UNIVERSITY OF MINNESOTA
Driven to Discover℠

Twin Cities Campus

Sustainable Systems Management B.S.

Bioproducts and Biosystems Engineering

College of Food, Agricultural and Natural Resource Sciences

- Program Type: Baccalaureate
- Requirements for this program are current for Spring 2019
- Required credits to graduate with this degree: 120
- Required credits within the major: 84 to 91
- Degree: Bachelor of Science

Businesses, governments, and nonprofit organizations are making decisions with sustainability in mind with increasing frequency. They recognize that to ensure positive environmental, economic, and social outcomes, they must prepare comprehensive, long-term plans and employ informed, proficient individuals to carry them out. To accomplish these tasks, these public and private entities rely upon the expertise of employees and consultants who possess both a broad understanding of sustainability and an in-depth familiarity with the particular sector in which they operate.

The sustainable systems management major prepares students to enter the workforce with the knowledge and skills necessary to design, assess, implement, and manage systems to advance the goals of sustainability. Key features of this inherently interdisciplinary major include its skills-based and content-based integrated core courses, its emphasis on the development of strong analytical and quantitative skill sets, and its broad requirement of foundation courses in mathematics, science, business, economics, history, and policy.

Students choose to specialize in one of four tracks: (1) corporate sustainability systems, (2) sustainable products business management, (3) building science and technology, or (4) energy systems.

Program Delivery

This program is available:

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

Admission Requirements

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

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

All major requirements must be taken A-F (unless only offered S-N), and students must earn a grade of at least C- or better.

Core and Foundation Courses

Orientation

SSM 1004 - Sustainable Systems Management Orientation (1.0 cr)

Mathematical Thinking

MATH 1271 - Calculus I [MATH] (4.0 cr)

Statistics

STAT 3011 - Introduction to Statistical Analysis [MATH] (4.0 cr)
or STAT 3021 - Introduction to Probability and Statistics (3.0 cr)
or CEGE 3102 - Uncertainty and Decision Analysis (3.0 cr)
or ESPM 3012 - Statistical Methods for Environmental Scientists and Managers [MATH] (4.0 cr)

Physical and Biological Sciences

CHEM 1061 - Chemical Principles I [PHYS] (3.0 cr)
CHEM 1065 - Chemical Principles I Laboratory [PHYS] (1.0 cr)

Biology

BIOL 1001 - Introductory Biology: Evolutionary and Ecological Perspectives [BIOL] (4.0 cr)
or BIOL 1009 - General Biology [BIOL] (4.0 cr)

Social Sciences and Historical Perspective

ESPM 3241W - Natural Resource and Environmental Policy [SOCS, CIV, WI] (3.0 cr)

Information current as of March 29, 2024

HSCI 3244 - Nature's History: Science, Humans, and the Environment [HIS, ENV] (3.0 cr)
or HSCI 5244 - Nature's History: Science, Humans, and the Environment (3.0 cr)

Economics

APEC 1101 - Principles of Microeconomics [SOCS, GP] (4.0 cr)
or ECON 1101 - Principles of Microeconomics [SOCS, GP] (4.0 cr)
or ESPM 3261 - Economics and Natural Resources Management [SOCS, ENV] (4.0 cr)

Skills Based Integrated Core

ESPM 3603 - Environmental Life Cycle Analysis (3.0 cr)
SSM 4506W - Sustainable Systems Management Capstone [WI] (3.0 cr)

Intro to Systems Thinking

SSM 2003 - Systems Thinking: Development and Applications in Sustainability (3.0 cr)
or ESPM 2021 - Environmental Sciences: Integrated Problem Solving (3.0 cr)

Content Based Integrate Core

SSM 4407W - Sustainable Manufacturing Principles and Practices [WI] (3.0 cr)
SSM 4504W - Sustainable Products Systems Management [WI] (3.0 cr)
ESPM 3607 - Natural Resources Consumption and Sustainability [GP] (3.0 cr)

Content Based Integrate Core

ESPM 3601 - Sustainable Housing--Community, Environment, and Technology [TS] (3.0 cr)
or HSG 3482 *{Inactive}*[TS] (3.0 cr)

Experiential Learning

Take 0 - 1 course(s) from the following:
•SSM 4504W - Sustainable Products Systems Management [WI] (3.0 cr)

Interdisciplinary Learning

Take 0 - 1 course(s) from the following:
•ESPM 2021 - Environmental Sciences: Integrated Problem Solving (3.0 cr)
•SSM 4407W - Sustainable Manufacturing Principles and Practices [WI] (3.0 cr)

Upper Division Writing Intensive within the Major

Students are required to take one upper division writing intensive course within the major. If that requirement has not been satisfied within the core major requirements, students must choose one course from the following list. Some of these courses may also fulfill other major requirements.

Take 0 - 1 course(s) from the following:
•SSM 4407W - Sustainable Manufacturing Principles and Practices [WI] (3.0 cr)
•SSM 4504W - Sustainable Products Systems Management [WI] (3.0 cr)
•SSM 4506W - Sustainable Systems Management Capstone [WI] (3.0 cr)
•ESPM 3241W - Natural Resource and Environmental Policy [SOCS, CIV, WI] (3.0 cr)

Program Sub-plans

Students are required to complete one of the following sub-plans.

Sustainable Products Business Management

The sustainable products business management sub-plan combines science, engineering, technology, and business coursework with cutting-edge research related to sustainable product development, business management, and their applications. This specialization prepares students to enter the workforce with the knowledge and skills necessary to design, assess, implement, and manage business systems to advance the goals of sustainable products and technologies, and bring them closer to consumers.

