

What is Chemical Engineering?

Chemical engineering deals with the physical, chemical and biological transformations of matter that are the basis for making useful products. The field is incredibly diverse and dynamic, opening up the potential for a wide variety of careers, including the following:

ENERGY: Chemical engineers work in all aspects of the energy industry developing inexpensive solar cells, new materials for fuel cells, lighter and stronger composites for transportation, etc.

BIOTECHNOLOGY, PHARMACEUTICALS AND MEDICINE:

Chemical engineers are pioneers in the application of genetic engineering to manufacture new biotech-based drugs and products. They have an incredible impact through the manufacture of the life-saving drugs, materials, and devices used for human health care.

THE ENVIRONMENT: Chemical engineers work to minimize our impact on the environment by developing and applying technologies such as catalytic converters, fuel cells, and photovoltaic devices and by developing more efficient processing and recycling methods.

ELECTRONIC AND HIGH-TECH MATERIALS:

Chemical engineers create the materials that make our high-tech world possible from the semiconductors in your laptop to the liquid crystal polymers used in flat-panel displays to the batteries that keep your cell phone working.

PETROCHEMICALS: Crude oil is transformed in refineries into the building blocks for fuels, lubricants, plastics, paint, detergents, etc., and chemical engineers work to improve the efficiency and safety of these transformations.



MATERIALS OF EVERYDAY LIFE: Chemical engineers help to make scarce and expensive materials widely available through mass production using industrial processes. Chemical engineers made plastics inexpensive and widely available in the 20th century and continue to work to develop new products.

FEEDING THE WORLD: Chemical engineers contribute to food production in many ways, from fertilizers that help crops grow more abundantly to processing methods that help to retain or enhance taste and nutritional value.

FIBERS: Chemical engineers fabricate a broad array of fibers for our comfort and safety, ranging from fleece fabrics to high-performance fibers for sports, outdoor gear, and bulletproof vests, to high-tech inorganic fibers, such as fiber optics.

Major Areas of Emphasis

Research in the department covers all the key areas of modern chemical engineering, from very fundamental studies to applied engineering technology. They include sophisticated experimental efforts using state-of-the-art laboratory facilities as well as advanced computational modeling of physical processes. Particular strengths in the department include biochemical and biomedical engineering; new energy technology; catalysis and reactions; colloids and interfaces; environmental chemical engineering; systems biology; materials, polymers, and composites; thermodynamics; and transport separations. More detailed information about our research program is available on our website.

Our undergraduates benefit from the active research program in the department. Ongoing cutting-edge research ensures that the content of the undergraduate program is constantly renewed and maintained at a challenging technical level and that discovery learning is integrated into the program. In addition, our undergraduates can work with faculty and graduate students as research assistants, for pay or credit during the academic year or the summer months. More than 75% of our graduating seniors have participated in some type of research experience.

With its emphasis on problem-solving skills, quantitative analysis and teamwork, a **chemical engineering** education also provides an excellent foundation for future careers in **medicine, law, business, consulting, and management.**

Additional Opportunities for Study

Exploring the humanities and social sciences through the breadth requirements

All engineering curricula have at least 21 credits set aside for breadth requirement courses, 18 credits of which are chosen from an extensive list of humanities and social science options. The remaining 3 credits are usually satisfied by chemistry, math, or physics courses all engineering students are required to take. The University requires that 3 credits of breadth requirement coursework satisfy the Multicultural Requirement and the College requires that 6 credits of breadth requirement coursework be above the introductory level. Students entering with Advanced Placement (AP) credit may have already completed several of these courses.

Exploring other subjects through minors

A minor is a small set of courses in a particular subject area that is different from a student's major. Minors normally require five to seven courses to be completed in their subject areas. Because students may double-count courses for credit against both majors and minors, they can often complete a minor by doing no additional work if they choose their elective courses carefully. About half of all engineering students have at least one minor, and many have two or three. Some of the most popular minors for chemical engineering majors include biochemical engineering, biology, chemistry, economics, environmental engineering, foreign languages, materials science, mathematics, nanoscale materials, physics, and sustainable energy technology.

