Consider opportunities for financial aid

The Department of Agricultural and Biological Engineering offers a limited number of graduate fellowships and assistantships on a competitive basis. This support is intended to attract and retain outstanding candidates for the Ph.D. and M.S. degrees by enriching the academic experiences of the students. Most fellowships require U.S. citizenship and a composite GRE score of over 1700 and an undergraduate GPA of 3.5 or higher. Fellowships provide monetary stipends, tuition and partial fee waiver. Candidates who wish to be considered for fellowships must submit their completed application materials prior to February 1 in order to receive full consideration for fellowships for the following fall semester.

Assistantships offer employment in research. An assistantship appointment provides a stipend plus tuition and partial fee waiver. A one-half time assistantship requires an average of 20 hours per week of work. Typically, graduate students will have the opportunity to gain significant teaching experience. For current assistantship and fellowship stipends see the department website.

Need more information?

For more information about the Agricultural and Biological Engineering Graduate Program, contact:

Department of Agricultural and Biological Engineering
Graduate Program Director
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Urbana, Illinois 61801
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Many of the leaders in academia, research, and industry have founded their future on the benefits of a graduate degree. For many positions, a graduate degree is required or considered a key point of personal and professional development. The Agricultural and Biological Engineering (ABE) Department at the University of Illinois at Urbana-Champaign (UIUC) offers one of the most comprehensive graduate programs in the nation and the world. It is our mission to bring engineering into life and biological systems. We focus on advanced study and participation in creative research to solve engineering problems in agricultural and biological systems, and improve the quality of life. Our faculty is conducting research in all major areas of agricultural and biological engineering.

Our department has been consistently ranked as one of the top programs in the nation according to U.S. News and World Report. We are fortunate to be affiliated with two nationally top ranked colleges; College of Engineering and College of Agricultural, Consumer and Environmental Sciences. A graduate degree in Agricultural and Biological Engineering connects you to a bright future with many career possibilities. Our research is in five themes:

- **Agriculture automation**
- **Bio-energy and bio-products**
- **Environmental control and sustainability**
- **Biological systems and biosensors**
- **Systems informatics and analysis**

Our M.S. and Ph.D. degrees are available in a wide variety of specialized areas. In addition, our ABE graduate program actively participates in various inter-departmental curriculum concentrations such as the Computational Science and Engineering (CSE) Option. Our M.S. and Ph.D. students can select these options and work with respective faculty in all research areas.
Challenge your mind to push back the frontiers of knowledge

Agricultural and biological engineers apply the principles of engineering science and design to the production and processing of food and fiber and the preservation of environmental quality. While continuing to explore the physical processes, today's agricultural and biological engineers are also concerned with the biological and chemical aspects of production and processing, and environmental protection. Students who qualify and choose to pursue advanced degrees in agricultural and biological engineering leave with more than a degree. They gain practical experience in their chosen area of research, improve their communication skills, increase their knowledge of the field and use research to push back the frontiers of knowledge. Unlike undergraduate education, there is no set curriculum for a graduate degree. Rather, the program is flexible enough to be tailored to your specific needs and areas of interest.

Students who enter the Master of Science (M.S.) program usually have a bachelor's degree in agricultural and biological engineering or a closely related engineering field. Students with a non-engineering degree but with a strong background in mathematics, physics, and the sciences may be admitted provisionally and, with the approval of their advisor and the department head, may take the prerequisite courses concurrently with graduate courses. See the Graduate Catalog for details. This M.S. program introduces you to research methodology while providing study in advanced coursework. In consultation with an advisor, students design and execute a research plan, analyze the resulting data, and write a thesis. The M.S. degree includes at least 25 semester hours of course work and 8 semester hours of thesis research, and requires 18 to 24 months beyond the B.S. degree. M.S. graduates are highly sought after and are typically employed in industry, governmental agencies, or consulting firms.

Admission to the Doctor of Philosophy (Ph.D.) program is limited to those who have demonstrated exceptional ability in obtaining their M.S. degree and/or through a high degree of technical and professional accomplishment. The Ph.D. candidate is expected to attain a thorough and comprehensive knowledge of the professional field while becoming an expert in the methods of research. The student must be able to conduct independent, original research. The Ph.D. degree includes at least 32 semester hours of course work and 32 semester hours of dissertation research. Candidates take a preliminary examination once they have completed the required course work and prepared a research proposal. After the dissertation is completed, the student defends it in a final oral examination. Normally, the duration of the Ph.D. program is two to three years beyond the M.S. degree. Ph.D. graduates are typically employed in academia, governmental agencies, industry, or consulting firms.

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Automation

- Development of both multi-spectral and hyperspectral imaging sensors for monitoring crop conditions, and weed and pest infestations.
- Application of unmanned aerial vehicles for above-field image capture to be used for crop condition monitoring and precision farming.
- Development of multi-robot systems for in-field deployment to monitor crop health and perform selective agronomic activities.

Bio-Energy and Sustainability

- Dry-grind corn process to increase conversion efficiencies, and develop other value-added co-products and bio-energy.
- Engineering solutions for biomass crop production, transportation and storage.
- Bio-energy production from human, animal and food bio-waste materials via thermo-chemical conversion (TCC) to crude oil or fermentation.
- Evaluation of alternative biofuels for diesel-powered vehicles.
- Algae-based bioprocesses for simultaneous biofuel production and phytoremediation.
- Systems informatics and analysis of renewable energy systems.
- Alternative energy systems for buildings based on solar, wind, geothermal and biomass.

Bio-Energy and Sustainability

- Design and analysis of gene regulatory circuits and sensors including biophysics of hydrophobic proteins and applications in bioprocessing.
- Development of biosensing technologies for monitoring the health of livestock and their environment.
- Extraction of organic, inorganic and polymeric materials using ionic liquids.
- Systems informatics and analysis of designed microbial and agricultural ecosystems.
- Using nano-scale biological components such as proteins and nucleic acids to create devices or systems of devices that provide functions not normally seen in nature.
- Using tools from computer sciences and molecular genetics to implement intelligent functionality and reasoning in living organisms at the molecular or genetic level.

Building Environment

- Development of technologies for the control of indoor environments, including laboratory and production animal buildings, office buildings and transportation vehicles.
- Airflow measurement including volumetric particle tracking and velocimetry measurement technology.
- Heating, ventilation and air-conditioning equipment, control strategies and systems.
- Computational fluid dynamics simulation for building environment studies.
- Optimized environmental control and facility design for improved animal well-being.
- Development of key technologies, including sensors to monitor the animals, their micro-environment and emissions and models to quantify the relationships between growth, nutrient supply and utilization, microenvironment, and emissions.

Food Process and Bio-Products

- Food process design including developing new separation technologies for conversion of grains and other plant materials into food, feed and industrial products.
- Evaluation for process efficiency including process simulation and economics analysis of grain and other food bioprocesses.
- Evaluation of co-products for industrial and human and animal food uses.
- Biorefineries of interest include wet milling, dry milling, dry grind ethanol and distillation.
- Separation technologies, such as microfiltration, applied to conventional corn processes to improve product quality and process efficiencies.

Indoor Air Quality

- Fundamentals and applied air cleaning mechanisms including gravitational, aerodynamic, diffusive, electrostatic and chemical.
- Development of air-cleaning technologies for animal and commercial buildings, transportation vehicles and other indoor environments.
- Quantification of airborne pollutant (particulate matters, gases) emissions to the indoor environment.
- Air quality sampling including sampler development and sampling efficiency studies.

Emission Control

- Characterization of the physical, chemical and biological properties of the pollutants from livestock buildings.
- Development of control strategies to reduce emissions from livestock buildings.
- Development of new technologies to control emissions from diesel engines from on-road and off-road vehicles.
- Development of technologies for on-board diagnosis (OBD) of diesel engine aftertreatment systems.
Off-Road Equipment

- Development of intelligent vehicle systems for automatic and autonomous vehicle guidance.
- Development of electro-hydraulic systems and control for off-road vehicles, crop planting and on-vehicle information management.
- Fundamental investigation of granular particle flow characteristics and development of control systems for site-specific granular fertilizer application.
- Development of off-road vehicles and modeling of in-field crop handling systems.

Precision Agriculture

- Development of sensors, information mapping systems and control systems for more precise management of in-field crop planting and chemical application.
- Remote sensing with the recording and processing of data from satellites, airplanes and ground-based vehicles.
- Map-based and real-time control of crop planting and chemical application.

Safety in Agriculture

- Measurement and modeling of farm injuries and illnesses, including sensors on off-road vehicles for human detection and safety and airborne contaminants to workers respiratory systems.
- Development of effective safety education intervention programs, including senior farmer safety issues and crash risk of farm equipment operated on public roadways.
- Utilization of behavioral psychology models in the prediction and analysis of agricultural safety behaviors and providing effective assistance to farmers with physical disabilities.

Soil and Water Resources Engineering

- Modeling the effect of extensive subsurface drainage on the hydrologic response of a watershed and the pathways for water and pollutant movement in flat, drained watersheds.
- Modeling the effects of intense use of military training areas on land and water resources within and adjacent to those areas.
Water Quality and Sustainability

- Measurement of surface and subsurface movement of microbial pathogens.
- Infield and edge-of-field treatment of nitrate in subsurface drainage systems.
- Water quality modeling for evaluation of best management practices.
- Design and evaluation of vegetative filter strips for controlling nutrients and pathogens from agricultural fields and animal production facilities.
- Environmental occurrence and treatment of emerging contaminants such as pharmaceuticals, pesticides and endocrine disrupting compounds (EDCs).
- Water quality modeling for evaluation of best management practices.
- Intelligent infrastructure systems for water purification and water resource management.
- Development of advanced wastewater treatment processes including membrane bioreactors and integrated adsorption-membrane bioreactors.
- Design of sustainable water reuse and recycling systems for municipal, agricultural and industrial applications.

Discover what Champaign-Urbana has to offer

The Champaign-Urbana community offers a diverse mix of collegiate, agricultural, business, industrial, athletic, and social opportunities. From artistic performances at the Krannert Center for the Performing Arts to the excitement of Fighting Illini football and basketball, entertainment opportunities abound. The population of more than 120,000 people supports excellent medical, transportation and social services in a friendly, hometown setting.

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