

CHEMICAL & BIOMOLECULAR ENGINEERING, MSE

The Chemical and Biomolecular Engineering master's is for students who wish to prepare themselves for research and development activities by obtaining a more solid foundation in the principles of chemical and biomolecular engineering. At the same time, limited specialization in one of several fields, such as fluid mechanics, thermodynamics, control, design, bioengineering, polymer engineering, heat transfer, or computer applications is possible.

For more information: <http://www.cbe.seas.upenn.edu/prospective-students/masters/index.php> (<http://www.cbe.seas.upenn.edu/prospective-students/masters/>)

Master's Degree Requirements

10 course units are required for the MSE in Chemical and Biomolecular Engineering.¹⁻²

Code	Title	Course Units
Core Courses		
CBE 6180	Advanced Molecular Thermodynamics	1
CBE 6210	Advanced Chemical Kinetics and Reactor Design	1
CBE 6400	Transport Processes I (Fall)	1
ENM 5100	Foundations of Engineering Mathematics - I ³	1
Chemical and Biomolecular Engineering Electives		
5000-level CBE courses		2
Electives		
Engineering or Science elective 5000-level or above		1
Any elective 5000-level or above ⁴		3
Independent Study ⁵		
Students are free to take other classes (non-technical, interdisciplinary, or below 5000-level) to round out their education, but such will not count toward their ten required credits.		
Total Course Units		10

1

Students are required to take ten course units to graduate: (3 core, 1 math, 2 CBE and 4 electives)

2

Program Duration

- MSE students must register for at least three course units per semester to maintain full-time status. This is especially important for international students to maintain their visa status.
- Full-time master's students can complete their degrees in one to two years. In order to complete the degree in one year, it is necessary to take four course units in both the fall and spring semesters, with two course units during the summer session.

3

Alternative graduate level math courses may be considered at the discretion of the Graduate Group Chair.

4

Students may take up to one course in the Wharton School. Non-technical classes will be allowed at the discretion of the Graduate Chair.

5

With permission, students may take up to two Independent Study (5990) course units with a letter grade or two written Thesis (5970) course units with an S grade, with a CBE faculty member, which are counted as Free electives.

Transferring Courses

Petition for transfer of up to **two** course units of graduate credit from another graduate school may be made to the Chair of the Graduate Group Committee after one term's attendance.

GPA Requirement

Grades given in graduate engineering courses are **A, B, C, D, F**, and **I**. The **I** (Incomplete) is a temporary grade which is changed to a letter grade when the course requirements have been completed. A grade average of at least **B** must be kept to remain in good standing. Students with an undergraduate degree in a field other than chemical engineering receiving a grade of **C** or below in any required graduate course will be asked to withdraw. It should be emphasized that merely passing all graduate courses does not obligate the University to grant a degree. Successful candidates for the MSE degree must be recommended as such by the Graduate Group Committee.

Focus areas include:

- Biotechnology and Pharma
- Catalysis, Energy, and Environment
- Computational Science and Simulation
- Process Control and Design
- Soft Matter

See Graduate Group Chair or Graduate Coordinator for suggested lists of elective courses in different focus areas.

The degree and major requirements displayed are intended as a guide for students entering in the Fall of 2022 and later. Students should consult with their academic program regarding final certifications and requirements for graduation.