Twin Cities Campus

Chemical Engineering B.Ch.E.

Chemical Engineering & Materials Science

College of Science and Engineering

- Program Type: Baccalaureate
- Requirements for this program are current for Spring 2012
- Required credits to graduate with this degree: 128
- Required credits within the major: 54
- Degree: Bachelor of Chemical Engineering

Chemical engineering deals with operations such as materials handling, mixing, fluid flow and metering, extrusion, coating, heat exchange, filtration, drying, evaporation, distillation, absorption, extraction, ion exchange, combustion, catalysis, and processing in chemical and biochemical reactors.

Because many industries are based on some chemical or physical transformation of matter, chemical engineers are much in demand. They may work in the manufacture of inorganic products (fertilizers, paints, ceramics, electronic materials); in the manufacture of organic products (polymers, films, papers, petrochemicals); in the manufacture of batteries and fuel cells; in the processing of minerals and materials; in food processing and fermentation; or in the production of antibiotics and biochemical products.

Program Delivery

This program is available:

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

Admission Requirements

Students must complete 14 courses before admission to the program.

Freshman and transfer students students are usually admitted to pre-major status before admission to this major

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

Required prerequisites

Mathematics

Honors math (MATH 1571H, 1572H, 2573H, 2574H) may be taken in place of the listed courses
MATH 1271 - Calculus I [MATH] (4.0 cr)
or MATH 1371 - CSE Calculus I [MATH] (4.0 cr)
MATH 1272 - Calculus II (4.0 cr)
or MATH 1372 - CSE Calculus II (4.0 cr)
MATH 2243 - Linear Algebra and Differential Equations (4.0 cr)
or MATH 2373 - CSE Linear Algebra and Differential Equations (4.0 cr)
MATH 2263 - Multivariable Calculus (4.0 cr)
or MATH 2374 - CSE Multivariable Calculus and Vector Analysis (4.0 cr)

Physical Sciences

CHEM 1021 *{Inactive}*[PHYS] (4.0 cr)
or CHEM 1031H *{Inactive}*[PHYS] (4.0 cr)
CHEM 1022 *{Inactive}*[PHYS] (4.0 cr)
or CHEM 1032H *{Inactive}*[PHYS] (4.0 cr)
CHEM 2301 - Organic Chemistry I (3.0 cr)
CHEM 2302 - Organic Chemistry II (3.0 cr)
CHEM 3501 *{Inactive}*(3.0 cr)
CHEM 3121 *{Inactive}*(3.0 cr)
PHYS 1301W - Introductory Physics for Science and Engineering I [PHYS, WI] (4.0 cr)
or PHYS 1401V - Honors Physics I [PHYS, WI] (4.0 cr)
PHYS 1302W - Introductory Physics for Science and Engineering II [PHYS, WI] (4.0 cr)
or PHYS 1402V - Honors Physics II [PHYS, WI] (4.0 cr)

Chemical Engineering Lower Division

CHEN 2001 - Material and Energy Balances (4.0 cr)

Freshman Writing

WRIT 1301 - University Writing (4.0 cr)

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General Requirements

All students are required to complete general University and college requirements including writing and liberal education courses. For more information about University-wide requirements, see the liberal education requirements.Required courses for the major or minor in which a student receives a D grade (with or without plus or minus) do not count toward the major or minor (including transfer courses).

Program Requirements

Students interested in chemical engineering are encouraged to take CHEN 1001.

Major Courses

CHEM 3502 *{Inactive}*(3.0 cr)
CHEM 2311 - Organic Lab (4.0 cr)
or CHEM 2312H - Honors Organic Lab (5.0 cr)
CHEN 3701 - Introduction to Biomolecular Engineering (3.0 cr)
CHEN 3006 - Mass Transport and Separation Processes (4.0 cr)
CHEN 3101 - Chemical Engineering Thermodynamics (4.0 cr)
CHEN 3102 - Reaction Kinetics and Reactor Engineering (4.0 cr)
CHEN 3201 - Numerical methods in ChEn applications (3.0 cr)
CHEN 4401W - Senior Chemical Engineering Lab [WI] (4.0 cr)
CHEN 4501W - Chemical Engineering Design [WI] (4.0 cr)
CHEN 4502W *{Inactive}*[WI] (2.0 cr)
CHEN 4601 - Process Control (3.0 cr)
MATS 3011 - Introduction to Materials Science and Engineering (3.0 cr)
CHEN 3005 - Transport Phenomena: Momentum and Heat (4.0 cr)
CHEN 4402W *{Inactive}*[WI] (2.0 cr)

