BACHELOR OF ENGINEERING IN CHEMICAL ENGINEERING, 4+ 1 GRADUATE TRACK

Introduction

The Chemical Engineering Program at Youngstown State University--supplemented with courses in chemistry, physics, mathematics, and general engineering--provides a broad preparation for design, operation, and management in the chemical, biomedical, biological, nuclear, pharmaceutical, and energy-conversion industries, as well as graduate study leading to research positions in industry and government and to academic careers.

COURSE	TITLE	S.H.
FIRST YEAR REQUIREMENT -STUDENT SUCCESS		
YSU 1500	Success Seminar	1-2
or YSU 1500S	Youngstown State University Success Seminar	
or HONR 1500	Intro to Honors	
General Education Requirements		
ENGL 1550	Writing 1	3-4
or ENGL 1549	Writing 1 with Support	
ENGL 1551	Writing 2	3
Gen Ed Math met in major		
Natural Science (7 s.h.)		
CHEM 1515	General Chemistry 1	3
CHEM 1515L	General Chemistry 1 Laboratory	1
PHYS 2610	General Physics 1	4
PHYS 2610L	General Physics Laboratory 1	1
Arts and Humanities (6 s.h. select one course)		3
PHIL 2626	Engineering Ethics	3
Social Science (6 s.h. select one course)		3
ECON 2610	Principles 1: Microeconomics	3
General Education Elective (9 s.h. select 2 courses)		6
CMST 1545	Communication Foundations	3
Major Requirements		
ECEN 1521	Digital Circuits	3
ECEN 1521L	Digital Circuits Laboratory	1
ECEN 2611	Instrumentation and Computation Lab 1	1
ECEN 2612	Instrumentation and Computation Lab 2	1
ECEN 2632	Basic Circuit Theory 1	3
ECEN 2633	Basic Circuit Theory 2	3
ECEN 3710	Signals and Systems	3
ECEN 3711	Intermediate Laboratory 1	1
ECEN 3712	Intermediate Laboratory 2	1
ECEN 3733	Digital Circuit Design	3
ECEN 3741	Electromagnetic Fields 1	3
ECEN 3742	Electromagnetic Fields 2	3
ECEN 3771	Digital and Analog Circuits 1	3
ECEN 3772	Digital and Analog Circuits 2	3
ECEN 4803	Linear Control Systems	3
ECEN 4803L	Linear Control Systems Laboratory	1
ECEN 4811	Senior Laboratory	1
ECEN 4844	Electromagnetic Energy Conversion	3
ENGR 1500	Engineering Orientation	1
ECEN 4899	Senior Design Project	3
ECEN 4899L	Senior Design Project Lab	1
ENGR 1550	Engineering Concepts	2
ENGR 1560	Engineering Computing	2
MECH 2620	Statics and Dynamics	3
ISEN 2610	Engineering Statistics	3
PHYS 3705	Thermodynamics and Classical Statistical Dynamics	3
CSIS 2610	Programming and Problem-Solving	3
CSIS 2610L	Programming and Problem-Solving Lab	1
Dual Credit Requirements		
Select 9 s.h. of 5800 or 6900 level or higher CSCI/ECEN electives below		9
ECEN 5800	Special Topics	
ECEN 5808	Advanced Signals and Systems	
ECEN 5830	Digital Signal Processing	
ECEN 5835	Computer Architecture with VHDL	
ECEN 5840	Electric Power Systems	
ECEN 5860	Fundamental of Antenna Design and Application	
ECEN 5890	Power Electronics	
ECEN 6900	Seminar	
ECEN 6901	Control Systems 1	
ECEN 6902	Control Systems 2	
ECEN 6933	Digital Systems: VHDL Design	
ECEN 6934	Digital Systems: Computer Arithmetic	
Mathematics Minor -one course counts toward Gen Ed		
MATH 1571	Calculus 1	4
MATH 1572	Calculus 2	4
MATH 2673	Calculus 3	4
MATH 3705	Differential Equations	3
MATH 3718	Linear Algebra and Discrete Mathematics for Engineers	3
Total Semester Hours		**126-128**

Course List

Dual Credit Requirements

Accelerated 4+1 Program

Undergraduate Chemical Engineering students can apply for admission into the accelerated 4+1 MSE in Chemical Engineering graduate program after completing 78 undergraduate semester hours with a GPA of 3.3 or higher. After being admitted to the accelerated 4+1 MSE program, students will be allowed a maximum of nine semester hours of graduate coursework, specified as 5000 level or higher, to be double counted toward both a bachelor's and master's degrees. The courses chosen to count for both undergraduate and graduate coursework must be approved by the Graduate Program Director. An additional three hours of graduate coursework can be completed as an undergraduate and used exclusively for graduate credit. This allows the student to graduate with a master's degree with one year of additional full-time study beyond the bachelor's degree, as the total hours counted towards the Master's degree is greater than or equal to 30 hours.

Courses Counting Towards Requirements

Select 3 of these courses, as only 3 can be double counted. Can select a 4th that would only count for the Master's degree.

