Graduate Council requirements.

No University-level (Graduate Council) minimum number of courses completed or credits earned are specified for the Ph.D.; the student’s Ph.D. committee will recommend the minimum requirements as appropriate for each individual student’s program of study and dissertation research. Unless previously taken for the M.S., each Ph.D. student must complete:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BRS 500</td>
<td>Research Methods</td>
<td>3</td>
</tr>
<tr>
<td>BRS 501</td>
<td>Biobased Polymers</td>
<td>3</td>
</tr>
<tr>
<td>BRS 502</td>
<td>Human Behavior and ethics in Management and Technology</td>
<td>3</td>
</tr>
</tbody>
</table>

Electives
- Two courses from list of electives maintained by the program office (at least 1 credit)
- At least one statistics course (at least 1 credit)

Culminating Experience
- BRS 600 Thesis Research (at least 1 credit)
- A two-year writing requirement
- A comprehensive examination, including a written and oral examination
- The Ph.D. committee will administer the Qualifying Examination.
- The Qualifying Examination will consist of developing a comprehensive examination covering the major, minor, and related areas of study.
- The Qualifying Examination will be completed by the student soon after s/he has completed at least 18 credits but before the end of the third semester.
- Successful completion of the Qualifying Examination does not mean that the student’s Ph.D. research proposal is approved. Rather, final approval of the candidate’s research proposal will be the responsibility of the Ph.D. committee.

Doctor of Philosophy (Ph.D.)
Requirements listed here are in addition to Graduate Council policies listed under GCAC-600 Research Degree Policies. (http://gradschool.psu.edu/graduate-education-policies/)

Official entrance into a Ph.D. program occurs upon successful completion of the Qualifying Examination. Ph.D. degree requirements include successful completion of the following:
- approved graduate course work,
- Ph.D. language and communication requirements,
- a comprehensive examination,
- and defense, approval, and submission of a dissertation.

The Ph.D. committee must meet all of the Graduate Council requirements (http://gradschool.psu.edu/graduate-education-policies/gcac/gcac-600/phd-dissertation-committee-formation/), and:

1. the chairperson and at least one other member must be BRS Graduate Faculty members,
2. at least one member must be from a department other than ABE and s/he should be a Graduate Faculty member of a program other than BRS,
3. at least one member must represent any minor department(s) if the student selects a minor(s), and
4. the Ph.D. committee can be appointed only after the Qualifying Examination has been passed.

Ph.D. Language and Communication Requirement
The purpose of the communication requirement is to strengthen the student’s professional communication skills. The candidate must take a minimum of one three-credit course and receive a grade of B or better. Course selections must be approved by the academic adviser prior to registration. Courses used to satisfy this requirement must include the substantial practice of writing and/or speaking.

Comprehensive Examination
When a Ph.D. candidate has substantially completed the course work, including the communication requirements, s/he is required to take a Comprehensive Examination covering the major, minor, and related areas of study. The Comprehensive Examination will be both written and oral. The nature and details of the Comprehensive Examination will be determined by the student’s Ph.D. committee. In general, the
student will be required to demonstrate ability to synthesize information acquired through formal coursework and to use technical literature to find information required for solving biorenewable systems problems. A favorable vote of at least two-thirds of the committee is required for passing. If a candidate fails, the committee will determine whether another examination may be taken.

**Final Oral Examination**

Upon recommendation of the Adviser, a Ph.D. candidate who has satisfied all other requirements for the degree will be scheduled to take a Final Oral Examination. The student must be a registered full-time or part-time degree student for the semester in which the Final Oral Examination is taken. This examination is open to the public and the student should notify all departmental faculty and graduate students. The examination is related largely to the dissertation, but may cover the candidate’s entire field of study without regard to courses that have been taken either at Penn State University or elsewhere. The defense of the dissertation should be well-prepared including any appropriate visual aids. One of the aims of the preparation should be to synthesize the important conclusions in a time-efficient presentation, leaving ample time for questions and discussion. A favorable vote of at least two-thirds of the committee is required for passing. If a candidate fails, the committee will determine whether another examination may be taken.