

CHEMICAL ENGINEERING UNDERGRADUATE MAJOR (BA, BS, HBA, HBS)

The Bachelor of Science and Honors Bachelor of Science degrees in Chemical Engineering are accredited by the Engineering Accreditation Commission of ABET, <http://www.ABET.org>.

Chemical engineering is the discipline that focuses on the science and engineering of processes to convert raw materials into valued chemicals and products at a manufacturing scale. These include products found in everyday life such as transportation and heating fuels, plastics, pharmaceuticals, household and paper products (soaps, cosmetics, health care and cleaning products, etc.), as well as more advanced products like solar cells, computer chips, and advanced composites for jet aircraft.

Chemical engineers find employment in traditional chemical industries such as pulp and paper manufacturing and petroleum refining, high-tech industries such as semiconductor device manufacturing, biopharmaceutical production, aerospace, and emerging industries, particularly sustainable energy.

Alumni of the chemical engineering program will be work-ready engineers, problem solvers, responsible professionals, and interdisciplinary collaborators. Program educational objectives can be found here.

The chemical engineering undergraduate curriculum is designed to meet the student objectives through relevant course content, structured collaborative learning experiences, and hands-on laboratory and design experiences at the first year through senior levels. The school has a core curriculum where students from all three programs housed within the school (CHE, BIOE, ENVE) take common courses in the areas of first-year engineering, material and energy balances, thermodynamics, transport phenomena, and senior year laboratory.

Chemical engineering students have opportunities to obtain internships offered through the School of CBEE, and through the Multiple Engineering Cooperative Program (MECOP). Many scholarships are available on a competitive basis for chemical engineering undergraduate students. More detailed descriptions of the curriculum and requirements may be viewed here.

Major Code: 303

- Ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
- Ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
- Ability to communicate effectively with a range of audiences.
- Ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.
- Ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.

- Ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
- Ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

First Year		Credits
CBEE 101	CHEMICAL, BIOLOGICAL, AND ENVIRONMENTAL ENGR ORIENTATION	3
CBEE 102	ENGINEERING PROBLEM SOLVING AND COMPUTATIONS	3
CH 231 & CH 261	GENERAL CHEMISTRY and *LABORATORY FOR CHEMISTRY 231	5
CH 232 & CH 262	GENERAL CHEMISTRY and *LABORATORY FOR CHEMISTRY 232	5
CH 233 & CH 263	GENERAL CHEMISTRY and *LABORATORY FOR CHEMISTRY 233	5
MTH 251	*DIFFERENTIAL CALCULUS	4
MTH 252	INTEGRAL CALCULUS	4
MTH 254	VECTOR CALCULUS I	4
PH 211	*GENERAL PHYSICS WITH CALCULUS	4
WR 121	*ENGLISH COMPOSITION	3
	Biological science baccalaureate core lab course ⁺	4
HHS 231	*LIFETIME FITNESS FOR HEALTH ⁺	2
HHS 241	*LIFETIME FITNESS (or any PAC course)	1-2
Credits		47-48
Second Year		
CH 331 & CH 332	ORGANIC CHEMISTRY and ORGANIC CHEMISTRY	8
CBEE 211	MATERIAL BALANCES AND STOICHIOMETRY	3
CBEE 212	ENERGY BALANCES	3
CBEE 213	PROCESS DATA ANALYSIS	4
COMM 111 or COMM 114	*PUBLIC SPEAKING or *ARGUMENT AND CRITICAL DISCOURSE	3
ENGR 201	ELECTRICAL FUNDAMENTALS I	3
ENGR 211	STATICS	3
MTH 256	APPLIED DIFFERENTIAL EQUATIONS	4
MTH 306 or MTH 264 and MTH 265	MATRIX AND POWER SERIES METHODS or INTRODUCTION TO MATRIX ALGEBRA and INTRODUCTION TO SERIES	4
PH 212 & PH 213	*GENERAL PHYSICS WITH CALCULUS and *GENERAL PHYSICS WITH CALCULUS	8
WR 327	*TECHNICAL WRITING	3
Credits		46
Third Year		
CH 440 & CH 441 & CH 442	PHYSICAL CHEMISTRY and PHYSICAL CHEMISTRY and PHYSICAL CHEMISTRY	9
CHE 311	THERMODYNAMICS	3
CHE 312	CHEMICAL ENGINEERING THERMODYNAMICS	3
CHE 320	SAFETY, ENGINEERING ETHICS AND PROFESSIONALISM	3
CHE 331	TRANSPORT PHENOMENA I	4
CHE 332	TRANSPORT PHENOMENA II	3
CHE 333	TRANSPORT PHENOMENA III	3
CHE 334	TRANSPORT PHENOMENA LABORATORY	3
CHE 361	CHEMICAL PROCESS DYNAMICS AND SIMULATION	3
CHE 461	PROCESS CONTROL	3
	*Perspectives ⁺	6
	Advanced Chemistry	3
	Engineering elective	3
Credits		49
Fourth Year		
CHE 411	MASS TRANSFER OPERATIONS	4
CBEE 414	*PROCESS ENGINEERING LABORATORY	3
CHE 415	CHEMICAL ENGINEERING LABORATORY I	3

