Chemical Engineering, M.S.Ch.E.

Curriculum in Master of Science in Chemical Engineering

A candidate for the M.S. degree in chemical engineering must comply with the rules and regulations as outlined in the WVU Graduate Catalog and the specific requirements of the Statler College and the Chemical and Biomedical Engineering Department.

Program Requirements

All M.S. degree candidates are required to establish an Advising and Examining Committee (AEC). The student's advisor, in conjunction with the student's AEC will be responsible for determining the plan of study appropriate to the student's needs. The underlying principle of the planned program is to provide the students with the necessary support to complete their degree and prepare them for their career.

Curriculum Requirements

Code	Title	Hours
A minimum GPA of 3.0 is required in all courses		
Course Requirements *		
A maximum of 6 credit hours can be taken at the 400 level		
A grade of C- or higher must be earned in all required courses		
Plan of Study		
CHE 531	Mathematical Methods in Chemical Engineering	3
CHE 615	Transport Phenomena	3
CHE 620	Thermodynamics	3
CHE 625	Chemical Reaction Engineering	3
Graduate Seminar **		
CHE 786	Professional Development Seminar for Chemical and Biomedical Engineering	0
Electives (Select courses from the following based on degree path):		9
Any BIOM, BMEG, CE, CHE, CHEM, CPE, CS, EE, EMGT, FIN, IENG, IH&S, MAE, MATH, MINE, PNGE, PHYS, SAFM, SENG, or STAT courses 400-795, as approved by the student's AEC		
Complete 1 of the following options:		9
Thesis Option - 9 hours		
CHE 697	Research (6 hours)	
Complete 3 additional hours of coursework in CHE (any CHE course 400-795 as approved by the student's AEC)		
Final Oral or Written Examination		
Thesis		
Problem Report Option - 9 hours		
CHE 697	Research (3 hours)	
Complete 6 additional hours of coursework in CHE (any CHE course 400-795 as approved by the student's AEC)		
Formal written report or professional report/paper		
Final Oral or Written Examination		
Coursework Options - 9 hours		
Complete 9 additional hours of coursework in CHE (any CHE course 400-795 as approved by the student's AEC)		
Total Hours		30

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Students who do not hold a baccalaureate degree in chemical engineering may be required to take a set of undergraduate chemical engineering courses above and beyond the minimum coursework requirements.

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Full-time Students are required to take a Seminar course each semester

EXAMINATION

M.S. students following the thesis or problem report option must prepare a written research proposal and oral presentation. The proposal must be approved by the student's AEC at least one semester prior to the final oral examination. This oral defense is administered by the student's AEC and must be completed by the end of the second semester after the student begins his/her research.

All students completing a thesis or problem report are required to pass a final oral or written examination, administered by their AEC, covering the thesis or problem report and/or related course material.

Accelerated Bachelor's/Master's in Chemical Engineering

DEGREE REQUIREMENTS

Students must meet the following criteria to qualify for a Bachelor of Science in Chemical Engineering degree:

- Complete a minimum of 128 credit hours
- Satisfy WVU's undergraduate degree requirements
- Satisfy Statler College's undergraduate degree requirements (http://catalog.wvu.edu/undergraduate/collegeofengineeringandmineralresources/#policiestext)
- Complete all courses listed in the curriculum requirements with the required minimum grades
- Attain an overall grade point average of 2.00 or better
- Attain a WVU grade point average of 2.00 or better
- Attain a Statler grade point average of 2.00 or better
- A maximum of one math or science courses with a grade of D+, D, or D- may apply towards a Statler College degree
- Complete a survey regarding their academic and professional experiences at WVU, as well as post-graduation job placement or continuing education plans.

The Statler GPA is computed based on all work taken at WVU with a subject code within Statler College (BIOM, BMEG, CE, CHE, CPE, CS, CSEE, CYBE, EE, ENGR, ENVE, ETEC, IENG, IH&S, MAE, MINE, PDA, PNGE, SAFM, SENG) excluding ENGR 140, ENGR 150, and CS 101. The WVU GPA is computed based on all work taken at WVU. The Overall GPA is computed based on all work taken at WVU and transfer work.

