

# CHEMICAL AND BIOMOLECULAR ENGINEERING, PHD

## Program Requirements

The Ph.D. is awarded for original research performed under the guidance of a thesis advisor. The formal requirements for this degree are:

1. Completion of six graduate-level courses, including the four required core and elective courses.
2. Completion of an annual research evaluation each year.
3. Serve as a teaching assistant for at least two required courses.
4. Completion in the first semester of departmental safety requirements (see Handbook for more information).
5. Attend graduate seminars (EN.540.600 Chemical and Biomolecular Engineering Seminar I/EN.540.601 Chemical and Biomolecular Engineering Seminar II) every semester. Students are expected to enroll and attend department seminars throughout their tenure in the department.
6. Successful completion of the Graduate Board Oral Exam.
7. Completion of an original research project, documented in a dissertation that is defended by the candidate in a public presentation.
8. Completion of Responsible Conduct of Research training. For complete information, see <https://engineering.jhu.edu/wse-research/resources-policies-forms/responsible-conduct-of-research/online-training-course-for-the-responsible-conduct-of-research/>
9. Completion of Academic Ethics (EN.500.603 Graduate Orientation and Academic Ethics)
10. Application for Graduation submitted to Registrar's office.
11. Successful submission of a dissertation for publication through the electronic thesis dissertation system of (ETDS) the Johns Hopkins Library (<https://www.library.jhu.edu/library-services/electronic-theses-dissertations/>).

## Ph.D. Course Work

Students must successfully complete six graduate-level courses including the four required core and elective courses listed below:

Code	Title	Credits
<b>Students must successfully complete six graduate-level courses, including:</b>		
EN.540.630	Thermodynamics & Statistical Mechanics	3
EN.540.652	Advanced Transport Phenomena	3
<b>In their first semester, students are also required to complete:</b>		
EN.500.601	Research Laboratory Safety	1
<b>In addition, students must choose to take at least two courses from the list of strongly recommended electives:</b>		
EN.540.602	Metabolic Systems Biotechnology	3
EN.540.605	Modern Data Analysis and Machine Learning for ChemBEs	3
EN.540.615	Interfacial Science with Applications to Nanoscale Systems (Not Offered AY 21-22)	3
EN.540.673	Advanced Chemical Reaction Engineering in Practice	3

EN.540.674	Advanced Separation and Purification Processes in Practice	3
EN.540.681	Molecular Kinetics and Catalysis	3

**Ph.D. Students are strongly encouraged to take the four required courses in the first fall semester.** However, students who do not have an undergraduate degree in Chemical Engineering or a closely related field may need additional courses and should discuss an appropriate course plan with the Director of the Graduate Program at the start of their first semester.

The remaining two engineering or science courses are chosen with the help of the student's advisor to design a curriculum appropriate for the student's research interest. These two courses cannot include seminars, independent study, graduate research or special studies. They must be a semester-long letter grade course.

Each of the six courses must be passed with a letter grade of B- or higher. In addition, the student must maintain an overall grade point average (GPA) of 3.0 or better. If the student's GPA falls below 3.0, the student must re-take one or more of the courses and earn a higher grade. All grades remain on graduate students transcripts. If a student receives a grade of C+ or lower in a required core course, the student will be allowed to re-take the course once to achieve a grade of B- or higher. Failure to receive a B- or better the second time may be cause for dismissal from the program. Receipt of grades of C+ or lower in two or more required courses may be cause for dismissal from the program without the opportunity to re-take those courses.

## Ph.D. Thesis Criteria and Graduate Board Oral Exam

Candidates must write a dissertation conforming to university requirements that describes the student's work and results in detail. A public defense of the dissertation is required, and will be followed by a closed examination session. Because the closed examination session fulfills the university Graduate Board Oral (GBO) examination requirement, all procedures pertaining to GBOs as established by the University Graduate Board must be followed.

Additional information can be found in the department Graduate Handbook. (<https://engineering.jhu.edu/chembe/wp-content/uploads/2022/09/ChemBE-PhD-Handbook-August2022.pdf>)