

Chemical Engineering, B.S.Ch.E.

Degree Offered

- Bachelor of Science in Chemical Engineering (B.S.Ch.E.)

Nature of the Program

VISION

Our vision is to foster a community for lifelong personal and professional growth of our students, faculty and staff. We strive to be a recognized undergraduate Chemical Engineering program that prepares our students to be successful in a wide range of career paths and leadership roles. We inspire the pursuits of continuing education, innovation, critical thinking, creative problem-solving, leadership and social responsibility.

MISSION

The Chemical Engineering program emphasizes undergraduate instruction. Graduates of this program have the skills and knowledge to become effective professional practitioners in a variety of industries and service organizations, as well as to be successful in programs of advanced study.

The Chemical Engineering department supports the development of West Virginia, the nation, and the global community by educating graduates who are employed in organizations that significantly contribute to the well - being of humanity.

This mission is filled by the achievement of the following **Program Objectives**:

- Program graduates will be prepared for successful chemical engineering careers in energy, chemical, materials processing, biotechnology, and related industries. They may take positions in manufacturing, environmental affairs, engineering and construction firms, government, education and technical service/sales.
- Program graduates will progress into positions having significant professional responsibilities. These responsibilities may include management and leadership duties, significant contributions on projects having valuable societal impacts, and entrepreneurial activity.
- Program graduates will have the foundation to continue with advanced study. This may include graduate work in engineering, business, or the sciences, as well as the study of medicine or law.
- Program graduates will continue with professional development.
- Program graduates will be dedicated to sustainability, safety, and ethical behavior.
- Program graduates will engage in service to their alma mater, communities and the profession.

General Education Foundations

Please use this link to view a list of courses that meet each GEF requirement. (<http://registrar.wvu.edu/gef/>)

NOTE: Some major requirements will fulfill specific GEF requirements. Please see the curriculum requirements listed below for details on which GEFs you will need to select.

Code	Title	Hours
General Education Foundations		
F1 - Composition & Rhetoric		3-6
ENGL 101 & ENGL 102 or ENGL 103	Introduction to Composition and Rhetoric and Composition, Rhetoric, and Research Accelerated Academic Writing	
F2A/F2B - Science & Technology		4-6
F3 - Math & Quantitative Reasoning		3-4
F4 - Society & Connections		3
F5 - Human Inquiry & the Past		3
F6 - The Arts & Creativity		3
F7 - Global Studies & Diversity		3
F8 - Focus (may be satisfied by completion of a minor, double major, or dual degree)		9
Total Hours		31-37

Please note that not all of the GEF courses are offered at all campuses. Students should consult with their advisor or academic department regarding the GEF course offerings available at their campus.

Curriculum Requirements

Code	Title	Hours
	University Requirements	25
	Program Requirements	3
	Math and Science Requirements	32
	Chemical Engineering Major Requirements	66
	Total Hours	126

University Requirements

Code	Title	Hours
	General Education Foundations (GEF) 1, 2, 3, 4, 5, 6, 7, and 8 (31-37 Credits)	
	Outstanding GEF Requirements 1, 5, 6, and 7	15
WVUE 191	First Year Seminar	1
	General Electives *	9
	Total Hours	25

*

Students are not required to take electives within a single area. However, an area of focus may be of benefit in entering a particular area of engineering practice or post-graduate study. Students should note that some of the courses listed are offered on an irregular basis and may not be available when desired. This is particularly true of some of the 400 level engineering and science electives.

Program Requirements

Code	Title	Hours
MDS 270	Effective Public Speaking (GEF 4)	3
	Total Hours	3

An overall 2.0 Professional GPA is required. Professional GPA includes all Math, Science and Engineering Major courses.

