Twin Cities Campus

Sustainable Agriculture and Food Systems B.S.

Agronomy & Plant Genetics, Applied Economics, Bioproducts and Biosystems Engineering, Horticultural Science

College of Food, Agricultural and Natural Resource Sciences

- Program Type: Baccalaureate
- Requirements for this program are current for Fall 2022
- Required credits to graduate with this degree: 120
- Required credits within the major: 71 to 75
- none
- Degree: Bachelor of Science

Food systems are interconnected sets of biological, technological, economic, and social activities that nourish human populations. The activities include farming, food processing and manufacturing, food distribution and retailing, food consumption, and managing post-consumption food waste. The food systems major offers graduates the knowledge, problem-solving skills and leadership ability to address complex and often controversial challenges and opportunities in food systems, guided by a desire to create systems that are increasingly sustainable in environmental, economic, and social terms, in diverse contexts and at different scales.

The core courses in the food systems major begin with an orientation to food systems followed by a three-course core sequence that provides a basic understanding of the structure and interactions within food systems, introduces techniques for life cycle analysis of the outcomes, impacts and sustainability of food systems and explores conventional, sustainable and organic examples of production systems for food plants. The core course sequence culminates in a capstone experience aimed at solving real-world problems in local community food systems, and involvement in future systems design and visioning.

Students will choose from one of three existing tracks of required courses, or in collaboration with an advisor, will develop an individually tailored coursework track.

Flexibility in course sequence and required courses has been incorporated into the major so that students can transfer into the program and still graduate in a timely fashion. This flexibility will also make it attractive to students who wish to pursue a dual major or minor with food systems as one of those majors.

Program Delivery

This program is available:

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

Admission Requirements

A GPA above 2.0 is preferred for the following:

- 2.50 already admitted to the degree-granting college
- 2.50 transferring from another University of Minnesota college

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

At least 18 upper-division credits in the major must be taken at the University of Minnesota Twin Cities campus.

Integrated Food Systems Core Courses

Plant Production Systems

FDSY 2101 - Plant Production Systems (3.0 cr)

Sustainability of Food Systems: A Life Cycle Perspective

BBE 3201 - Sustainability of Food Systems: A Life Cycle Perspective [GP] (3.0 cr)

An Introduction to the Food System: Analysis, Management, and Design - Interdisciplinary Learning

APEC 3202 - An Introduction to the Food System: Analysis, Management and Design (3.0 cr)

Holistic Approaches to Improving Food Systems Sustainability - Experiential Learning

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FDSY 4101 - Holistic Approaches to Improving Food Systems Sustainability (3.0 cr)

Internship Requirement - Experiential Learning

Select 1 course.

HORT 4096W *{Inactive}*[WI] (1.0 cr)
or AGRO 4096W - Professional Experience Program: Internships [WI] (2.0 cr)
or CFAN 3096 - Making the Most of your Professional Experience (1.0 cr)
or CFAN 4096 - Reflecting on Your Professional Experience (1.0 cr)

Writing Intensive Selections

FDSY 1016W - Growing Food & Building Community: Urban Agriculture in the Twin Cities [WI] (3.0 cr)

Communications

WRIT 3562W - Technical and Professional Writing [WI] (4.0 cr)
AECM 2421W - Professional and Oral Communication for Agriculture, Food & the Environment [WI] (3.0 cr)
or COMM 1101 - Introduction to Public Speaking [CIV] (3.0 cr)

Physical and Biological Sciences

FSCN 1112 - Principles of Nutrition [TS] (3.0 cr)
CHEM 1015 - Introductory Chemistry: Lecture [PHYS] (3.0 cr)
CHEM 1017 - Introductory Chemistry: Laboratory [PHYS] (1.0 cr)
or CHEM 1061 - Chemical Principles I [PHYS] (3.0 cr)
CHEM 1065 - Chemical Principles I Laboratory [PHYS] (1.0 cr)

Mathematical Thinking

MATH 1031 - College Algebra and Probability [MATH] (3.0 cr)
or MATH 1051 - Precalculus I [MATH] (3.0 cr)

Social Sciences

APEC 1101 - Principles of Microeconomics [SOCS, GP] (4.0 cr)
or ECON 1101 - Principles of Microeconomics [SOCS, GP] (4.0 cr)

Interdisciplinary Learning

APEC 3202 fulfills this requirement. APEC 3202 also meets Integrated Food Systems Core Course.

Experiential Learning

Any of the internship courses - HORT 4096W, AGRO 4096W, CFAN 3096, or CFAN 2096 - or FDSY 4101 will meet this requirement and the Food Systems core requirement.

