or Social/Behavioral Science course with Cultural Studies designation)</th>
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<td><strong>Total Hours</strong></td>
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*for the degree of Bachelor of Science in Agricultural & Biological Engineering, Biological Engineering Concentration*

**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**
128 Mumford Hall
1301 West Gregory Drive
Urbana, IL 61801

**Advising**
Phone: 217-333-3570
Email: tsm-etm-abe-advising@rt.aces.illinois.edu
ABE Advising Website (https://abe.illinois.edu/academics/advising/)

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

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