CHEMICAL ENGINEERING, M.S.

Graduate study in the department may be directed toward the master of science or the doctor of philosophy in chemical engineering. The graduate courses are planned to train outstanding students for advanced work in research and development.

The Department of Chemical and Biological Engineering has a tradition of excellence dating back to 1905. For a century, the program has consistently ranked as one of the best in the world. The department offers research opportunities in both traditional and emerging areas of research in chemical and biological engineering. These areas include energy-related science and technology, soft and hard materials science and engineering, systems engineering and optimization, catalysis, process control and design, nanotechnology, biotechnology, biomedical engineering, complex fluids, colloid and interfacial phenomena, atomic, molecular, and multiscale modeling, polymers (synthesis and processing), micro- and nano-electronics, environmental engineering and sustainability, reactor design, and atomic-scale design of surface reactivity. These areas of research are advanced by leveraging tools from the fields of applied mathematics, statistical mechanics, kinetics and catalysis, thermodynamics, and transport phenomena.

Research in the department is highly interdisciplinary, capitalizing on programs of national prominence such as the NSF Materials Research Science and Engineering Center (MRSEC), the nation’s largest NIH-funded biotechnology training program, and the Computation and Informatics in Biology and Medicine training program. Interdisciplinary research opportunities are also available through the Materials Science Program, the Center for Nanotechnology, and the Rheology Research Center. Researchers in the department have access to state-of-the-art facilities for research, including facilities for nanofabrication and the life sciences.

Graduate students in the department are encouraged to participate in international research experiences, industry internships, and entrepreneurial activities.

For interests and activities of faculty members, along with a list of selected publications for each, see the department’s faculty directory (http://directory. engr.wisc.edu/che/faculty).

FUNDING

Financial support for qualified graduate students is available in the form of research assistantships, teaching assistantships, and fellowships.

REQUIREMENTS

MINIMUM DEGREE REQUIREMENTS AND SATISFACTORY PROGRESS
To make progress toward a graduate degree, students must meet the Graduate School Minimum Degree Requirements and Satisfactory Progress (http://guide. wisc. edu/graduate/#policiesandrequirements) in addition to the requirements of the program.

MASTER’S DEGREES
M.Eng., M.S.

MINIMUM GRADUATE DEGREE CREDIT REQUIREMENT
30 credits

MINIMUM GRADUATE RESIDENCE CREDIT REQUIREMENT
16 credits

MINIMUM GRADUATE COURSEWORK (50%) REQUIREMENT
Half of degree coursework (15 credits out of 30 total credits) must be completed graduate-level coursework courses with the Graduate Level Coursework attribute are identified and searchable in the university's Course Guide (http://my. wisc. edu/CourseGuideRedirect/BrowseByTitle).

PRIOR COURSEWORK REQUIREMENTS: GRADUATE WORK FROM OTHER INSTITUTIONS
With program approval, students are allowed to count graduate coursework from other institutions toward the Minimum Graduate Degree Credit Requirement and the Minimum Graduate coursework (50%) Requirement. No credits from other institutions can be counted toward the Minimum Graduate Residence Credit Requirement. Coursework earned five or more years prior to admission to a master's degree is not allowed to satisfy requirements.

PRIOR COURSEWORK REQUIREMENTS: UW–MADISON UNDERGRADUATE
A total of 7 undergraduate credits from the UW–Madison undergraduate degree may be counted toward coursework requirements. If those credits are numbered 300 or above, they may be counted toward the Minimum Graduate Degree Credit Requirement. If those credits are numbered 700 or above, they may be counted toward the Minimum Graduate coursework (50%) Requirement. No credits can be counted toward the Minimum Graduate Residence Credit Requirement. Coursework earned five or more years prior to admission to a master's degree is not allowed to satisfy requirements.