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CHE 431 & CHE 432	CHEMICAL PLANT DESIGN I and CHEMICAL PLANT DESIGN II	6
CHE 443	CHEMICAL REACTION ENGINEERING	4
Elective		4
Advanced Chemistry with lab		4
Engineering elective		8
*Perspectives ⁺		3
Difference, Power, and Discrimination ⁺		3
*Synthesis ⁺		6
Credits to meet 192 graduation requirement		2
Credits		50
Total Credits		192-193

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Baccalaureate Core Course (BCC)

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Writing Intensive Course (WIC)

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Must be selected to satisfy the requirements of the baccalaureate core

Code	Title	Credits
Advanced Chemistry		
CH 411	INORGANIC CHEMISTRY	3
CH 412	INORGANIC CHEMISTRY	3
CH 418	NUCLEAR CHEMISTRY	3
CH 421	ANALYTICAL CHEMISTRY	3
CH 422	ANALYTICAL CHEMISTRY	3
CH 424	BIOANALYTICAL CHEMISTRY	3
CH 435	STRUCTURE DETERMINATION BY SPECTROSCOPIC METHODS	3
CH 450	INTRODUCTORY QUANTUM CHEMISTRY	3
WSE 321	CHEMISTRY OF RENEWABLE MATERIALS	3
ATS 413	ATMOSPHERIC CHEMISTRY	3
BB 350	ELEMENTARY BIOCHEMISTRY	4
BB 450	GENERAL BIOCHEMISTRY	4
OEAS 540	THE BIOGEOCHEMICAL EARTH	4
Advanced Chemistry with Lab		
OC 450 & OC 499	CHEMICAL OCEANOGRAPHY and SPECIAL TOPICS IN OCEANOGRAPHY	8
CH 324	QUANTITATIVE ANALYSIS	4
CH 337	ORGANIC CHEMISTRY LABORATORY	4
CHE 417	INSTRUMENTATION IN CHEMICAL, BIOLOGICAL, AND ENVIRONMENTAL ENGINEERING	4
Engineering Electives		
CHE 444	THIN FILM MATERIALS PROCESSING	4
CHE 445	POLYMER ENGINEERING AND SCIENCE	4
CHE 450	CONVENTIONAL AND ALTERNATIVE ENERGY SYSTEMS	3
CHE 451	SOLAR ENERGY TECHNOLOGIES	3
CHE 499	SPECIAL TOPICS	4
CHE 514	FLUID FLOW	4
CHE 520	MASS TRANSFER I	4
CHE 525	CHEMICAL ENGINEERING ANALYSIS	4
CHE 537	CHEMICAL ENGINEERING THERMODYNAMICS I	4
BIOE 351	BIOMATERIALS AND BIOINTERFACES	3
BIOE 440	BIOCONJUGATION	3
BIOE 445	SURFACE ANALYSIS	3
BIOE 457	BIOREACTORS	3
BIOE 459	CELL ENGINEERING	3
BIOE 462	BIOSEPARATIONS	3
ENVE 322	FUNDAMENTALS OF ENVIRONMENTAL ENGINEERING	4
ENVE 421	DRINKING WATER TREATMENT PROCESSES	4
ENVE 422	WASTEWATER TREATMENT PROCESSES	4

ENVE 425	AIR POLLUTION CONTROL	3
ENVE 431	FATE AND TRANSPORT OF CHEMICALS IN ENVIRONMENTAL SYSTEMS	4
ENVE 456	SUSTAINABLE WATER RESOURCES DEVELOPMENT	3
CE 412	HYDROLOGY	4
ECE 415	MATERIAL SCIENCE OF NANOTECHNOLOGY	3
ECE 416	ELECTRONIC MATERIALS AND DEVICES	4
ECE 417	BASIC SEMICONDUCTOR DEVICES	4
ECE 418	SEMICONDUCTOR PROCESSING	4
ENGR 221	THE SCIENCE, ENGINEERING AND SOCIAL IMPACT OF NANOTECHNOLOGY	3
IE 355	STATISTICAL QUALITY CONTROL	4
IE 356	EXPERIMENTAL DESIGN FOR INDUSTRIAL PROCESSES	4
MATS 321	INTRODUCTION TO MATERIALS SCIENCE	4
MATS 322	MECHANICAL PROPERTIES OF MATERIALS	3
CBEE 416	CBEE LABORATORY II	3

