

CHEMICAL ENGINEERING, BACHELOR OF SCIENCE

College of Engineering

The Department of Chemical Engineering offers two undergraduate programs: Chemical Engineering (p. 1) and Biochemical Engineering (<https://catalog.ucdavis.edu/departments-programs-degrees/chemical-engineering/biochemical-engineering-bs/>).

Chemical Engineering Undergraduate Program

The Chemical Engineering program is accredited by the Engineering Accreditation Commission of ABET (<http://www.abet.org>).

Chemical engineers apply the principles of chemistry and engineering to produce useful commodities, ranging from fuels to polymers. Chemical engineers are increasingly concerned with chemical and engineering processes related to the environment and food production. They work in diverse areas ranging from integrated circuits to integrated waste management. Preparation for a career in chemical engineering requires an understanding of both engineering and chemical principles to develop proficiency in conceiving, designing, and operating new processes.

The chemical engineering curriculum has been planned to provide a sound knowledge of engineering and chemical sciences so that you may achieve competence in addressing current and future technical problems.

Objectives

The objectives of the program in Chemical Engineering are to educate students in the fundamentals of chemical engineering, balanced with the application of these principles to practical problems; to train them as independent, critical thinkers who can also function effectively in teams; to foster a sense of community, ethical responsibility, and professionalism; to prepare them for careers in industry, government, and academia; to illustrate the necessity for continuing education and self-learning; and to help students to learn to communicate proficiently in written and oral form.

Students are encouraged to adhere carefully to all prerequisite requirements. The instructor is authorized to drop students from a course for which stated prerequisites have not been completed.

Exclusive of General Education units, the minimum number of units required for the Chemical Engineering major is 156.

Options for Junior & Senior Year

The focus in the junior year is on fundamentals such as thermodynamics, fluid mechanics, energy transfer, and mass transfer phenomena. In the senior year, students draw these fundamentals together and apply them in a study of kinetics, process design, and process dynamics and control. The program's requirement of eight chemical engineering elective units allow students to strengthen specific areas in chemical engineering, explore new areas, or pursue new areas of specialization.

Honors Program

An Honors Program is available to qualified students in the Chemical Engineering & Biochemical Engineering majors. It is a two-year program designed to challenge the most talented students in these majors.

Students are invited to participate in their sophomore year. In the upper division coursework, students will complete either an honors thesis or a project that might involve local industry. Students must maintain a grade point average of 3.500 to continue in the program. Successful completion of the Honors Program will be acknowledged on the student's transcript.

| Code | Title | Units |
|--|---|-------|
| Lower Division Required Courses | | |
| <i>Mathematics</i> | | |
| MAT 021A | Calculus | 4 |
| MAT 021B | Calculus | 4 |
| MAT 021C | Calculus | 4 |
| MAT 021D | Vector Analysis | 4 |
| MAT 022A | Linear Algebra | 3-4 |
| or MAT 027A | Linear Algebra with Applications to Biology | |
| MAT 022B | Differential Equations | 3-4 |
| or MAT 027B | Differential Equations with Applications to Biology | |
| <i>Physics</i> | | |
| PHY 009A | Classical Physics | 5 |
| PHY 009B | Classical Physics | 5 |
| PHY 009C | Classical Physics | 5 |
| <i>Chemistry</i> | | |
| Choose One: | | 5 |
| CHE 002A | General Chemistry | |
| CHE 002AH | Honors General Chemistry | |
| CHE 004A | General Chemistry for the Physical Sciences & Engineering | |
| Choose One: | | 5 |
| CHE 002B | General Chemistry | |
| CHE 002BH | Honors General Chemistry | |
| CHE 004B | General Chemistry for the Physical Sciences & Engineering | |
| Choose One: | | 5 |
| CHE 002C | General Chemistry | |
| CHE 002CH | Honors General Chemistry | |
| CHE 004C | General Chemistry for the Physical Sciences & Engineering | |
| <i>Chemical Engineering & Programming</i> | | |
| ECH 005 | Introduction to Analysis & Design in Chemical Engineering | 3 |
| ECH 051 | Material Balances | 4 |
| ECH 060 | Numerical Methods in Engineering | 4 |
| or ECS 032A | Introduction to Programming | |
| ECH 080 | Chemical Engineering Profession | 1 |
| <i>Engineering</i> | | |
| Choose one: | | 4 |
| ENG 017 | Circuits I | |
| or ENG 017V | Circuits I | |
| ENG 035 | Statics | |
| ENG 045 | Properties of Materials | |
| or ENG 045Y | Properties of Materials | |
| Lower Division Composition/Writing; choose one: a grade of C- or better is required: | | 4 |
| COM 001 | Major Works of the Ancient World | |

| | |
|------------------------|---|
| COM 002 | Major Works of the Medieval & Early Modern World |
| COM 003 | Major Works of the Modern World |
| COM 004 | Major Works of the Contemporary World |
| ENL 003 or ENL 003V | Introduction to Literature |
| NAS 005 | Introduction to Native American Literature |
| UWP 001 | Introduction to Academic Literacies (Recommended) |
| UWP 001V | Introduction to Academic Literacies: Online (Recommended) |
| UWP 001Y | Introduction to Academic Literacies (Recommended) |

Lower Division Required Courses Subtotal 72-74

Upper Division Required Courses

Chemical Engineering

| | | |
|-----------|--|---|
| ECH 140 | Mathematical Methods in Biochemical & Chemical Engineering | 4 |
| ECH 141 | Fluid Mechanics for Biochemical & Chemical Engineers | 4 |
| ECH 142 | Heat Transfer for Biochemical & Chemical Engineers | 4 |
| ECH 143 | Mass Transfer for Biochemical & Chemical Engineers | 4 |
| ECH 145A | Chemical Engineering Thermodynamics Laboratory | 3 |
| ECH 145B | Chemical Engineering Transport Lab | 3 |
| ECH 148A | Chemical Kinetics & Reaction Engineering | 3 |
| ECH 148B | Chemical Kinetics & Reaction Engineering | 4 |
| ECH 152A | Chemical Engineering Thermodynamics | 3 |
| ECH 152B | Chemical Engineering Thermodynamics | 4 |
| ECH 155 | Chemical Engineering Kinetics & Reactor Design Laboratory | 4 |
| ECH 157 | Process Dynamics & Control | 4 |
| ECH 158AN | Separations & Unit Operations | 4 |
| ECH 158BN | Process Economics & Green Design | 4 |
| ECH 158C | Plant Design Project | 4 |

Chemistry

| | | |
|----------|------------------------------|---|
| CHE 128A | Organic Chemistry | 3 |
| CHE 128B | Organic Chemistry | 3 |
| CHE 129A | Organic Chemistry Laboratory | 2 |

Chemical Engineering Technical Electives

Choose 20 units: 20

1. At least 3 units must be completed in any upper division engineering course(s) not numbered 190C, 192, 198, and 199 (independent study, research, seminar, or internship courses).

2. Remaining 17 units, for a total minimum of 20 units are subject to the following:

a. Units must be completed in science, engineering or business courses carrying one of the following subject designations: ARE, ATM, BIM, BIS, BIT, CHE, EAE, EBS, ECH, ECN, ECI, ECS, EEC, EME, EMS, ENG, FPS, MAT, MCB, MGT, PHY, STA and VEN.

b. A minimum of 9 units must be completed in upper division (100-199) courses.

c. You may receive chemical engineering elective credit up to a maximum of 4 units of ECH 192, ECH 198, and ECH 199 combined (192's/198's/199's from outside the department require a petition, see below item d).

d. Credit for independent studies (199s) or internships (192s) completed outside of the department must be approved by the department's Undergraduate Affairs Committee. Additionally, students applying for these credits must submit an essay of at least 4 pages and no more than 10 pages detailing the engineering and/or science aspects of their work, results or outcomes (figures and graphs may be included), and how the experience relates to their educational program and objectives. The report must be submitted in pdf format and use 1.5 line spacing, 1" margins, and 12pt Times New Roman font. No intellectual property should be contained in the report. Applications must also include a written evaluation of the students' performance by the student's supervisor or faculty advisor.

e. Courses numbered 92, 98, and 99 may not be used to satisfy this requirement.

3. Courses used to satisfy other major requirements cannot be used to satisfy the technical elective requirements.

Upper Division Composition Requirement; a grade of C- or better is required:

Choose one: 0-4

UWP 102E Writing in the Disciplines: Engineering

UWP 102F Writing in the Disciplines: Food Science & Technology

UWP 104A Writing in the Professions: Business Writing

or UWP 104AV Writing in the Professions: Business Writing

or UWP 104AY Writing in the Professions: Business Writing

UWP 104E Writing in the Professions: Science

UWP 104T Writing in the Professions: Technical Writing

Passing the Upper Division Composition Exam.

Upper Division Required Courses Subtotal 84-88

Total Units 156-162