



Twin Cities Campus

Forest and Natural Resource Management B.S.

Forest Resources

College of Food, Agricultural and Natural Resource Sciences

- Program Type: Baccalaureate
- Requirements for this program are current for Spring 2020
- Required credits to graduate with this degree: 120
- Required credits within the major: 79 to 91
- This program requires summer terms.
- Degree: Bachelor of Science

The forest and natural resource management curriculum prepares students to plan, implement, and research the management, protection, and sustainable use of forest and related natural resources and environments, including vegetation, timber, water, wildlife, recreation, and aesthetic resources. The curriculum provides a unique integration of the physical, biological, and social sciences with managerial sciences and policy, field skill development, and technologies for measuring and monitoring natural resources for ecological, economic, and social benefits. Students are also trained in problem solving approaches to address specific local, regional, and global issues. Students select one of three tracks: 1) forest ecosystem management and conservation, 2) park and protected area management, or 3) urban and community forestry. Students should choose one of these tracks early in their college careers. Minors are also available for each track.

Graduates find positions as foresters; forest, park, river or wilderness rangers; urban foresters; land and water managers; protected area managers; habitat managers; resource-based tourism providers; specialists in forest fire protection, ecology, ecosystem health, harvesting and silviculture; nursery managers; geographic information specialists; resource analysts/consultants; environment and natural resource law and policy analysts; land acquisition specialists; environmental and natural resource planners; outdoor recreation planners; heritage preservation specialists; conservationists; and educators and researchers. Principal employers are federal, state and local forestry, wildlife, parks, wilderness, conservation and related natural resource management agencies; forest products industry and related natural resource firms; landowner organizations; consulting firms; nongovernmental conservation organizations and international development agencies.

Additionally, the curriculum provides excellent preparation in the fundamental and applied sciences that is essential for graduate study and careers in research and teaching. Opportunities for experiential learning through internships and field courses, as well as international study abroad programs, are available.

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

Communication Skills

[COMM 1101](#) - Introduction to Public Speaking [CIV] (3.0 cr)

or [AECM 2421W](#) - Professional and Oral Communication for Agriculture, Food & the Environment [WI] (3.0 cr)

Physical and Biological Sciences

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

or [BIOL 1009](#) - General Biology [BIOL] (4.0 cr)

[PMB 2022](#) - General Botany (3.0 cr)

[SOIL 2125](#) - Basic Soil Science [PHYS, ENV] (4.0 cr)

Chemistry

[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)
or CHEM 1071H - Honors Chemistry I [PHYS] (3.0 cr)
CHEM 1075H - Honors Chemistry I Laboratory [PHYS] (1.0 cr)

Economics and Policy

ESPM 3261 - Economics and Natural Resources Management [SOCS, ENV] (4.0 cr)
ESPM 3241W - Natural Resource and Environmental Policy [SOCS, CIV, WI] (3.0 cr)

Professional Courses

FNRM 1001 - Orientation and Information Systems (1.0 cr)
FNRM 1101 - Dendrology: Identifying Forest Trees and Shrubs (3.0 cr)
FNRM 3131 - Geographical Information Systems (GIS) for Natural Resources [TS] (4.0 cr)
FNRM 4232W - Managing Recreational Lands [WI] (4.0 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:

- ESPM 3202W - Environmental Conflict Management, Leadership, and Planning [WI] (3.0 cr)
- ESPM 3241W - Natural Resource and Environmental Policy [SOCS, CIV, WI] (3.0 cr)
- ESPM 4061W - Water Quality and Natural Resources [ENV, WI] (3.0 cr)
- FNRM 4232W - Managing Recreational Lands [WI] (4.0 cr)
- HORT 4141W - Scheduling Crops for Protected Environments [WI] (4.0 cr)
- URBS 3001W - Introduction to Urban Studies: The Complexity of Metropolitan Life [WI] (3.0 cr)

Program Sub-plans

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

Forest Ecosystem Management and Conservation

Students pursuing the forest ecosystem management and conservation sub-plan learn the principles, practices, and techniques of forestry and related natural resource management. The sub-plan prepares students to become directly involved in forest ecosystem management or further specializations, such as resource analysis, conservation planning, timber harvesting, forest protection, or policy analysis. Principal employers are federal, state and county forestry, wildlife, and conservation agencies; forest products companies; consulting firms; international agencies; and nongovernmental conservation organizations. This sub-plan is accredited by the Society of American Foresters. Further, successful completion of sub-plan course work qualifies a student for the Society of American Foresters' Candidate Certified Forester program.