Additional Foundation Courses

CHEM 1062 - Chemical Principles II [PHYS] (3.0 cr)
CHEM 1066 - Chemical Principles II Laboratory [PHYS] (1.0 cr)
PHYS 1101W - Introductory College Physics I [PHYS, WI] (4.0 cr)
APEC 1102 - Principles of Macroeconomics (3.0 cr)
or ECON 1102 - Principles of Macroeconomics (4.0 cr)

Sustainable Products Business Mgmt Specialization Courses

ACCT 2051 - Introduction to Financial Reporting (4.0 cr)
FINA 3001 - Finance Fundamentals (3.0 cr)
MGMT 3001 - Fundamentals of Management (3.0 cr)
MKTG 3001 - Principles of Marketing (3.0 cr)
BBE 1002 - Biorenewable Resources [TS] (3.0 cr)
BBE 2201 - Renewable Energy and the Environment [TS] (3.0 cr)
SSM 3503 - Marketing of Bio-based Products (4.0 cr)
BBE 4302 - Biodegradation of Bioproducts (3.0 cr)
ESPM 3605 - Recycling: Extending Raw Materials [TS] (3.0 cr)

Building Science and Technology

The building science and technology sub-plan is designed to investigate and enrich the important relationships between people, their homes, and the environment. From a solid scientific and engineering base, this interdisciplinary specialization builds critical thinking skills and helps students explore the opportunities that can enhance the performance of houses and building systems.

Additional Foundation Courses

MATH 1272 - Calculus II (4.0 cr)
PHYS 1301W - Introductory Physics for Science and Engineering I [PHYS, WI] (4.0 cr)
PHYS 1302W - Introductory Physics for Science and Engineering II [PHYS, WI] (4.0 cr)

Building Science and Technology Specialization Courses

BBE 1002 - Biorenewable Resources [TS] (3.0 cr)
BBE 2001 - Mechanics and Structural Design (4.0 cr)
BBE 4302 - Biodegradation of Bioproducts (3.0 cr)
SSM 3612 - Systems Approach to Building Science and Construction (4.0 cr)
SSM 4616 - Building Science I: Fundamentals (4.0 cr)
SSM 4614 - Building Systems Performance: Testing & Diagnostics (2.0 cr)
SSM 4618 - Building Science II: Applications (3.0 cr)
CEGE 3402 - Civil Engineering Materials (3.0 cr)
CMGT 3011 - Construction Plan Reading (2.0 cr)
CMGT 4021 - Construction Planning and Scheduling (3.0 cr)

Corporate Sustainability Systems

The corporate sustainability systems sub-plan specialization prepares students to enter the workforce with the knowledge and skills necessary to design, assess, implement, and manage systems to advance the goals of sustainability within a business, industrial, corporate, and non-profit organization context.

Additional Foundation Courses

CHEM 1062 - Chemical Principles II [PHYS] (3.0 cr)
CHEM 1066 - Chemical Principles II Laboratory [PHYS] (1.0 cr)
MATH 1272 - Calculus II (4.0 cr)
PHYS 1301W - Introductory Physics for Science and Engineering I [PHYS, WI] (4.0 cr)
PHYS 1302W - Introductory Physics for Science and Engineering II [PHYS, WI] (4.0 cr)
APEC 1102 - Principles of Macroeconomics (3.0 cr)
or ECON 1102 - Principles of Macroeconomics (4.0 cr)

Corporate Sustainability Systems Specialization Courses

APEC 3611W - Environmental and Natural Resource Economics [ENV, WI] (3.0 cr)
CEGE 3501 - Introduction to Environmental Engineering [ENV] (3.0 cr)
ESPM 3602 - Regulations and Corporate Environmental Management (3.0 cr)
ESPM 3604 - Environmental Management Systems and Strategy (3.0 cr)
ESPM 3605 - Recycling: Extending Raw Materials [TS] (3.0 cr)
MGMT 3001 - Fundamentals of Management (3.0 cr)
APEC 1251 - Principles of Accounting (3.0 cr)
or ACCT 2051 - Introduction to Financial Reporting (4.0 cr)

Energy Systems

The energy systems sub-plan specialization combines science, engineering, technology, and systems thinking coursework with cutting-edge research related to sustainable energy systems and their applications. This specialization prepares students to enter the workforce with the knowledge and skills necessary to design, assess, implement, and manage energy systems to advance the goals of sustainability.

Additional Foundation Courses

CHEM 1062 - Chemical Principles II [PHYS] (3.0 cr)
CHEM 1066 - Chemical Principles II Laboratory [PHYS] (1.0 cr)
MATH 1272 - Calculus II (4.0 cr)
PHYS 1301W - Introductory Physics for Science and Engineering I [PHYS, WI] (4.0 cr)
PHYS 1302W - Introductory Physics for Science and Engineering II [PHYS, WI] (4.0 cr)

Energy Systems Specialization Courses

APEC 3611W - Environmental and Natural Resource Economics [ENV, WI] (3.0 cr)
BBE 2201 - Renewable Energy and the Environment [TS] (3.0 cr)
BBE 3033 - Material and Energy Balances in Biological Systems (3.0 cr)
BBE 4733 - Renewable Energy Technologies [TS] (3.0 cr)
ESPM 3602 - Regulations and Corporate Environmental Management (3.0 cr)
ESPM 3605 - Recycling: Extending Raw Materials [TS] (3.0 cr)
BBE 3043 - Biological and Environmental Thermodynamics (3.0 cr)
or ME 3331 - Thermodynamics (3.0 cr)