

CHEMICAL ENGINEERING

Home Department: Chemical Engineering

Department Head:

Susan Farhat, Ph.D.

Program Overview

Chemical engineers apply the principles of chemistry, math, and physics to the design and operation of large-scale chemical manufacturing processes. They translate processes developed in the lab into practical applications for the production of products such as plastics, medicines, detergents, and fuels; design plants to maximize productivity and minimize costs; and evaluate operations for performance and product quality.

Chemical Engineers work in very diverse industries including petrochemicals, biotechnology, pharmaceuticals, alternative energy, food, health, automotive, aerospace, and the environment. Chemical Engineers have a broad knowledge of engineering science and environmental regulations, and as a consequence are apt at managing projects of significant proportions. Chemical Engineers have an integrated approach towards systems and understand the complete process and its critical components. Chemical engineers affect or control the production of almost every article manufactured on an industrial scale.

Kettering University's Bachelor of Science in Chemical Engineering is a strong interdisciplinary program which draws on the strengths of our exceptional faculty, curricula, laboratories, and unique co-op component.

The Chemical Engineering program is accredited by the Engineering Accreditation Commission (EAC) of ABET.

Program Educational Objectives

The Chemical Engineering program is designed to provide its graduates a solid educational foundation on which they can build successful and sustainable careers in chemical engineering or a related field. In particular, all graduates of the Chemical Engineering program will:

- Be employed or pursuing an advanced degree in the field of chemical engineering or other related disciplines.
- Be productive members of interdisciplinary teams.
- Assume leadership positions in their industry, their continuing education, or in their communities, as their careers develop.
- Continue their professional development and engage in the life-long learning necessary for a sustainable career.

BS/MASTERS PATHWAY

Undergraduate students also have an opportunity to get their bachelor's and master's degrees in five years with the BS/MASTERS Pathway.

Chemical Engineering Program Curriculum Requirements

Code	Title	Credit Hours
First Year Experience		
CILE-101	First Year Foundations	1
General Education		

COMM-101	Rhetoric & Writing	4
ECON-201	Economic Principles	4
LA-201	Sophomore Seminar: Exploring the Human Condition	4
LA-489	Sr. Seminar: Leadership, Ethics	4
Advanced Humanities Electives ¹		8
Advanced Social Science Electives ¹		8
Total Credit Hours		33

¹ Humanities and Social Science advanced electives must be selected from approved 300 and 400 level courses.

Code	Title	Credit Hours
Basic Sciences		
Select one of the following:		4
CHEM-137 & CHEM-136	General Chemistry I and Principles of Chemistry Lab	
CHEM-135 & CHEM-136	Principles of Chemistry and Principles of Chemistry Lab	
CHEM-237 & CHEM-238	General Chemistry II and General Chemistry II Lab	4
CHEM-345 & CHEM-346	Organic Chemistry I and Organic Chemistry I Lab	6
CHEM-347	Organic Chemistry II	4
Advanced Chemistry Elective & Lab ³		7
PHYS-114 & PHYS-115	Newtonian Mechanics and Newtonian Mechanics Laboratory	4
PHYS-224 & PHYS-225	Electricity and Magnetism and Electricity and Magnetism Laboratory	4
<i>Credit Hours Subtotal:</i>		33
Mathematics		
MATH-101	Calculus I	4
or MATH-101X	Calculus I	
MATH-102	Calculus II	4
or MATH-102X	Calculus II	
MATH-203	Multivariate Calculus	4
or MATH-203X	Multivariate Calculus	
MATH-204	Differential Equations & Laplace Transforms	4
MATH-258	Probability and Statistics	4
<i>Credit Hours Subtotal:</i>		20
Engineering Topics		
CHME-100	Introduction to Chemical Engineering	4
CHME-200	Mass & Energy Balance	4
CHME-210	Chemical Engineering Thermodynamics	4
CHME-225	Computing in Chemical Engineering	2
CHME-310	Fluid Dynamics and Heat Transfer	4
CHME-325	Fluid Dynamics and Heat Transfer Lab	2
CHME-330	Mass Transfer and Separations	4
CHME-350	Reaction Engineering	4
CHME-360	Sustainable Engineering Design: Energy and the Environment	4