All required courses in this sub-plan must be taken A-F and completed with a grade of at least C-.

Mathematical Thinking

ESPM 3012 - Statistical Methods for Environmental Scientists and Managers [MATH] (4.0 cr)
or STAT 3011 - Introduction to Statistical Analysis [MATH] (4.0 cr)
MATH 1151 - Precalculus II [MATH] (3.0 cr)
or MATH 1142 - Short Calculus [MATH] (4.0 cr)
or MATH 1271 - Calculus I [MATH] (4.0 cr)

Forest Ecosystem Management and Conservation Core

FNRM 3104 - Forest Ecology (4.0 cr)
FNRM 3114 - Hydrology and Watershed Management (3.0 cr)
FNRM 3218 - Measuring and Modeling Forests (3.0 cr)
FNRM 3262 - Remote Sensing and Geospatial Analysis of Natural Resources and Environment (3.0 cr)
FNRM 3411 - Managing Forest Ecosystems: Silviculture (3.0 cr)
FNRM 3431 - Timber Harvesting and Road Planning (2.0 cr)
FNRM 3471 - Forest Management Planning (3.0 cr)
FNRM 5413 - Managing Forest Ecosystems: Silviculture Lab (1.0 cr)
ESPM 3202W - Environmental Conflict Management, Leadership, and Planning [WI] (3.0 cr)
ENT 4251 - Forest and Shade Tree Entomology (3.0 cr)
or PLPA 3003 - Diseases of Forest and Shade Trees (3.0 cr)
FW 2001W - Introduction to Fisheries, Wildlife, and Conservation Biology [ENV, WI] (3.0 cr)
or FW 4102 - Principles of Conservation Biology [ENV] (3.0 cr)
or FW 4103 - Principles of Wildlife Management (3.0 cr)

Field Training in the Biology and Assessment of Forests



Courses are taught at the Cloquet Forestry Center

[FNRM 2101](#) - Identifying Forest Plants (1.0 cr)

with [FNRM 2102](#) - Northern Forests Field Ecology (2.0 cr)

with [FNRM 2104](#) - Measuring Forest Resources (1.0 cr)

Advanced Field Training in the Assessment and Management of Forests

Courses are taught at the Cloquet Forestry Center

A minimum of 2 courses required:

Take 2 - 3 course(s) from the following:

•[FNRM 4511](#) - Field Silviculture (2.0 cr)

•[FNRM 4515](#) - Field Resource Survey (1.0 cr)

•[FNRM 4521](#) - Field Timber Harvesting and Road Planning (2.0 cr)

Experiential Learning

[FNRM 4232W](#) Managing Recreational Lands [WI] (4.0 cr),

[FNRM 2102](#) Northern Forest Field Ecology (2.0 cr), or one course approved by the major coordinator.

Interdisciplinary Learning

[FNRM 4501](#) - Urban Forest Management: Managing Greenspaces for People (3.0 cr)

or [ESPM 1011](#) - Issues in the Environment [ENV] (3.0 cr)

or [ESPM 2021](#) - Environmental Sciences: Integrated Problem Solving (3.0 cr)

or [ESPM 3575](#) - Wetlands (3.0 cr)

or [ESPM 4021W](#) - Problem Solving: Environmental Review [WI] (4.0 cr)

or [ESPM 4041W](#) - Problem Solving for Environmental Change [WI] (4.0 cr)

or [AGRO 3203W](#) - Environment, Global Food Production, and the Citizen [GP, WI] (3.0 cr)

or [AGRO 3305](#) - Agroecosystems of the world [GP] (3.0 cr)

or [ANSC 3203W](#) - Environment, Global Food Production, and the Citizen [GP, WI] (3.0 cr)

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

or [CFAN 1501](#) *{Inactive}*[TS] (3.0 cr)

or [CFAN 2333](#) - Insects, Microbes, and Plants: Ecology of Pest Management [TS] (3.0 cr)

or [FW 2001W](#) - Introduction to Fisheries, Wildlife, and Conservation Biology [ENV, WI] (3.0 cr)

or [FSCN 1102](#) - Food: Safety, Risks, and Technology [CIV] (3.0 cr)

or [GCC 3001](#) *{Inactive}*[ENV] (3.0 cr)

or [GCC 5001](#) *{Inactive}*[ENV] (3.0 cr)

or [GCC 3007](#) - Toward Conquest of Disease [ENV] (3.0 cr)

or [GCC 5007](#) - Toward Conquest of Disease [ENV] (3.0 cr)

