Name of course:
Merging Measurements and Modeling in Soil Physics

ECTS credits: 5

Course parameters:
Language: English
Level of course: PhD course
Time of year: 15-20 June 2026
No. of contact hours/hours in total incl. preparation, assignment(s) or the like: 150 hrs
Capacity limits: 28 participants

Objectives of the course:
This course will present accepted and emerging concepts of key processes of water flow in unsaturated porous media. These concepts will be presented together with standard and novel methods to make the measurements necessary to describe these processes. The focus of the course is the need for a unified treatment of measurement and modelling in quantitative soil physics. Specifically, we will discuss how advancements in our understanding of soil physics should guide the design of measurement and monitoring efforts. Similarly, we will discuss how the interpretation of measurements made with emerging indirect methods should be made in the context of the soil physical model of interest.

Learning outcomes and competences:
At the end of the course, the student **should be able to**:
Understand, measure and analyze data on

- Soil water retention from ovendry to water saturated
- Saturated and unsaturated hydraulic conductivity in soils
- Gas diffusion in soil (gas diffusivity data)
- Gas advection in soil (air permeability data)
- Leaching of solutes, colloids, and nutrients in soil
- Soil water repellency in soils

and

- Understand the principles of near infrared spectroscopy
- Understand modelling theory
- Do modelling of solute transport in Hydrus
- Perform coupled hydro geophysical analysis
- Perform measurement and modeling integration
    - Investigate the value of data
    - Do decision support

Compulsory programme:
Preparatory reading must be completed before course start. The student should participate in the entire course; all lecture, all laboratory experiments, and all exercises. All assignments must be finalized and the final exam passed.

Course contents:
Theoretical lectures, computer laboratory, field-work, laboratory measurements, data analysis, computer modelling. Merging of measurements and modelling.

Prerequisites:
The course is for PhD students, but MSc students with a soils background and interest in PhD enrollment can be admitted

Name of lecturer[s]:
Name of lecturers: Professors Ty Ferré, University of Arizona, Professor Per Moldrup, Aalborg University, and Professors Lis Wollesen de Jonge, Bo Vangsø Iversen, Mogens Greve, Emmanuel Arthur, Maria Knadel, and Trine Nørgaard Aarhus University

Type of course/teaching methods:
Lectures, seminars, exercises, hand-on laboratory work, data analysis, modelling, team work

Literature:
Book chapters, articles, and laboratory protocols will be made available well in advance of the course.

Course homepage:
To be added

Course assessment: Daily assignments, presentations, and final exam

Provider: Department of Agroecology, Aarhus University, Denmark

Special comments on this course:
This is a very intensive course, so do expect very long days. Lunch, dinner, coffee, cake, and fruit is included in the course fee.

Time: 15-20 June 2026

Place: AU Campus Viborg, Blichers Allé 20, DK-8830 Tjele
Course fee: 620 EURO

Registration: **Merging Measurements and Modelling in Soil Physics - Laravel**

PLEASE NOTE: Deadline for pre-registration is May 31 (but we close registration at 28 students)

If you have any questions, please contact

PhD Course Secretary Friederike Malisch-Johnigk:malish-johnigk@agro.au.dk

PhD Course responsibles: Tenure track assistant professor Trine Nørgaard: trine.norgaard@agro.au.dk and professor Lis Wollesen de Jonge: lis.w.de.jonge@agro.au.dk