

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</i>		
ECH 005	Introduction to Analysis & Design in Chemical Engineering	3
ECH 051	Material Balances	4
ECH 060	Numerical Methods in Engineering	4
ECH 080	Chemical Engineering Profession	1
<i>Engineering</i>		
Choose one:		4
ENG 017	Circuits I	
ENG 035	Statics	
ENG 045	Properties of Materials	
ENG 045Y	Properties of Materials	
<i>Biotechnology</i>		
BIT 001Y	Introduction to Biotechnology	4-5
or BIS 002A	Introduction to Biology: Essentials of Life on Earth	
Choose one: a grade of C- or better is required:		4
ENL 003	Introduction to Literature	

UWP 001	Introduction to Academic Literacies
UWP 001V	Introduction to Academic Literacies: Online
UWP 001Y	Introduction to Academic Literacies
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
NAS 005	Introduction to Native American Literature

Lower Division Required Courses Subtotal 76-79

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 158A	Process Economics & Green Design	4
ECH 158B	Separations & Unit Operations	4
ECH 158C	Plant Design Project	4

Chemistry

CHE 110A	Physical Chemistry: Introduction to Quantum Mechanics	4
CHE 110B	Physical Chemistry: Properties of Atoms & Molecules	4
CHE 128A	Organic Chemistry	3
CHE 128B	Organic Chemistry	3
CHE 129A	Organic Chemistry Laboratory	2

Chemical Engineering Electives

Choose 8 units: 8

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).

Remainder of units, for a total of a minimum of 8 units, may be completed in any upper division engineering and/or science course(s)¹ including courses numbered 192 (internship) and 199 (independent study) but not numbered 190 or 198²

You may receive chemical engineering elective credit up to a maximum of 4 units of an internship (192) and/or independent study (199).

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 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 80-84

Total Units 156-163

¹ Acceptable science courses must carry one of the following subject designations: ATM, BIS, BIT, CHE, FPS, FST, MAT, MCB, PHY, STA, and VEN.

² With the exception of ECH 198.