or [GCC 5008](#) - Policy and Science of Global Environmental Change [ENV] (3.0 cr)

or [GCC 3009](#) *{Inactive}*[ENV] (3.0 cr)

or [GCC 3031](#) - The Global Climate Challenge: Creating an Empowered Movement for Change [CIV] (3.0 cr)

or [GCC 5031](#) - The Global Climate Challenge: Creating an Empowered Movement for Change [CIV] (3.0 cr)

or [GCC 3013](#) - Making Sense of Climate Change - Science, Art, and Agency [CIV] (3.0 cr)

or [GCC 5013](#) - Making Sense of Climate Change - Science, Art, and Agency [CIV] (3.0 cr)

or [GCC 3017](#) - World Food Problems: Agronomics, Economics and Hunger [GP] (3.0 cr)

or [GCC 5017](#) - World Food Problems: Agronomics, Economics and Hunger [GP] (3.0 cr)

or [HORT 4850](#) *{Inactive}*(3.0 cr)

or [PLPA 2003](#) - Plague, Famine, and Beer: The Impact of Microscopic Organisms on Human Civilization [HIS] (3.0 cr)

or [SSM 4407W](#) - Sustainable Manufacturing Principles and Practices [WI] (3.0 cr)

Park and Protected Area Management

The park and protected area management sub-plan prepares students to plan for and manage natural resources, especially protected areas such as parks, forests, wild lands, and water resources, for multiple benefits including those attained by visitors, resource-dependent communities, and society as a whole. The curriculum emphasizes natural and managed protected areas; natural resources-oriented recreation programs in public and private sectors; social science aspects of natural resource use; and skills in communication, planning, and management. Graduates often serve as park, river or wilderness rangers; protected area managers; outdoor recreation planners; resource-based tourism providers; heritage preservation specialists; and outdoor educators. Typical employers include protected area management and planning agencies within federal, state, and local parks; forestry; wildlife; nature conservation; and related non-governmental organizations. Additionally, this curriculum provides excellent preparation for graduate training in the human dimensions of natural resources. A minor is also available. Students may also apply credits toward the international ecotourism certificate.

All required courses in this sub-plan must be taken A-F and completed with a grade of at least C-.

Mathematical Thinking

[ESPM 3012](#) - Statistical Methods for Environmental Scientists and Managers [MATH] (4.0 cr)

or [STAT 3011](#) - Introduction to Statistical Analysis [MATH] (4.0 cr)

[MATH 1031](#) - College Algebra and Probability [MATH] (3.0 cr)

or [MATH 1051](#) - Precalculus I [MATH] (3.0 cr)

Social Sciences

[PSY 1001](#) - Introduction to Psychology [SOCS] (4.0 cr)



or SOC 1001 - Introduction to Sociology [SOCS, DSJ] (4.0 cr)

PSY 3201 - Introduction to Social Psychology (3.0 cr)

or SOC 3721 - Principles of Social Psychology (3.0 cr)

Management of Biophysical Resources

FNRM 3104 - Forest Ecology (4.0 cr)

or ESPM 3108 - Ecology of Managed Systems [ENV] (3.0 cr)

FNRM 3114 - Hydrology and Watershed Management (3.0 cr)

or ESPM 4061W - Water Quality and Natural Resources [ENV, WI] (3.0 cr)

FW 2001W - Introduction to Fisheries, Wildlife, and Conservation Biology [ENV, WI] (3.0 cr)

or FW 4102 - Principles of Conservation Biology [ENV] (3.0 cr)

or FW 4103 - Principles of Wildlife Management (3.0 cr)

Park and Protected Area Management Core

FNRM 3101 - Park and Protected Area Tourism (3.0 cr)

FNRM 5259 - Visitor Behavior Analysis (3.0 cr)

ESPM 3202W - Environmental Conflict Management, Leadership, and Planning [WI] (3.0 cr)

ESPM 3245 - Sustainable Land Use Planning and Policy [ENV] (3.0 cr)

ESPM 4811 - Environmental Interpretation (3.0 cr)

Field course(s) or Internship

Requirement ranging from 1-4 credits

CFAN 3096 - Making the Most of your Professional Experience (1.0 cr)

or FNRM 3206 - Park and Protected Area Management Field Studies (2.0 cr)

or Introductory Cloquet Field Session

FNRM 2101 - Identifying Forest Plants (1.0 cr)

with FNRM 2102 - Northern Forests Field Ecology (2.0 cr)

with FNRM 2104 - Measuring Forest Resources (1.0 cr)

Experiential Learning

FNRM 4232W Managing Recreational Lands [WI] (4.0 cr) or one course approved by the major coordinator.

