Duluth Campus

Chemical Engineering B.S.Ch.E.

Chemical Engineering

Swenson College of Science and Engineering

- Program Type: Baccalaureate
- Requirements for this program are current for Fall 2019
- Required credits to graduate with this degree: 128 to 132
- Required credits within the major: 110 to 114
- Degree: Bachelor of Science in Chemical Engineering

The Department of Chemical Engineering strives for nationally recognized excellence in engineering education and research by using modern, hands-on, and active learning experiences to prepare undergraduate students for professional success, and to hold paramount the safety, health, and welfare of the public and protect the environment in performance of their professional duties.

The Department of Chemical Engineering produces engineers with a strong foundation of technical, communication, teamwork, and problem-solving skills required for professional success, consistent with the following objectives:

1. Pursue careers where they apply their engineering and problem-solving skills.
2. Pursue advanced studies or other forms of continuing education.
3. Value their University of Minnesota Duluth (UMD) chemical engineering education and endorse the program and its students.

This four-year baccalaureate (B.S.Ch.E.) degree program emphasizes the development of the student's ability to analyze and design chemical processing systems. By the end of the program, the student must demonstrate the ability to solve engineering problems, have a sensitivity to the social and environmental impacts of the engineering profession, and the ability to maintain a high level of competency.

Chemical engineering graduates are qualified for employment in diverse industries, ranging from those that manufacture inorganic chemicals, petrochemicals, plastics, synthetic fibers, paper and pulp, and pharmaceuticals to those that process minerals, materials, and hazardous wastes.

Graduates are qualified for assignments that include plant operations, process development, process control, project engineering, or technical sales, and frequently pursue engineering management later in their careers. They are also well qualified to continue with professional or graduate education.

The chemical engineering curriculum is based on fundamental sciences including physics, chemistry, and mathematics; traditional chemical engineering sciences such as material and energy balance, transport phenomena, and thermodynamics; and chemical engineering design courses such as reaction engineering, separations, and unit operations, with a capstone design course during the senior year. Students have an opportunity to become involved in research, through either the Undergraduate Research Opportunities Program or the department honors program.

The Bachelor of Science in Chemical Engineering is accredited by the Engineering Accreditation Commission of ABET, http://www.abet.org

Honors Requirement: To graduate with department honors, students must have a minimum 3.50 GPA and be nominated by the chemical engineering faculty.

Program Delivery

This program is available:

- via classroom (the majority of instruction is face-to-face)

Admission Requirements

Students may declare a chemical engineering major in their first or second year. Transfer students from other majors require an overall GPA of 3.00, or higher, and completion of one year of general chemistry and one year of calculus. Students must complete the majority of the program's lower division technical requirements (first and second years), including CHE 2111 or 2211, CHEM 2541, MATH 3280, and PHYS 2015, before applying for admission to upper division professional program (third and fourth years). Successful completion of CHE 2111 or 2211 (with a grade of C+ or better) is required. Admission to the upper division is competitive and applicants are admitted on a space-available basis, with priority determined by the cumulative technical GPA of 3.00 or higher in all technical courses, including in engineering, physics, mathematics, and chemistry.

For information about University of Minnesota admission requirements, visit the Office of Admissions website.

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General Requirements

The Board of Regents, on recommendation of the faculty, grants degrees from the University of Minnesota. Requirements for an undergraduate degree from University of Minnesota Duluth include the following:

1. Students must meet all course and credit requirements of the departments and colleges or schools in which they are enrolled including an advanced writing course. Students seeking two degrees must fulfill the requirements of both degrees. However, two degrees cannot be awarded for the same major.
2. Students must complete all requirements of the Liberal Education Program.
3. Students must complete a minimum of 120 semester credits.
4. At least 30 of the last 60 degree credits earned immediately before graduation must be awarded by UMD.
5. Students must complete at least half of their courses at the 3xxx-level and higher at UMD. Study-abroad credits earned through courses taught by UM faculty and at institutions with which UMD has international exchange programs may be used to fulfill this requirement.
6. If a minor is required, students must take at least three upper division credits in their minor field from UMD.
7. The minimum cumulative UM GPA required for graduation will be 2.00 and will include only University of Minnesota coursework. A minimum UM GPA of 2.00 is required in each UMD undergraduate major and minor. No academic unit may impose higher grade point standards to graduate.
8. Diploma, transcripts, and certification will be withheld until all financial obligations to the University have been met.

Program Requirements

1. A minor or second major is not required for B.S.Ch.E.

2. A 2.00 minimum GPA in all courses taken in the chemical engineering major, including required courses in related fields. GPA requirements apply to all courses in the major taken at the University of Minnesota Duluth calculated separately and to all courses in the major when transfer credits are included.

