The nitrogen cycle: from microbial transformations to global budgets (2026)

Name of course: The nitrogen cycle: from microbial transformations to global budgets (2026)

ECTS credits: 5 ECTS (European Credit Transfer System)

Course parameters
Language: English
Level of course: PhD (Masters and young researchers with strong interest are also welcomed)
No. of contact hours/hours in total incl. preparation, assignment(s) or the like: 125 hours in total, including lectures, exercises, lab and field trips, and assignments, as well as one week of preparatory reading
Capacity limits: 20

Objectives of the course:
The course aims to provide participants with a deeper understanding of:

- the importance of the nitrogen cycle and of nitrogen losses as nitrous oxide, nitrate leaching, and ammonia volatilization.
- the main processes involved in nitrogen cycling.
- methodologies to measure nitrogen pools and fluxes.
- options to steer nitrogen cycling at the field scale.
- options to act on nitrogen issues from the perspective of consumers and policymakers.
- approaches to model nitrogen cycling at different scales.

Learning outcomes and competencies:

At the end of the course, the participants will be able to:

- have a better understanding of the role of nitrogen for a wide range of ecosystem services and sustainable development goals,
- have an overall view of the nitrogen flows in agroecosystems and in the food system,
- describe the key nitrogen transformations in the plant-soil-atmosphere continuum,
- understand interactions between the nitrogen and carbon biogeochemical cycles,
- describe the impact of agricultural management practices on nutrient cycling,
- understand different agricultural systems in relation to nitrogen inputs and outputs, considering their benefits and limitations,
- use different techniques to measure nitrogen fluxes,

- discuss dilemmas related to nitrogen cycling in agroecosystems, including trade-offs and policy initiatives.

Name of lecturers:

- Diego Abalos (Spain), Professor. Department of Agroecology, Aarhus University. Responsible for overall course coordination.
- Klaus Butterbach-Bahl (Germany), Professor. Land-CRAFT center, Aarhus University. Responsible for environmental nitrogen losses from local to global scales.
- Xin Zhang (China), Professor. University of Maryland Center for Environmental Science, USA. Responsible for emerging nitrogen technology and sustainability challenges from farm to fork.
- Jim Rasmussen (Denmark), Senior Researcher. Department of Agroecology, Aarhus University. Responsible for organic nitrogen cycling.
- Davide Cammarano (Italy), Professor. Department of Agroecology, Aarhus University. Responsible for nitrogen management in the context of precision agriculture and climate change adaptation.
- Huan Liu (China), Postdoc, Department of Agroecology, Aarhus University. Responsible for model comparison in relation to nitrogen flows.
- Jaber Rahimi (Iran), Research Scientist, Karlsruhe Institute of Technology (KIT), Germany. Responsible for concepts and approaches to model nitrogen cycling.
- Christian Dold (Germany), Track Assistant Professor, Department of Agroecology, Aarhus University. Responsible for methodologies to measure nitrogen fluxes at field and lab scale.

Type of course/teaching methods: Lectures, exercises, group work, lab and field trip, final assignment

Course assessment: Classwork - satisfactory participation in the course; Group work and oral presentation. Prior to the course, each participant should prepare one slide PPT to introduce their research.

Provider: Department of Agroecology, Aarhus University, Blichers Allé 20, Postboks 50, DK-8830 Tjele

Special comments on this course: The course fee is 620 Euros.

Time: November 16-20, 2026

Place: AU Viborg – Department of Agroecology

Registration: The deadline for registration is October 25 2026.

For registration: **Nitrogen PhD course 2026 - Laravel**

If you have any questions, please contact Diego Abalos, e-mail: d.abalos@agro.au.dk