Technical Electives

Take 12 credits of electives. These normally include CHEN 4214 and 3 other courses selected with the aid of an adviser.
BBE 4301 - Applied Surface and Colloid Science (3.0 cr)
or BBE 4723 - Food Process Engineering (3.0 cr)
or BBE 4733 - Renewable Energy Technologies [TS] (3.0 cr)
or BIOC 3021 - Biochemistry (3.0 cr)
or BIOC 4521 - Introduction to Physical Biochemistry (3.0 cr)
or BIOC 5527 *{Inactive}*(4.0 cr)
or BIOL 4003 - Genetics (3.0 cr)
or BIOL 4004 - Cell Biology (3.0 cr)
or BMEN 5001 - Advanced Biomaterials (3.0 cr)
or BMEN 5041 - Tissue Engineering (3.0 cr)
or BMEN 5311 - Advanced Biomedical Transport Processes (3.0 cr)
or BMEN 5371 *{Inactive}*(3.0 - 4.0 cr)
or BMEN 5501 - Biology for Biomedical Engineers (3.0 cr)
or CEGE 4502 - Water and Wastewater Treatment (3.0 cr)
or CEGE 4561 - Solids and Hazardous Wastes (3.0 cr)
or CEGE 4562 - Environmental Remediation Technologies (3.0 cr)
or CHEM 4001 - Chemistry of Biomass and Biomass Conversion to Fuels and Products [ENV] (4.0 cr)
or CHEM 4011 - Mechanisms of Chemical Reactions (3.0 cr)
or CHEM 4021 - Computational Chemistry (3.0 cr)
or CHEM 4066 *{Inactive}*(3.0 cr)
or CHEM 4201 - Materials Chemistry (3.0 cr)
or CHEM 4301 - Applied Surface and Colloid Science (3.0 cr)
or CHEM 4311W - Advanced Organic Chemistry Lab [WI] (4.0 cr)
or CHEM 4321 - Organic Synthesis (3.0 cr)
or CHEM 4322 - Advanced Organic Chemistry (3.0 cr)
or CHEM 4411 - Introduction to Chemical Biology (3.0 cr)
or CHEM 4413 *{Inactive}*(3.0 cr)
or CHEM 4511W - Advanced Physical Chemistry Lab [WI] (3.0 cr)
or CHEM 4701 - Inorganic Chemistry (3.0 cr)
or CHEM 4711W - Advanced Inorganic Chemistry Lab [WI] (3.0 cr)
or CHEM 4725 - Organometallic Chemistry (3.0 cr)
or CHEM 4745 - Advanced Inorganic Chemistry (3.0 cr)
or CHEM 5210 - Materials Characterization (4.0 cr)
or CHEN 4214 - Polymers (3.0 cr)

