

Course description

Bioactive Molecules in Agroecology

ECTS credits: 5

Course parameters

Language: English

Level of course: PhD course (also offered for MSc students)

(<https://kursuskatalog.au.dk/en/course/104495/Bioactive-Molecules-in-Agroecology>)

Semester/quarter: Monday 2 Aug – Friday 13 August 2021

Workload:

- one week preparative work
- two weeks on-site activities, consisting of 8 theoretical lectures of approx 3 hours and 6 laboratory experiments of a mean length of 9 hours, each of them distributed over several days
- two weeks report writing

Total workload: 150 hours

Capacity limits: 16 (year 2021)

Objectives of the course:

Thousands of molecules influence the biological interactions in ecological systems. The overall objective of the course is that the students achieve understanding of the importance of bioactive molecules in agroecological interactions. The students get acquainted with bioactive plant defense compounds, phytochemicals, contaminants and pesticides and will obtain the qualifications for explaining how the structure of the compounds determines their uptake in neighbouring biological organisms or in mammal consumers, their possible beneficial or negative effects as well as their transformation in soil or biological organisms. Student qualifications will cover both theoretical understanding and experience in performing laboratory assays related to fate and effects of bioactive compounds.

More information look [here](https://kursuskatalog.au.dk/en/course/104495/Bioactive-Molecules-in-Agroecology) <https://kursuskatalog.au.dk/en/course/104495/Bioactive-Molecules-in-Agroecology>

Learning outcomes and competences:

On completion of the course the students have attained competence to:

- Classify bioactive compounds of importance in agriculture on basis of their structure, physico-chemical properties and their origin.
- Explain the degradation (aerobic and/or anaerobic) and sorption processes of small bioactive molecules in soil, water, and atmosphere, and conclude on the factors that influence these processes.
- Use LC-MS/MS equipment for quantitation of bioactive molecules and their degradation products in soil, plants and biofluids
- Model the kinetics for bioactive compound degradation in soil
- Evaluate the applicability of the newest practical methods used in bioactive molecules research: quantitative measurements of residues in the environment and body fluids,

toxicological cell tests, toxicological test on nematodes, uptake and transformation in plants and mammals, effect of natural compounds fed to bees on the bees' capacity of transforming pesticides.

- Explain the principles of Absorption, Distribution, Metabolism, Excretion (ADME) of bioactive molecules, including Phase 1 and Phase 2 metabolism processes.
- Report and discuss data from laboratory tests.

Compulsory programme:

Entire course.

Course contents:

The course is constructed as follows:

- ◆ Preparatory reading of selected parts of textbook
- ◆ Theoretical lessons:
 - Small bioactive molecules in agriculture – wanted or unwanted (I: contaminants)
 - Ecotoxicology beneficial insects
 - Small bioactive molecules in agriculture – wanted or unwanted (II: natural compounds)
 - Absorption, distribution, metabolism and excretion (ADME) of bioactive compounds
 - Toxicology testing
 - Degradation kinetics
 - Contaminants in agriculture coming from sludge
- ◆ Laboratory experiments
 - Does the pesticide bentazone have a potential for leaching to groundwater?
 - Effects of plant defense benzoxazinoids on non-target soil organisms?
 - Using a maize root culture system to study metabolism of contaminants
 - Bioactive benzoxazinoids in bread – excretion in urine from rye-bread-eating students
 - Testing the toxicity of a common detergent on fibroblast proliferation and survival
 - Will bees' intake of a dietary phytochemical affect their capability of metabolising pesticides?
- ◆ Subsequent elaboration of reports on the laboratory experiments.

Prerequisites:

The course is for PhD students or MSc students

Lecturers

Associate professor Inge S. Fomsgaard (course coordinator)

<https://pure.au.dk/portal/en/inge.fomsgaard@agro.au.dk>

Senior scientist Mette Vestergård; Laboratory Technician Bente Laursen; PhD students Ida KL Andersen, Hossein Hazrati, postdoc Kouros Houshmand.

Course coordinator

Administrative case officer Sonja Graugaard (Sonja.Graugaard@agro.au.dk)

Type of course/teaching methods: Lectures, Laboratory experiments

Literature

Selected chapters from C.J. van Leeuwen and T.G Vermeire: Risk Assessment of chemicals: an introduction. 2nd edition, Springer 2007. Hand outs of articles and scientific reports.

Course homepage:

<https://kursuskatalog.au.dk/en/course/104495/Bioactive-Molecules-in-Agroecology>

Course assessment:

Elaboration of a 30- to 40-page report on the total of six laboratory experiments (Take-home assignment, to be handed in no later than two weeks after the end on the on-site study period). For PhD students the report is assessed as "passed" or "not passed". Presence at a minimum of 90% of theoretical and practical lessons is required to obtain the course diploma. For MSc students the assessment will use the 7-point grading scale. Grading will be with internal co-examination.

Provider: Department of Agroecology, Aarhus University

Special comments on this course:

none

Course venue

The course venue is Research Centre Flakkebjerg, situated in Southwest Zealand, 10 km south of Slagelse (100 km west of Copenhagen). Complete address:

Department of Agroecology, Research Centre Flakkebjerg, Forsøgsvej 1,
DK-4200 Slagelse, Denmark, Tel: +45 87 15 81 92

Direct telephone number to Inge S. Fomsgaard (+45 87 15 82 12 or +45 22 28 33 99).

Inge.Fomsgaard@agro.au.dk.

Accommodation

We have pre-booked rooms at OnlySleep (please refer to Sonja Graugaard).

OnlySleep

Trafikcenter Alle 2, DK-4200 Slagelse, Denmark

Phone: +45 58505360

info@onlysleep.dk

www.onlysleep.dk

Rooms are available as 1-person and 2-person rooms respectively.

A 1-person room is DKK 395 per night (breakfast not included)

A 2-person room is DKK 475 per night (breakfast not included)

Breakfast is DKK 99

Transport from OnlySleep is by bus to Flakkebjerg (Please note that "Flakkebjerg Efterskole" in the example below are the buildings approx. 500 metres after Aarhus University) – please see https://www.rejseplanen.dk/webapp/?language=en_EN

Comments from participants in our 2018 course

“The course was very well structured. It was easy to follow the course, because of the good connection between theory and practice”

“It was impressive how we went through so many different themes in the short period of time”

“Very good methodological variation”

“I liked the small group, the number of teachers and the time that was on hand (however, you always run short on time)”

“Nice to have a folder with the printed hand-outs”

Time: Monday 2 August – Friday 13 August 2021

Place: Aarhus University, Department of Agroecology, Forsøgsvej 1, DK-4200 Slagelse, Denmark

Registration

MSc students: Registration is open 15 January – 8 April, 2021 and takes place through the AU Summer University. Cost for participation depends on agreements between AU and your home university

<https://international.au.dk/education/admissions/summeruniversity/course/bioactivemoleculesinagroecology/>

PhD students: Registration is open. Sign up by email to Sonja-Graugaard@agro.au.dk. By 9 April, invoices of 500 EUR will be sent to the signed up students with two weeks deadline for payment. Maximum number of participants in year 2021: 10.

Cancellation

Registration is binding, but you may cancel your registration by sending an e-mail to sonja.graugaard@agro.au.dk no later than 1 July 2021. If you cancel your registration later than 1 July, your registration fee will be forfeit, and your seat may be transferred to another person.

If you have any questions, please contact Sonja Graugaard, e-mail: sonja.graugaard@agro.au.dk