

# SOIL SCIENCE, DOCTORAL MINOR

## ADMISSIONS

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All Graduate School students must utilize the Graduate Student Portal in MyUW to add, change, or discontinue any doctoral minor. To apply to this minor, log in to MyUW, click on Graduate Student Portal, and then click on Add/Change Programs. Select the information for the doctoral minor for which you are applying.

## REQUIREMENTS

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A doctoral minor in Soil Science shall consist of a minimum of 9-credits of SOIL SCI courses ([http://guide.wisc.edu/courses/soil\\_sci/](http://guide.wisc.edu/courses/soil_sci/)) with a "Grad 50%" attribute. One credit of graduate seminar, SOIL SCI 728, may be applied towards the 9-credit minimum. A minor advisor from the Department of Soil Science must serve in the student's graduate committee and approve the courses taken to complete the minor. Please return the signed form to Soil Science Graduate Coordinator (see contact information box).

## PEOPLE

### PEOPLE FACULTY

Dr. Francisco Arriaga

Applied Soil Physics, Soil and Water Management and Conservation: Conservation agriculture systems; development of conservation tillage practices that enhance soil quality, soil hydraulic properties, and plant water use through the adoption of cover crops and non-inversion tillage for traditional cropping systems.

Dr. Nicholas Balster

Soil Ecology, Plant Physiological Ecology, and Education: Energy and material cycling in natural and anthropogenic soils including forests, grasslands, and urban ecosystems; stable isotope ecology; environmental education; nutrition management of nursery soils; tree physiology, production and response; ecosystem response to global change; urban ecosystem processes; invasive plant ecology; biodiversity.

Dr. Phillip Barak

Soil Chemistry and Plant Nutrition: Nutrient cycling; nutrient recovery from wastewater; molecular visualization of soil minerals and molecules; soil acidification.

Dr. Zachary Freedman

Soil microbiology, ecology and sustainability: Effects of environmental change on biogeochemical cycles; community

ecology and trophic dynamics; forest soil ecology; soil organic matter dynamics; sustainable agroecosystems; bio-based product crop production on marginal lands.

Dr. Alfred Hartemink

Pedology, Digital Soil Mapping: Pedology; soil carbon; digital soil mapping; tropical soils; history and philosophy of soil science.

Dr. Jingyi Huang

Soil Physics, Proximal and Remote Sensing, Soil Monitoring and Management, Digital Soil Mapping: Application of proximal and remote sensing technologies for understanding the movement of water, heat, gas, and solutes in soils across different spatial and temporal scales; application of physical and empirical models for monitoring, mapping, and managing soil changes due to natural processes and human activities.

Dr. Inna Popova

Environmental soil chemistry; understanding and mitigating the response of soil systems to the increased pressure of organic contaminants; application of biopesticides; development of novel separation and analyses methods for contaminants in environmental matrices.

Dr. Natasha Rayne

Soil Fertility and Nutrient Management: Manure placement, timing, and nitrogen credits; Organic soil amendments and nutrient cycling; Climate-smart and site-specific nitrogen management; Improvement of nitrogen use efficiency in cereal crop production.

Dr. Matthew Ruark

Soil Fertility and Nutrient Management: Soil fertility and management of grain biofuel, and vegetable crops; cover crop management; agricultural production and water quality; sustainability of dairy cropping systems; soil organic matter management.

Dr. Douglas Soldat

Turfgrass and Urban Soils–Turfgrass, urban soils, nutrient management, water resources, soil testing, landscape irrigation; soil contamination.

Dr. Thea Whitman

Soil Ecology, Microbiology, and Biogeochemistry: Soil microbial ecology; organic matter decomposition and carbon stabilization; global environmental change; stable isotopes; linking functional significance of microbial communities with ecosystem processes; fire effects on soil carbon and microbes; management and policy.

Dr. Xia Zhu-Barker

Soil Biogeochemistry, Land Management, and Environmental Sustainability: Nitrogen and carbon biogeochemical cycles; greenhouse gas and air pollutant emissions; nitrate leaching and runoff; innovative manure and nutrient utilization; composting; climate change mitigation and adaptation; ecosystem services and carbon markets; dairy environmental sustainability; novel methods in isotopic techniques; mechanistic exploration of soil-plant-microbe

interactions; process-based modelling. The specific research topics include:

- Microbial and abiotic processes involved in the production and consumption of nitrogen and carbon gases ( $N_2O$ ,  $NO_x$ ,  $NH_3$ ,  $CO_2$ ,  $CH_4$ )
- Land management practices (e.g., compost, fertilizer, cover crops, irrigation, and tillage) that change soil health, nitrogen use efficiency, crop productivity, nitrogen losses, carbon turnover.
- Process oriented modelling of carbon/nitrogen turnover in agricultural ecosystems.
- Environmental changes on the sustainability and resilience of agricultural ecosystems especially dairy production systems.