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or CHEN 4701 - Applied Math (3.0 cr)
or CHEN 4702 - Introduction to Rheology (2.0 cr)
or CHEN 4703 *{Inactive}*(3.0 cr)
or CHEN 4704 - Advanced Undergraduate Physical Rate Processes I: Transport (3.0 cr)
or CHEN 4706 *{Inactive}*(3.0 cr)
or CHEN 4707 *{Inactive}*(3.0 cr)
or CHEN 4708 - Advanced Undergraduate Chemical Rate Processes: Analysis of Chemical Reactors (3.0 cr)
or CHEN 5531 *{Inactive}*(3.0 cr)
or CHEN 5551 *{Inactive}*(3.0 cr)
or CHEN 5751 - Biochemical Engineering (3.0 cr)
or CHEN 5752 *{Inactive}*(3.0 cr)
or CHEN 5753 - Advanced Biomedical Transport Processes (3.0 cr)
or CHEN 5759 *{Inactive}*(2.0 cr)
or CHEN 5771 - Colloids and Dispersions (3.0 cr)
or CSCI 5304 - Computational Aspects of Matrix Theory (3.0 cr)
or CSCI 5451 - Introduction to Parallel Computing: Architectures, Algorithms, and Programming (3.0 cr)
or EE 3015 - Signals and Systems (3.0 cr)
or EE 3161 - Semiconductor Devices (3.0 cr)
or EE 4231 - Linear Control Systems: Designed by Input/Output Methods (3.0 cr)
or EE 5171 - Microelectronic Fabrication (3.0 cr)
or EE 5173 - Basic Microelectronics Laboratory (1.0 cr)
or EE 5653 - Physical Principles of Magnetic Materials (3.0 cr)
or EE 5655 - Magnetic Recording (3.0 cr)
or FSCN 4111 *{Inactive}*(3.0 cr)
or FSCN 5441 *{Inactive}*(2.0 cr)
or IE 3521 - Statistics, Quality, and Reliability (4.0 cr)
or IE 5441 - Financial Decision Making (4.0 cr)
or IE 5513 - Engineering Safety (4.0 cr)
or IE 5522 - Quality Engineering and Reliability (4.0 cr)
or MATH 2283 *{Inactive}*(3.0 cr)
or MATH 4457 *{Inactive}*(4.0 cr)
or MATH 4458 *{Inactive}*(4.0 cr)
or MATH 4567 - Applied Fourier Analysis (4.0 cr)
or MATH 5445 - Mathematical Analysis of Biological Networks (4.0 cr)
or MATH 5485 - Introduction to Numerical Methods I (4.0 cr)
or MATH 5486 - Introduction To Numerical Methods II (4.0 cr)
or MATS 3013 - Electrical and Magnetic Properties of Materials (3.0 cr)
or MATS 4212 - Ceramics (3.0 cr)
or MATS 4301W - Materials Processing [WI] (4.0 cr)
or MATS 4511W *{Inactive}*[WI] (4.0 cr)
or MATS 5531 *{Inactive}*(3.0 cr)
or ME 4431W - Energy Conversion Systems Laboratory [WI] (4.0 cr)
or ME 5113 - Aerosol/Particle Engineering (4.0 cr)
or ME 5115 *{Inactive}*(4.0 cr)
or ME 5223 - Materials in Design (4.0 cr)
or ME 5446 - Introduction to Combustion (4.0 cr)
or MICB 3301 - Biology of Microorganisms (5.0 cr)
or PMB 4121 - Microbial Ecology and Applied Microbiology (3.0 cr)
or MICB 4131 - Immunology (3.0 cr)
or NSCI 3101 - Neurobiology I: Molecules, Cells, and Systems (3.0 cr)
or PHAR 6163 *{Inactive}*(3.0 cr)
or PHAR 6164 - Biopharmaceutics (3.0 cr)
or PHAR 6224 - Advanced Pharmacogenomics and Precision Medicine (2.0 cr)
or PHCL 5110 - Introduction to Pharmacology (3.0 cr)
or PHSL 5061 - Principles of Physiology for Biomedical Engineering (4.0 cr)
or PHYS 4911 - Introduction to Biopolymer Physics (3.0 cr)
or CHEM 4223W - Polymer Laboratory [WI] (2.0 cr)
or CHEN 4223W - Polymer Laboratory [WI] (2.0 cr)
or MATS 4223W - Polymer Laboratory [WI] (2.0 cr)
or MATS 4214 - Polymers (3.0 cr)
or CHEM 4214 - Polymers (3.0 cr)

Program Sub-plans

A sub-plan is not required for this program.

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Honors UHP

This is an honors sub-plan.

Students admitted to the University Honors Program (UHP) must fulfill UHP requirements in addition to degree program requirements. Honors courses used to fulfill degree program requirements will also fulfill UHP requirements.

Current departmental honors course offerings are listed at:
http://www.honors.umn.edu/academics/curriculum/dept_courses_current.html

Honors students complete an honors thesis project in the final year, most often in conjunction with an honors thesis course, or with an honors directed studies or honors directed research course. Students select honors courses and plan for a thesis project in consultation with their UHP adviser and their departmental faculty adviser.

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