CHME-425	Separations, Reactions, and Prototyping Lab	3
CHME-430	Process Controls	4
CHME-440	Senior Chemical Engineering Design I	4
CHME-480	Chemical Engineering Capstone	4
Chemical Engineering Elective		4
EE-212	Applied Electrical Circuits	3
MECH-231L	Signals for Mechanical Systems Lab	1
<i>Credit Hours Subtotal:</i>		55
Electives		
Technical Electives ⁴		8
Free Electives		8
<i>Credit Hours Subtotal:</i>		16
Undergraduate Thesis		
CILE-400	Culminating Undergraduate Experience: Thesis ⁵	4

(Minimum) Total Credits Required for Program: 161²

² The minimum total number of credit hours required for graduation is 161; however, the total number of credit hours taken may exceed 161.

All Chemical Engineering majors must meet the general educational requirements and their program's requirements for a minor or concentration.

³ Advanced Chemistry Elective/Lab must be numbered 300 or higher and cannot be Organic Chemistry I or Organic Chemistry II, since these are already required courses.

⁴ A minimum of eight hours of technical electives are required for the Chemical Engineering Degree. A technical elective may be any course numbered 300-599 in BIOL, CE, CHEM, CHME, CS, EE, IME, ISYS, MATH, MECH, or PHYS that is not used to complete core degree requirements. Additional courses that can be used include BUSN-303, BUSN-304, and MGMT-419/619. Other courses may be used but require approval by the Department Head of Chemical Engineering.

⁵ Students are automatically registered for CILE-400 in a co-op term when they reach Junior II status.

Representative Program ^{1,2}

Course	Title	Credit Hours
Freshman I		
CILE-101	First Year Foundations	1
CHEM-137 or CHEM-135	General Chemistry I or Principles of Chemistry	3
CHEM-136	Principles of Chemistry Lab	1
CHME-100	Introduction to Chemical Engineering	4
COMM-101	Rhetoric & Writing	4
MATH-101	Calculus I	4
Credit Hours		17
Freshman II		
CHEM-237	General Chemistry II	3
CHEM-238	General Chemistry II Lab	1
ECON-201	Economic Principles	4
MATH-102	Calculus II	4
PHYS-114	Newtonian Mechanics	3

PHYS-115	Newtonian Mechanics Laboratory	1
Credit Hours		16
Sophomore I		
CHEM-345	Organic Chemistry I	4
CHEM-346	Organic Chemistry I Lab	2
CHME-200	Mass & Energy Balance	4
MATH-203	Multivariate Calculus	4
PHYS-224	Electricity and Magnetism	3
PHYS-225	Electricity and Magnetism Laboratory	1

Credit Hours **18**

Sophomore II		
CHEM-347	Organic Chemistry II	4
MATH-204	Differential Equations & Laplace Transforms	4
CHME-210	Chemical Engineering Thermodynamics	4
LS-201	Sophomore Seminar: Exploring the Human Condition	4
CHME-225	Computing in Chemical Engineering	2

Credit Hours **18**

Junior I		
CHME-310	Fluid Dynamics and Heat Transfer	4
CHME-325	Fluid Dynamics and Heat Transfer Lab	2
Advanced Humanities or Social Science Elective		4
Advanced Chemistry Elective & Lab		7

Credit Hours **17**

Junior II		
CHME-330	Mass Transfer and Separations	4
CHME-350	Reaction Engineering	4
CHME-360	Sustainable Engineering Design: Energy and the Environment	4
Advanced Humanities or Social Science Elective		4

Credit Hours **16**

Senior I		
Advanced Chemical Engineering Elective		4
CHME-430	Process Controls	4
EE-212	Applied Electrical Circuits	3
MECH-231L	Signals for Mechanical Systems Lab	1
Technical Elective		4
Advanced Humanities or Social Science Elective		4

Credit Hours **20**

Senior II		
CHME-425	Separations, Reactions, and Prototyping Lab	3
CHME-440	Senior Chemical Engineering Design I	4
MATH-258	Probability and Statistics	4
Advanced Humanities or Social Science Elective		4
Free Elective		4

Credit Hours **19**

Senior III		
CHME-480	Chemical Engineering Capstone	4
LS-489	Senior Seminar: Leadership, Ethics, and Contemporary Issues	4
Technical Elective		4

Free Elective		4
	Credit Hours	16
Any Term		
CILE-400	Culminating Undergraduate Experience: Thesis	4
	Credit Hours	4
	Total Credit Hours	161

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