



Advanced Analytical Tools: Multiple Applications for Mass Spectrometry

PhD Advanced Course

18-22 April 2022

ECTS: 6; Classes: 22.5 hours

Online Course through Zoom Platform

Course Coordinators:

Maria Rosário Bronze, FFUL

Noélia Duarte, FFUL

Teaching Staff: Invited speakers as detailed in the programme.

Who should attend?

This course is intended for 1st year PhD students from FFUL. However, considering the increasing interest in mass spectrometry it is also offered to postgraduate students from FFUL or other academic institutions and industry participants.

The course will be delivered completely online through Zoom platform.

Short Introduction

Mass Spectrometry (MS) is an advanced analytical technique that has reached an outstanding position due to its unique characteristics: high selectivity, low detection limits, speed and a large diversity of applications. During the last two decades, MS has progressed rapidly through the advances on ionization methods and mass analyzers that have led to the advent of new equipment. This progress has allowed the development of new applications mostly oriented towards health promoting areas such as proteomics, lipidomics, metabolomics, foodomics, drug discovery, pollution control and forensic and toxicological sciences. This course aims to give an overview on basic MS fundamentals and instrumentation highlighting several recent applications. It will be covered by a variety of lecturers with different experience and know-how, most of them members of the Portuguese Mass Spectrometry Network (RNEM).

Goals and Learning Outcomes

The course will provide an up-to-date review of concepts and technology, as well as the qualitative and quantitative applications of Mass Spectrometry (MS).

The main goals are:

- ✓ To understand the fundamentals of MS;
- ✓ To provide an overview of MS applications in different areas as pharmaceutical, food, chemistry, biotechnology, forensic, clinical and toxicological applications;
- ✓ To present major advantages and limitations of the methodology and give an overview of available equipment and their use.

Assessment

The assessment will consist on two parts:

- a) Oral participation in the discussion panel after each lecture (30%)
- b) Oral presentation and discussion of a theme previously chosen (70%)

Students should choose one of the proposed topics and make a 10 min presentation suggesting the best solution to the question. A brief discussion will follow the presentation.

Registration and Fees

The registration is made through the FenixEdu Platform until April 11, 2022.

Registration Guide ([Portuguese](#) or [English](#))

- Registration with evaluation: 125€
- Registration without evaluation: 100€

This course is free for 1st year PhD students of FFUL Doctoral Program.

Contacts:

For information regarding the organization of the Course:
posgraduados@ff.ulisboa.pt

For scientific information: mduarte@ff.ulisboa.pt or mrbronze@ff.ulisboa.pt

Programme

April 18, 2022 (Monday)

Introduction to Mass Spectrometry and Instrumentation.

Applications: Pharmaceutical and Biomedical; Clinical and Forensic Toxicology

9:30h – Opening Session

9:40h – Maria Rosário Bronze/Noélia Duarte (FFULisboa): “Fundamentals on mass spectrometry and instrumentation”.

10:40h – Discussion

10:45h – Break

11:00h – Fátima Nunes (FFUC): “Mass Spectrometry - an important tool in drug discovery”.

11:40h – Discussion

11:45h - Vitória Rodrigues (Synlab): “Novel methodologies in the identification of microorganisms”

12:25h – Discussion

12:30h – Lunch Break

14:00h - Antonio Castanera (INMLCF): “Mass spectrometry and workflow in forensic toxicology”

14:40h – Discussion

14:45h – João Ruivo (IPDJ): “Application of Mass Spectrometry in Doping Control”

15:25h – Discussion

15:30h – Tiago Gonçalves (UMLDBQ): «The Military Laboratory Unit for Biological and Chemical Defense and Mass Spectrometry»

16:10 – Discussion

April 19, 2022 (Tuesday)

Applications: Metabolomics, Lipidomics and Foodomics

09:30h – José Paulo da Silva (UAlg): "LC-MS based analysis of marine biotoxins"

10:10h – Discussion

10:15h - Ana Guerreiro (UniMS – ITQB/IBET): “Tackling the complexity of metabolomics using MS platforms”

10:55h – Discussion

11:00h – Break

11:15 – Sílvia Rocha (UAveiro): Body fluids metabolomics as a powerful strategy for biomarkers discovery based on advanced GC-MS based methodologies

11:55h – Discussion

12:00h – Lunch Break

14:00h – Maria Rosário Domingues (UAveiro): “Lipidomics in health and disease”.

14:40 – Discussion

14:45 – Pedro Mena (University of Parma): “Targeted LC-MS applications for plant bioactives: from farm to fork”

15:25 – Discussion

15:30h – Ville Koistinen (University of Turku) – “Metabolomics analysis of phytochemicals from food”

16:10h – Discussion

April 20, 2022 (Wednesday)

Applications: Proteomics

9:30h – Debora Penque (INSA): “Disease biomarkers discovery by Proteomics-based approaches”

10:10h – Discussion

10:15h – Ricardo Gomes (UniMS - ITQB/IBET): “The analytical power of the QTOF-LC-MS platform to assess biological quality attributes”

10:55h – Discussion

11:00h – Break
11:15 – Hugo Osório (IPATIMUP): “Mass spectrometry-based proteomics in cancer”
11:55h – Discussion
12:00h – Lunch Break
14:00h – Carlos Cordeiro (FCULisboa): “Magnetic Resonance Mass Spectrometry: From small molecules to macromolecular assemblies”
14:40 – Discussion
14:45 – Bruno Manadas (CNCB-UCoimbra): “A different vision of translational research in biomarker discovery: Case Study for Parkinson’s disease potential biomarkers”
15:25 – Discussion

April 21, 2022 (Thursday)

Other applications of mass spectrometry

09:30h – Maria Conceição Oliveira (IST-Ulisboa): Mass Spectrometry tools for the identification of emerging contaminants in environmental samples.
10:10h – Discussion
10:15h – João Paulo Correia Leal (CTN – IST): The lab in a nutshell: fundamental Chemistry Studies in a Mass Spectrometer
10:55h – Discussion
11:00h – Break
11:15 – Hugo Santos (FCT-UNL) Mass-Up: an all-in-one open software application for MALDI-TOF mass spectrometry knowledge discovery
11:55h – Discussion
12:00h – Lunch Break
14:00h - Sofia Catarino (ISA-ULisboa): “ICP-MS applications for wine quality and authenticity assessment”
14:40h – Discussion

Day 5

Assessment

10h – Assessment

12:30h – End of Course