CHEMICAL AND BIOLOGICAL ENGINEERING MS

Degree Requirements

The following requirements are in addition to, or further elaborate upon, those requirements outlined in The Graduate School Policy Guide (https://catalogs.northwestern.edu/tgs/academic-policies-procedures/).

The Chemical and Biological Engineering program offers a Coursework Master's and a Thesis Master's. The different requirements are described below.

Coursework Master's

Total Units Required: 10[1]

Course	Title
Department Core Courses (4 units)	
These four courses form the core chemical engineering topics:	
CHEM_ENG 401-0	Mathematical Methods for Chemical Engineering
CHEM_ENG 420-0	Transport Phenomena
CHEM_ENG 404-0	Advanced Thermodynamics
CHEM_ENG 408-0	Chemical Engineering Kinetics and Reactor Design
Electives (6 units)	
Department Electives (2 units)	
Two electives must be taken within the department.	
Additional Electives (4 units)	
Additional electives may be from within or outside the department from approved math, science, Chemical Engineering, or other engineering courses.	

[1] For coursework master's: at least 6 courses in Chemical and Biological Engineering are required; this includes the 4 required core courses.

Other Coursework MS Degree Requirements

- **Examinations:** none specified
- **Research/Projects:** none specified
- **Master's Thesis:** none specified
- **Other:** students are strongly recommended to take the CHEM_ENG 520-0 Professional Development in Chemical and Biological Engineering 1 course on professional skills and are also urged but not required to attend the quarterly departmental research seminar.

Thesis Master's

Total Units Required: 10[2]

Course	Title
Department Core Courses (4 units)	
These four courses form the core chemical engineering topics:	
CHEM_ENG 401-0	Mathematical Methods for Chemical Engineering
CHEM_ENG 420-0	Transport Phenomena
CHEM_ENG 404-0	Advanced Thermodynamics
CHEM_ENG 408-0	Chemical Engineering Kinetics and Reactor Design
Electives (3 units)	
Department Electives (1 unit): One elective must be taken within the department.	
Additional Electives (2 units): Additional electives may be from within or outside the department from approved math, science, Chemical Engineering, or other engineering courses.	
Research (3 units)	
3 unit thesis (three units of independent study projects)	
CHEM_ENG 499-0	Projects

[2] For thesis master's: at least 6 units in Chemical and Biological Engineering are required; this includes the 4 required core courses, 1 departmental elective, and one of the 499 units for the thesis. If the 499 is in another department, an additional unit in Chemical Engineering must be included in the additional electives.

Other Thesis MS Degree Requirements

- **Departmental Seminar:** students are urged but not required to attend
- **Short Courses:** Students are required to attend the Responsible Conduct of Research course.
- **Examinations:** defense of thesis
- **Research/Projects:** towards thesis
- **Master's Thesis:** based on current research in the field
- **Other:** students are strongly recommended to take the CHEM_ENG 520-0 Professional Development in Chemical and Biological Engineering 1 course on professional skills and are also urged but not required to attend the quarterly departmental research seminar.

Prerequisites

Although students do not need to be enrolled in the chemical engineering bachelor's program to be admitted, MS programs will expect a level of substantive competency equivalent to the completion of the following courses:

- Thermodynamics (CHEM_ENG 211-0 Thermodynamics preferred, or equivalent)
- Fluid mechanics (CHEM_ENG 321-0 Fluid Mechanics or equivalent)
- Heat or mass transfer (CHEM_ENG 322-0 Heat Transfer or CHEM_ENG 323-0 Mass Transfer, or equivalent)
- Kinetics/reaction engineering (CHEM_ENG 307-0 Kinetics and Reactor Engineering)

These prerequisite courses can be completed before beginning the MS program at Northwestern, or they may be taken after matriculation to Northwestern and prior to completion of the Chemical Engineering MS core courses. Opting to take the courses after matriculating into the MS program may extend the time to degree completion as many of our courses are only offered once per year.