Interdisciplinary Learning

FNRM 4501 - Urban Forest Management: Managing Greenspaces for People (3.0 cr)

or ESPM 1011 - Issues in the Environment [ENV] (3.0 cr)

or ESPM 2021 - Environmental Sciences: Integrated Problem Solving (3.0 cr)

or ESPM 3575 - Wetlands (3.0 cr)

or ESPM 4021W - Problem Solving: Environmental Review [WI] (4.0 cr)

or ESPM 4041W - Problem Solving for Environmental Change [WI] (4.0 cr)

or AGRO 3203W - Environment, Global Food Production, and the Citizen [GP, WI] (3.0 cr)

or AGRO 3305 - Agroecosystems of the world [GP] (3.0 cr)

or ANSC 3203W - Environment, Global Food Production, and the Citizen [GP, WI] (3.0 cr)

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

or CFAN 1501 *{Inactive}*[TS] (3.0 cr)

or CFAN 2333 - Insects, Microbes, and Plants: Ecology of Pest Management [TS] (3.0 cr)

or FW 2001W - Introduction to Fisheries, Wildlife, and Conservation Biology [ENV, WI] (3.0 cr)

or FSCN 1102 - Food: Safety, Risks, and Technology [CIV] (3.0 cr)

or GCC 3001 *{Inactive}*[ENV] (3.0 cr)

or GCC 5001 *{Inactive}*[ENV] (3.0 cr)

or GCC 3007 - Toward Conquest of Disease [ENV] (3.0 cr)

or GCC 5007 - Toward Conquest of Disease [ENV] (3.0 cr)

or GCC 5008 - Policy and Science of Global Environmental Change [ENV] (3.0 cr)

or GCC 3009 *{Inactive}*[ENV] (3.0 cr)

or GCC 3031 - The Global Climate Challenge: Creating an Empowered Movement for Change [CIV] (3.0 cr)

or GCC 5031 - The Global Climate Challenge: Creating an Empowered Movement for Change [CIV] (3.0 cr)

or GCC 3013 - Making Sense of Climate Change - Science, Art, and Agency [CIV] (3.0 cr)

or GCC 5013 - Making Sense of Climate Change - Science, Art, and Agency [CIV] (3.0 cr)

or GCC 3017 - World Food Problems: Agronomics, Economics and Hunger [GP] (3.0 cr)

or GCC 5017 - World Food Problems: Agronomics, Economics and Hunger [GP] (3.0 cr)

or HORT 4850 *{Inactive}*(3.0 cr)

or PLPA 2003 - Plague, Famine, and Beer: The Impact of Microscopic Organisms on Human Civilization [HIS] (3.0 cr)

or SSM 4407W - Sustainable Manufacturing Principles and Practices [WI] (3.0 cr)

Urban & Community Forestry

The urban and community forestry sub-plan prepares students for planning and managing vegetation and related natural resources in or near urban communities, and for specializations, such as urban planning and environmental education. Urban forests include areas along streets, in parks, private lands, greenbelts, and open spaces. Graduates help plan, design, and protect these forests including supervision of tree selection, planting, and plant health care programs. Employers include city government, tree care/arboricultural firms, state and federal forestry agencies, nurseries, and utility companies. Graduates may also qualify for traditional forestry positions. This sub-plan is also accredited by the Society of American Foresters.



All required courses in this sub-plan must be taken A-F and completed with a grade of at least C-.

Mathematical Thinking

- ESPM 3012 - Statistical Methods for Environmental Scientists and Managers [MATH] (4.0 cr)
or STAT 3011 - Introduction to Statistical Analysis [MATH] (4.0 cr)
- MATH 1151 - Precalculus II [MATH] (3.0 cr)
or MATH 1142 - Short Calculus [MATH] (4.0 cr)
or MATH 1271 - Calculus I [MATH] (4.0 cr)

