

## **Course: Proteome Analysis by Mass Spectrometry**

**(Monday September 30-Friday October 4, 2024)**

### **Program:**

#### **Monday**

##### **Morning: Open Lectures**

- Introduction to mass spectrometry and proteomics /Mass spectrometers, ionization

types & mass analyzers

- Sample preparation for proteomics

##### **Afternoon: Laboratory session**

- Introduction to nano-LC-ion trap and Q- Orbitrap mass spectrometers.

Acquisition of

spectra, acquisition modes, mass calibration, spectra analysis: resolution, signal-to-noise ratio, dynamic range, etc.

Shotgun comparative and quantitative proteomics experiment: Discussion on the biological problem. Sample processing for proteomic analysis: FASP and gel-based

strategies (hands on, students on wet lab).

#### **Tuesday**

##### **Morning: Open Lectures**

- Protein analysis by shotgun/bottom-up and by top-down proteomics.
- Strategies for quantitative proteomic analysis (label-based, label-free, etc.)

##### **Afternoon: Laboratory session**

- Sample injection on mass spectrometers. Data Acquisition (DDA, DIA, PRM, SRM,

etc).

Quantitative Proteomics from a computational perspective. Software for performing

label-free (spectral counting/XIC) quantitation. ITRAQ and TMT

## **Wednesday**

### **Morning: Open Lectures**

- Data quality control.
- Looking under the hood of a search engine/False Discovery Rate and dealing with redundancy in databases

### **Afternoon: Laboratory session**

- Protein identification/Quantification and using search engines.

Examples provided by the organizers; data provided by the students:

- Identification of crosslinked peptides, • Cytoscape

## **Thursday**

### **Morning: Open Lectures**

- Mass spectrometry-based structural proteomics
- