

Chemical Engineering, B.S.

Program Educational Objectives: Graduates of the Chemical Engineering program will (1) demonstrate achievement by applying a broad knowledge of chemical engineering; (2) apply critical reasoning and quantitative skills to identify and solve problems in chemical engineering; (3) implement skills for effective communication and teamwork; (4) demonstrate the potential to effectively lead chemical engineering projects in industry, government, or academia; and (5) exhibit a commitment to lifelong learning.

(Program educational objectives are those aspects of engineering that help shape the curriculum; achievement of these objectives is a shared responsibility between the student and UCI.)

High School Students: See School Admissions (<http://catalogue.uci.edu/thehenrysamuelischoolofengineering/#undergraduatestudytext>) information.

Transfer Students: Preference will be given to junior-level applicants with the highest grades overall, and who have satisfactorily completed the following **required** courses: two years of approved calculus, one year of calculus-based physics with laboratories (mechanics, electricity and magnetism), completion of lower-division writing, one year of general chemistry (with laboratory), one year of organic chemistry (with laboratory), and one course in introductory programming. For course equivalency specific to each college, visit <http://assist.org>.

Students are encouraged to complete as many of the lower-division degree requirements as possible prior to transfer. Students who enroll at UCI in need of completing lower-division coursework may find that it will take longer than two years to complete their degrees. For further information, contact The Henry Samueli School of Engineering at 949-824-4334.

All students are required to meet the University Requirements (<http://catalogue.uci.edu/informationforadmittedstudents/requirementsforabachelorsdegree/>).

All students are required to meet the School Requirements (<http://catalogue.uci.edu/thehenrysamuelischoolofengineering/#schoolrequirements>).

Major Requirements

Mathematics and Basic Science Courses:

CHEM 1A or ENGR 1A	General Chemistry General Chemistry for Engineers
CHEM 1B- 1C- 1LC- 1LD	General Chemistry and General Chemistry and General Chemistry Laboratory and General Chemistry Laboratory
CHEM 51A- 51B- 51C- 51LB- 51LC	Organic Chemistry and Organic Chemistry and Organic Chemistry and Organic Chemistry Laboratory and Organic Chemistry Laboratory
CBE 105	Engineering Physical Chemistry
MATH 2A- 2B	Single-Variable Calculus and Single-Variable Calculus
MATH 2D	Multivariable Calculus
MATH 2E	Multivariable Calculus
MATH 3A	Introduction to Linear Algebra
MATH 3D	Elementary Differential Equations
PHYSICS 7C- 7LC	Classical Physics and Classical Physics Laboratory
PHYSICS 7D- 7LD	Classical Physics and Classical Physics Laboratory

Engineering Topics Courses:

Students must complete a minimum of 18 units of engineering design.

CBE 1	Introduction to Chemical Engineering
CBE 40A- 40B- 40C	Chemical Processes and Material Balances and Process Thermodynamics and Chemical Engineering Thermodynamics
CBE 100	Introduction to Numerical Methods in Engineering
CBE 110	Reaction Kinetics and Reactor Design

CBE 120A- 120B- 120C	Momentum Transfer and Heat Transfer and Mass Transfer
CBE 130	Separation Processes
CBE 140A- 140B	Chemical Engineering Laboratory I and Chemical Engineering Laboratory II
CBE 145	Chemical Process Control
CBE 150A- 150B	Chemical Engineering Design I and Chemical Engineering Design II
CBE 160	Engineering Biology
ENGR 54	Principles of Materials Science and Engineering
ENGRMAE 10	Introduction to Engineering Computations

Students select, with the approval of a faculty advisor, any additional engineering topics courses needed to satisfy school and department requirements.

Technical Elective Courses:

Students select, with the approval of a faculty advisor, a minimum of 16 units of technical electives. Students may select an area of specialization and complete the associated requirements, as shown below.

(The nominal Chemical Engineering program will require 193 units of courses to satisfy all university and major requirements. Students typically need at least 14 units of engineering topics from technical electives to meet school requirements. Because each student comes to UCI with a different level of preparation, the actual number of units will vary.)

Engineering Professional Topics Course:

ENGR 190W	Communications in the Professional World
-----------	--

Specialization in Biomolecular Engineering:

Requires:

CBE 161	Introduction to Biochemical Engineering
---------	---

and a minimum of 8 units from the following:

BIO SCI 98	Biochemistry
BIO SCI 99	Molecular Biology
BME 50A	Cell and Molecular Engineering
BME 50B	Cell and Molecular Engineering
BME 114	Genetic Engineering and Synthetic Biology
BME 121	Quantitative Physiology: Organ Transport Systems
BME 132	Introduction to Computational Biology
BME 160	Tissue Engineering
CBE 163	Kinetics of Biochemical Networks
CBE 199	Individual Study (up to 4 units)

Specialization in Energy and Sustainability:

Requires a minimum of 11 units including at least one course from the following:

CBE 176	Nuclear and Radiochemistry
CBE 199	Individual Study (up to 4 units)
MSE 141	Nano-Scale Materials and Applications

and select the remaining units from the following:

ENGRCEE 160	Environmental Processes
ENGRCEE 162	Introduction to Environmental Chemistry
ENGRCEE 163	Wastewater Treatment Process Design
ENGRCEE 164	Carbon and Energy Footprint Analysis
ENGRCEE 165	Physical-Chemical Treatment Processes
ENGRMAE 110	Combustion and Fuel Cell Systems
ENGRMAE 114	Fuel Cell Fundamentals and Technology
ENGRMAE 117	Solar and Renewable Energy Systems
ENGRMAE 164	Air Pollution and Control
MSE 158	Ceramic Materials for Sustainable Energy
MSE 171	Green Engineering: Theory and Practice

Specialization in Materials Science:

Requires a minimum of 12 units from:

CBE 181	Polymer Science and Engineering
CBE 183	Surface and Adhesion Science
CBE 187	Semiconductor Device Packaging
CBE 199	Individual Study (up to 4 units)
MSE 69	Electronic and Optical Properties in Materials
MSE 141	Nano-Scale Materials and Applications
MSE 155	Mechanical Behavior and Design Principles
MSE 158	Ceramic Materials for Sustainable Energy
MSE 164	X-ray Diffraction, Electron Microscopy, and Microanalysis
MSE 174	Composite Materials Design
ENGRMAE 155	Composite Materials and Structures

The sample program of study chart shown is typical for the major in Chemical Engineering. Students should keep in mind that this program is based upon a sequence of prerequisites, beginning with adequate preparation in high school mathematics, physics, and chemistry. Students who are not adequately prepared, or who wish to make changes in the sequence for other reasons, must have their program approved by their faculty advisor. Chemical Engineering majors are encouraged to consult with academic counselors as needed, and students who are academically at risk are mandated to see a counselor as frequently as deemed necessary by the advising staff.

Freshman

Fall	Winter	Spring
MATH 2A	MATH 2B	MATH 2D
ENGRMAE 10	PHYSICS 7C	PHYSICS 7D
CHEM 1A or ENGR 1A	PHYSICS 7LC	PHYSICS 7LD
CBE 1	CHEM 1B	CHEM 1C
General Education	General Education	CHEM 1LC

Sophomore

Fall	Winter	Spring
MATH 3A	MATH 3D	MATH 2E
CHEM 51A	CHEM 51B	CHEM 51C
CHEM 1LD	CHEM 51LB	CHEM 51LC
CBE 40A	CBE 40B	CBE 40C
General Education	ENGR 54	

Junior

Fall	Winter	Spring
CBE 100	CBE 105	CBE 120C
CBE 120A	CBE 110	CBE 130
CBE 160	CBE 120B	Technical Elective
General Education	General Education	General Education

Senior

Fall	Winter	Spring
CBE 140A	CBE 140B	CBE 150B
CBE 145	CBE 150A	Technical Elective
ENGR 190W	Technical Elective	General Education
Technical Elective	General Education	General Education