Duluth Campus

Environmental Engineering Minor

Chemical Engineering

Swenson College of Science and Engineering

- Program Type: Undergraduate free-standing minor
- Requirements for this program are current for Fall 2020
- Required credits in this minor: 54 to 59

The environmental engineering minor develops a student's ability to understand and address environmental concerns. Coursework provides broad-based science and engineering knowledge suited to pollution prevention and waste management. The minor enhances degrees in science or other engineering fields.

Program Delivery

This program is available:

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

Minor Requirements

Lower Division (38 - 40 cr)

Chemistry I and II with labs

Chemistry I

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

CHEM 1155 - General Chemistry II (4.0 cr)
CHEM 1156 - General Chemistry Lab II (1.0 cr)

Chemical Engineering

Material Energy Balances

CHE 2111 - Material and Energy Balances (3.0 cr)
or CHE 2211 - Materials and Energy Balances (4.0 cr)

Chemical and Environmental Engineering

CHE 1011 - Introduction to Chemical Engineering. [LE CAT] (3.0 cr)
or CHE 2001 - Introduction to Environmental Engineering (3.0 cr)

Analytical Chemistry

CHEM 2212 - Environmental Chemistry [NAT SCI, SUSTAIN] (4.0 cr)
or CHEM 2222 - Quantitative Analysis (3.0 cr)
CHEM 2223 - Quantitative Analysis Laboratory (1.0 cr)

Mathematics

MATH 1290 - Calculus for the Natural Sciences [LE CAT2, LOGIC & QR] (5.0 cr)
or MATH 1296 - Calculus I [LE CAT, LOGIC & QR] (5.0 cr)

Calculus II

MATH 1297 - Calculus II [LOGIC & QR] (5.0 cr)

Physics I with lab requirement

PHYS 2013 - General Physics I [LE CAT, NAT SCI] (4.0 cr)
or PHYS 2017 - Honors: General Physics I [NAT SCI] (4.0 cr)
PHYS 2014 - General Physics Lab I [NAT SCI] (1.0 cr)

Electives

Take 1 or more course(s) from the following:

- CHE 2011 - Design of Engineering Experiments (3.0 cr)
- STAT 2411 - Statistical Methods [LE CAT, LOGIC & QR] (3.0 cr)
- STAT 3411 - Engineering Statistics (3.0 cr)
- STAT 3611 - Introduction to Probability and Statistics (4.0 cr)

Additional Requirements (10 - 11 cr)

Students taking CE 3025 should replace CHE 1011 or CHE 2001 with an additional upper division elective.

Mathematics

MATH 3280 - Differential Equations with Linear Algebra (4.0 cr)

Fluid Mechanics

CE 3221 - Fluid Mechanics (3.0 cr)
or CHE 3111 - Fluid Mechanics (3.0 cr)

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or ME 3111 - Fluid Mechanics (3.0 cr)

Mass and Energy Balances

CE 3025 - Environmental Engineering [SUSTAIN] (4.0 cr)
or CHE 3112 - Heat and Mass Transfer (3.0 cr)
or ME 4112 - Heat and Mass Transfer (3.0 cr)

Advanced Electives (6-8 cr)

Other upper division electives may be substituted subject to department approval.
Take 2 or more course(s) from the following:

- BIOL 5807 - Mathematical Ecology (3.0 cr)
- CE 3225 - Hydraulics and Hydrology (4.0 cr)
- CE 4215 - Hydraulic Design (3.0 cr)
- CE 4237 - Water Quality Engineering (3.0 cr)
- CE 4256 - Design of Water and Wastewater Treatment Plants (3.0 cr)
- CE 4257 - Municipal Solid Waste Management and Hazardous Waste Systems (3.0 cr)
- CE 4515 - Sustainable Design [SUSTAIN] (3.0 cr)
- CE 5201 - Water Policy (3.0 cr)
- CE 5216 - Applications in Environmental Modeling (3.0 cr)
- CE 5226 - Water Resources Engineering (3.0 cr)
- CE 5237 - Water Quality Engineering (3.0 cr)
- CE 5421 *{Inactive}*(3.0 cr)
- CE 5515 - Sustainable Design and Construction (SUSTAIN) (3.0 cr)
- CHE 4601 - Biochemical Engineering I (3.0 cr)
- CHE 4603 - Biorenewable Resources [SUSTAIN] (3.0 cr)
- CHE 4613 - Air Pollution Control (3.0 cr)
- CHE 5601 - Biochemical Engineering I (3.0 cr)
- CHE 5612 - Hazardous Waste Process Engineering (3.0 cr)
- ES 3500 - Ecological Economics (3.0 cr)
- EES 3201 - Environmental Resources and Remediation (3.0 cr)
- EES 3202 - Energy Resources (3.0 cr)
- EES 3100 *{Inactive}*(3.0 cr)
- GEOL 5240 *{Inactive}*(4.0 cr)
- EES 5250 - Hydrogeology (4.0 cr)
- ME 4050 - Fundamentals of Nuclear Engineering (3.0 cr)
- ME 4365 - Global Sustainability Experience in Design/Manufacturing in Africa (3.0 cr)
- ME 5305 - Computational Fluid Dynamics (3.0 cr)
- ME 5325 - Sustainable Energy System (3.0 cr)
- ME 5335 - Introduction to Finite Element Analysis (3.0 cr)

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