

# Chemical and Biochemical Engineering, PhD

## Requirements

The Doctor of Philosophy program in chemical and biochemical engineering requires a minimum of 72 s.h. of graduate credit. However, the degree is granted primarily on the basis of research achievement rather than on the accumulation of semester hours. Students must maintain a UI cumulative grade-point average (GPA) of at least 3.25.

All students must complete a core curriculum, which consists of one course each in transport phenomena, chemical thermodynamics, chemical reaction kinetics, technical communication, and data science plus five additional courses (total of 30 s.h.).

Students entering with a degree other than chemical engineering may need to take additional coursework to attain proficiency in core areas of chemical engineering.

The PhD in chemical and biochemical engineering requires the following coursework.

## Core Courses

Students must complete the five core courses with a minimum GPA of 3.50.

Course #	Title	Hours
All of these:		
CBE:5105	Introduction to Literature Review and Proposal Writing	3
CBE:5110	Intermediate Thermodynamics	3
CBE:5115	Transport Phenomena I	3
CBE:5120	Data Science in Chemical and Engineering Systems	3
One of these:		
CBE:3205	Introduction to Biochemical Engineering	3
CBE:5315	Polymer Chemistry	3
CBE:5425	Atmospheric Chemistry and Physics	3

## Professional Development Experience

Professional growth extends beyond the curriculum and the research laboratory. Graduate professionals must be able to identify and lead educational and research enterprises that advance the scope and impact of the discipline. Important skills include building professional networks, developing a comprehensive outlook for identifying emerging directions in the field, the ability to explain scientific and engineering principles to a variety of audiences, and more.

Some examples of professional development experiences include an industrial internship, a second teaching assistant experience, teacher training, organizing a session at a national conference, and organizing a local conference. A student's professional development experience must be

developed in consultation with their research mentor and approved by the director of graduate studies.

## Service Expectations

The service expectation has two components: one that explicitly links the student's research to service and another that connects the student to the more general support activities of their academic and professional community.

For the first service component, students must discuss the impact of research and highlight how research provides outreach opportunities in a comprehensive proposal chapter. Like the rest of the proposal, the chapter is expected to be prospective and prompt the student to incorporate broader impacts into their professional activities.

For the second service component, students must identify approximately 10 hours of appropriate service in their individual development plan and then carry it out during the semester. Students submit documentation, including a description of the event and a photograph showing them carrying out the service.

## Electives

Students supplement the core curriculum with electives tailored to their research area.

## Additional Requirements

All students are required to take ENGR:7270 Engineering Ethics during their first semester and CBE:5000 Seminar in Chemical and Biochemical Engineering every semester in residence. Students are required to present at one CBE:5000 graduate seminar.

In addition to a minimum GPA in the five core courses, students are required to pass a comprehensive examination before they can become degree candidates. The comprehensive examination is the presentation and defense of the candidate's research proposal. These examinations are arranged by members of the examining committee and may be repeated at the committee's discretion. Comprehensive examination policies are published in the Manual of Rules and Regulations on the Graduate College website. All students are also required to serve as a teaching assistant at least once during the duration of their graduate studies. A final examination, which is a defense of the thesis, completes the doctoral program.

For a detailed description of program requirements, see Graduate Program on the Department of Chemical and Biochemical Engineering website.