Chemical engineering students often have strong interests in math, chemistry, physics and biology. These subjects are often combined together and encountered throughout our curriculum. Overall, chemical engineering students are often curious about how and why things work and they have a desire to invent new ways to improve existing technology.

The BSChE degree is a professional degree that prepares graduates for employment and graduate study in chemical engineering and related fields, as well as entry into professional programs such as medicine, dentistry, law and business.

Chemical engineers apply economics, chemistry, biology, physics and mathematics to the design and operation of processes and to the research and development of new materials, processes and systems. The many and varied issues associated with going from concept to demonstration to operation of processes and equipment all fall within the province of chemical engineering. Chemical engineers are as comfortable with plant operations, research and development projects, synthesis of alternative fuels, energy conservation and conversion, process design, optimization and control, environmental conservation and pollution prevention, as they are with the exciting fundamental studies associated with biotechnology, nanotechnology, electrochemical technology and other areas yet to be discovered.

The BSChE degree and curriculum place strong emphasis on the basic sciences, but a vital feature remains the high degree of confidence and practical ability gained from laboratory and design courses. Laboratories include equipment needed to study and demonstrate heat, mass and momentum transfer; material and energy balances; process dynamics and control; chemical reaction systems including catalysis; and thermodynamics. The Laboratory courses cover fundamental principles to reinforce the basic courses within the chemical engineering curriculum, while also containing pilot scale process units and other pieces of equipment that allow students to build, operate and analyze results collected during their operation. The Chemical and Biological Engineering High Bay Facility provides state-of-the-art visualization equipment for research and instruction in continuous and batch distillation and reaction engineering. Individual faculty member research laboratories give students the opportunity to work one-on-one with faculty in special problems courses.

The Chemical and Biological Engineering Design component of this curriculum includes development of student creativity, use of open-ended problems, development and use of modern design theory and methodology, formulation of design problem statements and specifications, consideration of alternative solutions, feasibility analyses, concurrent engineering design, technical research, and detailed system descriptions. The introduction of realistic constraints, such as economic factors, safety, reliability, aesthetics, ethics, and environmental and social impacts, are used to fully develop each design experience.

**Program Objectives**

Within a few years of graduation, UA chemical and biological engineering graduates will be able to:

- Provide solution strategies for a wide variety of technical applications, including the design and improvement of chemical or biological processes,
- Work independently and in teams to solve problems and effectively communicate technical issues and solutions to engineering colleagues, non-technical professionals, and lay persons alike, and
- Make decisions that are ethical, safe and environmentally-responsible.

**Special Features**

While the baccalaureate degree curriculum contains many courses designed to sequentially introduce students to methodologies for understanding, defining and solving a broad array of increasingly complex problems, there are elements in the program that also allow students to investigate exciting and challenging issues that often exist at the intersections where engineering and the sciences meet. Some of the elective and special program options are described below.

**Chemical and Biological Engineering Curriculum**

**Elective Courses and Minors**

Students can explore other areas of personal interest through six hours of career electives as part of the curriculum. Six hours of credit must be selected to fulfill the career electives requirements of the curriculum. This provides students with an option to add breadth to their degree in preparation for the wide variety of careers that chemical engineers pursue after completing the B.S. degree. A student may also select courses through a chemical engineering elective course, an advanced science elective, a biochemistry elective and an engineering elective. Many of these elective courses can be used as part of obtaining a minor or certificate along with a B.S. degree in chemical engineering.

**Undergraduate Research**

Many students elect to take special problems (undergraduate research) to gain valuable hands-on experience in laboratory or computational settings with a faculty member in ChBE or related disciplines. These courses may be used to satisfy elective course requirements when they are designed to meet the requirements of those course blocks. Products from this activity often include opportunities for making presentations at local and national meetings, co-authoring technical papers, or travel. This kind of activity is particularly helpful to students who wish to pursue an advanced degree in chemical engineering or related fields.

**International Opportunities**

Study abroad programs enhance the undergraduate experience. While there are many opportunities to participate in international classes, some specific programs for chemical engineering students in recent years have included summer lab (ChE 323) in Denmark or Vienna, and an international exchange with University College Dublin in Ireland. Students should check the engineering website and UA’s Study Abroad office for updated opportunities.

**Scholars Program**

Administered by the University’s Graduate School, this program allows eligible students to prepare for advanced study by enrolling in courses that can concurrently satisfy bachelor of science (B.S.) and master of science (M.S.) degree requirements. Enrollment typically is prior to the start of the junior year. The eligibility requirements may be found in the Special Academic Programs section of this catalog. A similar PhD
scholars program began in 2015 that allows students to combine their B.S with a PhD in Chemical Engineering.

**Dual Chemical Engineering/Chemistry Major**

UA’s Department of Chemical and Biological Engineering and Department of Chemistry offer a dual major program allowing undergraduate students to obtain a single B.S. degree in chemical engineering with both chemistry and chemical engineering listed as majors. The dual major combines core coursework for both chemical engineering and chemistry majors. Career and advanced science elective slots in the chemical engineering curriculum are satisfied by courses in Chemical Equilibria and Analyses, covering classical methods of quantitative and analysis including a laboratory introduction to spectroscopic and chromatographic methods, and Physical Chemistry with Elementary Physical Chemistry Laboratory, while the biology elective slot is fulfilled with Biochemistry I. In addition, Organic Chemistry Laboratory I and a 400 level chemistry elective course are required for a total of four additional hours beyond the chemical engineering degree requirement. Alternatively, students can pursue double majors, resulting in two degrees. A double major requires a completion of both degree programs (B.S. ChE and B.S. Chemistry, for example), and a minimum of 150 course credits at graduation.

**Pre-medical/Pre-dental/Pre-law Options**
The baccalaureate degree is a popular study plan for preparation to enter one of the professional programs listed. Acceptance rates for our students are excellent and the preparation that an engineering degree provides makes these tracks desired ones.

**C- Pre-Requisite Rule**
The Department of Chemical and Biological Engineering requires a grade of "C-" or better be earned in all courses that are pre-requisites to ChE classes. If a grade lower than "C-" is received in a course that is a pre-requisite, that course must be repeated and a grade of "C-" or higher must be earned before enrolling in the subsequent course.

**Chemical and Biological Engineering Curriculum**
The College of Engineering enforces a C- or higher requirement for any courses that are a prerequisite for another required course.
<table>
<thead>
<tr>
<th>Humanities (HU), Literature (L), or Fine Arts (FA) Elective</th>
<th>Humanities (HU), Literature (L), or Fine Arts (FA) Elective</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>3</td>
</tr>
</tbody>
</table>

### Senior

<table>
<thead>
<tr>
<th>Fall</th>
<th>Hours</th>
<th>Spring</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHE 481</td>
<td>3</td>
<td>CHE 482</td>
<td>3</td>
</tr>
<tr>
<td>CHE 493</td>
<td>3</td>
<td>CH Elective</td>
<td>3</td>
</tr>
<tr>
<td>Chemical Engr. Elective</td>
<td>3</td>
<td>CHE 440 or 540</td>
<td>3</td>
</tr>
<tr>
<td>(see advisor)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CH 341</td>
<td>3</td>
<td>Engineering Elective</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(see advisor)</td>
<td></td>
</tr>
<tr>
<td>CH 343</td>
<td>1</td>
<td>History (H) or Social and Behavioral Sciences (SB) Elective</td>
<td>3</td>
</tr>
<tr>
<td>CH 461</td>
<td>2</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Total Hours: 131

1. EC 110 Principles of Microeconomics is a recommended SB course.
2. Some undergraduates may qualify to enroll in 500-level courses.
3. CHE 323 can be replaced by Academic Year Labs CHE 321 and CHE 322.

Students find careers in the following industries: petroleum, pulp and paper, fine chemicals, pharmaceuticals, medical field, environmental.

**Types of Jobs Accepted**

Our chemical engineering students are often in high demand and find jobs with local industries within the state, as well as with Fortune 500 companies around the globe. Common employers are power companies, engineering design firms, large chemical manufacturers and petroleum refiners.

**Jobs of Experienced Alumni**

Our experienced alumni have become leaders in major industries, consulting firms and at leading academic institutions. We have had alumni obtain faculty positions at MIT, CEOs at Fortune 500 companies, senior technical officers in the medical field, and become prominent judges. Many of our alumni stay connected with our department, including service on our Industrial Advisory Board.

Learn more about opportunities in this field at the Career Center.