## MAJOR: CHEMICAL ENGINEERING, B.S.

DEPARTMENT OF CHEMICAL ENGINEERING

This chemical engineering major emphasizes the development of the student's ability to analyze and design chemical processing systems. 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 hazardous and nuclear wastes. Graduates are qualified for assignments that include plant operations, process development, process control, project engineering, or 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 program's educational objectives are to produce graduates who 1) are able to apply theoretical and practical knowledge of engineering in the workplace, 2) possess the ability to communicate effectively with technical and non-technical users of technology, 3) are prepared to engage in advanced or additional education in their chosen field of endeavor or interest, and 4) recognize that the broader aspects of engineering practices include economic, environmental, social, political and professional constraints.

TYPICAL PROGRAM OF STUDY

| FALL SEMESTER | | SPRING SEMESTER | |
|---|---|---|---|
| **FIRST YEAR** | | | |
| *CHE 1011 Introduction to Chemical Engineering[1] | 3 cr | *CHEM 1152 General Chemistry II[2] | 5 cr |
| *CHEM 1151 General Chemistry I[2] | 5 cr | *CS 1121 Visual BASIC.Net | 3 cr |
| *WRIT 1120 College Writing | 3 cr | *MATH 1297 Calculus II[3] | 5 cr |
| *MATH 1296 Calculus I^[3] | 5 cr | *PHYS 2011 General Physics I | 4 cr |
| Total: | 16 cr | Total: | 17 cr |
| **SECOND YEAR** | | | |
| *CHE 2111 Material & Energy Balances | 3 cr | *CHE 2121 Chemical Engineering Thermodynamics | 3 cr |
| *CHEM 2541 Organic Chemistry I | 3 cr | *CHE 3031 Computational Methods in Chemical Eng. | 3 cr |
| *CHEM 2543 Organic Chemistry I lab | 1 cr | CHEM 2222 Quantitative Analysis | 3 cr |
| *ENGR 2015 Statics | 3 cr | CHEM 2223 Quantitative Analysis lab | 1 cr |
| *MATH 3280 Differential Equations w/Linear Algebra | 4 cr | PHYS 2012 General Physics II | 4 cr |
| Liberal education course[4] | 3 cr | Liberal education course[4] | 3 cr |
| Total: | 17 cr | Total: | 17 cr |
| **Admission to the upper division of the B.S.Ch.E program is competitive and based on cumulative GPA, space availability, and performance in lower division courses (courses marked with *.) Students must complete CHE 2111 with a C+ grade or better to be accepted to upper division. See department for details regarding application to upper division.* | | | |
| **THIRD YEAR** | | | |
| CHE 2011 Design of Engineering Experiments | 3 cr | CHE 3112 Heat and Mass Transfer | 3 cr |
| CHE 3111 Fluid Mechanics | 3 cr | CHE 3231 Properties of Engineering Materials | 3 cr |
| CHE 3241 Principles of Particle Technology | 3 cr | CHE 4402 Process Dynamics and Control | 3 cr |
| CHEM 254x or higher elective[7] | 4 cr | CHEM 254x elective[7] | 4 cr |
| Science/engineering elective 3xxx level (or higher)[7] | 3 cr | WRIT 3130 or 3150 Advanced Writing[5] | 3 cr |
| Total: | 16 cr | Total: | 16 cr |
| **FOURTH YEAR** | | | |
| CHE 3211 Chemical Engineering lab I | 3 cr | CHE 4211 Chemical Engineering lab II | 3 cr |
| CHE 4111 Separations | 3 cr | CHE 4502 Chemical Engineering Design II | 4 cr |
| CHE 4301 Chemical Reaction Engineering | 3 cr | CHE 4xxx level or higher elective[8] | 3 cr |
| CHE 4501 Chemical Engineering Design I | 4 cr | Liberal education courses[4] | 6 cr |
| Liberal education course[5] | 3 cr | Total: | 16 cr |
| Total: | 16 cr | | |

^First math course is determined by ACT math score or math placement exam. This schedule presupposes placement into Math 1296.

[1] Instead of CHE 1011, students may take CHE 2001 or, with departmental approval, a CHE elective at the 3xxx or 4xxx level.

[2] Students may take CHEM 1161/1162 Honors General Chemistry I and II in place if CHEM 1151/1152.

[3] Students may take MATH 1596/1597 Honors: Calculus I and II in place of MATH 1296/1297.

[4] Choose 1 from each category 6-10. Students may choose 2 category 9 courses and none from 10 as long as the courses are from 2 different departments.

[5] Students may take WRIT 3130 Advanced Writing: Engineering or WRIT 3150 Advanced Writing: Science.

[6] Students are required to take 8 or more credits of CHEM electives at the 254x-5xxx level. This requirement may not be satisfied with CHEM 3184, 4184, 4185, 4632 or 4634.

[7] Students are required to take 3 or more credits of advanced science or engineering electives at the 3xxx level or higher, subject to department approval.

[8] Students are required to take 3 or more credits of CHE electives at the 4xxx level or higher.

