

CHEMICAL ENGINEERING, M.S.

The Department of Chemical and Biological Engineering does not consider applications for a terminal M.S. degree; the department admits only to the Ph.D. program. The M.S. degree can be awarded post admission for work completed leading to the Ph.D. degree. The M.S. degree is not a prerequisite for the Ph.D. degree.

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/>).

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/>)

FUNDING

GRADUATE SCHOOL RESOURCES

Resources to help you afford graduate study might include assistantships, fellowships, traineeships, and financial aid. Further funding information (<https://grad.wisc.edu/funding/>) is available from the Graduate School. Be sure to check with your program for individual policies and restrictions related to funding.

PROGRAM RESOURCES

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

REQUIREMENTS

MINIMUM GRADUATE SCHOOL REQUIREMENTS

Review the Graduate School minimum academic progress and degree requirements (<http://guide.wisc.edu/graduate/#policiesandrequirements>), in addition to the program requirements listed below.

MAJOR REQUIREMENTS

MODE OF INSTRUCTION

Face to Face	Evening/ Weekend	Online	Hybrid	Accelerated
Yes	No	No	No	No

Mode of Instruction Definitions

Accelerated: Accelerated programs are offered at a fast pace that condenses the time to completion. Students are able to complete a program with minimal disruptions to careers and other commitments.

Evening/Weekend: Courses meet on the UW-Madison campus only in evenings and/or on weekends to accommodate typical business schedules. Students have the advantages of face-to-face courses with the flexibility to keep work and other life commitments.

Face-to-Face: Courses typically meet during weekdays on the UW-Madison Campus.

Hybrid: These programs combine face-to-face and online learning formats. Contact the program for more specific information.

Online: These programs are offered 100% online. Some programs may require an on-campus orientation or residency experience, but the courses will be facilitated in an online format.

CURRICULAR REQUIREMENTS

Requirements Detail

Minimum 30 credits
Credit
Requirement

Minimum 16 credits
Residence
Credit
Requirement

Minimum Graduate Coursework 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 (<https://registrar.wisc.edu/course-guide> (<https://registrar.wisc.edu/course-guide/>)).

Overall Graduate GPA Requirement 3.00 GPA required.

Other Grade Requirements Professional group of courses: Grades of B or better are required.

Elective group of courses: Grades of B or better are required.

Assessments and Examinations An M.S. candidate not planning to seek re-admission to the Ph.D. program must successfully complete an oral examination before a departmental examining committee of the advisor(s) plus two other CBE faculty members. An M.S. candidate who is seeking re-admission to the Ph.D. program must successfully complete an oral examination before a departmental examining committee of the advisor(s) plus three other CBE faculty members. The candidate may defend an M.S. thesis or an independent study project report in a closed defense. The independent study project will comprise a minimum of three credits of supervised CBE 790 and may involve a lab project, theoretical work, or a critical review of an advanced engineering topic. The defense of an independent study project is conducted in a closed session.

Language Requirements No language requirements.

REQUIRED COURSES

To qualify for the 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 600–899 (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 in consultation with the advisor(s) 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 no fewer than 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 14 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.

Students who enter the program without a Bachelor of Science in Chemical Engineering may be required to take remedial coursework.

POLICIES

GRADUATE SCHOOL POLICIES

The Graduate School's Academic Policies and Procedures (<https://grad.wisc.edu/acadpolicy/>) provide essential information regarding general university policies. Program authority to set degree policies beyond the minimum required by the Graduate School lies with the degree program faculty. Policies set by the academic degree program can be found below.

MAJOR-SPECIFIC POLICIES

PRIOR COURSEWORK

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.

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.

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.

PROBATION

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

An M.S. candidate not planning to seek re-admission to the Ph.D. program must successfully complete an oral examination before a departmental examining committee of the advisor(s) plus two other CBE faculty members. An M.S. candidate who is seeking re-admission to the Ph.D. program must successfully complete an oral examination before a departmental examining committee of the advisor(s) plus three other CBE faculty members.

CREDITS PER TERM ALLOWED

15 credits

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.

GRIEVANCES AND APPEALS

These resources may be helpful in addressing your concerns:

- Bias or Hate Reporting (<https://doso.students.wisc.edu/bias-or-hate-reporting/>)
- Graduate Assistantship Policies and Procedures (<https://hr.wisc.edu/policies/gapp/#grievance-procedure>)
- Hostile and Intimidating Behavior Policies and Procedures (<https://hr.wisc.edu/hib/>)
 - Office of the Provost for Faculty and Staff Affairs (<https://facstaff.provost.wisc.edu/>)
- Dean of Students Office (<https://doso.students.wisc.edu/>) (for all students to seek grievance assistance and support)
- Employee Assistance (<http://www.eao.wisc.edu/>) (for personal counseling and workplace consultation around communication and conflict involving graduate assistants and other employees, post-doctoral students, faculty and staff)
- Employee Disability Resource Office (<https://employeeabilities.wisc.edu/>) (for qualified employees or applicants with disabilities to have equal employment opportunities)
- Graduate School (<https://grad.wisc.edu/>) (for informal advice at any level of review and for official appeals of program/departmental or school/college grievance decisions)
- Office of Compliance (<https://compliance.wisc.edu/>) (for class harassment and discrimination, including sexual harassment and sexual violence)
- Office of Student Conduct and Community Standards (<https://conduct.students.wisc.edu/>) (for conflicts involving students)
- Ombuds Office for Faculty and Staff (<http://www.ombuds.wisc.edu/>) (for employed graduate students and post-docs, as well as faculty and staff)
- Title IX (<https://compliance.wisc.edu/titleix/>) (for concerns about discrimination)

