



## 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:

- **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.
- **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.
- **POLYMERS AND PLASTICS:** Chemical engineers made plastics inexpensive and widely available in the early 20th century, and they are still actively working to develop new engineering polymers and to improve the properties of existing materials, including their recyclability.
- **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.
- **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.

*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.*

## 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; catalysis and reactions; colloids and interfaces; environmental chemical engineering; expert systems and process control; 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.



## ADDITIONAL OPPORTUNITIES FOR STUDY

### EXPLORING THE HUMANITIES AND SOCIAL SCIENCES THROUGH THE BREADTH REQUIREMENTS

All engineering curricula have at least 18 credits set aside for breadth requirement courses, which are chosen from an extensive list of humanities and social science options. To provide both breadth and depth, students are required to complete courses from both categories, with at least two of the courses being above the introductory level. Students entering with Advanced Placement (AP) credits may already have 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			SPRING		
FIRST YEAR			FIRST YEAR		
COURSE #	COURSE DESCRIPTION	CREDITS	COURSE #	COURSE DESCRIPTION	CREDITS
EGGG 101	Introduction to Engineering (FYE)	2	CHEG 112	Introduction to Chemical Engineering	3
CHEM 111	General Chemistry	3	CHEM 112	General Chemistry	3
MATH 242	Analytic Geometry & Calculus B	4	MATH 243	Analytic Geometry & Calculus C	4
CISC 106	General Computer Science for Engineers	3	PHYS 207	Fundamentals of Physics I	4
ENGL 110	Critical Reading and Writing	3		Breadth Requirement Elective 1*	3
		<b>15</b>			<b>17</b>
SECOND YEAR			SECOND YEAR		
CHEG 231	Chemical Engineering Thermodynamics	3	CHEG 325	Chemical Engineering Thermodynamics	3
CHEM 220	Quantitative Analysis	3	CHEM 444	Physical Chemistry II	3
CHEM 221	Quantitative Analysis Laboratory	1	CHEM 445	Physical Chemistry Laboratory I	1
PHYS 208	Fundamentals of Physics II	4	MATH 305	Applied Math for Chemical Engineering	3
	Technical Elective 1	3		Technical Elective 2	3
	Breadth Requirement Elective 2	3		Breadth Requirement Elective 3	3
		<b>17</b>			<b>16</b>
THIRD YEAR			THIRD YEAR		
CHEG 332	Chemical Engineering Kinetics	3	CHEG 320	Engineering Economics and Risk Analysis	3
CHEG 341	Fluid Mechanics	3	CHEG 342	Heat and Mass Transfer	3
CHEM 331	Organic Chemistry	3	CHEG 345	Chemical Engineering Laboratory I	3
CHEM 333	Organic Chemistry Laboratory I	1	CHEM 332	Organic Chemistry	3
MSEG 302	Materials Science for Engineers	3		Breadth Requirement Elective 4	3
	Technical Elective 3	3			<b>15</b>
		<b>16</b>	FOURTH YEAR		
FOURTH YEAR			CHEG 432	Chemical Process Analysis (DLE)	3
CHEG 401	Chemical Process Dynamics and Control	4	CHEG 474	Chemical Engineering Project or	
CHEG 443	Mass Transfer Operations	3		CHEG Technical Elective 2	3
CHEG 445	CHEG Laboratory II	3		CHEG Technical Elective 3	3
CHEG 473	CHEG Project or			Technical Elective/CHEG Technical Elective	3
CHEG	Technical Elective 1	3		Breadth Requirement Elective 6	3
	Breadth Requirement Elective 5	3			<b>15</b>
		<b>16</b>			

**TOTAL CREDIT HOURS 127**

\* A list of Breadth Requirement courses is available at: [www.engr.udel.edu/advise/undergrad\\_programs.html](http://www.engr.udel.edu/advise/undergrad_programs.html)