Math and Science Requirements

Code	Title	Hours
MATH 155	Calculus 1 (GEF 3)	4
MATH 156	Calculus 2 (GEF 8)	4
MATH 251	Multivariable Calculus	4
CHEM 115 & 115L	Fundamentals of Chemistry 1 and Fundamentals of Chemistry 1 Laboratory (GEF 2)	4
CHEM 116 & 116L	Fundamentals of Chemistry 2 and Fundamentals of Chemistry 2 Laboratory (GEF 8)	4
CHEM 233 & 233L	Organic Chemistry 1 and Organic Chemistry 1 Laboratory	4
PHYS 111 & 111L	General Physics 1 and General Physics 1 Laboratory (GEF 8)	4
PHYS 112 & 112L	General Physics 2 and General Physics 2 Laboratory	4
	Total Hours	32

Chemical Engineering Major Requirements

Code	Title	Hours
CHE 100	Introduction to Chemical Engineering 1	2
CHE 102	Introduction to Chemical Engineering	3
CHE 211	Material Balances	3
CHE 212	Energy Balances	3
CHE 316	Transport Operations	4
CHE 317	Transport Operations 2	4

CHE 318	Particle Processing Operations	3
CHE 320	Chemical Engineering Thermodynamics	3
CHE 327	Kinetics and Reactor Design	3
CHE 330	Modeling and Analysis	3
CHE 350	Chemical Engineering Laboratory	2
CHE 357	Design Laboratory 1	2
CHE 358	Design Laboratory 2	2
CHE 435	Chemical Process Control	3
CHE 450L	Unit Operations Laboratory 1	2
CHE 451L	Unit Operations Laboratory 2	2
CHE 457	Design Laboratory 3	3
CHE 458	Design Laboratory 4	3
ENGR 111	Software Tools for Engineers	3
ENGR 401	Senior Engineering Seminar	1
Advanced Science Electives (any BIOL, CHEM, or PHYS course 200-level or higher, MAE 410, GEOL 312, excluding CHEM 233, CHEM 234, and CHEM 235)		3
Advanced Chemistry Electives (any CHEM course 200-level or higher, excluding CHEM 233, CHEM 234, and CHEM 235)		3
Chemical Engineering Electives (select from the following): *		3
CHE 411	Advanced Heat Transfer	
CHE 417	Advanced Separation Processes	
CHE 461	Polymer Science and Engineering	
CHE 493	Special Topics	
CHE 496	Senior Thesis	
Technical Elective		3
Any BIOL Course		
Any CHEM Course at the 200-level or higher		
Any CHE, CE, CPE, CS, CMGT, EE, MAE Course		
Any MATH Course at the 200-level or higher		
Total Hours		66

Students majoring in Chemical Engineering cannot earn a minor in Chemistry, however it is possible to earn a Dual Degree in Chemical Engineering and Chemistry. Students interested in the Dual Degree option should contact their advisor.

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Other courses may be approved by the Chair.

Suggested Plan of Study

First Year

Fall	Hours	Spring	Hours
ENGL 101 (GEF 1)		3 ENGL 102 (GEF 1)	3
CHE 100		2 CHE 102	3
CHEM 115 & 115L (GEF 2)		4 ENGR 111	3
MATH 155 (GEF 3)		4 CHEM 116 & 116L (GEF 8)	4
WVUE 191		1 MATH 156 (GEF 8)	4
		14	17

Second Year

Fall	Hours	Spring	Hours
CHE 211		3 CHE 212	3
CHEM 233 & 233L		4 PHYS 112 & 112L	4
MATH 251		4 Technical Elective	3

PHYS 111 & 111L (GEF 8)		4 MDS 270 (GEF 4)		3
		GEF 5		3
		15	16	
Third Year				
Fall	Hours	Spring		Hours
CHE 316		4 CHE 317		4
CHE 320		3 CHE 318		3
CHE 330		3 CHE 327		3
CHE 357		2 CHE 350		2
GEF 6		3 CHE 358		2
		General Elective		3
		15	17	
Fourth Year				
Fall	Hours	Spring		Hours
CHE 435		3 CHE 451L		2
CHE 450L		2 CHE 458		3
CHE 457		3 ENGR 401		1
GEF 7		3 Advanced Chemistry Elective		3
Advanced Science Elective		3 Chemical Engineering Elective		3
General Elective		3 General Elective		3
		17	15	

Total credit hours: 126

Major Learning Outcomes

CHEMICAL ENGINEERING

In order to achieve the educational objectives, the academic program will produce the following outcomes. Our graduates will gain:

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

These outcomes are achieved through rigorous coursework in mathematics, chemistry, physics, chemical engineering, and the humanities and social sciences. Electives in other engineering, scientific and business disciplines are required, enabling graduates to work effectively with professionals having different areas of expertise.