Twin Cities Campus

Land and Atmospheric Science M.S.

Soil, Water, & Climate

College of Food, Agricultural and Natural Resource Sciences

Link to a list of faculty for this program.

Contact Information:
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- Program Type: Master's
- Requirements for this program are current for Fall 2020
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Land and atmospheric science (LAAS) is a science-based interdisciplinary program focused on the fundamentals of Earth system processes related to land and atmosphere and their coupled interactions. Students have the option to develop a program based on one of the more traditional areas in atmospheric science or soil science or to design their own interdisciplinary course of study bridging the two disciplines. The land and atmospheric science graduate program has no formal tracks or emphasis areas, but instead allows students to design a curriculum that addresses their interests within the scope of the program. This multidisciplinary program encompasses aspects of chemistry, physics, biology, atmospheric sciences, and geology.

Program Delivery

This program is available:

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

Prerequisites for Admission

The preferred undergraduate GPA for admittance to the program is 3.20.

BS degree in a related field of science, or a graduate or professional degree.

Required prerequisites

Basic Sciences

Students are expected to have taken a minimum of four of the following courses (or their equivalent).
MATH 1271 - Calculus I [MATH] (4.0 cr)
or MATH 1142 - Short Calculus [MATH] (4.0 cr)
or MATH 2243 - Linear Algebra and Differential Equations (4.0 cr)
PHYS 1101W - Introductory College Physics I [PHYS, WI] (4.0 cr)
PHYS 1102W - Introductory College Physics II [PHYS, WI] (4.0 cr)
or ESPM 3131 - Environmental Physics (3.0 cr)
or BIOL 1009 - General Biology [BIOL] (4.0 cr)
or CHEM 1061 - Chemical Principles I [PHYS] (3.0 cr)
CHEM 1065 - Chemical Principles I Laboratory [PHYS] (1.0 cr)
CHEM 1062 - Chemical Principles II [PHYS] (3.0 cr)
CHEM 1066 - Chemical Principles II Laboratory [PHYS] (1.0 cr)
or STAT 3011 - Introduction to Statistical Analysis [MATH] (4.0 cr)

Environmental Sciences

Students are expected to have taken a minimum of two of the following (or similar) courses:
Take 2 - 6 course(s) from the following:
•ESPM 1011 - Issues in the Environment [ENV] (3.0 cr)
•ESPM 1425 - Introduction to Weather and Climate [PHYS, ENV] (4.0 cr)
•SOIL 2125 - Basic Soil Science [PHYS, ENV] (4.0 cr)
•ESCI 1001 - Earth and Its Environments [PHYS, ENV] (4.0 cr)
•ESPM 3612W - Soil and Environmental Biology [WI] (4.0 cr)

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or MICB 3301 - Biology of Microorganisms (5.0 cr)
•EEB 3407 - Ecology (3.0 cr)

Other requirements to be completed before admission:
Student course admission prerequisites are as shown below. Students who are admitted with deficiencies would be provided with a list of courses they are required to take before the completion of their degree. This list would be developed by the directors of graduate studies in consultation with the student's faculty advisor.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations(TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

Plan A: Plan A requires 14 major credits, 6 credits outside the major, and 10 thesis credits.The final exam is oral.

Plan B: Plan B requires 20 major credits and 10 credits outside the major.The final exam is oral. A capstone project is required.
Capstone Project: The Plan B project typically consists of a technical paper of a topic and length acceptable to the student's advisory committee.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

Use of 4xxx-level courses requires advisor and director of graduate studies approval.

Core Courses
Take the following courses:
LAAS 5050 - Integrated Topics in Land & Atmospheric Science (3.0 cr)
LAAS 8128 - Land and Atmospheric Science Seminar (1.5 cr)
SOIL 8123 - Research Ethics in the Plant and Environmental Sciences (0.5 cr)

LAAS and Related Courses
Plan A students must select at least 15 credits (9 major credits and 6 related fields) from this list, and Plan B students must select at least 25 credits (15 major credits and 10 related fields). Courses are selected based on relevance to research interests and with the consent of the advisor.
Take 15 - 25 credit(s) from the following:
•LAAS 5311 - Soil Chemistry and Mineralogy (3.0 cr)
•LAAS 5416 - Precision Agriculture and Nutrient Management (3.0 cr)
•LAAS 5425 - Atmospheric Processes I: Thermodynamics and Dynamics of the Atmosphere (3.0 cr)
•LAAS 5426 - Atmospheric Processes II: Radiation, Composition, and Climate (3.0 cr)
•LAAS 5480 - Special Topics in Land and Atmospheric Science (1.0 - 4.0 cr)
•LAAS 5515 - Soil Formation: Earth Surface Processes and Biogeochemistry (3.0 cr)
•LAAS 5621 - Environmental Genomics and Microbiomes (3.0 cr)
•LAAS 8195 - Research Problems in Soils (1.0 - 5.0 cr)

