CHEMICAL AND BIOMOLECULAR ENGINEERING, PHD

Program Requirements

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

1. Completion of six graduate-level courses, including the two required core and four elective courses.
2. Completion of an annual research evaluation by the end of June.
3. Serve as a teaching assistant for two ChemBE 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 (for students who enrolled in the program in Fall 2025 and later years, the GBO is expected to be completed by June 30 of the second year).
7. Completion of an original research project, documented in a dissertation that is defended by the candidate in a public presentation.
8. Successful Completion of the Responsible Conduct of Research course (https://engineering.jhu.edu/research/resources-policies-forms/online-training-course-responsible-conduct-of-research/).
9. Successful Completion of Academic Ethics course (EN.500.603 Graduate 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 two required core courses and four elective courses (at least two of which MUST be ChemBE elective courses) listed below:

Code	Title	Credits
Students must successfully complete six graduate-level courses, including:		
EN.540.630	Thermodynamics & Statistical Mechanics	3
EN.540.652	Advanced Transport Phenomena	3
In their first semester, students are also required to complete:		
EN.500.601	Research Laboratory Safety	1
In addition, students must choose to take at least two elective courses offered by ChemBE:		
EN.540.460	Polymer Physics	3
EN.540.602	Metabolic Systems Biotechnology	3
EN.540.603	Colloids and Nanoparticles	3
EN.540.605	Modern Data Analysis and Machine Learning for ChemBEs	3
EN.540.607	Renewable Energy Technologies	3
EN.540.614	Computational Protein Structure Prediction and Design	3
EN.540.615	Interfacial Science with Applications to Nanoscale Systems	3
EN.540.618	Cancer Metabolism	3
EN.540.621	Project in Design: Pharmacodynamics	3
EN.540.622	Introduction to Polymeric Materials	3
EN.540.628	Supramolecular Materials and Nanomedicine	3
EN.540.632	Project in Design: Pharmacokinetics	3
EN.540.633	Pharmacokinetics and Pharmacodynamics	3
EN.540.635	Software Carpentry	3
EN.540.637	Application of Molecular Evolution to Biotechnology	3
EN.540.638	Advanced Topics in Pharmacokinetics and Pharmacodynamics I	3
EN.540.639	Advanced Topics in Pharmacokinetics and Pharmacodynamics II	3
EN.540.640	Micro/Nanotechnology: The Science and Engineering of Small Structures	3
EN.540.658	Modeling and Design of Sustainable Chemical Processes	3
EN.540.660	Polymer Physics	3
EN.540.665	Engineering Principles of Drug Delivery	3
EN.540.667	Targeted Drug Delivery: Mechanistic Concepts	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
EN.540.695	Special Topics in Chemical and Biomolecular Engineering	3
EN.580.646	Molecular Immunoengineering	3

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

The remaining three elective 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 and should preferably be completed in the spring semester of the first year (second semester of studies).

Each of the six courses must be passed with a letter grade of B- or higher. In addition, the student must maintain an unofficial overall grade point average (GPA) of 3.0 or better (note that there is no official GPA calculated for WSE graduate students by the university and will not show on the transcript). 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 attempt to achieve a grade of B- or higher.

Ph.D. Thesis Criteria and Graduate Board Oral Exam

Candidates must write a dissertation conforming to university requirements that describes the students' research outcomes/findings in detail. A public defense of the dissertation is required. Starting Fall 2024, new incoming students will complete the Graduate Board Oral (GBO) towards the end of their second year. Current students (who matriculated before Fall 2024) will be given the option to either complete the GBO in the summer after their second year or in a closed examination session immediately following their public defense of the dissertation. Because the closed examination session fulfills the university GBO examination requirement, all procedures pertaining to GBOs as established by the Homewood Graduate Board/Doctor of Philosophy Board must be followed.

Additional information can be found in the department Graduate Handbook. (https://engineering.jhu.edu/chembe/academics/graduate-studies/phd-program/)