

Name of course (working title): C and N flows in cover crop and grassland-based systems

ECTS credits: 5 ECTS.

Course parameters:

Language: English

Level of course: PhD course

Time of year: October 19th to 23rd 2020

No. of contact hours/hours in total: 125 hours in total whereof 45 are contact hours.

Capacity limits: app. 25 students

Objectives of the course:

The objectives of the course are to:

- (i) present understanding of drivers for C and N flows in arable systems focusing on cover crop and grasslands,
- (ii) present concepts/ideas on how to manipulate cover crop and grassland-based system to enhance soil C storage and N fertility,
- (iii) present state-of-the-art methods to identify and quantify C and N flows,
- (iv) assist students in identifying key drivers in relation to own projects on cover crops and grasslands, and
- (v) train students writing skills.

Learning outcomes and competences:

At the end of the course, the student **should be able to:**

- explain the present understanding of drivers for C and N flows in cover crop and grassland-based systems,
- explain emerging ideas of designing cover crop and grassland systems for enhancing soil C storage and N fertility, and
- relate this knowledge to own projects and identify appropriate methods to study C and N flows.

Compulsory program:

The students must deliver:

- a pre-course assignment,
- peer-feedback on pre-course assignments,
- active participation in discussions at the intensive course week, and
- a post-course assignment.

Course contents:

The sustainability of the plant production needs to increase, and the key issues are to enhance the nutrient use efficiency reducing external inputs and increasing soil carbon (C) storage mitigating atmospheric CO₂ loads. Nitrogen (N) is a key limiting nutrient for both plant growth and C storage, which requires good management to keep N in the system and add it via N₂-fixing legumes. In low external input systems use of cover crops is a key strategy to maintain N in the cropping systems, and these temporary crops further add C to soil and potentially N if legumes are included. Likewise, grasslands with legumes are the key to N input in low external input cropping systems, where grasslands also greatly improve the soil C stock. The course provides a knowledge platform for students to dig into the drivers of C and N flows in these cropping systems.

The students will in this course be introduced to key drivers for C and N cycling in cropping systems with cover crops and grasslands, they will discuss ideas on how these cropping systems can be designed and managed to enhance the sustainability of the plant production, and finally the students will become familiar with key methodologies to study C and N flows. The course consists four sections: (i) a pre-course section where the students will write an assignment focused on their own project, and prepare feedback for two peers, (ii) the first part of the intensive course focusing on state-of-the-art knowledge regarding C and N flows in cover crops and grasslands including methods to study these flows, (iii) the second part of the intensive course focusing on how cover crops and grasslands can be designed to meet different needs in cropping systems, and (iv) a post-course section where the students will prepare the final assignment incorporating new knowledge obtained at the intensive course week into their pre-course assignment.

Prerequisites:

The students should have a background in soil science, agricultural science, environmental science or related fields.

Name of lecturers:

Maria Ernfors, Dept. Biosystems and Technology, Swedish University of Agricultural Sciences, Alnarp, Sweden.
Kristian Thorup-Kristensen, Dept. Plant and Environmental Sciences, Copenhagen University, Denmark.
Diego Abalos, Dept. Agroecology, Aarhus University, Denmark.
Arezoo Taghadezih-Toosi, Dept. Agroecology, Aarhus University, Denmark.
Chiara De Notaris, Dept. Agroecology, Aarhus University, Denmark.
Course responsible: Jim Rasmussen, Dept. Agroecology, Aarhus University, Denmark.

Type of course/teaching methods:

Discussion sessions, individual reading and writing, peer and teacher feed-back sessions.

Literature:

The literature will be selected by the course lecturers. Additionally each student shall read and give feedback to two-three of their peers assignments.

Course homepage: None

Course assessment: The assessment will be based on the post-course assignment.

Provider: Department of Agroecology

Special comments on this course: None

Time: September-October 2020 – intensive course week 19-23 October 2020.

Place: Research Centre Foulum, Aarhus University, Denmark.

Course fee: 600 €

Registration:

Deadline for registration is August 15th 2020. Information about admission is given before August 30th 2020.

For registration use the web-shop link: <https://tilmeld.events/candnflows>

If you have any questions, please contact Jim Rasmussen, e-mail: jim.rasmussen@agro.au.dk