For additional information: Department of Chemical Engineering
176 Engineering Building ♦ 218-726-7126
che@d.umn.edu ♦ http://www.d.umn.edu/che

# CHEMICAL ENGINEERING, B.S.

| MAJOR COURSE REQUIREMENTS | CREDITS | PREREQUISITES | SEMESTER TO BE COMPLETED | GRADE |
|---|---|---|---|---|
| **FIRST YEAR** | | | | |
| WRIT 1120 College Writing | 3 | | | |
| CHE 1011 Introduction to Chemical Engineering[1] | 3 | High school chemistry, high school algebra | | |
| CHEM 1151 General Chemistry I[2] | 5 | ACT math ≥ 21 or MATH 1005 with at least a C-, (1 yr HS chemistry or CHEM 1113) | | |
| CHEM 1152 General Chemistry II[2] | 5 | CHEM 1151 or 1161 | | |
| CS 1121 Visual BASIC.Net | 3 | | | |
| MATH 1296 Calculus I^[3] | 5 | ACT math ≥ 25, or MATH 1250 with ≥a 'C-' or math placement | | |
| MATH 1297 Calculus II[3] | 5 | MATH 1290, 1296 or 1596 with ≥a 'C-' | | |
| PHYS 2011 General Physics I | 4 | MATH 1290, 1296 or 1596 | | |
| **SECOND YEAR** | | | | |
| CHE 2111 Material & Energy Balances | 3 | CHEM 1151 or 1161 | | |
| CHE 2121 Chemical Engineering Thermodynamics | 3 | CHE 1011 (prereq or coreq ), 2111, MATH 1297 | | |
| CHE 3031 Computational Methods in Chem. Eng | 3 | BSChE candidate, CHE 2111, MATH 3280 | | |
| CHEM 2222 Quantitative Analysis | 3 | CHEM 1152 or 1162 | | |
| CHEM 2223 Quantitative Analysis lab | 1 | Concurrent registration in CHEM 2222 | | |
| CHEM 2541 Organic Chemistry I | 3 | CHEM 1152 or 1162 | | |
| CHEM 2543 Organic Chemistry I lab | 1 | CHEM 1152 or 1162; concurrent registration in CHEM 2541 | | |
| ENGR 2015 Statics | 3 | PHYS 2011, MATH 1297 | | |
| MATH 3280 Differential Equations w/Linear Alg. | 4 | MATH 1297 or 1597 with 'C-' or better | | |
| PHYS 2012 General Physics II | 4 | PHYS 2011, MATH 1297 or 1597 | | |
| **THIRD YEAR** | | | | |
| CHE 2011 Design of Engineering Experiments. | 3 | MATH 1297; CHE 2111 concurrent reg. OK | | |
| CHE 3111 Fluid Mechanics | 3 | BSChE cand., ENGR 2015, MATH 3280,CHE 2111 concurrent reg. OK | | |
| CHE 3112 Heat and Mass Transfer | 3 | BSChE cand., CHE 3111, CHE 2121(prereq or coreq ) | | |
| CHE 3231 Properties of Engineering Materials | 3 | CHE 2121, CHEM 1151 or 1161, BSChE cand | | |
| CHE 3241 Principles of Particle Technology | 3 | BSChE cand., CHE 3111 (prereq or coreq ), PHYS 2012 | | |
| CHE 4402 Process Dynamics and Control | 3 | BSChE cand., CHE 3031, Phys 2012 | | |
| CHEM 254x or higher elective[6] | 4 | | | |
| CHEM 254x or higher elective[6] | 4 | | | |
| WRIT 31xx Advanced Composition[5] | 3 | WRIT 1120, 60 credits | | |
| 3xxx or higher science or engineering elective[7] | 3 | | | |
| **FOURTH YEAR** | | | | |
| CHE 3211 Chemical Engineering lab I | 3 | BSCHE cand. and CHE 3112, CHE 2011 (prereq or coreq ), CHEM 2223, WRIT 31xx) | | |
| CHE 4111 Separations | 3 | BSChE cand., CHE 3031, CHE 3112 | | |
| CHE 4211 Chemical Engineering lab II | 3 | CHE 3211, 4111, 4301, 4402 (pre- or coreq.), BSChE cand. | | |
| CHE 4301 Chemical Reaction Engineering | 3 | CHE 3112 | | |
| CHE 4501 Chemical Engineering Design I | 4 | BSChE cand, (prereq or coreq: CHE 4111,4301, WRIT 31xx) | | |
| CHE 4502 Chemical Engineering Design II | 4 | CHE 4501, (prereq or coreq 3231, 4402) | | |
| CHE 4xxx level or higher elective[8] | 3 | See specific course requirements | | |

^First math course is determined by ACT math score or math placement exam. This schedule presupposes placement into Math 1296.

[1] Instead of CHE 1011, students may take CHE 2001 or, with departmental approval, a CHE elective at the 3xxx or 4xxx level.

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[7] Students are required to take 3 or more credits of advanced science or engineering electives at the 3xxx level or higher, subject to department approval.

[8] Students are required to take 3 or more credits of CHE electives at the 4xxx level or higher.