AGRICULTURAL & BIOLOGICAL ENGINEERING, PHD

for the degree of Doctor of Philosophy in Agricultural & Biological Engineering

Opportunity exists for specializing in computational science and engineering via the Computational Science & Engineering (http://catalog.illinois.edu/graduate/engineering/concentration/computational-science-engineering/) optional graduate concentration.

Admission Requirements
Admission to the PhD program is limited to individuals who have demonstrated exceptional ability through outstanding performance in obtaining an MS degree and/or through a high degree of technical and professional accomplishment. Candidates must also satisfy entrance requirements for the MS degree program.

All applicants whose native language is not English must submit a minimum TOEFL (http://www.toefl.org/) score of 88 (iBT), 230 (CBT) or 570 (PBT); or minimum International English Language Testing System (IELTS) (http://www.ielts.org/) academic exam scores of 6.5 overall. Applicants may be exempt from the TOEFL if certain criteria (http://grad.illinois.edu/admissions/instructions/04c/) are met. For those taking the TOEFL or IELTS, full admission status (http://grad.illinois.edu/admissions/instructions/04c/) is granted for scores greater than 102 (TOEFL iBT), 253 (TOEFL CBT), 610 (TOEFL PBT), or 7.0 (IELTS). Limited status (http://grad.illinois.edu/admissions/instructions/04c/) is granted for lesser scores and requires enrollment in English as a Second Language (ESL) courses (https://linguistics.illinois.edu/testing/english-placement-test-ept/) based on an ESL Placement Test (EPT) taken upon arrival to campus.

Financial Aid
Fellowships, supported by University, College of Agricultural, Consumer and Environmental Sciences, and The Grainger College of Engineering funds, are available on a competitive basis. A limited number of assistantships, providing both teaching and research experience, are often available on a half-time basis. Starting in Fall 2020, Grainger Engineering PhD students in their first five years of enrollment who meet the minimum eligibility requirements (https://grainger.illinois.edu/academics/graduate/phd-funding-guarantee/) are guaranteed a funded appointment for fall and spring that includes a full tuition waiver, a partial fee waiver, and a stipend.

All applicants, regardless of US citizenship, whose native language is not English and who wish to be considered for teaching assistantships must demonstrate spoken English language proficiency (http://grad.illinois.edu/admissions/taengprof.htm) by achieving a minimum score of 24 on the speaking subsection of the TOEFL iBT or 8 on the speaking subsection of the IELTS. For students who are unable to take the iBT or IELTS, a minimum score of 4CP is required on the EPI test (http://cte.illinois.edu/testing/oral_eng/epi_overview.html), offered on campus. All new teaching assistants are required to participate in the Graduate Academy for College Teaching (https://citl.illinois.edu/citl-101/teaching-learning/grad-academy-for-college-teaching/) conducted prior to the start of the semester.

Graduate Teaching Experience
Experience in teaching is considered a vital part of the graduate program and is required as part of the academic work of all PhD candidates in this program. For details of expectations, see the department's Graduate Handbook (https://abe.illinois.edu/academics/graduate-degrees/).

Department Research
Current research interests of the faculty include off-road equipment engineering (robotics and machinery automation, remote sensing and precision agriculture, machinery management systems, pesticide application technology, engines and biofuels); soil and water resources (hydrology, erosion and sediment transport, water management, wetlands, and water quality); bioenvironmental engineering (building environment and energy conservation, air quality, renewable energy, biomass to bioenergy conversion, structural analysis and facility design, building materials evaluation, environmental control and ergonomic design for plant, animal, and human housing systems and facilities); food and bioprocess engineering (engineering properties of foods, physical properties of biological products, grain drying, grain quality evaluation, dry-grind corn processing, wet and dry milling, modified bioprocesses for improved co-products, fuel and chemicals, fermentation, and transport phenomenon in biological materials); or electronic and electrical systems (biosensors and controls, energy systems, machine vision, near-infrared spectroscopy applications, bionanotechnology, microfabricated devices, bioconjugation techniques, transcriptional control, modeling life support systems, and multiscale biological processes). For more details, visit the department's research website. (https://abe.illinois.edu/research/areas/)

for the degree of Doctor of Philosophy in Agricultural & Biological Engineering

For additional details and requirements for all degrees, please refer to the program's Graduate Degree Requirements (https://abe.illinois.edu/graduate/) and the Graduate College Handbook (http://www.grad.illinois.edu/gradhandbook/).

Entering with approved M.S./M.A. degree

Code	Title	Hours
ABE 501	Graduate Research I	1
ABE 594	Graduate Seminar	0
One MATH course beyond differential equations from an approved list (http://abe.illinois.edu/graduate/handbook/)		3-4
At least one course in statistical design and analysis from an approved list (http://abe.illinois.edu/graduate/handbook/)		3-5
One course in instrumentation and measurement from an approved list (http://abe.illinois.edu/graduate/handbook/)		3-5
One 500-level course (taken for at least 3 credit hours) in an area of specialization – chosen in consultation with advisor		3-5
Elective courses – chosen in consultation with advisor (subject to Other Requirements and Conditions below)		10-21
ABE 599	Thesis Research	32
Total Hours		**64**

Other Requirements and Conditions (may overlap)

Code	Title	Hours
A maximum of 4 hours of ABE 597 (or other independent study) may be applied toward the elective course work requirement.		
Teaching experience determined in consultation with advisor with guidance provided by the department's Graduate Handbook.		
The minimum program GPA is 3.0.		
Ph.D. exam and dissertation requirements:		
Preliminary exam		
Final Exam or dissertation defense		

Dissertation deposit	
A Masters degree is required for admission to the Ph.D. program.	

Entering with approved B.S./B.A. degree

Code	Title	Hours
ABE 501	Graduate Research I	1
ABE 594	Graduate Seminar (minimum 6 semesters)	0
At least one MATH course beyond differential equations from an approved list (http://abe.illinois.edu/graduate/handbook/)		3-4
At least one course in statistical design and analysis from an approved list (http://abe.illinois.edu/graduate/handbook/)		3-5
At least one course in instrumentation and measurement from an approved list (http://abe.illinois.edu/graduate/handbook/)		3-5
In addition to above 3 courses in math, stats, and instrumentation, the student is required to take two more courses from any of the three areas (math, stats, or instrumentation) above		6-10
Two 500-level courses (taken for at least 3 credit hours) in an area of specialization – chosen in consultation with advisor		6-10
Elective courses – chosen in consultation with advisor (subject to Other Requirements and Conditions below)		21-34
ABE 599	Thesis Research	40
Total Hours		**96**

Other Requirements and Conditions (may overlap)

Requirement	Description
Two 500-level courses must be formal coursework, not seminar courses, special topics or independent study.	
A maximum of 6 hours of ABE 597 (or other independent study) may be applied toward the elective course work requirement.	
Teaching experience determined in consultation with advisor with guidance provided by the department's Graduate Handbook.	
The minimum program GPA is 3.0.	
Ph.D. exam and dissertation requirements:	
Qualifying requirements review in the 2nd year: It is required to complete all courses in math, stats, and instrumentation by the 3rd semester with a 3.25 or higher GPA.	
Preliminary exam	
Final Exam or dissertation defense	
Dissertation deposit	

for the degree of Doctor of Philosophy in Agricultural & Biological Engineering

---

Student learning outcomes are based on educational outcomes suggested by the Accreditation Board for Engineering and Technology (ABET) and the objectives of the program:

1. An ability to apply knowledge of mathematics, science, and engineering;
2. An ability to design and conduct experiments, as well as to analyze and interpret data;
3. An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability;
4. An ability to function in multidisciplinary teams;
5. An ability to identify, formulate, and solve engineering problems;
6. An understanding of professional and ethical responsibility;
7. An ability to communicate effectively;
8. The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context;
9. A recognition of the need for and an ability to engage in life-long learning;
10. A knowledge of contemporary issues;
11. An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice;
12. Conduct independent research with expertise in research design, methods, and analysis;
13. Function effectively in leadership roles in their professional careers and activities in professional societies.
14. For Ph.D. graduates entering academia, function effectively as instructors with presentation skills, e.g., teaching skills (in addition to 1-13)

for the degree of Doctor of Philosophy in Agricultural & Biological Engineering

---

Department of Agricultural & Biological Engineering
Department Head: Ronaldo Maghirang
Director of Graduate Studies: Xinlei Wang
Contact: Heather Crump (hcrump@illinois.edu)
Agricultural & Biological Engineering Department website (https://abe.illinois.edu/)
Department of Agricultural & Biological Engineering faculty (https://abe.illinois.edu/directory/faculty/)
338 Agricultural Engineering Sciences Building, 1304 West Pennsylvania Avenue, Urbana, IL 61801
(217) 333-3570
Agricultural & Biological Engineering email (abe@illinois.edu)

College of Agricultural, Consumer & Environmental Sciences (ACES)
College of Agricultural, Consumer & Environmental Sciences website (http://catalog.illinois.edu/schools/aces/)

Grainger College of Engineering
Grainger College of Engineering website (https://grainger.illinois.edu/)

Admissions
Agricultural & Biological Engineering Admissions & Requirements (https://abe.illinois.edu/apply/#graduate)
Graduate College Admissions & Requirements (https://grad.illinois.edu/admissions/apply/)