

Facilities

Many of the department's classrooms, study areas, computer laboratories and some of its state-of-the-art laboratories are located in Engineering Hall and the Engineering Research Center. The department's machine shop and laboratories are located at the Arkansas Agriculture Research and Extension Center in Fayetteville. The department has thermal processing, food safety, machine vision and biosensors, precision agriculture, water resources, bioprocessing, and hydrologic modeling laboratories.



Admission Requirements

To be admitted into the Department of Biological and Agricultural Engineering, the admission requirements of the University of Arkansas Graduate School must first be met. Application materials can be found on the University of Arkansas Graduate School's website (www.uark.edu/depts/gradinfo/). After acceptance by the Graduate School, the applicant's materials are reviewed in the Department and a faculty member is selected to work with the prospective student.

Financial Assistance

Graduate assistantships are available to qualified students. Interested students are strongly encouraged to apply as early as possible (no later than April 1 for Fall semester and November 1 for Spring semester) for consideration. Assistantships are awarded based on academic record, faculty needs, and interest of the applicant.

Graduate Faculty

The BAEG department faculty represents a broad cross-section of age, geographic and educational background, expertise and academic interest. BAEG is unique at the University of Arkansas in that it is linked administratively to two colleges—the College of Engineering and the Dale Bumpers College of Agricultural, Food and Life Sciences—and to the Arkansas Agricultural Experiment Station, Division of Agriculture. There is a close working relationship with the Cooperative Extension Service, the extension engineers being very much involved in the activities of the department.



Biological and Agricultural Engineering @ University of Arkansas

GRADUATE PROGRAMS IN BIOLOGICAL ENGINEERING



DALE
BUMPERS COLLEGE
of AGRICULTURAL, FOOD AND LIFE SCIENCES

UofA
UNIVERSITY OF ARKANSAS
DIVISION OF AGRICULTURE

Engineering for Life

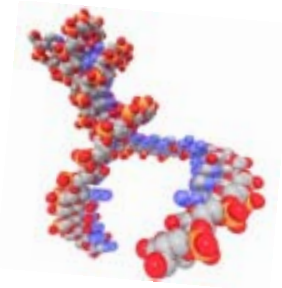
GRADUATE PROGRAMS IN BIOLOGICAL ENGINEERING

The Department of Biological & Agricultural Engineering at the University of Arkansas offers graduate programs at the Master's and Ph.D. levels. A master's program in Biomedical Engineering is also offered.

Departmental Philosophy

The core of graduate education in biological and agricultural engineering lies in obtaining technical expertise in an area of specialization. The department desires that each graduate student receive a broad educational experience, including social as well as intellectual development. Although coursework is primary, students are encouraged to be involved in all departmental functions including teaching, research, extension, and social activities so that they may obtain the best possible education. The objectives of the graduate program are for its students to:

- ❖ Develop the ability to comprehend and apply engineering principles in order to solve problems in research, development and design;
- ❖ Obtain sufficient understanding of the mathematical, physical and biological sciences for comprehension of literature in these and related fields;
- ❖ Acquire the skills required to use appropriate equipment, including instruments and computers, in solving problems in their areas of interest;
- ❖ Achieve the technical competence necessary to teach college level courses and conduct adult education programs, such as in Cooperative Extension.



MASTER OF SCIENCE DEGREES

The Master's degree programs offered by the department are:

- ❖ Master of Science in Biological Engineering (MSBE)
- ❖ Master of Science in Biomedical Engineering (MSBME)
- ❖ Master of Science in Engineering (MSE)

The MSBE and MSBME requires the student to take a minimum of 24 course hours beyond the B.S. degree; at least 10 semester hours of advanced BENG courses (5000 level or above); and at least one course in mathematics or statistics. In addition, 6 hours of master's thesis are required. There is not a non-thesis option. Courses taken prior to acceptance for graduate study cannot be used to fulfill this requirement.

The MSE degree has three options available: (1) 24 hours of coursework plus 6 hours of master's thesis and completion of the thesis; (2) 30 hours of course work plus a 3 hour technical project and report; or (3) 36 hours of coursework.

DOCTOR OF PHILOSOPHY

The doctoral program leads to a Ph.D. in Engineering degree and requires satisfactory completion of at least 30 course hours beyond the master's degree, plus 18 hours of dissertation and the completion of the dissertation based on original research. All Ph.D. students must take a minimum of 13 hours of advanced BENG courses (5000 level or above). At least one course in mathematics or statistics is required in the student's graduate program.



Faculty & Areas of Research

Research Activities

The Department of Biological and Agricultural Engineering conducts research on problems of importance to Arkansas and the entire nation. Graduate students contribute significantly to this research effort through their thesis and dissertation activities. Typically, a thesis or dissertation constitutes part of a larger research program conducted by the student's major advisor. Research topics can range from the very basic to the very applied. Successful research is a team effort directed toward program objectives, for which graduate students are considered important members of the research teams.

The three focus areas of research in the department are:

- ◆ Biomedical Engineering
- ◆ Biotechnology Engineering
- ◆ Ecological Engineering

Biomedical Engineering:

A multidisciplinary area which fuses engineering with molecular life science and medical science. The goal of this discipline is to design solutions to problems in biology, medicine, and human health, including breakthroughs in diagnosis, treatment, and prevention of disease. Examples are: designing sensors for point-of-care diagnostics, development of nanodrug delivery systems; single molecule imaging; stem cell and organ regeneration; *in vivo* and *in vitro* models to study cancer, diabetes and blood vessels.

Biotechnology Engineering:

Designing systems to manipulate plant, animal and microbial materials into industrially and medically relevant consumer products, and to develop environmentally relevant biotechnology to manage natural resources. Examples are: genetically modifying bacteria to produce novel chemicals and pharmaceuticals; utilizing bacterial processes to convert dangerous waste products into beneficial soil; providing safe and plentiful food by plant and animal production; producing nutritious safe and tasty microwavable dinners; monitoring our food supply to protect us from terrorism; and integrating biological materials into systems at the micro- and nanometer scale for the next generation of bio/abio hybrid engineered systems for medical diagnoses.

Ecological Engineering:

applying the science of ecology with the practice of engineering to solve complex ecosystem problems. These solutions include designing advanced wastewater treatment, erosion control, stream restoration, watershed management, and ecological risk assessment.

Biomedical Engineering

Mahendra Kavdia, Assistant Professor (PhD, 2000, Oklahoma State University). Experimental and computational research of nitric oxide and reactive oxygen species as applied to the endothelium function and diabetes; *in vitro* drug delivery, *in vitro* experimental system design; statistical analysis; mammalian cell culture techniques; microscopy, spectrophotometry; radio-immuno assays, enzyme-based assays; mathematical modeling of reaction and transport; and biological control.

G. Scott Osborn, Assistant Professor (PhD, 1994, North Carolina State University). Heat and mass transfer coupled with kinetics of biological reactions; design of equipment and processes to control biological systems; modeling of biological processes. Application areas include: control of rice fissuring through genetic manipulation, ecological engineering, oxygenation of wastewater and natural water bodies, biomechanics, food engineering, and biomedical engineering.

Kaiming Ye, Assistant Professor (PhD, 1991, East China University of Science and Technology) Stem cell engineering; high throughput screening platform for screening for breast cancer-specific genes using siRNA library; biosensing and bioimaging.

Biotechnology Engineering

Danielle Julie Carrier, Associate Professor (PhD, 1992, McGill University, Canada). Effect of agricultural production systems on phytonutrient (or health beneficial compounds), with emphasis on drying and extraction of vegetable and medicinal plant crops.

Carl Griffis, Professor (PhD, 1968, University of Arkansas). Applications of computers and microcircuitry for monitoring and control of biological processes in food processing, quality, and safety.

Jin-Woo Kim, Associate Professor (PhD, 1998, Texas A&M University). Biotechnological/biochemical engineering, including: process analysis and optimization, bioreactor design, biological remediation of environmental toxins, conversion of renewable biological wastes to high value products, and biocatalytic potential of microbes.

Yanbin Li, Professor (PhD, 1989, Pennsylvania State University). Developing biosensors and engineering methods for food safety and sanitation, e.g., description of bacteria in poultry meat and processing water, and rapid detection of bacteria in food products.

Ecological Engineering

Sreekala Bajwa, Assistant Professor (PhD, 2000, University of Illinois at Urbana-Champaign). Precision agricultural machinery and equipment, sensors and controls, remote sensing for crop monitoring and soil characterization, GIS, GPS, air quality and decision support systems.

Indrajeet Chaubey, Associate Professor (PhD, 1997, Oklahoma State University). Nonpoint source pollution control and modeling; development and assessment of best management

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Faculty & Areas of Research *(continued)*

practices to minimize nonpoint source pollution; effect of land use on sediment, nutrient and metal transport; interaction of terrestrial and aquatic processes affecting water quality; and linking these processes to develop integrated watershed management technology; and application of geographic information systems in natural resource management.

Thomas A. Costello, Associate Professor (PhD, 1986, Louisiana State University). Plot and field-scale studies to quantify impacts of land application of animal manure on surface water quality; broiler litter management and its effects on air quality (for birds and workers); building energy consumption; bird performance and the final value of the litter as a fertilizer; energy conservation and environmental control in poultry houses. Projects include development of heat exchangers, fogging systems, and systems for reduction of ammonia concentrations.

Brian E. Haggard, Associate Professor (PhD, 2000, Oklahoma State University). Evaluation of nitrogen, phosphorus, carbon and antibiotics transport and transformation through aquatic systems; sorption and release of dissolved phosphorus to or from soils and sediments; determination of factors limiting the growth of periphyton and phytoplankton in streams and reservoirs; and the use of aquatic and terrestrial ecosystems to provide wastewater treatment and nutrient retention.

Marty D. Matlock, Associate Professor (PhD, 1996, Oklahoma State University). Nonpoint source nutrient loading effects on waterbodies and developing engineering design parameters for using constructed ecosystems as treatment systems.

Extension Programs & Education

Dennis Gardisser, Professor, Associate Head Extension (PhD, 1992, University of Arkansas). Engineering aspects of agricultural chemical applications, e.g., pesticides, plant nutrients, other biological products; processing, e.g., on-farm storage, drying, handling of grain; fencing and animal confinement or movement control; educational leadership and coordination of precision agriculture, GPS, and GIS.

Phil Tacker, Associate Professor (MS, 1982, University of Arkansas). Water resource development, management and water quality; irrigation system design, selection and operation using soil and water management variables to determine drainage and irrigation requirements; irrigation scheduling; monitoring irrigation pumping; and controlling pumping costs.

Karl VanDevender, Professor (PhD, 1992, University of Arkansas). Program development and implementation for livestock and poultry waste management (liquid and dry). Educational programs in collection, storage, and land application of waste to prevent contamination of surface and groundwater. Develop and demonstrate manure storage, treatment, and utilization practices that address environmental, production, and economic considerations.

Administration

Lalit R. Verma, Professor and Department Head, PE, ASABE Fellow (PhD, 1976, University of Nebraska).

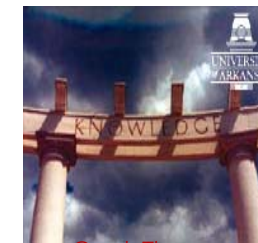
For More Information

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*Information about the
department, faculty, and BAEG
Graduate Student Handbook*



Engineering Hall

University of Arkansas
Graduate School
119 Ozark Hall
University of Arkansas
Fayetteville, AR 72701
479-575-4401



Greek Theater

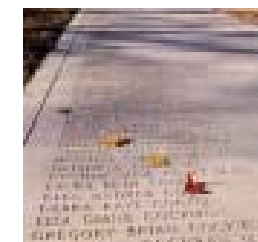
www.uark.edu/depts/gradinfo/
*Information regarding University
of Arkansas admissions,
requirements, Graduate School
Catalog and Graduate School
Handbook*



Old Main

International Admissions
180 Dickson St. Annex
University of Arkansas
Fayetteville, AR 72701
479-575-6246

www.uark.edu/ua/iao/
*Information regarding admission
and requirements for
international applicants*



Senior Walk