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 2017
- Required credits in this minor: 54 to 58

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

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

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

Math

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

Physics

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)

Upper Division Requirements (10 cr)

Students taking CE 3025 should replace CHE 1011 or CHE 2001 with an additional upper division elective.
MATH 3280 - Differential Equations with Linear Algebra (4.0 cr)
CE 3221 - Fluid Mechanics (3.0 cr)
or CHE 3111 - Fluid Mechanics (3.0 cr)
or ME 3111 - Fluid Mechanics (3.0 cr)
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)

Upper Division Electives (6-8 cr)

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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 5410 *{Inactive}*(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 5610 *{Inactive}*(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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