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:

- WRIT 3562W - Technical and Professional Writing [WI] (4.0 cr)
  or WRIT 3562V - Honors: Technical and Professional Writing [WI] (4.0 cr)

Program Sub-plans

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

Agroecology

Students in this track will be prepared for jobs emerging in managing the relationship between agricultural production systems and surrounding resource systems, including landscapes, waterways, and food and energy systems. Positions are rapidly emerging with government at multiple levels, non-profits, and private sector consulting and engineering firms, etc. Students will also be solidly prepared for advanced scientific study in graduate school in a range of fields related to the ecology of agricultural systems.

Required Courses

ESPM 3108 - Ecology of Managed Systems [ENV] (3.0 cr)
SOIL 2125 - Basic Soil Science [PHYS, ENV] (4.0 cr)
PLSC 3005W - Introduction to Plant Physiology [WI] (4.0 cr)
HORT 2121 - Agricultural Biochemistry (3.0 cr)
or BIOC 3021 - Biochemistry (3.0 cr)
HORT 1001 - Plant Propagation [BIOL] (4.0 cr)
or BIOL 1009 - General Biology [BIOL] (4.0 cr)

Track Electives

Choose at least 16 credits from the following, of which at least 9 credits must be upper division.

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Take 16 or more credit(s) from the following:
•AGRO 2501 - Plant Identification for Urban and Rural Landscapes (1.0 cr)
•AGRO 4505 - Biology, Ecology, and Management of Invasive Plants (3.0 cr)
•AGRO 4888 - Issues in Sustainable Agriculture (2.0 cr)
•CFAN 2333 - Insects, Microbes, and Plants: Ecology of Pest Management [TS] (3.0 cr)
•CHEM 2301 - Organic Chemistry I (3.0 cr)
•ENT 5341 - Biological Control of Insects and Weeds (3.0 cr)
•ESPM 5071 - Ecological Restoration (4.0 cr)
•HORT 1014 - The Edible Landscape [TS] (3.0 cr)
•GCC 3017 - World Food Problems: Agronomics, Economics and Hunger [GP] (3.0 cr)
•AGRO 3305 - Agroecosystems of the world [GP] (3.0 cr)
•PLSC 3002 - Seed Science, Technology, and Society (2.0 cr)
•AGRO 5321 - Ecology of Agricultural Systems (3.0 cr)
•AGRO 2022 - Growth and Development of Minnesota Field Crops (1.0 cr)
•AGRO 4605 - Strategies for Agricultural Production and Management (3.0 cr)
•**Directed Study & Directed Research**
Directed Study
HORT 3093 - Directed Study (1.0 - 4.0 cr)
or AGRO 3093 - Directed Study (1.0 - 4.0 cr)
or PLSC 3093 - Directed Study (1.0 - 4.0 cr)
or FDSY 3093 - Directed Study (1.0 - 4.0 cr)
or PLPA 3993 - Directed Study (1.0 - 4.0 cr)
or **Directed Research**
HORT 3094 - Directed Research (1.0 - 4.0 cr)
or PLSC 3094 - Directed Research (1.0 - 4.0 cr)
or FDSY 3094 - Directed Research (1.0 - 4.0 cr)
or ENT 3294 - Directed Research in Entomology (1.0 - 4.0 cr)

Consumer and Markets

Students in this track will study aspects of the food system that extend beyond primary food production, including processing, wholesale and retail distribution, consumer choice, and human nutrition. This track will prepare students for careers in these aspects of the food system. Note that most of these courses have prerequisites.

Required Courses
HORT 1001 - Plant Propagation [BIOL] (4.0 cr)
or BIOL 1009 - General Biology [BIOL] (4.0 cr)
Track Electives
Select at least 30 credits from the following, of which at least 16 must be upper division (3XXX or above)
Take 30 or more credit(s) from the following:
•ANSC 1511 - Food Animal Products for Consumers (3.0 cr)
•APEC 3071 - Microeconomics of International Development (3.0 cr)
•APEC 3411 - Commodity Marketing (3.0 cr)
•APEC 3451 - Food and Agricultural Sales (3.0 cr)
•APEC 3501 - Agribusiness Finance (3.0 cr)
•APEC 3551 - Concept Design and Value-Added Entrepreneurship in Food, Agricultural and Natural Resource Sciences (3.0 cr)
•APEC 3811 - Principles of Farm Management (3.0 cr)
•APEC 3841 - Agricultural and Consumer Cooperatives and Mutuals (3.0 cr)
•APEC 4451W - Food Marketing Economics [CIV, WI] (3.0 cr)
•FSCN 1011 - Science of Food and Cooking [PHYS] (4.0 cr)
•FSCN 1102 - Food: Safety, Risks, and Technology [CIV] (3.0 cr)
•FSCN 2001 - A Food Systems Approach to Cooking for Health and the Environment (3.0 cr)
•FSCN 2021 - Introductory Microbiology (4.0 cr)
•FSCN 3102 - Introduction to Food Science (3.0 cr)
•FSCN 3612 - Life Cycle Nutrition (3.0 cr)
•FSCN 4131 - Food Quality (3.0 cr)
•HORT 1031 - Vines and Wines: Introduction to Viticulture and Enology (3.0 cr)
•GCC 3017 - World Food Problems: Agronomics, Economics and Hunger [GP] (3.0 cr)
•APEC 1251 - Principles of Accounting (3.0 cr)
•ACCT 2051 - Introduction to Financial Reporting (4.0 cr)
•CHEM 1062 - Chemical Principles II [PHYS] (3.0 cr)
•CHEM 1066 - Chemical Principles II Laboratory [PHYS] (1.0 cr)
•HORT 4461 - Horticultural Marketing (3.0 cr)
or APEC 4461 - Horticultural Marketing (3.0 cr)
•**Macroeconomics**
•APEC 1102 - Principles of Macroeconomics (3.0 cr)
or ECON 1102 - Principles of Macroeconomics (4.0 cr)

