Chemical & Biomolecular Engineering

University of Delaware | College of Engineering

What is Chemical and Biomolecular 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.

Major areas of emphasis

Departmental research covers all the key areas of modern chemical engineering, from 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. Strengths 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 and separations. More detailed information about our research program is available on our website.

Our undergraduates benefit from the active research programs 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.

Endless career opportunities

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.

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 study opportunities

Exploring the humanities and social sciences through the breadth requirements

All engineering curricula include self-selected humanities and social science courses. The required 21 credits of breadth coursework include 18 credits of humanities and social sciences, and 3 credits of chemistry, math or physics.

Please note: 3 of the above credits must also satisfy the Multicultural Requirement (University requirement); 6 credits must be above the introductory level (College requirement); and already completed Advanced Placement (AP) credit may apply toward these requirements.

Exploring other subjects through minors

A minor is a small set of courses in a particular subject area that differs from a student's major. Minors normally require five to seven courses to be completed in the subject area. Students may double-count courses for credit against both majors and minors. If electives are chosen carefully, minors can easily be integrated into the program requirements. Nearly half of all engineering students have at least one minor, many have two or three.

After graduation

We are committed to preparing students for a 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. 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.

Career resources

The Career Services Center provides comprehensive services to all matriculated undergraduate students, primarily in the development and implementation of career and educational plans. The Career Services Center can help you determine a major, find internships or full-time jobs, build your resume and cover letter, practice interview skills, apply to graduate or professional school, or network with employers. Visit www.udel.edu/CSC for details.

Chemical and Biomolecular Engineering Curriculum

Fall

First Year

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

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

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 (a)	1
	Technical Elective 1	3
	Technical Elective 2	3
		16

Fourth Year

COURSE #	COURSE DESCRIPTION	CREDITS
CHEG 401	Chemical Process Dynamics and Control	3
CHEG 431	Chemical Process Analysis	3
CHEG 445	Chemical Engineering Laboratory II	3
	CHEG Elective 2	3
	Breadth Requirement Elective 5	3
		15

Spring

First Year

COURSE #	COURSE DESCRIPTION	CREDITS
CHEG 112	Introduction to Chemical Engineering	3
CHEM 112	General Chemistry	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 304	Random Variability in Chemical Processes	3
CHEG 325	Chemical Engineering Thermodynamics	3
CHEM 444	Physical Chemistry	3
CHEM 445	Physical Chemistry Laboratory I (a)	1
MATH 305	Applied Math for Biomed, Chem & Biomole Eng	3
	Breadth Requirement Elective 3	3
		16

Third Year

COURSE #	COURSE DESCRIPTION	CREDITS
CHEG 342	Heat and Mass Transfer	3
CHEG 345	Chemical Engineering Laboratory I	3
CHEM 332	Organic Chemistry (b) (or)	
CHEM 527	Introduction to Biochemistry	3
	CHEG Elective I	3
	Breadth Requirement Elective 4	3
		15

Fourth Year

COURSE #	COURSE DESCRIPTION	CREDITS
CHEG 432	Chemical Process Analysis (DLE)	3
	CHEG Elective 3	3
	Technical Elective 3	3
	Technical Elective 4 or CHEG Elective 4	3
	Breadth Requirement Elective 6	3
		15

TOTAL CREDIT HOURS: 126

(a) If CHEM 333 is taken for two credits, CHEM 445 is not required.

(b) CHEM 332 or CHEM 527 may be taken. If CHEM 527 is not taken, the BISC requirement must be met using BISC 207 or another approved course.

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

See UD Catalog for course descriptions and a list of technical electives.

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