After Graduation

We are committed to preparing our students for the broad range of professional careers and advanced degrees that utilize a chemical engineer's unique abilities to understand complex and highly integrated problems and processes. We are successful: the starting salaries for our Bachelor of Chemical Engineering graduates consistently exceed the national average, demonstrating the high regard employers have for our students and program. On average, 70–80% of graduates choose employment in private industry, government laboratories and agencies, and non-profit research centers. Approximately 20–25% of graduates will choose to continue their education toward a master's or Ph.D. degree, and some graduates will choose to attend medical, law, or business school. Students who earn Ph.D. degrees in engineering usually pursue careers as researchers or faculty in a college of engineering.

Chemical Engineering Curriculum

Fall

First Year

COURSE #	COURSE DESCRIPTION	CREDITS
EGGG 101	Introduction to Engineering (FYE)	2
CHEM 111	General Chemistry I	3
MATH 242	Analytic Geometry & Calculus B	4
CISC 106	General Computer Science for Engineers	3
ENGL 110	Critical Reading and Writing	3
		15

Spring

First Year

COURSE #	COURSE DESCRIPTION	CREDITS
CHEG 112	Introduction to Chemical Engineering	3
CHEM 112	General Chemistry II	3
MATH 243	Analytic Geometry & Calculus C	4
PHYS 207	Fundamentals of Physics I	4
	Breadth Requirement Elective 1*	3
		17

Second Year

COURSE #	COURSE DESCRIPTION	CREDITS
CHEG 231	Chemical Engineering Thermodynamics	3
CHEM 220	Quantitative Analysis	3
CHEM 221	Quantitative Analysis Laboratory	1
PHYS 208	Fundamentals of Physics II	4
MSEG 302	Materials Science for Engineers	3
	Breadth Requirement Elective 2	3
		17

Second Year

COURSE #	COURSE DESCRIPTION	CREDITS
CHEG 325	Chemical Engineering Thermodynamics	3
CHEM 444	Physical Chemistry II	3
CHEM 445	Physical Chemistry Laboratory I	1
MATH 305	Applied Mathematics for Chemical Engineering	3
	Technical Elective 1	3
	Breadth Requirement Elective 3	3
		16

Third Year

COURSE #	COURSE DESCRIPTION	CREDITS
CHEG 332	Chemical Engineering Kinetics	3
CHEG 341	Fluid Mechanics	3
CHEM 331	Organic Chemistry	3
CHEM 333	Organic Chemistry Laboratory I	1
	Technical Elective 2	3
	Technical Elective 3	3
		16

Third Year

COURSE #	COURSE DESCRIPTION	CREDITS
CHEG 320	Engineering Economics and Risk Analysis	3
CHEG 342	Heat and Mass Transfer	3
CHEG 345	Chemical Engineering Laboratory I	3
CHEM 332	Organic Chemistry	3
	Breadth Requirement Elective 4	3
		15

Fourth Year

COURSE #	COURSE DESCRIPTION	CREDITS
CHEG 401	Chemical Process Dynamics and Control	3
CHEG 443	Mass Transfer Operations	3
CHEG 445	CHEG Laboratory II	3
CHEG 473	CHEG Project or CHEG Technical Elective 1	3
	Breadth Requirement Elective 5	3
		15

Fourth Year

COURSE #	COURSE DESCRIPTION	CREDITS
CHEG 432	Chemical Process Analysis (DLE)	3
CHEG 474	Chemical Engineering Project or CHEG Technical Elective 2	3
	CHEG Technical Elective 3	3
	Technical Elective / CHEG Technical Elective	3
	Breadth Requirement Elective 6	3
		15

TOTAL CREDIT HOURS: 126

* A list of Breadth Requirement courses is available at: www.engr.udel.edu/advise/undergrad_programs.html