Urban and Community Forestry Core

- FNRM 3501 - Arboriculture: Selection and Maintenance of Trees (3.0 cr)
- HORT 1015 - Plant Families for Plant People (4.0 cr)
- FNRM 4501 - Urban Forest Management: Managing Greenspaces for People (3.0 cr)
- ENT 4251 - Forest and Shade Tree Entomology (3.0 cr)
- PLPA 3003 - Diseases of Forest and Shade Trees (3.0 cr)
- FNRM 3104 - Forest Ecology (4.0 cr)
- FNRM 3411 - Managing Forest Ecosystems: Silviculture (3.0 cr)
- PMB 3002 - Plant Biology: Function (2.0 cr)
- FNRM 3218 - Measuring and Modeling Forests (3.0 cr)
or ESPM 3211 - Survey, Measurement, and Modeling for Environmental Analysis (3.0 cr)
- FNRM 3114 - Hydrology and Watershed Management (3.0 cr)
or ESPM 4061W - Water Quality and Natural Resources [ENV, WI] (3.0 cr)
- LA 3501 - Environmental Design and Its Biological and Physical Context [ENV] (3.0 cr)
or HORT 4141W - Scheduling Crops for Protected Environments [WI] (4.0 cr)
- URBS 1001W - Introduction to Urban Studies: The Complexity of Metropolitan Life [WI] (3.0 cr)
or URBS 3001W - Introduction to Urban Studies: The Complexity of Metropolitan Life [WI] (3.0 cr)
or URBS 3751 - Understanding the Urban Environment [ENV] (3.0 cr)

Field Training in the Biology and Assessment of Forests

- Courses are taught at the Cloquet Forestry Center
- FNRM 2101 - Identifying Forest Plants (1.0 cr)
with FNRM 2102 - Northern Forests Field Ecology (2.0 cr)
with FNRM 2104 - Measuring Forest Resources (1.0 cr)

Experiential Learning

- FNRM 4232W Managing Recreational Lands [WI] (4.0 cr),
- FNRM 2102 (2.0 cr) Northern Forests Field Ecology, or one course approved by the major coordinator.

Interdisciplinary Learning

- FNRM 4501 - Urban Forest Management: Managing Greenspaces for People (3.0 cr)
or ESPM 1011 - Issues in the Environment [ENV] (3.0 cr)
or ESPM 2021 - Environmental Sciences: Integrated Problem Solving (3.0 cr)
or ESPM 3575 - Wetlands (3.0 cr)
or ESPM 4021W - Problem Solving: Environmental Review [WI] (4.0 cr)
or ESPM 4041W - Problem Solving for Environmental Change [WI] (4.0 cr)
or AGRO 3203W - Environment, Global Food Production, and the Citizen [GP, WI] (3.0 cr)
or AGRO 3305 - Agroecosystems of the world [GP] (3.0 cr)
or ANSC 3203W - Environment, Global Food Production, and the Citizen [GP, WI] (3.0 cr)
or APEC 3202 - An Introduction to the Food System: Analysis, Management and Design (3.0 cr)
or CFAN 1501 *{Inactive}*[TS] (3.0 cr)
or CFAN 2333 - Insects, Microbes, and Plants: Ecology of Pest Management [TS] (3.0 cr)
or FW 2001W - Introduction to Fisheries, Wildlife, and Conservation Biology [ENV, WI] (3.0 cr)
or FSCN 1102 - Food: Safety, Risks, and Technology [CIV] (3.0 cr)
or GCC 3001 *{Inactive}*[ENV] (3.0 cr)
or GCC 5001 *{Inactive}*[ENV] (3.0 cr)
or GCC 3007 - Toward Conquest of Disease [ENV] (3.0 cr)
or GCC 5007 - Toward Conquest of Disease [ENV] (3.0 cr)
or GCC 5008 - Policy and Science of Global Environmental Change [ENV] (3.0 cr)
or GCC 3009 *{Inactive}*[ENV] (3.0 cr)
or GCC 3031 - The Global Climate Challenge: Creating an Empowered Movement for Change [CIV] (3.0 cr)
or GCC 5031 - The Global Climate Challenge: Creating an Empowered Movement for Change [CIV] (3.0 cr)
or GCC 3013 - Making Sense of Climate Change - Science, Art, and Agency [CIV] (3.0 cr)
or GCC 5013 - Making Sense of Climate Change - Science, Art, and Agency [CIV] (3.0 cr)
or GCC 3017 - World Food Problems: Agronomics, Economics and Hunger [GP] (3.0 cr)
or GCC 5017 - World Food Problems: Agronomics, Economics and Hunger [GP] (3.0 cr)
or HORT 4850 *{Inactive}*(3.0 cr)
or PLPA 2003 - Plague, Famine, and Beer: The Impact of Microscopic Organisms on Human Civilization [HIS] (3.0 cr)
or SSM 4407W - Sustainable Manufacturing Principles and Practices [WI] (3.0 cr)