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- AGRO 5121 - Applied Experimental Design (4.0 cr)
- AGRO 5321 - Ecology of Agricultural Systems (3.0 cr)
- BBE 5535 - Assessment and Diagnosis of Impaired Waters (3.0 cr)
- BBE 5608 - Environmental and Industrial Microbiology (3.0 cr)
- CEGE 4502 - Water and Wastewater Treatment (3.0 cr)
- CEGE 4562 - Environmental Remediation Technologies (3.0 cr)
- CEGE 5180 - Special Topics (1.0 - 4.0 cr)
- CEGE 5511 - Urban Hydrology and Water Quality (4.0 cr)
- CEGE 5541 - Environmental Water Chemistry (3.0 cr)
- CEGE 5542 - Experimental Methods in Environmental Engineering (3.0 cr)
- CEGE 5543 - Introductory Environmental Fluid Mechanics (4.0 cr)
- CEGE 5551 - Environmental Microbiology (3.0 cr)
- CEGE 8501 - Environmental Fluid Mechanics I (4.0 cr)
- CEGE 8502 - Environmental Fluid Mechanics II (4.0 cr)
- CEGE 8503 - Environmental Mass Transport (4.0 cr)
- CEGE 8506 - Stochastic Hydrology (4.0 cr)
- CEGE 8521 - The Atmospheric Boundary Layer (4.0 cr)
- CEGE 8541 *{Inactive}*(3.0 cr)
- CEGE 8542 - Chemistry of Organic Pollutants in Environmental Systems (3.0 cr)
- CEGE 8551 - Environmental Microbiology: Molecular Theory and Methods (3.0 cr)
- CEGE 8561 - Analysis and Modeling of Aquatic Environments I (3.0 cr)
- CEGE 8562 - Analysis and Modeling of Aquatic Environments II (3.0 cr)
- CEGE 8572 - Computational Environmental Fluid Dynamics (4.0 cr)
- EEB 4068 - Plant Physiological Ecology (3.0 cr)
- EEB 4611 - Biogeochemical Processes (3.0 cr)
- EEB 5053 - Ecology: Theory and Concepts (4.0 cr)
- EEB 5601 - Limnology (3.0 cr)
- EEB 5605 *{Inactive}*(2.0 cr)
- ESCI 5102 - Climate Change and Human History (3.0 cr)
- ESCI 5351 *{Inactive}*(3.0 cr)
- ESCI 5402 - Science and Politics of Global Warming (3.0 cr)
- ESCI 8401 - Aqueous Environmental Geochemistry (3.0 cr)
- ESCI 8801 *{Inactive}*(3.0 cr)
- ESPM 5061 - Water Quality and Natural Resources (3.0 cr)
- ESPM 5111 - Hydrology and Water Quality Field Methods (3.0 cr)
- ESPM 5245 - Sustainable Land Use Planning and Policy (3.0 cr)
- ESPM 5402 - Biometeorology (3.0 cr)
- ESPM 5601 *{Inactive}*(3.0 cr)
- FNRM 5114 - Hydrology and Watershed Management (3.0 cr)
- FNRM 5131 - Geographical Information Systems (GIS) for Natural Resources (4.0 cr)
- FNRM 5153 - Forest Hydrology & Watershed Biogeochemistry (3.0 cr)
- FNRM 5262 - Remote Sensing and Geospatial Analysis of Natural Resources and Environment (3.0 cr)
- FW 8459 - Stream and River Ecology (3.0 cr)
- GEOG 5401W - Geography of Environmental Systems and Global Change [ENV, WI] (3.0 cr)
- GEOG 5426 - Climatic Variations (3.0 cr)
- GEOG 5531 - Numerical Spatial Analysis (4.0 cr)
- GEOG 5839 - Introduction to Dendrochronology (4.0 cr)
- GEOG 5562 - GIS Development Practicum (3.0 cr)
- GEOG 8270 - Seminar: Climatology (3.0 cr)
- GIS 5555 - Basic Spatial Analysis (3.0 cr)
- PMB 4111 - Microbial Physiology and Diversity (3.0 cr)
- PMB 5412 - Plant Physiology and Development (3.0 cr)
- PLPA 8103 - Plant-Microbe Interactions (3.0 cr)
- PUBH 6100 - Topics: Environmental Health (1.0 - 4.0 cr)
- PUBH 6190 - Environmental Chemistry (3.0 cr)
- SAGR 8010 - Colloquium in Sustainable Agriculture (2.0 cr)
- SOIL 5232 - Vadose Zone Hydrology (3.0 cr)
- SOIL 5555 - Wetland Soils (3.0 cr)
- SOIL 5611 - Soil Biology and Fertility (4.0 cr)
- SOIL 8252 - Advanced Soil Physics (2.0 cr)
- SOIL 8510 - Advanced Topics in Pedology (2.0 - 4.0 cr)
- SOIL 8541 *{Inactive}*(3.0 cr)
- STAT 5021 - Statistical Analysis (4.0 cr)
- STAT 5302 - Applied Regression Analysis (4.0 cr)
- STAT 5303 - Designing Experiments (4.0 cr)
- WRS 5101 - Water Policy (3.0 cr)

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Plan Options

Plan A
Take 10 master's thesis credits.
LAAS 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

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