Since 1906, the Department of Biosystems and Agricultural Engineering has responded to the changing needs of society by combining engineering principles with biological sciences in a systems context. We have made significant contributions to Michigan, to the nation, and to the world through our teaching, research, and extension programs. Biosystems engineers at MSU are solving complex, rapidly changing problems related to food quality and safety, natural resource conservation, environmental protection, homeland security, and renewable energy development.

The department is affiliated with the College of Agriculture and Natural Resources (CANR) and the College of Engineering.

### UNDERGRADUATE PROGRAM

The department offers a bachelor of science (BS) degree program through the College of Engineering, as well as a certificate program through the College of Agriculture and Natural Resources (CANR).

**• Biosystems Engineering (BE), a College of Engineering BS degree program**

This ABET-accredited program prepares students to:

- identify and solve problems at the interface of biology and engineering, using modern engineering techniques and the systems approach
- analyze, design, and control components, systems, and processes that involve critical biological components

Students can complete optional concentrations in bioenergy, biomedical, ecosystems, or food engineering. Students also have many opportunities to engage in co- and extracurricular activities, including undergraduate research, corporate internships, and study abroad. BE graduates have a high placement rate and receive competitive salaries. Employers include environmental consulting firms, government agencies, medical companies, bioenergy companies, and the food industry. Many graduates also go on to graduate, medical, or law school. Scholarships are available to students on a competitive basis. During 2010-11, nearly $50,000 in scholarships was awarded to students.

**• Electrical Technology (ET), a CANR certificate program through the Institute of Agricultural Technology**

The ET certificate program prepares students to work as electrical technicians in agricultural as well as industrial settings. They are trained to solve problems related to electrical safety, and to deal with stray voltage.
EXTENSION AND OUTREACH

The department offers many short courses and two-day sessions across the state such as:
- Neutral-to-Earth Voltage Evaluator Training
- Michigan Electrical Code Update
- Agricultural Grounding and Wiring
- Farm Energy Audit
- Onsite Wastewater Systems
- Biofuels

GRADUATE PROGRAMS

The department offers MS and PhD degrees in Biosystems Engineering. Financial support is available for teaching and research assistantships. Currently, 40 graduate research assistantships are supported primarily through external research grants.

RESEARCH

Faculty members are active in a wide range of research:
- Bioenergy/Biobased products
- Animal waste management/Anaerobic digestion
- Nutrient transport and water quality
- Phytoremediation and constructed wetlands
- Small watershed hydrology
- Food quality and safety
- Food processing
- Biosensors and pathogen detection

RESEARCH PARTNERS

- Energy companies
- Food manufacturing companies
- Michigan commodity groups
- Michigan Department of Environmental Quality
- Michigan Economic Development Corp.
- Michigan Public Service Commission
- National Science Foundation
- U.S. Department of Agriculture
- U.S. Department of Homeland Security
Faculty members are internationally recognized experts.
- 18 tenure system faculty members
- 12 academic specialists and support staff

Many faculty members have Michigan State University Extension and AgBioResearch appointments.

PROGRAM HIGHLIGHTS

- **Anaerobic Digestion Research and Education Center (ADREC)**
  The department has received state and foundation grants exceeding $3 million to develop technology for smaller farms to turn animal waste into usable heat, electricity, and other valuable products.

- **Center for Biobased Renewable Energy**
  The department has received funding from the MSU Quality Fund to collaborate with the MSU Departments of Chemical Engineering and Materials Science and Forestry to create a multidisciplinary center to research the conversion of biomass into a renewable energy source. The program also offers courses on the technical, economic, and environmental aspects of producing energy from agricultural and forestry biomass.

- **Biosafety Level-2, Pilot-Scale Food Processing Facility**
  This unique facility meets the research and technology transfer needs for research validation trials, testing with industry partners, and teaching/training that involves pathogenic bacteria subjected to pilot-scale processes. The multidisciplinary researchers involved in this endeavor are committed to improving the safety of processed food products through innovative research, outreach, and training.

- **Algal Research** in the department is focused on algal cultivation to utilize nutrients in waste streams, sequester \( \text{CO}_2 \), and produce value-added biofuels/chemicals. The research outcomes will result in significantly reducing the environmental impacts and enhancing the revenue for agricultural waste treatments.

- **BE students** continue to win prestigious awards, including National Science Foundation Graduate Fellowships, Department of Homeland Security Undergraduate Scholarships, and Science, Mathematics, and Research for Transformation (SMART) fellowships from the Department of Defense.

- The department offers **study abroad programs** in Sweden with a focus on bioenergy and in Australia with a focus on sustainability.

- **The Student Design Showcase** was held for the 14th year in 2011. Student groups present their capstone design projects during an event that is attended by more than 150 people, including industry representatives.

NUMBERS AT A GLANCE

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<th>Category</th>
<th>Number</th>
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<tr>
<td>Total faculty</td>
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<td>Certificate program participants</td>
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FOR MORE INFORMATION

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