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. Students must maintain a Graduate College program grade-point average (GPA) of at least 3.25.

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.

Required Courses

Engineering Ethics and Graduate Seminar

Students are required to take ENGR:7270 Engineering Ethics (1 s.h.) during their first semester.

Students are also required to take CBE:5000 Seminar in Chemical and Biochemical Engineering (1 s.h.) every semester in residence. Students are required to present in the CBE:5000 seminar once before they graduate.

Core Courses

Students must complete the five core courses with a minimum GPA of 3.45. All core courses must be taken on an A–F graded basis.

Students who have previously taken CBE:5104 Introduction to Literature Review and Technical Writing may substitute this course for CBE:5105 Introduction to Literature Review and Proposal Writing; otherwise, CBE:5105 is required for the PhD.

Course #	Title	Hours
All of these:		
CBE:5105	Introduction to Literature Review and Proposal Writing	3
CBE:5110/ME:5210	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/CEE:5115	Atmospheric Chemistry and Physics	3

Elective Courses

Elective courses must bring the total credit for the degree to 72 s.h. At least 15 s.h. of these electives must be taken on an A–F graded basis; this 15 s.h. cannot include CBE:7999 Research: Chemical and Biochemical Engineering PhD Dissertation, although this course typically contributes to other elective credit.

Students select electives from courses numbered 3000 or above in the subjects listed below, excluding independent study courses.

Course #	Title	Hours
Subjects in the College of Engineering		
Chemical and biochemical engineering (prefix CBE), excluding CBE:3998		
Biomedical engineering (prefix BME), excluding BME:3995, BME:3998, BME:5998, BME:5999, and BME:7999		
Civil and environmental engineering (prefix CEE), excluding CEE:3998, CEE:5998, CEE:5999, and CEE:7999		
Core engineering courses (prefix ENGR), excluding ENGR:4000 and ENGR:4001		
Electrical and computer engineering (prefix ECE), excluding ECE:3998, ECE:5998, ECE:5999, and ECE:7999		
Industrial and systems engineering (prefix ISE), excluding ISE:3998, ISE:5998, ISE:5999, ISE:7998, and ISE:7999		
Mechanical engineering (prefix ME), excluding ME:4098, ME:6198, ME:6199, and ME:7299		
Subjects in Other Colleges		
Biochemistry and molecular biology (prefix BMB), excluding BMB:3800, BMB:3993, BMB:4999, BMB:5215, BMB:5261, and BMB:7292		
Chemistry (prefix CHEM), excluding CHEM:3994, CHEM:6990, and CHEM:7999		
Computer science (prefix CS), excluding CS:3990, CS:5990, CS:6990, and CS:7990		
Earth, environment, and sustainability (prefix SEES), excluding SEES:3150, SEES:3190, SEES:3992, SEES:4990, SEES:4995, SEES:6190, SEES:7990, and SEES:7999		
Informatics (prefix IGPI), excluding IGPI:5015, IGPI:6510, IGPI:6515, and IGPI:6520		
Mathematics (prefix MATH), excluding MATH:3996, MATH:3997, and MATH:7990		
Microbiology (prefix MICR), excluding MICR:4161, MICR:5264, and MICR:7261		
Occupational and environmental health (prefix OEH), excluding OEH:7000, OEH:7020, or OEH:7040		
Pharmacy (prefix PHAR), excluding PHAR:3994, PHAR:3995, PHAR:5520, PHAR:6120, PHAR:6305, PHAR:6320, PHAR:6515, PHAR:6720, and PHAR:6820		
Physics (prefix PHYS), excluding PHYS:4990, PHYS:4999, PHYS:7990, and PHYS:7992		

Additional Requirements

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.

Examinations and Dissertation

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. A final examination, which is a defense of the thesis, completes the doctoral program.

All students are also required to serve as a teaching assistant at least once during the duration of their graduate studies.

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