PRIOR COURSEWORK REQUIREMENTS: UW–MADISON UNIVERSITY SPECIAL
With program approval, students are allowed to count up to 15 credits of coursework numbered 300 or above taken as a UW–Madison Special student toward the Minimum Graduate Residence Credit Requirement, and the Minimum Graduate Degree Credit Requirement and the Minimum Graduate Coursework (50%) Requirement. Coursework earned five or more years prior to admission to a master's degree is not allowed to satisfy requirements.

CREDITS PER TERM ALLOWED
15 credits

PROGRAM-SPECIFIC COURSES REQUIRED
To qualify for M.S. degree, student must complete a minimum of 30 graduate-level credits (300 and above), divided into two groups:

1. Professional group: minimum of 12 credits of chemical engineering courses. At least 6 credits must be numbered 700–899 (excluding research).
2. Elective group: minimum of 12 credits of graduate courses. At least 6 of these credits shall be in departments other than CBE and shall be chosen for their relevance to chemical and biological engineering.

Up to 6 credits will be allowed for chemical and biological engineering courses numbered between 300 and 499 in groups I and II combined, provided equivalent courses were not previously taken by the student.

The independent study project will comprise a minimum of 3 credits of supervised CBE 790 Master’s Research or Thesis and may involve a lab project, theoretical work, or a critical review of an advanced engineering topic.

An M.S. candidate must successfully complete an oral examination before a departmental examining committee.

When a candidate presents a thesis, no fewer than 5 nor more than 8 credits of research (CBE 790) may be counted toward the 30-credit-total requirement. When a thesis is not presented, a maximum of 6 credits of research may be counted toward the total.

**OVERALL GRADUATE GPA REQUIREMENT**
GPA of 3.0 or better is required.

**OTHER GRADE REQUIREMENTS**
Professional group: Grades of B or better are required.

Elective group: In general, grades of B or better are required for credit in this group, but grades of BC or C in non-CBE courses will be counted if balanced credit for credit by grades of A or AB in other courses from this group.

**PROBATION POLICY**
The Graduate School regularly reviews the record of any student who earned grades of BC, C, D, F, or Incomplete in a graduate course (300 or above), or grade of U in research credits. This review could result in academic probation with a hold on future enrollment or in being suspended from the Graduate School.

**ADVISOR / COMMITTEE**
The thesis examining committee comprises the advisor(s) plus two other CBE faculty members. The candidate may defend an M.S. thesis or an independent study project report.

**ASSESSMENTS AND EXAMINATIONS**
An M.S. candidate must successfully complete an oral examination before a departmental examining committee of the advisor(s) plus two other CBE faculty members. The candidate may defend an M.S. thesis or an independent study project report.

**TIME CONSTRAINTS**
Master’s degree students who have been absent for five or more consecutive years lose all credits that they have earned before their absence. Individual programs may count the coursework students completed prior to their absence for meeting program requirements; that coursework may not count toward Graduate School credit requirements.

**LANGUAGE REQUIREMENTS**
No language requirements.

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**ADMISSIONS**

This master's program is offered for work leading to the Ph.D. Students may not apply directly for the master's, and should instead see the admissions information for the Ph.D. (http://guide.wisc.edu/graduate/chemical-biological-engineering/chemical-engineering-phd)

**LEARNING OUTCOMES**

**KNOWLEDGE AND SKILLS**
- demonstrate a strong understanding of mathematical, scientific, and engineering principles in the field.
- demonstrate an ability to formulate, analyze, and solve advanced engineering problems.
- demonstrate creative, independent problem solving skills.
- apply the latest scientific and technological advancements, advanced techniques, and modern engineering tools to these problems.

**PROFESSIONAL CONDUCT**
- recognize and apply principles of ethical and professional conduct.

**PEOPLE**

*Faculty:* Professors Abbott, Dumesic, Graham, Huber, Klingenberg, Kuech, Lynn, Maravelias (Assistant Chair), Mavrikakis (Chair), Murphy, Palecek, Rawlings, Root, Shusta, Yin; Associate Professors Pfleger, Reed, Swaney; Assistant Professor Zavala