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•**Directed Study & Directed Research**
Directed Study
HORT 3093 - Directed Study (1.0 - 4.0 cr)
or PLSC 3093 - Directed Study (1.0 - 4.0 cr)
or FDSY 3093 - Directed Study (1.0 - 4.0 cr)
or AGRO 3093 - Directed Study (1.0 - 4.0 cr)
or PLPA 3993 - Directed Study (1.0 - 4.0 cr)
or **Directed Research**
HORT 3094 - Directed Research (1.0 - 4.0 cr)
or PLSC 3094 - Directed Research (1.0 - 4.0 cr)
or FDSY 3094 - Directed Research (1.0 - 4.0 cr)
or ENT 3294 - Directed Research in Entomology (1.0 - 4.0 cr)

Organic and Local Food Production

In this track, students will pursue advanced coursework in horticultural science and organic production. This course of study will prepare them for advanced scientific study in graduate school, science-focused career paths, and preparation to become a producer or grower.

Required Courses
HORT 2121 - Agricultural Biochemistry (3.0 cr)
PLSC 3005W - Introduction to Plant Physiology [WI] (4.0 cr)
CFAN 2333 - Insects, Microbes, and Plants: Ecology of Pest Management [TS] (3.0 cr)
HORT 3131 - Student Organic Farm Planning, Growing, and Marketing (3.0 cr)
HORT 1001 - Plant Propagation [BIOL] (4.0 cr)
SOIL 2125 - Basic Soil Science [PHYS, ENV] (4.0 cr)
Track Electives
Take 13 or more credit(s) from the following:
•ESPM 3108 - Ecology of Managed Systems [ENV] (3.0 cr)
•HORT 1015 - Plant Families for Plant People (4.0 cr)
•HORT 4071W - Applications of Biotechnology to Plant Improvement [WI] (3.0 cr)
•HORT 4141W - Scheduling Crops for Protected Environments [WI] (4.0 cr)
•SOIL 3416 - Plant Nutrients in the Environment (3.0 cr)
•GCC 3017 - World Food Problems: Agronomics, Economics and Hunger [GP] (3.0 cr)
•PLSC 3401 - Plant Genetics and Breeding (4.0 cr)
•BIOL 1009 - General Biology [BIOL] (4.0 cr)
•AGRO 3305 - Agroecosystems of the world [GP] (3.0 cr)
•PLSC 3002 - Seed Science, Technology, and Society (2.0 cr)
•AGRO 5321 - Ecology of Agricultural Systems (3.0 cr)
•AGRO 4888 - Issues in Sustainable Agriculture (2.0 cr)
•HORT 1031 - Vines and Wines: Introduction to Viticulture and Enology (3.0 cr)
•HORT 1014 - The Edible Landscape [TS] (3.0 cr)
•HORT 4461 - Horticultural Marketing (3.0 cr)
or APEC 4461 - Horticultural Marketing (3.0 cr)
•**Directed Study & Directed Research**
Directed Study
HORT 3093 - Directed Study (1.0 - 4.0 cr)
or AGRO 3093 - Directed Study (1.0 - 4.0 cr)
or PLSC 3093 - Directed Study (1.0 - 4.0 cr)
or FDSY 3093 - Directed Study (1.0 - 4.0 cr)
or PLPA 3993 - Directed Study (1.0 - 4.0 cr)
or **Directed Research**
HORT 3094 - Directed Research (1.0 - 4.0 cr)
or PLSC 3094 - Directed Research (1.0 - 4.0 cr)
or FDSY 3094 - Directed Research (1.0 - 4.0 cr)
or ENT 3294 - Directed Research in Entomology (1.0 - 4.0 cr)

Individualized

Students choosing to follow this track will identify, in consultation and with the approval of a faculty advisor, a track made up of a minimum of 30 credits where at least 16 credits are upper division (3xxx or higher). The track will address the interests and ambitions of the student and will be consistent with the learning outcomes of the Food Systems major.

Required Courses
HORT 1001 - Plant Propagation [BIOL] (4.0 cr)
or BIOL 1009 - General Biology [BIOL] (4.0 cr)

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