DEPARTMENT OF CHEMICAL
AND BIOLOGICAL
ENGINEERING

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The mission of the Chemical and Biological Engineering Department is to
provide quality educational programs firmly based in fundamental
concepts and to perform and publish outstanding research in chemical
and biological engineering.

The educational objectives for graduates from Chemical Engineering
baccalaureate (B.S.) program are to:

1. Advance their careers through demonstrated skill in engineering
analysis, modeling and simulations, experimental methods,
application of codes and standards, process implementation,
product manufacturing, and design.
2. Drive client and stakeholder satisfaction through ethical,
sustainable, and safe work practices, effective project
management, and optimal use of time, talents, and budgetary
resources.
3. Become acknowledged as an effective communicator
within their field or industry through the creation of clear
problem statements, informative technical reports, and useful
participation in technical conferences or through knowledge-
sharing technologies.
4. Prioritize life-long learning and advancement through
innovation, entrepreneurship, activity in professional societies,
organizations, and communities, pursuit of continuing
education and graduate degrees, professional licenses or
certifications, or other professional development activities.

The educational objectives for graduates from Biological Engineering
baccalaureate (B.S.) program are to:

1. Learn and Integrate: Graduates will be proficient engineering
problem solvers capable of identifying, formulating, and
solving engineering problems by applying their knowledge of
mathematics, chemistry, physics, engineering, and appropriate
processing, biochemical, biomedical, and environmental topics.
2. Think and create: Graduates will be effective engineers who
can apply their skills to design systems, components, and
processes to solve engineering problems for an ever-changing
world.
3. Communicate: Graduates will be effective written and verbal
communicators, and productive team members.
4. Clarify purpose and perspective: Graduates will have a
strong professional identity with a keen awareness of their
professional and ethical responsibility, and practice lifelong
learning.
5. Practice Citizenship: Graduates will design for advancement
and sustainability of their local, national and global

Chemical Engineering Program

The Bachelor of Science Program in Chemical Engineering is accredited
by the Engineering Accreditation Commission of ABET, https://
www.abet.org, that combines the science of chemistry with the discipline
of engineering in order to solve problems and to increase process
efficiency. One of the most attractive aspects of a chemical engineering
future is the variety of work available. The Chemical Engineering Program
is a blend of physics, chemistry, and mathematics; thus, a chemical
engineer possesses a versatility that gives him or her many opportunities
for employment in fields such as energy systems, pulp and paper,
environmental engineering, food products, nuclear power, petroleum
and petrochemicals, semiconductors, synthetic fuels, radioisotope
applications, plastics and polymers, pharmaceuticals, education,
biomedical engineering, computer applications, alternate energy sources,
steel, nanotechnology, and textiles. A chemical engineer can choose
work in research and development, design and construction, operations,
management, teaching, or technical sales.

The faculty of the Chemical Engineering Program is dedicated to
excellence in teaching. It is the faculty's goal to provide the students
with a strong, well-rounded background for immediate entry into the
industrial workforce or for graduate study. This background includes the
theoretical aspects of chemical engineering as well as practical work
experiences. Thus, much of the equipment that is installed in Chemical
Engineering laboratories is on the scale of pilot plant equipment. Because
much of the equipment is made of glass, students are able to see at a
glance what processes occur and where the streams are flowing. The
department has a two-story distillation column, a gas absorber, a two-
stage evaporator, two types of chemical reactors, a catalytic reactor,
liquid extraction equipment, membrane-based gas separation, three

Communities protecting human health and safety, and
practicing environmental stewardship.

Progress towards these program educational objectives is assessed
by student performance on the nationally administered Fundamentals
in Engineering (FE) Examination, performance at international design
competitions, exit interviews with graduating students, and surveys of
graduated students and their employers.

Upon graduation, students will be able to:

1. Identify, formulate, and solve complex engineering problems by
applying principles of engineering, sciences, and mathematics.
2. Apply engineering design to produce solutions that meet
specified needs with consideration of public health, safety, and
welfare, as well as global, cultural, social, environmental, and
economic factors.
3. Communicate effectively with a range of audiences.
4. Recognize ethical and professional responsibilities in
engineering situations and make informed judgments, which
must consider the impact of engineering solutions in global,
economic, environmental, and societal contexts.
5. Function effectively on a team whose members together
provide leadership, create a collaborative and inclusive
environment, establish goals, plan tasks, and meet objectives.
6. Develop and conduct appropriate experimentation, analyze
and interpret data, and use engineering judgment to draw
conclusions.
7. Acquire and apply new knowledge as needed, using appropriate
learning strategies.