Year 1

Fall		**S.H.**
YSU 1500 or YSU 1500S or HONR 1500	Success Seminar or Youngstown State University Success Seminar or Intro to Honors	1-2
ENGL 1550 or ENGL 1549	Writing 1 or Writing 1 with Support	3-4

ENGR 1500	Engineering Orientation	1
ENGR 1550	Engineering Concepts	2
CHEM 1515	General Chemistry 1	3
CHEM 1515L	General Chemistry 1 Laboratory	1
MATH 1571	Calculus 1	4
GER AH-1 Arts and Humanities Elective		3
	Semester Hours	**18-20**
Spring		
ENGL 1551	Writing 2	3
ENGR 1560	Engineering Computing	2
GER GE-1 CMST 1545 Communication Foundations		3
CHEM 1516	General Chemistry 2	3
CHEM 1516L	General Chemistry 2 Laboratory	1
MATH 1572	Calculus 2	4
	Semester Hours	**16**
Year 2		
Fall		
CHEM 3719	Organic Chemistry 1	3
CHEM 3719L	Organic Chemistry 1 Laboratory	1
CHEM 3719R	Organic Chemistry Recitation 1	1
MATH 2673	Calculus 3	4
PHYS 2610	General Physics 1	4
CHEN 2683	Chemical Engineering Principles 1	3
CHEN 2650	Computer Methods in Chemical Engineering	2
	Semester Hours	**18**
Spring		
CHEM 3720	Organic Chemistry 2	3
CHEM 3720L	Organic Chemistry 2 Laboratory	1
CHEM 3720R	Organic Chemistry Recitation 2	1
MATH 3705	Differential Equations	3
PHYS 2611	General Physics 2	4
CHEN 2684	Chemical Engineering Principles 2	3
	Semester Hours	**15**
Year 3		
Fall		
CHEM 3739	Physical Chemistry 1	3
STAT 3743	Probability and Statistics	4
CHEN 3771	Chemical Engineering Thermodynamics 1	3
CHEN 5800A	Special Topics Thermo Dynamics Lab	1
CHEN 3786	Transport Phenomena 1	4
	Semester Hours	**15**
Spring		
GER SS-1 Social Science Elective		3
GER GE-2 General Education Elective		3
CHEN 3787	Transport Phenomena 2/Unit Operations 1	3
CHEN 4880	Chemical Reactor Design 1	3
Regulatory Safety Course [3]		2-3
CHEN 4880R	Reactor Design Applications	1
CHEN 3785L	Transport Phenomena Laboratory	1
	Semester Hours	**16-17**
Year 4		
Fall		
GER AH-2 Arts and Humanities Elective: Ethics [1]		3
CHEN 3787L	Unit Operations Laboratory 1	1
CHEN 4815	Unit Operations 2	3
CHEN 4815R	Unit Operations 2 Applications	1
CHEN 4887	Process and Plant Design 1	3
CHEN Elective-1 Chemical Engineering Elective [2]		3
	Semester Hours	**14**
Spring		
GER SS-2 Social Science Elective		3
GER GE-3 General Education Elective		3
CHEN 4815L	Unit Operations Laboratory 2	1
CHEN 4882	Process Dynamics	3
CHEN 4888	Process and Plant Design 2	3
CHEN Elective-2 Chemical Engineering Elective [2]		3
	Semester Hours	**16**
	Total Semester Hours	**128-131**

Note: Transfer students from any two- or four-year academic program at other institutions or at this University who wish to pursue studies in chemical engineering should consult with the program coordinator for individual counseling to develop a program of study that fully uses their educational background and requires a minimum of time to satisfy the requirements for the degree of Bachelor of Engineering in chemical engineering.

COURSE	TITLE	S.H.
1. Ethics Elective		**3**
Select one of the following:		
PHIL 1561	Technology and Human Values	
PHIL 2625	Introduction to Professional Ethics	
PHIL 2626	Engineering Ethics	
PHIL 2628	Business Ethics	
2. Chemical Engineering Elective		**6**
Select 2 courses from the following:		
Can select 3 from this list, over the 5000 level, to double count towards Bachelor's and Master's, after acceptance into the MSE program. Can select a 4th that counts only towards Master's Degree.		
STEM 4890	STEM Internship	
CHEN 2688	Energy Assessment	
CHEN 3700	Measurements and Instrumentation	
CHEN 4801	Chemical Engineering Projects	
CHEN 4840	Biochemical Engineering Fundamentals	
CHEN 5800	Special Topics	
CHEN 5800I	Special Topics Green Engineering	
CHEN 5805	Principles of Biomedical Engineering	
CHEN 5811	Advanced Transport Phenomena	
CHEN 5820	Industrial Pollution Control	
CHEN 5821	Fundamentals of Polymer Science	
CHEN 5845	Corrosion Engineering	
CHEN 5850	Industrial Processes	
CHEN 5883	Mathematical Methods in Chemical Engineering	
CHEN 6981	Advanced Chemical Reaction Engineering	
Other courses may be used at the discretion of the program coordinator		
3. Regulatory Safety Course		
Choose one of the following:		
CHEM 4860	Regulatory Aspects of Industrial Chemistry	2
ENST 5810	Environmental Safety	3
ENST 5860	Environmental Regulations	3
Total Semester Hours		**17**

Student Outcomes

1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
2. an 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
3. an ability to communicate effectively with a range of audiences
4. an 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.
5. an 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
6. an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies