

Soil systems: Analytical methods for integrating the chemical and biophysical interface in soils

PhD course, 3 ECTS

Date and location:

30th May - 23rd June 2023,

with three literature meetings and a four-day workshop.

Background

Soils are one of the most complex systems on earth in terms of their physical structure, chemical constitution and biodiversity. Until recently, soil science has been mainly operated on the basis of rather separate disciplines of physics, chemistry and biology. However, there is now an increasing awareness of the need to integrate these disciplines into a soil system view, i.e. looking at biogeochemical and biophysical interactions in soils. More specifically, soils are integrated complex adaptive system where macroscopic properties depend on interactions at smaller spatial scales. Recent technological advances are now available to discover interactions in the natural soil habitat, i.e. at nano- and micro-scales. Exploring this minute universe and the interactions therein may have profound implications for our understanding of soil functions at field, catchment and regional scales.

Course content

The aim of this course is to (i) provide an introduction to soil system sciences, (ii) give an overview of emerging micro-analytical techniques and their application to environmental samples; (iii) present examples of soil system sciences to study ecosystem services and (iv) to discuss challenges and the future of this research discipline.

The course consists of two parts:

- 1) Three literature group meetings prior a one-week workshop and one final group meeting after the workshop:
 - 30th May, 9:00 – 12:00: literature meeting I

- 6th June, 9:00 – 12:00: literature meeting II
- 13th June, 9:00 – 12:00: literature meeting III

During these meetings, we will review selected research and review papers. In the concluding meeting, students will give an oral or poster presentations of their research.

2) A workshop at Ultuna will be held between 20th and 23rd June with participation of international leading scientists in this research area (see below).

Participation in the workshop and group meetings are compulsory!

Plan for workshop lectures

Lectures (varying starting times due to lecturers from different time zones), including 15-minute morning and afternoon tea breaks and a 1-hour lunch break. The participants are expected to actively participate in the discussions.

Tuesday, 20th June: *Importance of soil systems for ecosystem services*

Wednesday, 21st June: *Soil interaction in the natural soil habitat – technical advances I*

Thursday, 22nd June: *Soil interaction in the natural soil habitat – technical advances II*

Friday, 23rd June: *Importance of soil systems for ecosystem services – various spatial scales*

Preliminarily confirmed lecturers

- Claire Chenu (*AgroParisTech, UMR Ecosys INRA-AgroParisTech, Université Paris-Saclay, France*)
- Naoise Nunan (*Centre National de la Recherche Scientifique – CNRS, Paris, France*)
- Tobias Bölscher (*AgroParisTech, UMR Ecosys INRA-AgroParisTech, Université Paris-Saclay, France*)
- Anke Herrmann (*Swedish University of Agricultural Sciences, Department of Soil & Environment, Sweden*)
- Frederic Leuther (*Swedish University of Agricultural Sciences, Department of Soil & Environment, Sweden*)
- Hermann Jungkunst (*University of Koblenz-Landau, Department of Environmental Sciences, Landau, Germany*)

Please do not hesitate to contact Katharina Meurer if you have any questions regarding the course.

Contact for applications: Dr. Katharina Meurer, katharina.meurer@slu.se

Deadline for applications: 16/05-2023