

Course description

Hands-on Liquid Chromatography–Mass spectrometry course in the analysis of small molecules (phytochemicals, contaminants, primary metabolites)

ECTS credits: 8

Course parameters

Language: English

Level of course: PhD course

Semester/quarter: Monday 10 June – Friday 21 June 2024

Preparatory reading of textbook: Approx. 40 hours.

Hours per week during two weeks on-site work: approx 45/per week. Monday 12 June – Friday 23 June: Long and intensive days, - part of the exercises will take place in the evening to assure that all participants have plenty of hands-on time.

Report writing: Approx. 100 hours

Total hours workload: 230

Capacity limits: 10

Objectives of the course:

Advanced tools such as liquid or gas chromatography coupled to mass spectrometry are necessary tool in the research into small molecules, either phytochemicals with defense or health properties, environmental contaminants such as pesticides or primary metabolites that can be affected by the presence of other bioactive compounds. The objective of the course is to teach the participant the theoretical background as well as the practical use of these tools for quantitative analysis as well as for identification. The course will take place in a well-equipped laboratory at Aarhus University, Research Centre Flakkebjerg, DK-4200 Slagelse, Denmark. LC-MSMS, LCMS-QTRAP, LC-TOF, GC-TOF instruments will be available for the students during the course and our experienced staff will provide instruction on the use of the equipment as well as practical techniques for the preparation of samples.

Learning outcomes and competences:

At the end of the course the student **is able to:**

- Use LCMSMS or GCMS equipment for quantitative and qualitative analysis of small molecules
- Give an account for the principles behind development of chromatographic methods for separation of small molecules
- Perform a basic method validation for quantitative analysis in LCMSMS
- Optimize the parameters for analysis of selected compounds
- Use LCMS-QTRAP or LC-QTOF in the identification of small molecules or their metabolization products

Compulsory programme:

Entire course.

Course contents:

The course is constructed as follows:

- ◆ Preparatory reading of selected chapters in an LC-MSMS textbook
- ◆ Approximately three days of practical exercises on basic LC-MSMS, quantitation methods, optimization of parameters for selected small molecules, preparation of samples, matrix effects, validation of the quantitative method
- ◆ Approximately three days of practical exercises chosen on the basis of each student's on-going PhD project
- ◆ Theoretical lessons on
 - ◆ Optimization of extraction methods
 - ◆ Method validation: LOD, LOQ, recovery, matrix interferences
 - ◆ ESI and APCI inlet systems
 - ◆ Use of an ion trap for analysis of small molecules
 - ◆ HPLC method development and optimization
 - ◆ Interpretation of mass spectra
 - ◆ Metabolomics
 - ◆ Representative sampling: plants, soil and water
 - ◆ Good Laboratory Practice
 - ◆ New developments in mass spectrometry
- ◆ Subsequent elaboration of a 30- to 40-page report on the practical exercises.

Prerequisites:

The course is for PhD students (in special individual cases master students with already planned PhD projects can be given access)

Lecturers from Aarhus University

Professor Inge S. Fomsgaard (course coordinator)

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

Laboratory Technician Bente Laursen; postdoc Jawameer Hama; postdoc Purna Kumar Khatri, MSc Amanda Thystrup.

Visiting lecturers

Mass spectrometry specialist, Sciex; Chromatography specialist, Phenomenex,

Type of course/teaching methods: Lectures, practical exercises

Literature: Study material will be shipped to the participating students not later than May 15.

Course homepage: None

Course assessment:

Elaboration of a 30- to 40-page report on the practical exercises. 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.

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, Telephone Inge S. Fomsgaard:+45 22 28 33 99.

Inge.Fomsgaard@agro.au.dk.

Accommodation

Accommodation will be at OnlySleep, Trafikcenter Alle 2-4, DK-4200 Slagelse.

Cost

The price for the course covers course fee, lecture material, hotel room 12 nights, lunch, dinner, transport from hotel to research station and VAT:Total per person 20790 DKK / 2790 EUR

The price without hotel is 11100 DKK / 1490 EUR

Comments from participants in our 2023 course

- The fact that we could handle sophisticated equipment's little by little, almost independently at the end of the course was very rewarding
- Even though some days we were at the lab more than 12 hours, the course was very interesting that did not feel bored or mentally exhausted at the end of the day
- I appreciate the problem-solving approach and guidance provided during the training
- All the instructors throughout the course were helpful, supportive, accommodating, and kind. I greatly appreciated their assistance and guidance. Also having individual consultations from the company representative is also appreciable..

Time: Monday 10 June – Friday 21 June 2024

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

Registration

Deadline for registration and payment: 1 May, 2024. Maximum number of participants: 10. First come, first served. Please register at <https://events.au.dk/hands-on-2024>(webshop)

Cancellation

Registration is binding, but you may cancel your registration by sending an e-mail to Course Administrator Mette.Abildgaard@agro.au.dk no later than 1 May 2024. If you cancel your registration later than 1 May, your registration fee will be forfeit, and your seat may be transferred to another person.

If you have any questions, please contact Course Administrator Mette Abildgaard, e-mail:
Mette.Abildgaard@agro.au.dk