Name of course: Isotopes for nutrient, organic matter cycling and plant-microbial interaction studies – theory and applications

ECTS credits: 5 ECTS.

Course parameters:
Language: English
Level of course: PhD course
Time of year: April to June 2026, specifically Day 1-2 on April 28-29, and Day 4-5 on June 22-23. In between we expect you to attend hands-on demonstrations.
No. of contact hours/hours in total: 125 hours in total whereof 50 are contact hours.
Capacity limits: 10-12 students

Objectives of the course:
The objectives of the course are to:
(i) present basic theory on stable and radioactive isotopes, including methods for their measurement,
(ii) present state-of-the-art methods to estimate C, N and nutrient flows in agroecosystems,
(iii) inspire students to broaden their perspectives on how isotopes can be applied, and
(iv) train students' skills in analyzing isotope data.

Learning outcomes and competences:
At the end of the course, the student **should be able to**:
- explain the basic theory underlying the use of isotopes in research experiments,
- explain the principles behind state-of-the-art methods for estimating a number of measurements where isotopes are used, and
- apply isotopes and handle isotope data in to the students own project.

Compulsory program:
The students must deliver:
- active participation in lectures and journal club discussions,
- a design for an experiment using isotopes relevant for their own project including a description of how the isotope data will be handled, and
- a course assignment.

Course contents:
Stable and radioactive isotopes are key tools in many studies of nutrient and organic matter cycling in agroecosystems. In order to get the full benefit from the use of isotopes, the present course will focus both on basic theory about isotopes and how isotopes are applied in experimental settings; the latter including training in how to handle isotope data.

The course will be divided in three overall themes:
(1) basic isotope theory and measurements of isotopes,
(2) application of isotopes in plant and soil experiments, and
(3) use of isotopes in the students' own projects.

Ad. (1): Teaching in this theme will consist of lectures, group discussion and discussion with specialists on measurements of isotopes, including an "excursion" presenting the local possibilities for measurements of isotopes.
Ad. (2): Teaching in this theme will consist of inspirational lectures, journal club and group discussions.
Ad. (3): Teaching in this theme will be based on the students own projects and interaction with relevant course teachers. The students will design an experiment using isotopes formulated as work packages in research application for e.g. a postdoc project, (if relevant) get hands-on experience with application of the isotopes, and work on sample-data sets to practice isotope-data handling.

The students shall deliver a course assignment describing the experiment designed under (3), where the student present relevant theory, examples of similar applications, how data will be generated and handled.

Prerequisites:

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

Name of lecturers:
Kirsten Lønne Enggrob, Leanne Peixoto, and Jim Rasmussen, Department of Agroecology. Additional lecturers will be included where relevant according to the topics of the participants.

Type of course/teaching methods:
Lectures, journal club and group discussion sessions, individual reading and writing, peer and teacher feed-back sessions.

Literature:
The literature will be selected both by the course lecturers and students with the aim to select literature targeted the students potential application of isotopes. Additionally each student shall read and give feed-back to two-three of their peers' assignments.

Course homepage: None

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

Provider: Department of Agroecology

Special comments on this course: There will be a course fee of 300 €.

Time: April to June 2026, specifically Day 1-2 on April 28-29, and Day 4-5 on June 22-23. In between we expect you to attend hands-on demonstrations.

Place: AU Viborg, Research Centre Foulum, Aarhus University, Denmark.

Registration:
Deadline for registration is February 1st 2026. Information regarding admission will be given before February 15th 2026.

For registration use the web-shop link: Isotopes PhD course 2026 - Laravel

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