Chemical Engineering

The chemical engineering program in the William G. Lowrie Department of Chemical and Biomolecular Engineering educates engineers to design, develop and operate chemical processes by which chemicals, petroleum products, food, pharmaceuticals and consumer goods can be produced economically and safely. Products and processes must be environmentally friendly and safe. Chemical engineering processes usually involve chemical reactions and separations to produce more useful and valuable products.

Chemical engineering students study changes in the composition, energy content or state of aggregation of materials and take into consideration the fundamentals of the nature of matter and its properties (chemistry); the forces that act on matter (physics); and the relationships between them (mathematics). Chemical engineering differs from chemistry in its emphasis on commercial applications of chemical reactions and separations and techniques for designing, operating and controlling processes. Chemistry, on the other hand, emphasizes development of new compounds that may become useful products and the determination of their structures and properties.

Pursuing Chemical Engineering at Ohio State
Students interested in chemical engineering as a major should try to gain experience in mathematics, chemistry, and written and verbal communication. Students should have scientific curiosity and be both imaginative and analytical in their thinking. Experience with computers is also important.

Students may directly enroll as pre-engineering students; however, selection is competitive. Factors used to determine eligibility to directly enroll include ACT/SAT scores (emphasis on math), strong college prep curriculum (emphasis on math, science and rigorous courses), and class rank or GPA. The middle 50% of directly enrolled pre-majors for autumn 2014 had an ACT score range of 28–32 and 96 percent were in the top 25% of their high school classes. Students not eligible to directly enroll in engineering may enroll in Science, Technology and Environment Exploration (see exploration.osu.edu).

To be considered for admission into the first chemical engineering core course, Chemical Engineering 2200 (Process Fundamentals), students must have completed Chemistry 1220, Mathematics 1172 (Calculus and Analytic Geometry) or equivalent, and Engineering 1182 (introduction to Engineering). Students must have a cumulative point-hour ratio (CPHR) and eligibility point-hour ratio (EPR) of at least 2.7 and complete a formal application, available at cbe.osu.edu/admissions.

Admission to the major for autumn semester is capped at 120 seats with students having the highest CPHR being admitted. Students applying for spring admission are guaranteed admission if they have completed the prerequisite course work and have earned a minimum 2.7 CPHR and EPHR.

Program Educational Objectives
The chemical engineering program objectives are to educate graduates who will be ethical, productive and contributing members of society. As they progress professionally after graduation, our alumni will:

1. Use their engineering foundation to be successful in a breadth of careers and occupations.
2. Use lifelong learning skills to
   • Take advantage of professional development opportunities in their disciplines.
   • Acquire and integrate new knowledge, skills, and areas of expertise.
   • Pursue new careers and adapt to changing global markets and workforce trends.
3. Engage in professional service and volunteerism by
   • Using their engineering background to benefit society.
   • Developing new knowledge and products that promote sustainable development.
   • Promoting engineering as a rewarding career and source of societal good.

The Student Outcomes supporting our Educational Objectives can be found at go.osu.edu/chemeng_outcomes.

Chemical Engineering Requirements
The chemical engineering curriculum technical requirements:
• General chemistry (10 credit hours)
• Organic chemistry (10 credit hours)
• Physical chemistry (3 credit hours)
• Quantitative biology (4 credit hours)
• Mathematics (14 credit hours)
• Physics (10 credit hours)
• Computer programming (2-3 credit hours)
• Engineering (4 credit hours)
• Chemical engineering core courses (38 credit hours)
• Technical electives (12 credit hours)

For more information, check these websites:
Chemical and Biomolecular Engineering: cbe.osu.edu
College of Engineering: engineering.osu.edu
Ohio State: osu.edu
Admissions: undergrad.osu.edu
Multicultural Center: multiculturalcenter.osu.edu
First Year Experience: fye.osu.edu
Co-Curricular Opportunities
Ohio State offers many opportunities for students to learn and grow outside of the classroom. These range from cooperative education (co-op) experiences and internships to study abroad programs to student organizations. Co-ops and internships place students in professional environments while they are Ohio State students. Ohio State offers more than 100 study abroad programs in 40 countries around the world. In addition, there are hundreds of student organizations on campus to meet the interests of a diverse student population.

These opportunities enable students to gain valuable work experience, learn about cultures and take on leadership roles before they enter the workforce. All of these experiences enhance learning and may provide an advantage in the job market.

Honors & Scholars Opportunities
Ohio State offers the Honors and Scholars programs to create an environment of intellectual support and stimulation within a close-knit community of high-ability undergraduate students. Through these programs, students have access to smaller classes, undergraduate research opportunities, close working relationships with faculty, priority scheduling and unique housing options. Honors and Scholars programs represent great opportunities to be part of a smaller community within a large university. Learn more about the Honors and Scholars program at [honors-scholars.osu.edu](http://honors-scholars.osu.edu).

Career Prospects in Chemical Engineering
Chemical engineers are responsible for commercial applications of chemistry. These applications often involve processes that provide the basic necessities of life—food, clothing, shelter, energy, transportation and communications. Chemical engineers often do on a large scale what chemists may do on a test tube scale. For example, a team can design, build and operate a process that produces millions of pounds per year of a polyester resin used for soft-drink bottles. Chemists who formulate that resin may produce only a few grams per day. Chemical engineers may help produce, purify and even determine appropriate dosage for pharmaceuticals. Chemical engineers are able to succeed in such diverse activities because of their education in a variety of scientific subjects.

Beginning salaries for chemical engineers range from $35,000 to $80,000 depending on the candidate's skills, previous work experience gained as a co-op or intern, and other factors of importance to the employer. Starting salaries for chemical engineers have been among the highest of all engineering disciplines for many years.

Ohio State’s chemical engineering program is accredited by the Engineering Accreditation Commission of ABET, [abet.org](http://abet.org).

Revised July 2015. Information subject to change. For the most up-to-date information on the chemical engineering program, visit [cbe.osu.edu](http://cbe.osu.edu).

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Curriculum Sample*
This is a sample list of classes a student will take to pursue a degree in chemical engineering. Since university students need more than specific education in a narrow field, they also will take classes to complete General Education (GE) requirements. Because GE courses come from a variety of academic areas of study, this course work helps students develop fundamental skills essential to collegiate success and allows them to tailor these courses toward their interests. Note: This sample represents one of several possible paths to a degree in chemical engineering. Consult the departmental website, cbe.osu.edu, for details on each specific track.

Freshman Year:
- Engineering survey 1
- General Chemistry 10
- Calculus 10
- English 3
- Introduction to Engineering 4
- Computer Programming 3
- Quantitative Biology 4
- **Total hours** 35

Sophomore Year:
- Chemical Engineering Process Fundamentals 4
- Introduction to Transport Phenomena 4
- Separations Processes 3
- Differential Equations/Linear Algebra 4
- Physics 10
- Organic Chemistry 8
- **Total hours** 33

Junior Year:
- Chemical Engineering Transport Phenomena 4
- Thermodynamics 4
- Unit Operations 1
- Kinetics and Reactor Design 4
- Physical Chemistry 4
- Organic Chemistry Lab 2
- Math or statistics technical elective 3
- Technical elective 3
- GE courses 6
- **Total hours** 32

Summer—Unit Operations Lab 3

Senior Year:
- Process Dynamics and Control 3
- Process Design, Economics, and Strategy 4
- Process Simulation and Product Engineering 4
- Technical elective 3
- GE courses 15
- **Total hours** 32

*Students can complete interdisciplinary programs to receive an environmental option, polymer option or biomolecular engineering certificates.