CH-403

# Mass spectrometry

Boyarkine Oleg

| Cursus | Sem. | Type |
|---|---|---|
| Chimiste | MA2 | Opt. |
| UNIL - Sciences forensiques | E | Obl. |

| | |
|---|---|
| Language of teaching | English |
| Credits | 3 |
| Session | Summer |
| Semester | Spring |
| Exam | Oral |
| Workload | 90h |
| Weeks | 14 |
| **Hours** | **2 weekly** |
| Courses | 2 weekly |
| **Number of positions** | |

## Summary

Become familiar with principles of mass spectrometric techniques and their applications in particular in proteomics andmetabolomics.

## Content

- Mass spectrometry history
- Isotopes and molecular weight
- Mass analyzers
- Ion sources, ion detectors
- Mass spectrometers
- Combination with liquid separation
- Tandem mass spectrometry (MS/MS)
- Gas-phase ion chemistry/physics
- Organic mass spectrometry
- Biological mass spectrometry, proteomics
- Mass spectrometry in medical research
- Mass spectrometry in environmental science
- Mass spectrometry in forensics

## Keywords

mass
isotopes
electrons
protons
peptide
electrical fields
ionization

## Learning Prerequisites

### Required courses

physics
thermodynamics
basic biology
basic chemistry

### Important concepts to start the course

atomic structure
molecular structure
peptide structure
ion motion in electrical/magnetic field
ion-molecule collisions
vacuum

## Learning Outcomes

By the end of the course, the student must be able to:

- Analyze mass spectra
- Work out / Determine molecular mass
- Choose ionization method
- Propose mass analyzer
- Select appropriately ion detector
- Distinguish charge states
- Reconstruct peptide sequence
- Distinguish types of dissociation

## Transversal skills

- Use a work methodology appropriate to the task.

## Teaching methods

lecturing
solving problems

## Expected student activities

listening lectures
solving problems
asking questions

## Assessment methods

oral exam
activity at lectures

## Resources

### Ressources en bibliothèque

- Spectrometrie de masse : Cours et exercices corriges / Hoffmann
- Mass Spectrometry : Principles and Applications / Hoffmann
- Mass Spectrometry : A Foundation Course / Downard

### Websites

- http://scgc.epfl.ch/telechargement_cours_chimie