CHEMICAL ENGINEERING MAJOR (B.S.)

https://ceps.unh.edu/chemical-engineering/program/bs/chemical-engineering-major

Description

Chemical engineering is concerned with the analysis and design of processes that deal with the transfer and transformation of energy and material.

The practice of chemical engineering includes the conception, development, design, and application of physicochemical processes and their products; the development, design, construction, operation, control, and management of plants for these processes; and activities relating to public service, education, and research.

The curriculum prepares students for productive careers in industry or government and provides a foundation for graduate studies. The program emphasizes chemical engineering fundamentals while offering opportunities for focused study in energy, environmental, or bioengineering.

Traditional employment areas in the chemical process industries include industrial chemicals, petroleum and petrochemicals, plastics, pharmaceuticals, metals, textiles, and food. Chemical engineers also are working in increasing numbers in the areas of energy engineering, pollution abatement, and biochemical and biomedical engineering; in addition, they are employed by many government laboratories and agencies as well as private industries and institutions.

Graduates from the program have the ability to apply knowledge of mathematics, science, and engineering to identify, formulate, and solve chemical engineering problems as well as to design and conduct experiments safely and analyze and interpret data. They are prepared to pursue advanced studies in chemical engineering. Program graduates gain a sense of professional and ethical responsibility with the ability to apply environmental, safety, economic, and ethical criteria in the design of engineering processes. They learn to function in individual and group working environments, and learn skills in written and oral communication and the effective use of computers for engineering practice, including information search in the library and on the Internet. They also understand the need for lifelong learning and the significance of societal and global issues relevant to chemical engineering.

A minimum of 129 credits is required for graduation with the degree of bachelor of science in chemical engineering. There are ten electives in the chemical engineering curriculum. Six of these are for the Discovery Program requirements. The remaining four electives should consist of three chemical engineering electives and one additional technical elective.

Students are required to obtain a minimum 2.0 grade-point average in CHE 501 Introduction to Chemical Engineering I-CHE 502 Introduction to Chemical Engineering II and in overall standing at the end of the sophomore year in order to continue in the major. Study abroad (Exchange) chemical engineering students are required to have a cumulative GPA of 3.0 or better in math, physics, chemistry, and CHE courses at the end of the semester prior to their exchange semester.

Requirements

Required Courses

Code	Title	Credits
CHE 400	Chemical Engineering Lectures	1
CHE 501	Introduction to Chemical Engineering I	3
CHE 502	Introduction to Chemical Engineering II	3
CHE 601	Fluid Mechanics and Unit Operations	3
CHE 602	Heat Transfer and Unit Operations	3
CHE 603	Applied Mathematics for Chemical Engineers	4
CHE 604	Chemical Engineering Thermodynamics	3
CHE 612	Chemical Engineering Laboratory I	3
CHE 614	Separation Processes	3
CHE 703	Mass Transfer and Stagewise Operations	3
CHE 707	Chemical Engineering Kinetics	3
CHE 708	Chemical Engineering Design	4
CHE 713	Chemical Engineering Laboratory II	3
CHE 752	Process Dynamics and Control	4
CHEM 405	Chemical Principles for Engineers	4
CHEM 683	Physical Chemistry I	3
CHEM 684	Physical Chemistry II	3
CHEM 685	Physical Chemistry Laboratory	2
CHEM 686	Physical Chemistry Laboratory	2
CHEM 651	Organic Chemistry I	3
CHEM 653	Organic Chemistry Laboratory	2
CHEM 652A	Organic Chemistry II	3
MATH 425	Calculus I	4
MATH 426	Calculus II	4
MATH 527	Differential Equations with Linear Algebra	4
MATH 644	Statistics for Engineers and Scientists	4
PHYS 407	General Physics I	4
PHYS 408	General Physics II	4

Elective Courses

Select three of the following:

Code	Title	Credits
BENG 755	Computational Molecular Bioengineering	4
CHE 651	Biotech Experience/Biomanufacturing	4
CHE 705	Fossil Fuels and Renewable Energy Sources	4
CHE 706	Electrochemical Methods for Energy Applications	4
CHE 709	Fundamentals of Air Pollution and Its Control	4
CHE 712	Introduction to Nuclear Engineering	4
CHE 722	Introduction to Microfluidics	4
CHE 744	Corrosion	4
CHE 761	Biochemical Engineering	4
CHE 762	Biomedical Engineering	4
CHE 766	Biomaterials	4

