

GRADUATE PROGRAM IN LAND AND ATMOSPHERIC SCIENCE



Welcome to the University of Minnesota Land and Atmospheric Science Graduate Program!

Welcome to the Graduate Program in Land and Atmospheric Science at the University of Minnesota. This is a science-based 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.

We have 34 members of the graduate faculty and a 2:1 faculty to graduate student ratio. Environmental Science topics constitute the majority of research conducted in the department, with a core focus on the emerging area of land-atmospheric interactions.

The Program

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.

Recent research topics addressed by students in this program include:

- Biogeochemical cycles of nitrogen, phosphorus, carbon and carbon sequestration;
- Impacts of land use change and Best Management Practices (agriculture, urbanization) on air or water quality;
- Impacts of climate change on export of dissolved organic carbon and metals from peatlands;
- Transport and fate of sediment, nutrients, pesticides, pharmaceuticals, and emerging pollutants from agricultural and urban ecosystems;
- Effects of biofuel production on soil dynamics and environmental quality;
- Effects of climate and land use change on hydrology and water supply;
- Emission of greenhouse gases and the transport and fate of other pollutants;
- Impacts of climate variations on crop productivity;
- Fate of organic and mineral phosphorus in soils under agricultural production;
- Impacts of climate variations and increasing carbon dioxide concentration on crop productivity;
- Track sources of fecal contamination of surface waters using DNA fingerprinting and other genomic techniques;
- Effects of nutrient management practices and precision agriculture on crop yield and environmental quality.

While research or coursework in other graduate programs and departments address similar research topics, LAAS is unique in investigating Earth system processes from the joint perspectives of land and atmospheric science.

Professional Outlook

Graduates of our program have had strong career opportunities and occupy important positions in academic research and teaching institutions; agricultural industries; state and federal government agencies; international agricultural and environmental agencies and foundations; environmental consulting firms; and others.

Nearly all of our graduates have careers closely related to their graduate training: from 1995 to present there has been a 90% placement.



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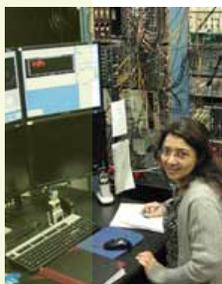
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Ph.D. Degree Requirements

The Ph.D. degree is granted chiefly in recognition of the candidate's discovery of new information and knowledge in a specific field. Students typically complete 40-50 credits to develop competency in their field of interest. Seven credits are required and include: Integrated topics in Land and Atmospheric Science; Research in Land and Atmospheric Science; Research Ethics; Directed Teaching Experience; and Departmental Seminar.

Written and oral examinations, preparation of the doctoral dissertation, and publishing manuscripts in peer-reviewed journals are the principal measures of achievement. Appropriate graduate level courses taken at another university may be considered for transfer to a University of Minnesota program. Course work completed under an M.S. program can be counted toward the Ph.D. degree. A yearly departmental seminar is required. The program requires that students maintain a B or better average.

M.S. Degree Requirements

The M.S. degree is offered under two options. Plan A requires a thesis. Plan B substitutes additional course work and special reports or projects for the thesis. The M.S. program ordinarily requires from three to five semesters in residence and cannot be completed in less than two semesters. At least 60% of the coursework must be completed as a registered University of Minnesota Graduate School student. Both Master's degree plans require that students maintain a B or better average.

Facilities and Resources

The University **research and outreach centers** serve as links between communities, families, and agriculture to the research, education, and outreach of the University of Minnesota:

- Northwest Research & Outreach Center at Crookston;
- West Central Research & Outreach Center at Morris;
- Southwest Research & Outreach Center at Lamberton;
- North Central Research & Outreach Center at Grand Rapids;
- Rosemount Research & Outreach Center (UMore Park) at Rosemount;
- Southern Research & Outreach Center at Waseca

Established in 1995, the **Precision Agriculture Center** fosters the use of site specific management techniques through collaborative research, education, and outreach programs.

The **High Performance Computing Cluster (HPCC)** and the **University of Minnesota Supercomputing Institute for Advanced Computation Research** are used to model atmosphere and biosphere processes and to process and analyze modeled and measured atmospheric data.

The **University of Minnesota Mesocosm Facility** consists of large steady-state growth chambers including a soil rhizotron and enclosed canopy with the capacity to manipulate a broad array of environmental variables including: photosynthetically active radiation; air and soil temperature; soil water content; and water table depth.

The **Mass Spectrometry Facility** includes a continuous flow isotope ratio mass spectrometer interfaced with a flask autosampler, a trace gas inlet system, and elemental analyzer inlet system.

The **Tall Tower Trace Gas Observatory** has been in operation since 2007. It consists of a 244 m tall tower equipped with micrometeorological sensors and trace gas analytical equipment for studying carbon, water, mercury, VOCs, carbon monoxide and many other trace gas species.

www.LAAS.umn.edu • www.cfans.umn.edu/GraduateStudents

The Graduate School

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College of Food, Agricultural
and Natural Resource Sciences
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