Introduction to Chemical Engineering (3 cr)

Transfer students with 36 or more credits and completion of one year of general chemistry and one year of calculus must take an additional 2xxx or higher engineering elective of 3 credits or more instead of CHE 1011.
CHE 1011 - Introduction to Chemical Engineering. [LE CAT] (3.0 cr)
or CHE 2001 - Introduction to Environmental Engineering (3.0 cr)

CHE Lower Division (9 - 10 cr)

CHE 2011 - Design of Engineering Experiments (3.0 cr)
CHE 2121 - Chemical Engineering Thermodynamics (3.0 cr)
CHE 2111 - Material and Energy Balances (3.0 cr)
or CHE 2211 - Materials and Energy Balances (4.0 cr)

CHE Upper Division (37 - 38 cr)

CHE 3311 (5 cr) may be substituted for CHE 3111 (3 cr) and CHE 3112 (3 cr).
CHE 3031 - Computational Methods in Chemical Engineering (3.0 cr)
CHE 3111 - Fluid Mechanics (3.0 cr)
CHE 3112 - Heat and Mass Transfer (3.0 cr)
CHE 3211 - Chemical Engineering Laboratory I [COMM & LAN] (3.0 cr)
CHE 3231 - Properties of Engineering Materials (3.0 cr)
CHE 4111 - Separations (3.0 cr)
CHE 4211 - Chemical Engineering Laboratory II (3.0 cr)
CHE 4301 - Chemical Reaction Engineering (3.0 cr)
CHE 4501 - Chemical Engineering Design I [SUSTAIN] (3.0 cr)
CHE 4502 - Chemical Engineering Design II (3.0 cr)
CHE 3241 - Principles of Particle Technology (3.0 cr)
or CHE 4141 - Material and Minerals Processing (3.0 cr)
CHE 4401 - Process Control (3.0 cr)
or CHE 4402 - Process Dynamics and Control (3.0 cr)

Courses From Other Programs (41 - 42 cr)

Computer Science

CS 1121 - Introduction to Programming in Visual BASIC.NET [LE CAT, LOGIC & QR] (3.0 cr)
or CS 1411 - Introduction to Programming in Matlab (4.0 cr)

Chemistry

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Information current as of March 29, 2024

Chemistry I with lab
CHEM 1153 - General Chemistry I [LE CAT, NAT SCI] (4.0 cr)
CHEM 1154 - General Chemistry Lab I [LE CAT, NAT SCI] (1.0 cr)
Chemistry II with lab
CHEM 1155 - General Chemistry II (4.0 cr)
CHEM 1156 - General Chemistry Lab II (1.0 cr)
Organic Chemistry I with lab
CHEM 2541 - Organic Chemistry I (3.0 cr)
CHEM 2543 - Organic Chemistry I Laboratory (1.0 cr)
Mathematics
MATH 1296 - Calculus I [LE CAT, LOGIC & QR] (5.0 cr)
MATH 1297 - Calculus II [LOGIC & QR] (5.0 cr)
MATH 3280 - Differential Equations with Linear Algebra (4.0 cr)
Physics
Physics I course
PHYS 2013 - General Physics I [LE CAT, NAT SCI] (4.0 cr)
or PHYS 2017 - Honors: General Physics I [NAT SCI] (4.0 cr)
Physics I lab
PHYS 2014 - General Physics Lab I [NAT SCI] (1.0 cr)
Physics II course
PHYS 2015 - General Physics II (4.0 cr)
or PHYS 2018 - Honors General Physics II (4.0 cr)
Physics II lab
PHYS 2016 - General Physics Lab II (1.0 cr)

Advanced Chemistry Electives (8 cr)
May not be satisfied with CHEM 4184, 4185, 4634 or 5350.
Take 8 or more credit(s) from the following:
- CHEM 2xxx
- CHEM 3xxx
- CHEM 4xxx
- CHEM 5xxx

Advanced Chemical Engineering Electives (6 cr)
May not be satisfied with CHE 3196 or 3296.
Take 6 or more credit(s) from the following:
Take at most 3 credit(s) from the following:
- CHE 3xxx

Take 3 or more credit(s) from the following:
- CHE 4xxx
- CHE 5xxx

Advanced Writing Requirement (3 cr)
WRIT 31xx or higher advanced writing course

Advanced Mathematics or Statistics Electives (3 - 4 cr)
Take 1 or more course(s) from the following:
- MATH 3298 - Calculus III (4.0 cr)
- MATH 3355 - Discrete Mathematics (4.0 cr)
- MATH 4810 - Applied Mathematics: Numerical Methods (4.0 cr)
- MATH 4240 - Applied Mathematics: Operational Methods (3.0 cr)
- MATH 5260 - Dynamical Systems (3.0 cr)
- MATH 5270 - Modeling with Dynamical Systems (3.0 cr)
- MATH 5280 - Partial Differential Equations (3.0 cr)
- MATH 5810 - Linear Programming (3.0 cr)
- MATH 5830 - Numerical Analysis: Approximation and Quadrature (4.0 cr)
- MATH 5840 *{Inactive}*(4.0 cr)
- MATH 5850 - Numerical Differential Equations (4.0 cr)
- STAT 3411 - Engineering Statistics (3.0 cr)
- STAT 3611 - Introduction to Probability and Statistics (4.0 cr)

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