

# CHEMICAL ENGINEERING (M)

Chemical Engineering is a discipline that involves transforming raw materials and chemicals into useful products through processes that are safe, sustainable and economical. Chemical Engineers address many challenges to benefit the society- for example, energy, clean water, food, oil, healthcare. You have heard of catalytic converters in vehicles. That's chemical engineering applied to an environmental problem. Desalination of sea water is an example of scientific breakthrough by chemical engineers. With foundation in chemistry, physics and math, the curriculum includes material and energy balances, thermodynamics, separation processes, fluid mechanics, heat and mass transfer, chemical reaction kinetics, reactor design, process dynamics and control, process safety to prepare you for a versatile career to do the world a lot of good.

The Concordia University Wisconsin Bachelor's of Science in Chemical Engineering program will provide students with technical and creative problem-solving skills that meet professional expectations. The curriculum will be grounded in a Christian approach to making the world safer and healthier.

The Chemical Engineering program consists of 133 credits, completed over eight semesters. Students will practice skills with hands-on experiential learning opportunities in modern labs, under the supervision of qualified and experienced faculty. Students will complete a capstone design project and are strongly encouraged to complete an internship. The total typical time to complete the program is four years. No minor will be required for chemical engineering students as the program is credit heavy. Concordia University will seek to have its B.S. Chemical Engineering program accredited by the Accreditation Board of Engineering and Technology; the application is due upon the graduation of the first cohort in Spring 2028.

Based on the University Mission and the Engineering programs mission, the Program Educational Objectives (PEO) of the Chemical Engineering program are to produce graduates who during their professional career will be:

PEO1: Productive Contributors with strong skills in teamwork and communication

PEO2: Creators of value in product or process or service at workplace with a commitment to professional growth

PEO3: Holistic and responsible professionals impacting society.

## Program Learning Outcomes

Students will:

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

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

## Curriculum

Code	Title	Hours
<b>Core Requirements (<a href="https://catalog.cuw.edu/undergraduate/university/acad-prog/trad/core/">https://catalog.cuw.edu/undergraduate/university/acad-prog/trad/core/</a>)</b>		<b>45</b>
<b>Major Requirements (Basic Sciences and Mathematics 28 + Discipline 56)</b>		<b>84</b>
<b>Elective (CHEM)</b>		<b>4</b>
Minor: Optional		
<b>Total Hours</b>		<b>133</b>

## Major Requirements

Code	Title	Hours
<b>Required Core Courses</b>		
CHEM 1414	General Chemistry I	
MATH 2050	Statistics I	
<b>Required Courses</b>		
<i>Basic Sciences and Mathematics</i>		
CHEM 1424	General Chemistry II	4
MATH 2010	Calculus I	4
MATH 2020	Calculus II	4
MATH 2030	Calculus III	4
MATH 3250	Linear Algebra and Differential Equations	4
PHYS 1714	University Physics I	4
PHYS 1724	University Physics II	4
<i>Discipline</i>		
CHEM 2414	Organic Chemistry I	4
CHEM 2424	Organic Chemistry II	4
CHEM 3504	Physical Chemistry: Quantum and Spectroscopy	4
ENGR 1010	Engineering Introduction, Design and Ethics	3
ENGR 1020	Engineering Applications and Programming	3
ENGR 2110	Material Balances	3
ENGR 2320	Thermodynamics	4
ENGR 3110	Separation Processes	3
ENGR 3120	Mass Transfer	3
ENGR 3140	Kinetics & Reactor Design	4
ENGR 3310	Heat Transfer	4
ENGR 3330	Fluid Mechanics	4
ENGR 4991	Internship Experience (may be taken and repeated as 1, 2, or 3 credits but 3 total credits are required)	3
or ENGR 4110	Process Safety	
ENGR 4210	Process Dynamics & Control	4
ENGR 4910	Engineering Capstone Project I	3
ENGR 4920	Engineering Capstone Project II	3
<i>Elective (Select at least one of the following CHEM courses)</i>		<b>4</b>
CHEM 2204	Analytical Chemistry	
CHEM 3214	Biochemistry	
CHEM 4524	Instrumental Analysis	
<b>Total Hours</b>		<b>88</b>

**Plan**

Course	Title	Hours
<b>Semester 1</b>		
CHEM 1414	General Chemistry I	4
MATH 2010	Calculus I	4
ENGR 1010	Engineering Introduction, Design and Ethics	3
ENG 1040	Introduction to Writing	3
CCE 1010	Christian Citizen	3
<b>Hours</b>		<b>17</b>
<b>Semester 2</b>		
ENGR 1020	Engineering Applications and Programming	3
MATH 2020	Calculus II	4
REL 1100	Christian Faith	3
MATH 2050	Statistics I	3
CHEM 1424	General Chemistry II	4
<b>Hours</b>		<b>17</b>
<b>Semester 3</b>		
PHYS 1714	University Physics I	4
CHEM 2414	Organic Chemistry I	4
MATH 2030	Calculus III	4
ENGR 2110	Material Balances	3
REL 1000	The Bible	3
<b>Hours</b>		<b>18</b>
<b>Semester 4</b>		
MATH 3250	Linear Algebra and Differential Equations	4
PHYS 1724	University Physics II	4
CHEM 2424	Organic Chemistry II	4
ENGR 2320	Thermodynamics	4
HHP 1100	Stewardship of the Body	1
HHP ACTIVITY COURSE OR VARSITY ATHLETICS		1
<b>Hours</b>		<b>18</b>
<b>Semester 5</b>		
ENGR 3310	Heat Transfer	4
ENGR 3330	Fluid Mechanics	4
ENGR 3110	Separation Processes	3
CCE 1020	Western Culture & Worldview	3
COMM 4100	Cross-Cultural Communication	3
<b>Hours</b>		<b>17</b>
<b>Semester 6</b>		
CHEM 3504	Physical Chemistry: Quantum and Spectroscopy	4
ENGR 3120	Mass Transfer	3
ENGR 3140	Kinetics & Reactor Design	4
COMM 3300	Technical Writing and Speaking	3
CCE 1030	Western Thought & Worldview	3
<b>Hours</b>		<b>17</b>
<b>Semester 7</b>		
ENGR 4910	Engineering Capstone Project I	3
CHEM 2204 or CHEM 3214 or CHEM 4524	Analytical Chemistry or Biochemistry or Instrumental Analysis	4
ENGR 4110 or ENGR 4991	Process Safety or Internship Experience	3
CCE 1040	Science & Humanity	3
FAITH AND LIFE		3
<b>Hours</b>		<b>16</b>
<b>Semester 8</b>		
ENGR 4920	Engineering Capstone Project II	3
ENGR 4210	Process Dynamics & Control	4
HUMAN CREATIVITY AND EXPRESSION		3

HUMAN BEINGS AND BEING HUMAN	3
<b>Hours</b>	<b>13</b>
<b>Total Hours</b>	<b>133</b>

Course options and schedule are subject to change.