Degree Plan

Course	Title	Credits
First Year		
Fall		
ENGL 401	First-Year Writing [1]	4
MATH 425	Calculus I [2]	4
CHEM 405	Chemical Principles for Engineers [3]	4
CHE 400	Chemical Engineering Lectures	1
Discovery Program Electives [7]		4
	Credits	**17**

Spring		
MATH 426	Calculus II	4
PHYS 407	General Physics I [3]	4
Discovery Program Electives (2) [7]		8
	Credits	**16**
Second Year		
Fall		
CHEM 683	Physical Chemistry I	3
CHEM 685	Physical Chemistry Laboratory	2
MATH 527	Differential Equations with Linear Algebra	4
PHYS 408	General Physics II	4
CHE 501	Introduction to Chemical Engineering I [4]	3
	Credits	**16**
Spring		
CHEM 684	Physical Chemistry II	3
CHEM 686	Physical Chemistry Laboratory	2
CHE 502	Introduction to Chemical Engineering II	3
MATH 740 or MATH 644	Design of Experiments I [5] or Statistics for Engineers and Scientists	4
Discovery Program Elective [7]		4
	Credits	**16**
Third Year		
Fall		
CHEM 651	Organic Chemistry I	3
CHEM 653	Organic Chemistry Laboratory	2
CHE 601	Fluid Mechanics and Unit Operations	3
CHE 603	Applied Mathematics for Chemical Engineers	4
CHE Elective		4
	Credits	**16**
Spring		
CHEM 652A	Organic Chemistry II	3
CHE 602	Heat Transfer and Unit Operations	3
CHE 604	Chemical Engineering Thermodynamics	3
CHE 612	Chemical Engineering Laboratory I	3
Discovery Program Elective [7]		4
	Credits	**16**
Fourth Year		
Fall		
CHE 703	Mass Transfer and Stagewise Operations	3
CHE 707	Chemical Engineering Kinetics	3
CHE 713	Chemical Engineering Laboratory II	3
CHE 752	Process Dynamics and Control	4
CHE Elective		4
	Credits	**17**
Spring		
CHE 614	Separation Processes	3
CHE 708	Chemical Engineering Design [6]	4
CHE Electives		4
Discovery Elective [7]		4
	Credits	**15**
	Total Credits	**129**

1. ENGL 401 First-Year Writing satisfies the Discovery Foundation Writing Skills category.
2. MATH 425 Calculus I satisifies the Discovery Foundation Quantitative Reasoning category.
3. PHYS 407 General Physics I or CHEM 405 Chemical Principles for Engineers satisfies the Discovery Physical Science (with lab) category.
4. CHE 502 Introduction to Chemical Engineering II satisfies the Discovery Inquiry requirement.
5. MATH 740 Design of Experiments I or MATH 644 Statistics for Engineers and Scientists is the recommended technical elective.
6. CHE 708 Chemical Engineering Design satisfies the Discovery Capstone Experience/Course.
7. CHE students do not have to take a course in the Discovery ETS category since they satisfy this requirement through a combination of courses in the CHE curriculum.

Student Learning Outcomes

- The ability to apply knowledge of mathematics, science and engineering.
- The ability to design and conduct experiments safely, as well as to analyze and interpret data.
- The ability to identify, formulate and solve chemical engineering problems.
- The ability to design a process that meets desired specifications with consideration of environmental, safety, economic and ethical criteria.
- An appreciation of contemporary issues relevant to chemical engineering.
- Completed the UNH general education/Discovery program and obtained a broad education useful to understand the impact of engineering solutions in a global and societal context.
- The ability to use computers effectively for engineering practice.
- An appreciation of professional and ethical responsibility.
- The ability to communicate effectively.
- Skills to search for information in the library and on the internet. These skills will be used in their pursuit of lifelong learning.
- The capacity of function and work effectively alone and in a team environment.