If a student feels unfairly treated or aggrieved by faculty, staff, or another student, the University offers several avenues to resolve the grievance. Students' concerns about unfair treatment are best handled directly with the person responsible for the objectionable action. If the student is uncomfortable making direct contact with the individual(s) involved, they should contact the advisor or the person in charge of the unit where the action occurred (program or department chair, section chair, lab manager, etc.). For more information see the Graduate School Academic Policies & Procedures: <https://grad.wisc.edu/acadpolicy/?policy=grievancesandappeals> The Assistant Dean for Graduate Affairs (enr-dean-graduateaffairs@enr.wisc.edu) provides overall leadership for graduate education in the College of Engineering (CoE), and is a point of contact for graduate students who have concerns about education, mentoring, research, or other difficulties.

PROCEDURES

1. The student is encouraged to speak first with the person toward whom the grievance is directed to see if a situation can be resolved at this level.
2. Should a satisfactory resolution not be achieved, the student should contact the CBE Graduate Associate Chair, or Department Chair if the grievance involves the Graduate Associate Chair, to discuss the grievance. The Graduate Associate Chair or Department Chair will facilitate problem resolution through informal channels and facilitate any complaints or issues of students. The first attempt is to help students informally address the grievance prior to any formal complaint. Students are also encouraged to talk with their faculty advisors regarding concerns or difficulties if necessary. University resources for sexual harassment, discrimination, disability accommodations, and other related concerns can be found on the UW Office of Equity and Diversity website: <https://oed.wisc.edu/>. Other campus resources include:
 - The Graduate School – www.grad.wisc.edu (<http://www.grad.wisc.edu/>)
 - McBurney Disability Resource Center – www.mcburney.wisc.edu (<http://www.mcburney.wisc.edu/>)
 - Employee Assistance Office – www.eao.wisc.edu (<http://www.eao.wisc.edu/>)
 - Ombuds Office – www.ombuds.wisc.edu (<http://www.ombuds.wisc.edu/>)
 - University Health Services – www.uhs.wisc.edu (<http://www.uhs.wisc.edu/>)
3. If the issue is not resolved to the student's satisfaction the student can submit the grievance to the Graduate Associate Chair in writing, within 60 calendar days of the alleged unfair treatment.
4. On receipt of a written complaint, a faculty committee will be convened by the Graduate Associate Chair to manage the grievance. The faculty committee will obtain a written response from the person, organization, or governing committee toward whom the complaint is directed. This response will be shared with the person filing the grievance.
5. The faculty committee will determine a decision regarding the grievance. The Graduate Associate Chair will report on the action taken by the committee in writing to both the student and the person, organization, or governing committee toward whom the complaint was directed within 20 working days from the date the complaint was received.
6. At this point, if either party (the student or the person, organization, or governing committee toward whom the grievance is directed) is unsatisfied with the decision of the faculty committee, the party may file a written appeal. Either party has 10 working days to file a written appeal to the College of Engineering. The Assistant Dean for Graduate Affairs (enr-dean-graduateaffairs@enr.wisc.edu) provides overall leadership for graduate education in the College of Engineering (CoE), and is a point of contact for graduate students who have concerns about education, mentoring, research, or other difficulties.
7. Documentation of the grievance will be stored for at least 7 years. Significant grievances that set a precedent will be stored indefinitely.

The Graduate School has procedures for students wishing to appeal a grievance decision made at the College of Engineering level. These policies are described in the Graduate School's Academic Policies & Procedures: <https://grad.wisc.edu/acadpolicy/?policy=grievancesandappeals>.

OTHER

Admitted students are offered research assistantships to support the pursuit of dissertation or degree research in chemical engineering. The stipend, after tuition and fees, is guaranteed for the duration of a student's graduate studies provided satisfactory progress is made toward their degree. Support for students receiving external funding or other program opportunities are reviewed case by case. Although students can be awarded M.S. degrees, there is no direct admission to the M.S. program.

PROFESSIONAL DEVELOPMENT

GRADUATE SCHOOL RESOURCES

Take advantage of the Graduate School's professional development resources (<https://grad.wisc.edu/pd/>) to build skills, thrive academically, and launch your career.

LEARNING OUTCOMES

1. Demonstrate a strong understanding of mathematical, scientific, and engineering principles in the field.
2. Demonstrate an ability to formulate, analyze, and solve advanced engineering problems.
3. Demonstrate creative, independent problem solving skills.
4. Apply the latest scientific and technological advancements, advanced techniques, and modern engineering tools to these problems.
5. Recognize and apply principles of ethical and professional conduct.

PEOPLE

PROFESSORS

Eric V. Shusta (Chair)
Michael David Graham
George Huber
Daniel J. Klingenberg
David M. Lynn
Manos Mavrikakis
Regina Murphy
Sean P. Palacek
Brian F. Pflieger
Thatcher Root
John Yin

ASSOCIATE PROFESSORS

Ross E. Swaney
Victor Zavala Tejada

ASSISTANT PROFESSORS

Styliani Avraamidou
Matthew Gebbie
Marcel Schreier

Reid Van Lehn

RESEARCH PROFESSOR

William Banholzer

See also Chemical and Biological Engineering Faculty Directory (<https://directory.engr.wisc.edu/che/faculty/>).