Students must meet the following criteria to qualify for a Master of Science in Chemical Engineering degree:

- Complete a minimum of 18 credit hours
- Satisfy WVU's graduate degree requirements
- Satisfy Statler College's graduate degree requirements (http://catalog.wvu.edu/graduate/collegeofengineeringandmineralresources/#masterstext)
- Complete all courses listed in the curriculum requirements with the required minimum grades
- Attain an grade point average of 3.0 or better
- Minimum of 60% of courses must be from 500 level or above
- Students admitted to this program must have their bachelor's and master's degree conferred simultaneously upon completion of all requirements for both degrees.

CURRICULUM REQUIREMENT

Code	Title	Hours
University Requirements		19
Fundamentals of Engineering Requirements		5
Math and Science Requirements		36
Chemical Engineering BS Program Requirements		68
Chemical Engineering MS Program Requirements		18
Total Hours		146

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, 4, 5, 6, and 7		18
ENGR 191	First-Year Seminar	1
Total Hours		19

FUNDAMENTALS OF ENGINEERING REQUIREMENTS

Code	Title	Hours
A minimum grade of C- is required in all Fundamentals of Engineering courses.		
ENGR 101	Engineering Problem Solving 1	2
Engineering Problem Solving (Select one of the following):		3

ENGR 102	Engineering Problem Solving 2
CHE 102	Introduction to Chemical Engineering
MAE 102	Introduction to Mechanical and Aerospace Engineering Design
Total Hours	5

MATH AND SCIENCE REQUIREMENTS

Code	Title	Hours
Course List Code Title Hours A minimum grade of C- is required in all Math and Science courses.		
Chemistry		
First Year Chemistry (GEF 2B):		8
CHEM 115 & 115L & CHEM 116 & CHEM 116L	Fundamentals of Chemistry 1 and Fundamentals of Chemistry 1 Laboratory and Fundamentals of Chemistry 2 and Fundamentals of Chemistry 2 Laboratory	
CHEM 233 & 233L	Organic Chemistry 1 and Organic Chemistry 1 Laboratory	4
Math		
Calculus 1 (GEF 3):		4
MATH 153 & MATH 154	Calculus 1a with Precalculus and Calculus 1b with Precalculus	
MATH 155	Calculus 1	
MATH 156	Calculus 2	4
MATH 251	Multivariable Calculus	4
MATH 261	Elementary Differential Equations	4
Physics		
PHYS 111 & 111L	General Physics 1 and General Physics 1 Laboratory	4
PHYS 112 & 112L	General Physics 2 and General Physics 2 Laboratory	4
Total Hours		36

CHEMICAL ENGINEERING BS PROGRAM REQUIREMENTS

Code	Title	Hours
CHE 221	Material and Energy Balance	4
CHE 230	Numerical Methods for Chemical Engineering	3
CHE 315	Chemical Engineering Transport Analysis	3
CHE 321	Chemical Engineering Thermodynamics and Kinetics	4
CHE 322	Unit Operations 1	4
CHE 323	Unit Operations 2	4
CHE 325	Chemical Reaction Engineering	3
CHE 351L	Chemical Process Laboratory	2
CHE 355	Process Simulation and Design	3
CHE 435	Chemical Process Control	3
CHE 452L & CHE 452S	Chemical Engineering Senior Laboratory and Chemical Engineering Senior Laboratory Analysis	3
CHE 455 & 455S	Chemical Process Design 1 and Chemical Process Design 1 Studio	4
CHE 456S	Chemical Process Design 2	3
CHE 475	Chemical Process Safety *	3
Technical Electives +		
Engineering Science Electives *		6
Advanced Science Electives		7
Advanced Chemistry Elective (3 credits)		

