AGRICULTURAL & BIOLOGICAL ENGINEERING, PhD

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

department head: Ronaldo G Maghirang (ronaldom@illinois.edu)
director of graduate studies: Xinlei Wang (xwang2@illinois.edu)
overview of admissions & requirements: https://abe.illinois.edu/
apply#graduate (https://abe.illinois.edu/apply/#graduate)
overview of grad college admissions & requirements: https://
grad.illinois.edu/admissions/apply (https://grad.illinois.edu/
admissions/apply/)
department website: https://abe.illinois.edu/
program website: https://abe.illinois.edu/graduate (https://
abe.illinois.edu/graduate/)
department faculty: https://abe.illinois.edu/directory/faculty
(https://abe.illinois.edu/directory/faculty/)
college websites: https://grainger.illinois.edu/ and https://
aces.illinois.edu/
contact: Heather Crump (hcrump@illinois.edu)
address: 338 Agricultural Engineering Sciences Bldg, 1304 W
Pennsylvania Ave, Urbana, IL 61801
phone: (217) 333-3570
e-mail: abe@illinois.edu

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 (http://linguistics.illinois.edu/students/esl/
guidelines/) 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/graduate/handbook/).

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,
and bioprocess engineering (engineering properties of foods, physical
buildings, 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,
and bioprocesses for improved co-products, fuel and chemicals, fermentation, and transport
biomass-to-energy 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
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 Web site.

Other Graduate Programs in the Department of
Agricultural & Biological Engineering

degrees:

Information listed in this catalog is current as of 02/2022
Agricultural & Biological Engineering, MS (http://catalog.illinois.edu/graduate/engineering/agricultural-biological-engineering-ms/)

optional concentration:
Computational Science & Engineering (http://catalog.illinois.edu/graduate/engineering/concentration/computational-science-engineering/)
Technical Systems Management, MS (http://catalog.illinois.edu/graduate/aces/technical-systems-management-ms/)
Technical Systems Management, MS - Professional Science Master’s (http://catalog.illinois.edu/graduate/aces/technical-systems-management-ms-professional-science-masters/)

The Department of Agricultural & Biological Engineering offers a graduate degree program which is at the forefront of the application of engineering principles to solve problems of agricultural production, utilization, environmental control, and biological systems and to improve the quality of life. Students may concentrate study in one of the faculty research interest areas listed below. Supporting course work includes: mathematics; computer science; statistics; engineering mechanics; chemical, civil, electrical, and mechanical engineering; animal science; crop sciences; food science; and other appropriate fields.

Opportunity also exists for specializing in energy and sustainability engineering via the

Energy and Sustainability Engineering (EaSE) Graduate Certificate Option (http://ease.illinois.edu/)

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

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

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.

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

Ph.D. exam and dissertation requirements:

Preliminary exam

Final Exam or dissertation defense

Dissertation deposit

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

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<td>At least one MATH course beyond differential equations from an approved list (<a href="http://abe.illinois.edu/graduate/handbook/">http://abe.illinois.edu/graduate/handbook/</a>)</td>
<td>3-4</td>
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<td>At least one course in statistical design and analysis from an approved list (<a href="http://abe.illinois.edu/graduate/handbook/">http://abe.illinois.edu/graduate/handbook/</a>)</td>
<td>3-5</td>
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<tr>
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<td>At least one course in instrumentation and measurement from an approved list (<a href="http://abe.illinois.edu/graduate/handbook/">http://abe.illinois.edu/graduate/handbook/</a>)</td>
<td>3-5</td>
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<td>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</td>
<td>6-10</td>
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<tr>
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<td>Two 500-level courses (taken for at least 3 credit hours) in an area of specialization – chosen in consultation with advisor</td>
<td>6-10</td>
</tr>
<tr>
<td></td>
<td>Elective courses – chosen in consultation with advisor (subject to Other Requirements and Conditions below)</td>
<td>21-34</td>
</tr>
<tr>
<td>ABE 599</td>
<td>Thesis Research</td>
<td>40</td>
</tr>
<tr>
<td></td>
<td>Total Hours</td>
<td>96</td>
</tr>
</tbody>
</table>

Other Requirements and Conditions (may overlap)

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
<table>
<thead>
<tr>
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<tbody>
<tr>
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