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

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

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

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>ABE 100</td>
<td>Intro Agric &amp; Biological Engr</td>
<td>1</td>
</tr>
<tr>
<td>ENG 100</td>
<td>Grainger Engineering Orientation Seminar (External transfer students take ENG 300.)</td>
<td>1</td>
</tr>
</tbody>
</table>

Total Hours: 2

Foundational Mathematics and Science

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM 102</td>
<td>General Chemistry I</td>
<td>3</td>
</tr>
<tr>
<td>CHEM 103</td>
<td>General Chemistry Lab I</td>
<td>1</td>
</tr>
<tr>
<td>CHEM 104</td>
<td>General Chemistry II</td>
<td>3</td>
</tr>
</tbody>
</table>

Total Hours: 33

Agricultural and Biological Engineering Technical Core

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>ABE 141</td>
<td>ABE Principles: Biological</td>
<td>2</td>
</tr>
<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>
</tr>
<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</td>
<td>4</td>
</tr>
<tr>
<td>CS 101</td>
<td>Intro Computing: Engr &amp; Sci</td>
<td>3</td>
</tr>
<tr>
<td>ECE 205</td>
<td>Electrical and Electronic Circuits</td>
<td>3</td>
</tr>
<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>
<td>3</td>
</tr>
</tbody>
</table>

Total Hours: 31

Concentration

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>ABE 340</td>
<td>Thermodynamics for Agricultural and Biological Engineering</td>
<td>4</td>
</tr>
<tr>
<td>TAM 251</td>
<td>Introductory Solid Mechanics</td>
<td>3</td>
</tr>
</tbody>
</table>

Select one of the following:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM 105</td>
<td>General Chemistry Lab II</td>
<td>1</td>
</tr>
<tr>
<td>MATH 221</td>
<td>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.)</td>
<td>4</td>
</tr>
<tr>
<td>MATH 231</td>
<td>Calculus II</td>
<td>3</td>
</tr>
<tr>
<td>MATH 241</td>
<td>Calculus III</td>
<td>4</td>
</tr>
<tr>
<td>MATH 257</td>
<td>Linear Algebra with Computational Applications</td>
<td>3</td>
</tr>
<tr>
<td>MATH 285</td>
<td>Intro Differential Equations</td>
<td>3</td>
</tr>
<tr>
<td>PHYS 211</td>
<td>University Physics: Mechanics</td>
<td>4</td>
</tr>
<tr>
<td>PHYS 212</td>
<td>University Physics: Elec &amp; Mag</td>
<td>4</td>
</tr>
</tbody>
</table>

Total Hours: 128

Information listed in this catalog is current as of 07/2023
ABE 440  Applied Statistical Methods I (the extra 1 credit hour may be used towards free electives.)  4
CEE 202  Engineering Risk & Uncertainty  3
IE 300  Analysis of Data  3
STAT 400  Statistics and Probability I (the extra 1 credit hour may be used towards free electives.)  4

Select one of the following:  4
ME 310  Fundamentals of Fluid Dynamics  4
TAM 335  Introductory Fluid Mechanics  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 Sciences Electives (at least 3 hours at 300 or 400 level)  6

ANSC 100  Intro to Animal Sciences  4
ANSC 221  Cells, Metabolism and Genetics  3
ANSC 350  Cellular Metabolism in Animals  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  Poultry 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 232  Elementary Organic Chemistry I  3 or 4
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
FHSN 101  The Science of Food and How it Relates to You  3
FHSN 414  Food Chemistry  3
FHSN 416  Food Chemistry Laboratory  3
FHSN 471  Food & Industrial Microbiology  3
FHSN 481  Food Processing Unit Operations I  2
FHSN 482  Food Processing Unit Operations I Lab  1
FHSN 483  Food Processing Unit Operations II  2
FHSN 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 344  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  2
MCB 150  Molec & Cellular Basis of Life  4
MCB 151  Molec & Cellular 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
MCB 300  Microbiology  3
MCB 301  Experimental Microbiology  3
MCB 314  Introduction to Neurobiology  3
MCB 316  Genetics and Disease  4
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

Information listed in this catalog is current as of 07/2023
Technical electives chosen in consultation with an advisor. At least 8 hours must be Agricultural and Biological Engineering courses.

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

Information listed in this catalog is current as of 07/2023
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.

<table>
<thead>
<tr>
<th>First Year</th>
<th>First Semester</th>
<th>Hours</th>
<th>Second Semester</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>ABE 100</td>
<td>4</td>
<td></td>
<td>ABE 141</td>
<td>2</td>
</tr>
<tr>
<td>MATH 221</td>
<td>4</td>
<td></td>
<td>MATH 231</td>
<td>3</td>
</tr>
<tr>
<td>(MATH 220 may be substituted)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CHEM 102</td>
<td>3</td>
<td></td>
<td>CHEM 104</td>
<td>3</td>
</tr>
<tr>
<td>CHEM 103</td>
<td>1</td>
<td></td>
<td>CHEM 105</td>
<td>1</td>
</tr>
<tr>
<td>ENG 100</td>
<td>1</td>
<td></td>
<td>PHYS 211</td>
<td>4</td>
</tr>
<tr>
<td>Composition I or SE 101</td>
<td>4-3</td>
<td></td>
<td>SE 101 or Composition I course</td>
<td>3-4</td>
</tr>
<tr>
<td></td>
<td>14</td>
<td></td>
<td></td>
<td>16</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Second Year</th>
<th>First Semester</th>
<th>Hours</th>
<th>Second Semester</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>ABE 223</td>
<td>2</td>
<td></td>
<td>ABE 225</td>
<td>2</td>
</tr>
<tr>
<td>MATH 241</td>
<td>4</td>
<td></td>
<td>MATH 285</td>
<td>3</td>
</tr>
<tr>
<td>ABE 224</td>
<td>2</td>
<td></td>
<td>ABE 226</td>
<td>2</td>
</tr>
<tr>
<td>TAM 211</td>
<td>3</td>
<td></td>
<td>TAM 212</td>
<td>3</td>
</tr>
<tr>
<td>CS 101</td>
<td>3</td>
<td></td>
<td>PHYS 212</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>15</td>
<td></td>
<td></td>
<td>16</td>
</tr>
</tbody>
</table>

Total Hours 128

Information listed in this catalog is current as of 07/2023