

Chemical and Biological Engineering

The Department of Chemical and Biological Engineering (CHBE) prepares students with the knowledge and skills to contribute to society and their profession. Our **Chemical engineering graduates** practice in a variety of fields: chemical manufacturing and petroleum refining, environmental engineering, materials and microelectronics, pharmaceutical manufacturing and delivery, food processing, and many others. Our **Biological engineering graduates** also practice in a variety of fields: chemical manufacturing using biological processing, biofuel production, environmental engineering and remediation, biomaterial manufacturing and biologically compatible materials, food processing, agrichemical processing, pharmaceutical production, medical device design, and biomedicine. In both fields there is an increased emphasis on sustainability and prudent use of natural resources. Both lists will continue to expand as the fields continue to develop.

The preparation of women and men competent to develop, design, and operate new chemical or biological systems, or to perform the research and development to improve existing products and processes, is a comprehensive process. Thus the curricula in **chemical engineering** and **biological engineering** are founded on the study of engineering principles and basic science, particularly chemistry, physics, biology, and mathematics. Safety and concern for the environment and society must be overriding concerns to chemical engineering and biological engineering practitioners, and developing this awareness is another aspect of the department's educational goals. Both chemical engineers and biological engineers typically work as teams of professionals, sharing expertise and knowledge for greater achievement, so teamwork and communication are emphasized. The curricula have been developed to provide these skills through faculty members who have extensive knowledge and experience in the field.

The department also offers a **minor in biomedical engineering** intended primarily for undergraduate students who have an interest in biomedical applications of engineering. The minor curriculum will give students the interdisciplinary expertise required to thrive in biomedical industry, professional programs, and graduate programs.

Mission

The Department of Chemical and Biological Engineering will serve the State of Montana and the nation through excellence in learning, discovery and engagement to meet the land grant mission of accessibility and value at Montana State University.

Chemical Engineering Program

The outcome of the undergraduate program in chemical engineering is an ABET accredited B.S. Chemical Engineering degree.

Our chemical engineering program educational objectives are as follows: Our graduates:

- will be confident in their ability to apply chemical engineering fundamentals
- will be effective communicators and team members
- will be highly ethical engineering professionals
- will have the ability to pursue lifelong learning
- will be proactive problem solvers
- will embrace process safety

Biological Engineering Program

The outcome of the undergraduate program in biological engineering is a B.S. Biological Engineering degree.

Our biological engineering program educational objectives are as follows:

Biological Engineering graduates will:

1. Have fundamental engineering skills, current technical knowledge, and professional skills to effectively practice biological engineering.
2. Demonstrate professional responsibility in safely performing engineering tasks and be willing to accept ethical responsibility for the social and environmental impacts of engineering practices.
3. Be able to communicate with diverse, global audiences and to work with and lead integrated teams and communities.
4. Be critical, creative, and independent thinkers who use their technical expertise to address societal needs and advance their field.

To achieve the program educational objectives, the Department will recruit, support, and retain high-quality faculty and staff, and provide facilities and equipment to create an atmosphere conducive to learning, engagement, and discovery.

Graduate Programs

The Department provides graduate programs that lead to masters degrees in bioengineering, chemical engineering and environmental engineering, as well as a Ph.D. in Chemical Engineering and a Ph.D. in Engineering with an environmental engineering option. The graduate programs provide students with opportunities for advanced study and research.

Dual Degree Program in Bioengineering

In partnership with Istanbul Technical University (ITU), the department offers a dual degree program in Bioengineering intended for Turkish students enrolled at ITU. Students are resident at ITU during years 1 and 3 and at MSU during years 2 and 4, and graduates receive degrees from both institutions. *Detailed curricular requirements are available from the Chemical and Biological Engineering department.*

Undergraduate Programs

- Biological Engineering (<http://catalog.montana.edu/undergraduate/engineering/chemical-biological-engineering/bioengineering/>)
- Chemical Engineering (<http://catalog.montana.edu/undergraduate/engineering/chemical-biological-engineering/chemical-engineering/>)
- Biomedical Engineering Minor (<http://catalog.montana.edu/undergraduate/engineering/chemical-biological-engineering/biomedical-engineering-minor/>)

The department offers graduate programs leading to the Master of Science in Chemical Engineering degree and a Master of Science degree in Environmental Engineering and a Master of Science in Bioengineering. The department offers a Doctor of Philosophy in Chemical Engineering and a Doctor of Philosophy in Materials Science. The department also participates in the Doctor of Philosophy degree in Engineering through the College of Engineering, with an available option in Environmental Engineering.

Degree Offered

- M.S. in Chemical Engineering (<http://catalog.montana.edu/graduate/engineering/chemical-biological-engineering/ms-chemical-engineering/>)
- M.S. in Environmental Engineering (<http://catalog.montana.edu/graduate/engineering/environmental-engineering/>)
- M.S. in Bioengineering (<http://catalog.montana.edu/graduate/engineering/chemical-biological-engineering/ms-bioengineering/>)

- Master of Engineering In Chemical Engineering (<http://catalog.montana.edu/graduate/engineering/chemical-biological-engineering/master-engineering-chemical-engineering/>)
- Master of Engineering in Bioengineering (<http://catalog.montana.edu/graduate/engineering/chemical-biological-engineering/master-engineering-bioengineering/>)
- Ph.D. in Chemical Engineering (<http://catalog.montana.edu/graduate/engineering/engineering-phd/chemical-engineering/>)
- Ph.D. in Materials Science (<http://catalog.montana.edu/graduate/letters-science/chemistry-biochemistry/phd-materials-science/>)
- Ph.D. in Engineering - Option Environmental Engineering (<http://catalog.montana.edu/graduate/engineering/engineering-phd/>)