Life Science Elective (4 credits)	
Other Technical Electives *	9
Total Hours	68

CHEMICAL ENGINEERING MS PROGRAM REQUIREMENTS

Code	Title	Hours
A minimum GPA of 3.0 is required in all courses		
Requirements		
Plan of Study		
CHE 531	Mathematical Methods in Chemical Engineering	3
CHE 615	Transport Phenomena	3
CHE 620	Thermodynamics	3
CHE 625	Chemical Reaction Engineering	3
CHE 786	Professional Development Seminar for Chemical and Biomedical Engineering ^	0
Complete 1 of the following options		6
Thesis Option - 6 credits		
CHE 697	Research	
Final Oral or Written Examination		
Thesis		
Problem Report - 6 credits		
CHE 697	Research	
Complete 3 additional credits of coursework in CHE ++		
Formal written report or professional report/paper		
Final Oral or Written Examination		
Coursework Option - 6 credits		
Complete 6 additional credits of coursework in CHE ++		
Total Hours		18

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Indicates courses that will be shared with the MS requirements

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See BSCHE degree for list of elective course options

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See MSCHE degree for list of elective course options

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Full-time students are required to take a seminar course each semester

SUGGESTED PLAN OF STUDY

IT IS IMPORTANT FOR STUDENTS TO TAKE COURSES IN THE ORDER SPECIFIED AS MUCH AS POSSIBLE; ALL PREREQUISITES AND CONCURRENT REQUIREMENTS MUST BE OBSERVED. A TYPICAL ABM BSCHE & MSCHE DEGREE PROGRAM THAT COMPLETES DEGREE REQUIREMENTS IN FIVE YEARS IS AS FOLLOWS.

First Year

Fall	Hours	Spring	Hours
CHEM 115 & 115L	4	CHEM 116 & 116L	4
ENGL 101	3	ENGR 102	3
ENGR 101	2	MATH 156	4
ENGR 191	1	PHYS 111 & 111L	4
MATH 155	4		

GEF 4		3	
		17	15

Second Year

Fall	Hours	Spring	Hours
CHE 221		4 CHE 230	3
CHEM 233 & 233L		4 MATH 261	4
ENGL 102		3 PHYS 112 & 112L	4
MATH 251		4 GEF 5	3
		GEF 6	3
		15	17

Third Year

Fall	Hours	Spring	Hours
CHE 321		4 CHE 323	4
CHE 322		4 CHE 351L	2
GEF 7		3 CHE 325	3
Life Science Technical Elective		4 CHE 355	3
Advanced Chemistry Elective		3 Technical Elective	3
		18	15

Fourth Year

Fall	Hours	Spring	Hours
CHE 315		3 CHE 435	3
CHE 452L & CHE 452S		3 CHE 456S	3
CHE 455 & 455S		4 CHE 475*	3
Technical Elective *		3 Engineering Science Elective (500+ level CHE course)*	3
Engineering Science Elective *		3 Technical Elective	3
		16	15

Fifth Year

Fall	Hours	Spring	Hours
CHE 531		3 CHE 615	3
CHE 620		3 CHE 625	3
Graduate CHE Elective (problem report or coursework) or CHE 697		3 Graduate CHE Elective (coursework only) or CHE 697	3
CHE 786		0 CHE 786	0
		9	9

Total credit hours: 146

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Indicates courses that will be shared with the MS requirements

Major Learning Outcomes

CHEMICAL ENGINEERING

Upon graduation, Chemical Engineering students will have:

- Understanding of advanced principles of chemical engineering, which include reaction engineering, transport phenomena, and thermodynamics
- Expert-level understanding of the background and theory/principles of their research topics.
- Ability to plan research projects, to perform the tasks, and to draw conclusions based on sound scientific and engineering principles.
- Ability to write technical articles for publication in refereed journals and to make oral and poster presentations at technical meetings.
- Demonstrated initiative in research planning and management, including safety and environmental issues.

- Been technically prepared for a lifetime of continuing education.
- Understanding of professional and ethical responsibilities.