

Department of Biological and Agricultural Engineering

For more information about this department, including contact information, visit the department (<https://bae.ncsu.edu/>) website.

The Department of Biological and Agricultural Engineering (BAE) applies engineering principles and the fundamentals of biologically-based systems and tools, primarily in agriculture and the environment. The scope of BAE ranges in scale from the molecular to the ecosystem level, for the safe, efficient, and environmentally sound production, processing and management of agricultural, biological and natural resources. From biomechanics to food processing and water management, we're engineering solutions for a sustainable future.

The BAE department provides excellent educational opportunities at the undergraduate level with programs that are well recognized as among the finest in the United States.

The BE curriculum includes concentrations in agricultural engineering, bioprocess engineering, ecological engineering, and environmental engineering. All concentrations within the BE curriculum emphasize core courses in biology, mathematics, physics, chemistry, hydraulics, mechanics, materials, and thermodynamics, which collectively provide solid training in basic science and engineering. The curriculum is designed to prepare each graduate to master fundamentals of engineering and biology, develop the ability to solve engineering problems, improve self-confidence, and apply the creative process of engineering design. The educational experience is capped off with a two semester senior level course that immerses each graduate in the team approach to developing engineering solutions to complex problems. By the time of graduation, approximately 80% of BE graduates will have passed the Fundamentals in Engineering exam and thus be well on their way toward licensure as a Professional Engineer.

Opportunities

BE students learn to solve a wide variety of engineering problems and will have opportunities for specialization through selection of a specific concentration. Scientific and engineering principles are applied: to conserve and manage air, energy, soil and water resources; to manage, protect and restore natural ecosystems; to understand and utilize biological, chemical and physical processes for the production and conversion of biomass to bio energy; to analyze, understand and utilize mechanical properties of biological materials; to design and develop machinery systems for all phases of agricultural and food production; to design and evaluate structures and environmental control systems for housing animals, plant growth, and biological product storage; to develop improved systems for processing and marketing food and agricultural products; and to design sensor-based instrumentation and control systems for biological and agricultural applications.

Graduates of the BE curriculum receive a Bachelor's of Engineering in Biological Engineering, qualifying them for positions in design, development, and research in industry, government and public institutions. The curriculum also prepares students for post-graduate work leading to advanced degrees. Typical positions filled by recent BE graduates include: stream and wetlands restoration project manager; product design; development and testing engineer; plant engineering and

management; engineering analysis and inspection for federal and state agencies; engineering consultant and research engineer. Entry-level salary ranges for BE graduates are similar to those of Civil, Industrial, and Mechanical Engineering graduates.

Curricula

The BE curriculum is jointly administered by the College of Agriculture and Life Sciences and the College of Engineering and combines the fields of engineering, biology and agriculture. The Biological Engineering program is accredited by the Engineering Accreditation Commission of ABET, <https://www.abet.org>. BE graduates are qualified to become registered professional engineers by passing the appropriate examinations and upon completing the engineering experience requirements. Specific curriculum requirements are available online.

BAE faculty, in concert with program constituencies, has developed the following undergraduate program objectives. Within the first five years following graduation, NC State's Biological Engineering graduates will:

- Excel in their careers or in graduate school by applying their knowledge of engineering principles, processes, and procedures;
- Practice engineering professionally and ethically;
- Communicate effectively in a professional environment; and
- Be engaged in life-long learning and professional development.

Faculty

Department Head

Lingjuan Wang-Li, *Professor, Interim Department Head*

Director

John Classen, *Director of Graduate Programs*

Professors

François Birgand

Michael Burchell, *Department Extension Leader*

Jay Cheng

Andy Hale, *Undergraduate Coordinator*

Steven Hall, *William White Distinguished Professor*

Bill Hunt, *William Neal Reynolds Distinguished University Professor & Extension Specialist*

Praveen Kolar

Sanjay Shah

Mohamed Youssef

Wenqiao (Wayne) Yuan

Associate Professors

Celso Castro Bolinaga

Natalie Nelson

Mahmoud Sharara, *Extension Specialist*

Jason Ward, *Extension Specialist*

Assistant Professors

Frank Bai

Lucie Guertault

Daniela Jones

Chad Poole, *Extension Specialist*

William Joe Sagues

Ryan Sartor

Chadi Sayde

Lirong Xiang

Lecturer

Tommy Stephenson

Associate Extension Professor

Barbara Doll

Grant Ellington