Major Code: 303

First Year

Fall		Credits
CBEE 101	CHEMICAL, BIOLOGICAL, AND ENVIRONMENTAL ENGR ORIENTATION	3
CH 231 & CH 261	GENERAL CHEMISTRY and *LABORATORY FOR CHEMISTRY 231	5
MTH 251	*DIFFERENTIAL CALCULUS	4
WR 121	*ENGLISH COMPOSITION	3
	Credits	15

Winter

*Biological Science with Lab ⁺		4
CBEE 102	ENGINEERING PROBLEM SOLVING AND COMPUTATIONS	3
CH 232 & CH 262	GENERAL CHEMISTRY and *LABORATORY FOR CHEMISTRY 232	5
MTH 252	INTEGRAL CALCULUS	4
	Credits	16

Spring

CH 233 & CH 263	GENERAL CHEMISTRY and *LABORATORY FOR CHEMISTRY 233	5
COMM 111 or COMM 114	*PUBLIC SPEAKING or *ARGUMENT AND CRITICAL DISCOURSE	3
MTH 254	VECTOR CALCULUS I	4
PH 211	*GENERAL PHYSICS WITH CALCULUS	4
	Credits	16

Second Year

Fall

CBEE 211	MATERIAL BALANCES AND STOICHIOMETRY	3
CH 331	ORGANIC CHEMISTRY	4
MTH 256	APPLIED DIFFERENTIAL EQUATIONS	4
PH 212	*GENERAL PHYSICS WITH CALCULUS	4
	Credits	15

Winter

CBEE 212	ENERGY BALANCES	3
CH 332	ORGANIC CHEMISTRY	4
MTH 306 or MTH 264 and MTH 265	MATRIX AND POWER SERIES METHODS or INTRODUCTION TO MATRIX ALGEBRA and INTRODUCTION TO SERIES	4
PH 213	*GENERAL PHYSICS WITH CALCULUS	4
Perspective ⁺		3
	Credits	18

Spring

CBEE 213	PROCESS DATA ANALYSIS	4
ENGR 201	ELECTRICAL FUNDAMENTALS I	3
ENGR 211	STATICS	3
HHS 231	*LIFETIME FITNESS FOR HEALTH	2

HHS 241	*LIFETIME FITNESS (or any PAC course) ⁺	1-2
WR 327	*TECHNICAL WRITING	3
Credits		16-17
Third Year		
Fall		
CH 440	PHYSICAL CHEMISTRY	3
CHE 311	THERMODYNAMICS	3
CHE 331	TRANSPORT PHENOMENA I	4
CHE 320	SAFETY, ENGINEERING ETHICS AND PROFESSIONALISM	3
Credits		13
Winter		
CH 441	PHYSICAL CHEMISTRY	3
CHE 361	CHEMICAL PROCESS DYNAMICS AND SIMULATION	3
CHE 312	CHEMICAL ENGINEERING THERMODYNAMICS	3
CHE 332	TRANSPORT PHENOMENA II	3
Perspective ⁺		3
Credits		15
Spring		
CH 442	PHYSICAL CHEMISTRY	3
CHE 461	PROCESS CONTROL	3
CHE 333	TRANSPORT PHENOMENA III	3
CHE 334	TRANSPORT PHENOMENA LABORATORY	3
Perspective ⁺		3
Advanced Chemistry Elective		3
Credits		18
Fourth Year		
Fall		
CBEE 414	*PROCESS ENGINEERING LABORATORY	3
CHE 443	CHEMICAL REACTION ENGINEERING	4
CHE 411	MASS TRANSFER OPERATIONS	4
Advanced Chemistry Laboratory		4
Perspective ⁺		3
Credits		18
Winter		
CHE 415	CHEMICAL ENGINEERING LABORATORY I	3
CHE 431	CHEMICAL PLANT DESIGN I	3
Difference, Power, Discrimination ⁺		3
Engineering Elective		4
Free Elective		4
Credits		17
Spring		
CHE 432	CHEMICAL PLANT DESIGN II	3
Engineering Elective		4
Synthesis ⁺		3
Synthesis ⁺		3
Credits to meet 192 graduation requirement		2
Credits		15
Total Credits		192-193

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Baccalaureate Core Course (BCC)

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Writing Intensive Course (WIC)

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Must be selected to satisfy the requirements of the baccalaureate core