BIOLOGICAL AND AGRICULTURAL ENGINEERING - BS

Graduates from the Biological and Agricultural Engineering program will:

- Successfully enter the biological and agricultural engineering profession as practicing engineers and consultants in the natural resources, machine systems, food processing, bioprocessing, and agricultural production and processing fields.
- Pursue graduate education and research at major universities in biological and agricultural engineering, and related fields.
- Advance into leadership positions in their chosen fields and professional societies.
- Engage in life-long learning through professional registration and professional development.

Students learn to apply fundamental knowledge of biological and physical sciences, mathematics, and engineering principles to formulate and solve engineering problems. Engineering design is integrated throughout the curriculum, along with opportunities to develop communication, learning, and teamwork skills, culminating in a capstone design experience. Electives in the curriculum allow the student to focus in one of the following areas:

- **Environmental and Natural Resources Engineering**—design and management of systems affecting soil, water, and air resources.
- **Renewable Energy Engineering**—design and development of biomass, wind and solar energy systems.
- **Food and Bioprocess Engineering**—design and development of systems for processing and handling of food and agricultural products and processes involving cells, enzymes, or other biological components.
- **Machine Systems Engineering**—design and development of machines and machine systems for food, feed and fiber production and processing.

Students select courses with the assistance of faculty advisors in an individualized advising system. Faculty members also assist with professional development and job placement for students.

The biological and agricultural engineering program is jointly administered by the College of Agriculture and Life Sciences and the College of Engineering, and the curriculum is fully accredited by the Engineering Accreditation Commission of ABET, Inc., www.abet.org. The department is one of the largest in North America and is consistently ranked as one of the top programs in the nation.

For graduates to become successful practicing biological and agricultural engineers, students need to acquire a set of skills, knowledge, and behaviors as they progress through the curriculum. We have established the following program outcomes outlining what students are expected to know and be able to do upon completion of the curriculum. At the time of graduation, students should have:

1. an ability to apply knowledge of mathematics, science and engineering;
2. an ability to design and conduct experiments, as well as to analyze and interpret data;
3. an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability;
4. an ability to function on interdisciplinary teams;
5. an ability to identify, formulate, and solve engineering problems;
6. an understanding of professional and ethical responsibility;
7. an ability to communicate effectively;
8. the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context;
9. a recognition of the need for, and an ability to engage in life-long learning;
10. a knowledge of contemporary issues;
11. an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

**Biological and Agricultural Engineering is accredited by the Accreditation Board for Engineering and Technology (ABET).**

### Program Requirements

#### First Year

<table>
<thead>
<tr>
<th>Semester</th>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall</td>
<td>CHEM 107</td>
<td>General Chemistry for Engineering Students</td>
<td>3</td>
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<td>CHEM 117</td>
<td>General Chemistry for Engineering Students Laboratory</td>
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<td></td>
<td>MATH 151</td>
<td>Engineering Mathematics I ¹</td>
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<td>ENGR 102</td>
<td>Engineering Lab I - Computation</td>
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<td>ENGL 104</td>
<td>Composition and Rhetoric</td>
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<td>American history (<a href="http://catalog.tamu.edu/undergraduate/general-information/university-core-curriculum/#american-history">http://catalog.tamu.edu/undergraduate/general-information/university-core-curriculum/#american-history</a>) ²</td>
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#### Spring

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<tr>
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<td>MATH 152</td>
<td>Engineering Mathematics II</td>
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<td>ENGL 210</td>
<td>Technical and Business Writing</td>
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<td>POLS 206</td>
<td>American National Government</td>
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<td>ENGR 216/</td>
<td>Experimental Physics and Engineering Lab II: Mechanics</td>
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<td>PHYS 216</td>
<td>Newtonian Mechanics for Engineering and Science</td>
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#### Second Year

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<td>MATH 251</td>
<td>Engineering Mathematics III</td>
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<td>BIOL 113</td>
<td>Essentials in Biology</td>
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<td>MEEN 221</td>
<td>Statics and Particle Dynamics</td>
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<td>MEEN 222/</td>
<td>Materials Science</td>
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<td>MSEN 222</td>
<td>Electricity and Magnetism for Engineering and Science</td>
<td>3</td>
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<td>PHYS 207</td>
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<td>ENGR 217/PHYS 217</td>
<td>Experimental Physics and Engineering Lab III - Electricity and Magnetism</td>
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### Spring

- BAEN 201 Analysis of Biological and Agricultural Engineering Problems 3
- BAEN 301 Biological and Agricultural Engineering Fundamentals I 3
- BAEN 320 Engineering Thermodynamics 3
- CVEN 305 Mechanics of Materials 3
- MATH 308 Differential Equations 3
- CHEM 222 Elements of Organic and Biological Chemistry 3

**Semester Credit Hours**: 18

### Third Year

#### Fall

- BAEN 302 Biological and Agricultural Engineering Fundamentals II 3
- BAEN 340 Fluid Mechanics 3
- BAEN 354 Engineering Properties of Biological Materials 3
- BAEN 375 Design Fundamentals for Agricultural Machines and Structures 3
- ECEN 215 Principles of Electrical Engineering 3

**Semester Credit Hours**: 15

#### Spring

- BAEN 365 Unit Operations for Biological and Agricultural Engineering 3
- BAEN 366 Transport Processes in Biological Systems 3
- BAEN 370 Measurement and Control of Biological Systems and Agricultural Processes 3
- POLS 207 State and Local Government 3
- Mathematics [link](http://catalog.tamu.edu/undergraduate/course-descriptions/math) 3

**Semester Credit Hours**: 15

### Fourth Year

#### Fall

- BAEN 479 Biological and Agricultural Engineering Design I 3
- ENGR 482/PHIL 482 Ethics and Engineering or Cultural Diversity and Ethics 3
- ENGR elective [link](http://catalog.tamu.edu/undergraduate/course-descriptions/engr) 3
- BAEN elective [link](http://catalog.tamu.edu/undergraduate/course-descriptions/baen) 3
- Social and behavioral sciences [link](http://catalog.tamu.edu/undergraduate/general-information/university-core-curriculum/#social-behavioral-sciences) 3

**Semester Credit Hours**: 15

#### Spring

- BAEN 399 Professional Development 3
- BAEN elective [link](http://catalog.tamu.edu/undergraduate/course-descriptions/baen) 3
- American history [link](http://catalog.tamu.edu/undergraduate/general-information/university-core-curriculum/#american-history) 3
- Creative arts [link](http://catalog.tamu.edu/undergraduate/general-information/university-core-curriculum/#creative-arts) 3
- Technical elective 3

**Semester Credit Hours**: 15

**Total Semester Credit Hours**: 127

1. Entering students will normally be given a placement test in mathematics. Test results will be used in selecting the appropriate starting course which may be at a higher or lower level.
2. The six hours of international and cultural diversity courses, as required for graduation, may be met by courses that also satisfy a core curriculum course.
3. Engineering, mathematics and technical electives must be selected from a departmental approved list in consultation with an academic advisor.
4. All undergraduate students must take at least two (2) specific courses in their major designated as writing intensive.
5. All engineering students are required to complete a high-impact experience in order to graduate. The list of possible high-impact experiences is available in the BAEN advising office.

A grade of C or better is required for all math, science, and engineering courses.