

# CHEMICAL ENGINEERING, PHD

**Degree:** Doctor of Philosophy (PhD)  
**Field of Study:** Chemical Engineering

## Program Overview

A PhD in Chemical Engineering will allow students to contribute more deeply to the impact of engineering on society. Students will push the frontiers of science and help develop the technologies that will solve the world's greatest engineering challenges in energy, materials, the environment, human health and more. With the most advanced degree in chemical engineering, students will have a wide range of high-level career opportunities in which they can be the decision maker.

Full financial support packages (tuition and stipend) are available for our PhD program, which has three components: research, technical coursework and professional development. At Case Western Reserve, students will get the chance to conduct their research alongside field-leading faculty mentors who are making boundary-busting discoveries—from developing advanced biosensors to inventing new and more efficient ways to produce ammonia to pioneering a more effective way to scrub carbon dioxide from the air on outer space missions. Students will build their own research portfolio and get the chance to publish their work in peer-reviewed journals and present at national conferences, with all of this work culminating in their PhD dissertation.

## PhD Policies

For PhD policies and procedures, please review the School of Graduate Studies section of the General Bulletin.

## Program Requirements

The degree of Doctor of Philosophy is awarded in recognition of deep and detailed knowledge of chemical engineering and a comprehensive understanding of related subjects together with a demonstration of the ability to perform independent research, to suggest new areas for research, and to communicate results in an acceptable manner. For students entering the PhD program with a BS degree, a total of 12 courses (36 credit hours) is required. Course requirements for students entering with MS degrees are adjusted to account for work done at other universities, but a minimum of 6 courses (18 credit hours) must be taken at CWRU. The course requirements for students entering with a BS degree are as follows:

Code	Title	Credit Hours
	Core and Elective courses <sup>a</sup>	30
	Professional Development courses <sup>b</sup>	6
	PhD thesis research <sup>c</sup>	18
<b>Total Credit Hours</b>		<b>54</b>

<sup>a</sup> Some of the graduate-level courses should be taken from a list of recommended courses that satisfy the Chemical Engineering core 'units' requirement. This list will be provided to the students upon admission to the program. For the PhD program, students should demonstrate that they have acquired a minimum of three

- core 'units' in each of the categories of Chemical Engineering Transport, Thermodynamics, Reactions and Applied Mathematics.
- <sup>b</sup> Professional development is an integral part of the PhD program of study. The 6 credit hours of professional development are acquired through courses in Chemical Engineering Communications (3 credit hours), and by attending the Chemical Engineering Colloquium (3 credit hours). All PhD students are required to assist in three teaching experiences as part of their degree requirements.
- <sup>c</sup> Students in the PhD program are required to complete 18 credit hours of thesis research. Also, students who enter the PhD program must pass a First Proposition Oral Examination (with an accompanying written report) that tests a student's ability to think creatively, grasp new research concepts, and discuss such concepts critically and comprehensively. The First Proposition Exam, typically taken in the Fall semester of the second year, serves as the qualifying examination for the PhD degree. A Second Proposition Exam focusing on the student's own research topic is required by the end of the second year in the PhD program. All PhD students must satisfy the residency requirements of the university and the Case School of Engineering. In addition, at various points in the course of the dissertation research, students will be required to prepare reports and seminars on their work, and defend their dissertation. The Chemical and Biomolecular Engineering Graduate Student Handbook contains a more detailed description of the department's PhD requirements and a time schedule for their completion.

The department anticipates that from time to time, special cases will arise which are exceptions to the above guidelines, e.g., a student may have taken a graduate-level course at another school. In these cases, the student must submit a statement with the Academic Program justifying the departure from the guidelines and have it approved by the department.