
Biosystems and Agricultural Engineering

Engineering for LIFE



Biosystems and agricultural engineers ensure that we have the necessities of life: safe and plentiful food to eat, pure water to drink, renewable fuel and energy sources, and a safe, healthy environment in which to live. More specifically, biosystems and agricultural engineering (BAE) is the link between biological sciences and engineering.

Biosystems and agricultural engineers. . .

- Devise practical, efficient solutions for producing, storing, transporting, processing, and packaging biological and agricultural products
- Solve problems related to systems, processes, and machines that interact with humans, plants, animals, microorganisms, and biological materials.
- Develop solutions for responsible, alternative uses of biological products, byproducts and wastes and of our natural resources - soil, water, air, and energy.

Perhaps you've decided that you'd like to enter the field of engineering but aren't sure which of the disciplines to pursue. The BAE academic program offers a unique and valuable educational experience. While other engineering students may study a single discipline, the BAE program includes coursework in a variety of engineering disciplines, complemented by classes in biological sciences. When they reach their advanced-level courses, BAE students choose a specialty area according to their individual interests.

The environment is fragile and our soil and water resources are vulnerable to degradation by both natural and man-made forces. BAEs with **Bioenvironmental Engineering** expertise understand hydrologic principles and work to design, build, operate and maintain structures to alleviate excess and deficit water conditions. They work on water treatment, irrigation, drainage, wetlands protection, stream restoration, and other water issues.

BAEs in the **Machine Systems Engineering** specialty focus on designing advanced equipment, making it more efficient and less demanding of our natural resources. They develop equipment for food processing, highly precise crop spraying, agricultural commodity and waste transport. This is in addition to the tractors, tillage equipment, irrigation equipment, and harvest equipment that have done so much to increase food and fiber production. Geographic information systems, global positioning systems, machine instrumentation and controls, electromagnetics, bioinformatics, biorobotics, machine vision, sensors, and spectroscopy are some of the exciting technologies being used today and being developed for the future.

BAEs understand the importance of creating and maintaining a healthy environment for humans, animals, plants, and organisms. Toward these ends, BAEs with expertise in **Controlled Environment Systems** design HVAC systems for office buildings, animal housing structures, storage structures, and greenhouses to provide appropriate ventilation, temperature and humidity controls, and structural strength for their climate and purpose. Sometimes the challenges are extraterrestrial as BAEs at NASA have studied greenhouse systems to support a manned expedition to Mars!

Food, fiber, and timber are only the beginning of a long list of products that benefit from efficient use of our natural resources. The list is growing - it includes biomass fuels, biodegradable packaging materials, nutraceuticals, pharmaceuticals and other products - and is limited only by the creative vision of **Food and Bioprocess Engineers**. They are experts in pasteurization, sterilization, and irradiation, and in the packaging, transportation and storage of perishable products. These engineers are at the forefront of the effort to identify and develop viable renewable energy sources - biomass, methane, and vegetable oil, to name a few - and to make these and other systems cleaner and more efficient

One of the rapidly growing areas of the BAE department is the **Pre-Biomedical Engineering** and **Pre-Veterinary Medicine** options that ready students for applying engineering practice to problems and opportunities presented by living things and the natural environment. Areas of interest range from medicine to plant-based pharmaceuticals and packaging materials. Students go on to design medical implants and other devices, or bioinstrumentation and imaging products.

One thing you'll enjoy as a student in the BAE program is the environment. Nearly every BAE student you'll talk to will describe the department in a similar way: "It's like a family." Cliché as that might sound; we pride ourselves on taking care of our students, on helping them become confident, competent leaders. In the BAE department, you'll enjoy a close personal academic experience in which faculty look after the students, and students look after each other. Perhaps that's because the faculty:student ratio is much lower than in most other engineering programs, or perhaps it's because all share an awareness of the higher sense of purpose in their work. For more information visit our website: <http://www.bae.uky.edu/>