CHEMICAL ENGINEERING, PHD

The Department of Chemical and Biological Engineering (CBE) (https://engineering.wisc.edu/departments/chemical-biological-engineering/)at UW-Madison was established in 1905. It has a tradition of excellence dating back to its founding and consistently ranks among the best programs in the world (https://engineering.wisc.edu/facts-and-stats/). The department has 21 core faculty and 7 affiliate faculty (https://directory.engr.wisc.edu/che/faculty/) who conduct experimental and theoretical research to address pressing societal, economic, and environmental challenges. R (https://engineering.wisc.edu/departments/chemical-biological-engineering/research/)esearch in CBE (https://engineering.wisc.edu/departments/chemical-biological-engineering/research/) is highly collaborative and often involves diverse teams from within the department, across campus, at other campuses, and in industry. CBE researchers address the most pressing challenges facing society including developing approaches to sustainably produce new fuels and chemicals, combat the plastic pollution crisis, create new therapeutic molecules and materials, optimize energy infrastructure, computationally design new materials and chemical processes, understand transport in complex environments, engineer bacteria to produce biofuels, and more.

Research on campus is highly interdisciplinary, benefiting from prominent centers such as the Center for the Chemical Upcycling of Waste Plastics (CUWP) (https://cuwp.org/), Center for Cell Manufacturing Technologies (CMaT) (https://cellmanufacturingusa.org/), Materials Research Science and Engineering Center (MRSEC) (https://mrsec.wisc.edu/), Great Lakes Bioenergy Research Center (GLBRC) (https://www.glbrc.org/), Wisconsin Institute for Discovery (WID) (https://wid.wisc.edu/), and the Stem Cell and Regenerative Medicine Center (https://stemcells.wisc.edu/).

CBE is strategically located in Engineering Hall (https://map.wisc.edu/s/p82kgyxu/) at the heart of the science and engineering areas of campus, facilitating interactions with students and researchers in other leading departments.

Graduate students in the department are encouraged to participate in international research experiences, industry internships, and entrepreneurial activities. For research interests and activities of faculty members, please see the department's research website (https://engineering.wisc.edu/departments/chemical-biological-engineering/research/) and faculty directory (http://directory.engr.wisc.edu/che/faculty/).

ADMISSIONS

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Please consult the table below for key information about this degree program's admissions requirements. The program may have more detailed admissions requirements, which can be found below the table or on the program's website.

Graduate admissions is a two-step process between academic programs and the Graduate School. ***Applicants must meet* the minimum requirements *(https://grad.wisc.edu/apply/requirements/) of the Graduate School as well as the program(s).*** Once you have researched the graduate program(s) you are interested in, apply online (https://grad.wisc.edu/apply/).

Requirements	Detail
Fall Deadline	December 1
Spring Deadline	September 1
Summer Deadline	The program does not admit in the summer.
GRE (Graduate Record Examinations)	Not required.
English Proficiency Test	Refer to the Graduate School: Minimum Requirements for Admission policy: https://policy.wisc.edu/library/UW-1241 (https://policy.wisc.edu/library/UW-1241/).
Other Test(s) (e.g., GMAT, MCAT)	n/a
Letters of Recommendation Required	3

Applicants with a strong background in chemical engineering or related disciplines and a serious interest in research are encouraged to apply for admission. Applications are accepted for both Fall (September) and Spring (January) admission, although historically most students start in the Fall and admission is seldom offered for the Spring semester. The Department of Chemical and Biological Engineering does not consider applications for a terminal MS degree; the department admits only to the PhD. An MS degree can be awarded post admission as an alternative to the PhD degree. The MS degree is not a prerequisite for the PhD degree.

Applications for Fall admission must be received **by noon (CST) on the deadline**. Admissions decisions are made by a committee of faculty with research expertise spanning the four research areas (https://engineering.wisc.edu/departments/chemical-biological-engineering/research/) of the department. Individual faculty do not recommend admissions decisions and advisors are not determined at the time of application. Instead, students will match with advisors (https://engineering.wisc.edu/blog/program-information-and-milestones/) after meeting with all faculty during the fall semester. Additional information about the application process, detailed information on required application materials, advice for preparing a competitive application, information on application fee waivers, and frequently asked questions are available here (https://engineering.wisc.edu/blog/how-to-apply-to-the-phd-program/).