Liquid extraction equipment, membrane-based gas separation, three
scanning probe microscopes, three vibrational spectroscopy instruments, multiple gas chromatographs, process control labs, and supporting analytical equipment, all used by undergraduate students. Proof that the program’s goals are being achieved is in the job-placement statistics for chemical engineers from U of I. Most receive job offers before graduation and many graduates now hold high-level technical and management positions in industry, government, and academia.

Students entering the graduate program in Chemical Engineering can work towards an M.S. (thesis), M.Engr. (non-thesis), or Ph.D. degree. The department has available a number of fellowships and assistantships for students, from industry and alumni, UI graduate assistantships, and externally funded research assistantships. Entering graduate students must normally hold a B.S. in Chemical Engineering. The graduate program also includes provisions for study leading to an M.S. in Chemical Engineering for students who have a B.S. degree in a related field. Students will be required to register as undergraduates for as many semesters as needed to meet prerequisites to courses required for the M.S. (Ch.E.) degree.

Graduate studies in this program are highly diversified in order to accommodate the needs of most students who have a good basic background in the physical sciences, mathematics, and engineering. Areas of expertise include chemical reaction engineering, simulation, optimization and process design especially for energy systems, pulp and paper, food applications, hazardous waste characterization and bioremediation, membranes, nanoscience, fluid mechanics, biochemical engineering, and mass transfer. The graduate program in chemical engineering requires the GRE with scores of: Analytical ≥4.5, Quantitative ≥157, and Verbal ≥153, as well as a TOEFL score of at least 550 (paper-based) or 79 (computer-based).

Biological Engineering Program

The Bachelor of Science Program in Biological Engineering is accredited by the Engineering Accreditation Commission of ABET, https://www.abet.org, that integrates engineering principles with biological systems to develop new technologies and solutions to address societal needs. For example, biological engineers improve environmental quality, engineer bacteria to produce value-added products, develop equipment to harvest and process food, and design/manufacture medical devices. Given the diversity of the biological engineering discipline, biological engineers find themselves working in a variety of fields including bioprocessing, bioenergy, environmental, food production, agricultural, pharmaceutical, and biomedical. This diverse expertise makes biological engineers exceptionally valuable in today’s challenging world.

The Biological Engineering Program offers courses in biology, chemistry, mathematics, and physics preparing students for more advanced courses in biotransport processes, bio-based products, bioenergy, biomedical engineering, bioprocessing, and sustainability. Much of our students’ education takes place in labs: make discoveries about renewable energy in the advanced biofuel lab, design controls and instruments in the power lab, analyze medical images in the neurophysiology lab, and operate bioreactors in cell and tissue engineering lab.

The graduate program is offered in Biological Engineering with specialization in bio-based products, biofuels, biomaterials, bioprocessing, biotechnology, cell/tissue engineering, climate modeling, environmental impact assessment, gene/drug delivery, liquid plasma technology, nanotechnology, neural imaging, precision agriculture, wastewater treatment, and water management. The graduate degrees offered in Biological Engineering are Master of Science (thesis), Master of Engineering (non-thesis) and Ph.D. Prospective students should have the equivalent of a B.S. degree in engineering and science.

Majors

- Biological Engineering (B.S.) (https://catalog.uidaho.edu/colleges-related-units/engineering/chemical-biological-engineering/chemical-engineering-bs/)
- Chemical Engineering (B.S.Ch.E.) (https://catalog.uidaho.edu/colleges-related-units/engineering/chemical-biological-engineering/chemical-engineering-bsche/)

Chemical and Biological Engineering Graduate Program

- Biological Engineering (M.Engr.) (https://catalog.uidaho.edu/colleges-related-units/engineering/chemical-biological-engineering/chemical-engineering-mengr/)
- Biological Engineering (M.S.) (https://catalog.uidaho.edu/colleges-related-units/engineering/chemical-biological-engineering/chemical-engineering-ms/)
- Biological Engineering (Ph.D.) (https://catalog.uidaho.edu/colleges-related-units/engineering/chemical-biological-engineering/chemical-engineering-phd/)
- Chemical Engineering (M.Engr.) (https://catalog.uidaho.edu/colleges-related-units/engineering/chemical-biological-engineering/chemical-engineering-mengr/)
- Chemical Engineering (M.S.) (https://catalog.uidaho.edu/colleges-related-units/engineering/chemical-biological-engineering/chemical-engineering-ms/)
- Chemical Engineering (Ph.D.) (https://catalog.uidaho.edu/colleges-related-units/engineering/chemical-biological-engineering/chemical-engineering-phd/)