

## Objective

The objective of this document is to provide background information and offer flexible opportunities to potential donors to support the research, teaching, and extension programs of the Department of Biological and Agricultural Engineering.

## Areas of Specialization

Three areas of concentration have been developed in the Biological Engineering academic programs and the departmental research and extension programs in the areas of:

**Biomedical Engineering** –nanomedicine, tissue engineering, organ regeneration and its clinical application, bioinstrumentation, biosensing/medical imaging, medical electronics, physiological modeling, biomechanics, and rehabilitation engineering. This area is excellent preparation for medical, veterinary, or dental school as well as for graduate programs in biomedical engineering.

**Biotechnology Engineering** - biotechnology at the micro and nano scales, food and bio-processing, food safety and security, developing new products from biomaterials, phytomedicine, biomass conversion, extraction of health beneficial compounds, and biotransformation to synthesize industrial and pharmaceutical products.

**Ecological Engineering** - design of sustainable systems to treat, remediate, and prevent pollution to the environment, mathematical modeling of watershed process, stream restoration, watershed management, water and waste water treatment design, ecological services management, urban greenway design and enclosed ecosystem design.

## Unique Opportunity

The faculty in the Department of Biological and Agricultural Engineering are committed to leading-edge programs in research, academic programs, and extension. There is a commitment to making the BAE programs to be one of the best in the country by addressing environmental, food, agriculture, biotechnology and human health issues from an engineering perspective. The Biological Engineering discipline has great potential for the University of Arkansas and the Division of Agriculture for increased student enrollment but also to address the most critical research and education needs of the state, region, and the nation. The potential for greater extramural funding from agencies such as the National Institutes of Health, and the National Science Foundation also exists. The need for equipping the labs, general support, and scholarships is critical however to this success. The bulk of the investment for Biological Engineering continues to be made by the Division of Agriculture and the Bumpers College of Food, Agricultural and Life Sciences, with financial support from the College of Engineering for the Biomedical Engineering initiative. Additional support needed for labs, equipment, and funding scholarships would greatly accelerate the goals we have set to be a nationally leading program.

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Biological and Agricultural Engineering @ University of Arkansas

Opportunities to Support Programs  
in the

Department of  
Biological and Agricultural  
Engineering

at the

University of Arkansas

and the

UA Division of Agriculture



UofA  
UNIVERSITY OF ARKANSAS  
DIVISION OF AGRICULTURE

# Engineering for Life

**Biological Engineering** is one of the most exciting and fast emerging programs nationally.

Biological Engineering is the branch of engineering that applies engineering to solve problems in Agriculture and other Biological Systems. Some examples of this are

**Biotechnology and Bioprocess Engineering** (Bio-nanotechnology, Food Safety, Food, Nutraceutical and Pharmaceutical processing, Bioconversion, Bioreactors), **Bioresources Engineering** (Bio-energy, biomass conversion, ), **Ecological Engineering** (Bioremediation, Water Quality, Natural Resources Conservation, Air Quality, and Non-Point Source Pollution), and **Biomedical** (Human Health, Physiological modeling, Biosensors, Biomarkers, Gerontology).

**The revolution** of Biotechnology, Genetic, Biomedical, and Ecological Engineering has begun. Engineers trained to apply their expertise to various **Biological** scenarios are in great demand and have exciting job opportunities to choose from. Additionally, this engineering program allows students to enter Medical, Dental, or Veterinary school or pursue graduate engineering programs in Biomedical, Biological, or Environmental Engineering.

**The undergraduate program** in the Biological and Agricultural Engineering Department has been revamped to a science-based curriculum leading to an ABET accredited Bachelor of Science in **Biological Engineering**. This curriculum is based on a knowledge of basic sciences (math, physics, chemistry and biology); augmented with an understanding of applied biological sciences (organic chemistry, biochemistry, and microbiology); integrated with training in engineering sciences (statics, mechanics of materials, mechanics of fluids, thermodynamics, and electronic circuits); and uniquely applied to developing engineering solutions to problems that affect plants, animals, humans, and the natural environment (biological

engineering design fundamentals, quantitative biological engineering, instrumentation, engineering properties of biological materials, biological process engineering, mechanical design in biological engineering, and senior biological engineering design).

**The educational objectives** of the Biological Engineering program are to produce graduates who: 1. Effectively apply engineering to biological systems and phenomena (plants, animals, humans, microbes, and the environment) with demonstrated proficiency in basic engineering skills, technical knowledge, and professional and personal skills. 2. Are well prepared for diverse careers in biological engineering, life-long learning, and professional and ethical contributions to society through sustained accomplishments in biomedical engineering, ecological engineering and biotechnology.



## CURRENT FUNDING

Funding from the UA Division of Agriculture, Dale Bumpers College of Agricultural, Food and Life Sciences and the College of Engineering has brought the Department to 13 full-time faculty, 4 extension faculty, and 11 adjunct faculty engineers. Laboratory space for the three areas of concentration at the Central Research and Education Center in Fayetteville and the Engineering Research Center has also been added. Our faculty is making very significant contributions in research, teaching, and extension programs. Ecological Engineering group has established a nationally recognized eminent program. Biotechnology Engineering is also adequately prepared for such advances with some additional support needed for extension

component. The area of Biomedical Engineering has hired two new faculty members and continues to grow with the Master's in Biomedical Engineering approved by the Arkansas Department of Higher Education in 2005.

## FUNDING OPPORTUNITIES

**Funds for BAE Laboratories:** Currently, new labs are needed to grow the program. There are several labs available for dedicated names. The minimum support for each lab is approximately \$100,000. A donor may want to support the complete **Biological and Agricultural Engineering Lab Complex** for \$400,000 or more. Individual labs could be sponsored for a minimum of \$100,000 each. This could also provide the opportunity to name the labs for the sponsor. Therefore the following two options are available:

**Option I:** Biological and Agricultural Engineering Lab Complex for \$400,000 or more.

**Option II:** Individual labs for \$100,000 each.

**Funds for BE Scholarships:** Endowed scholarships for students in the Biological Engineering program can be established at \$25,000 each. These can be identified to support students of a particular standing (freshmen, sophomore, etc.) or pursuing a certain concentration (Ecological, Biomedical, etc.) in the program.

**Funds for General Support of BAE Programs:** Research, education, and extension programs in the three areas of concentration need support for enhancing our service to students and citizens of the state and the world. Supporting student participation in competitions, Honors students' research projects, faculty research and extension support, are a few of the needs in this regard.