FUNDING

FUNDING

DEPARTMENT RESOURCES

Students admitted to the graduate program are provided financial support in the form of research assistantships, teaching assistantships, and fellowships. Support is dependent on availability of funds and students maintaining satisfactory progress towards their degree.

GRADUATE SCHOOL RESOURCES

The Bursar's Office provides information about tuition and fees associated with being a graduate student**.** Resources to help you afford graduate study might include assistantships, fellowships, traineeships, and financial aid. Further funding information is available from the Graduate School.

Be sure to check with your program for individual policies and restrictions related to funding.

REQUIREMENTS

MINIMUM GRADUATE SCHOOL REQUIREMENTS

Review the Graduate School minimum degree requirements (https://guide.wisc.edu/graduate/#requirementstext) and policies (https://guide.wisc.edu/graduate/#policiestext), 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 typically take enough credits aimed at completing the program in a year or two.

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

Requirement	Detail
Minimum Credit Requirement	51 credits
Minimum Residence Credit Requirement	32 credits
Minimum Graduate Coursework Requirement	26 credits must be graduate-level coursework. Refer to the Graduate School: Minimum Graduate Coursework (50%) Requirement policy: https://policy.wisc.edu/library/UW-1244 (https://policy.wisc.edu/library/UW-1244/).
Overall Graduate GPA Requirement	3.00 GPA required. Refer to the Graduate School: Grade Point Average (GPA) Requirement policy: https://policy.wisc.edu/library/UW-1203 (https://policy.wisc.edu/library/UW-1203/).
Other Grade Requirements	At least two of the core Chemical and Biological Engineering graduate classes must be taken in the first semester of residence in the graduate program, and at least four core graduate classes must be completed with grades of B or better, preferably by the end of the second semester of residence. A student who receives one grade of BC or lower in a core graduate class but who wishes to remains in the PhD program must take the fifth core course or re-take the low graded core course, preferably in the third semester, and the student must receive a B or better. A student who receives more than one grade of BC or lower in core graduate classes will be placed in the MS program. Upon successful completion of the MS program, the student may petition the full faculty for to return to the PhD program. A student who receives an average of 3.0 or higher on their preliminary exam becomes a candidate for the PhD program. A student who does not receive an average score of 3.0 or higher in the qualifying process is placed in the MS program. Upon successful completion of the MS program, the student may petition the full faculty to return to the PhD program.
Assessments and Examinations	A doctoral student who has met the grade requirements must complete a preliminary exam in the second semester of their second year. The preliminary exam consists of a written report and oral examination. During the first semester of the fourth year of the program, PhD Candidates will participate in a mandatory research progress meeting with their thesis committee.
Language Requirements	No language requirements.
Graduate School Breadth Requirement	All doctoral students are required to complete a doctoral minor or graduate/professional certificate. Refer to the Graduate School: Breadth Requirement in Doctoral Training policy: https://policy.wisc.edu/library/UW-1200 (https://policy.wisc.edu/library/UW-1200/).

REQUIRED COURSES

Code	Title	Credits
Research Credits		
Complete at least 30 research credits		30
CBE 790	Master's Research or Thesis	
CBE 890	Pre-Dissertator's Research	
CBE 990	Thesis-Research	
Coursework		
Complete 4 out of 5 Chemical and Biological Engineering (CBE) Core Courses		12
CBE 620	Intermediate Transport Phenomena	
CBE 660	Intermediate Problems in Chemical Engineering	
CBE 710	Advanced Chemical Engineering Thermodynamics	
CBE 735	Kinetics and Catalysis	

CBE 781	Biological Engineering: Molecules, Cells & Systems	
Breadth		**9**
Total Credits		**51**

- Grades of B or better are required in all Chemical and Biological Engineering courses used towards degree requirements.
- The requirement of four core Chemical and Biological Engineering graduate courses shall not be met by substitution of other courses.

Breadth Requirement

The breadth requirement is designed to represent a coherent body of work and should not be simply an after-the-fact ratification of a number of courses taken outside the major department. To ensure coherence, the student must consult with his or her advisor. The minor/certificate should be submitted for approval at an early date, before the student is halfway through the proposed course sequence.

Teaching Assistantship

Each student in the PhD program is required to serve as a teaching assistant (TA) for two semesters. Under normal circumstances, each student should serve as a teaching assistant one semester of the second year and one semester of the third year. Requests for alternate arrangements, partial or full waiver of the requirement, should be submitted in writing to the Graduate Program Committee.

POLICIES

GRADUATE SCHOOL POLICIES

The Graduate School's Academic Policies and Procedures (https://grad.wisc.edu/acadpolicy/) serve as the official document of record for Graduate School academic and administrative policies and procedures and are updated continuously. Note some policies redirect to entries in the official UW-Madison Policy Library (https://policy.wisc.edu/). Programs may set more stringent policies than the Graduate School. Policies set by the academic degree program can be found below.

MAJOR-SPECIFIC POLICIES

PRIOR COURSEWORK

Graduate Credits Earned at Other Institutions

Refer to the Graduate School: Transfer Credits for Prior Coursework (https://policy.wisc.edu/library/UW-1216/) policy.

Students matriculating with an MS degree from another university may, with department approval, use up to two courses from their MS work toward the breadth requirement, if the minor department or graduate/professional certificate program approves, and with departmental approval.

Undergraduate Credits Earned at Other Institutions or UW-Madison

Undergraduate coursework credits are not allowed to satisfy requirements.

Credits Earned as a Professional Student at UW-Madison (Law, Medicine, Pharmacy, and Veterinary careers)

Refer to the Graduate School: Transfer Credits for Prior Coursework (https://policy.wisc.edu/library/UW-1216/) policy.

Credits Earned as a University Special student at UW–Madison

Refer to the Graduate School: Transfer Credits for Prior Coursework (https://policy.wisc.edu/library/UW-1216/) policy.

PROBATION

Refer to the Graduate School: Probation (https://policy.wisc.edu/library/UW-1217/) policy.

ADVISOR / COMMITTEE

Refer to the Graduate School: Advisor (https://policy.wisc.edu/library/UW-1232/) and Graduate School: Committees (Doctoral/Master's/MFA) (https://policy.wisc.edu/library/UW-1201/) policies. Students should refer to the departmental Graduate Handbook of Academic Policies and Procedures for more information.

CREDITS PER TERM ALLOWED

15 credit maximum. Refer to the Graduate School: Maximum Credit Loads and Overload Requests (https://policy.wisc.edu/library/UW-1228/) policy.

TIME LIMITS

The Chemical and Biological Engineering department expects students to complete their PhD degree within five years. Any student unable to defend their thesis in this period must petition the faculty for an extension by May 1 of the fifth year, specifying reasons for the request and length of requested extension.

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/)
- 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://employeedisabilities.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 Student Assistance and Support (OSAS) (https://osas.wisc.edu/) (for all students to seek grievance assistance and support)
- 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)

Grievance Procedures

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 (engr-dean-graduateaffairs@engr.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 above.
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 (engr-dean-graduateaffairs@engr.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/documents/grievances-and-appeals/).

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 is reviewed case by case. Although students can be awarded MS degrees, there is no direct admission to the MS program.

Students placed in the MS program are expected to finish the MS program within five semesters of admission into the PhD program.

PROFESSIONAL DEVELOPMENT

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DEPARTMENT RESOURCES

The CBE Graduate Program office coordinates ongoing professional development workshops. Topics have included: life in industry, ethical decision making, intellectual property agreements, maintaining self-motivation, how to utilize software in creating figures, effective management of undergraduate researchers, effective management of your thesis advisor, and individual development plans (IDPs).

The Graduate School Office of Professional Development also offers training opportunities for graduate students and this information is emailed to all of the CBE grad students on a regular basis. Examples of these training offerings include sharing of information about The DELTA Program (https://grad.wisc.edu/delta/), dissertation writing, grant writing, and job search strategies.

In order to foster effective teaching among our graduate students, all students are required to serve as a TA for two semesters. Before graduate students are allowed to TA, each must participate in the New Educator's Orientation (NEO) training offered each semester. They are also encouraged to connect with the University's DELTA Program.

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

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1. Demonstrate an ability to synthesize knowledge from a subset of the biological, physical, and social sciences to help frame problems critical to the future of their discipline.
2. Conduct original research.

3. Demonstrate an ability to create new knowledge and communicate it to their peers.
4. Fosters ethical and professional conduct.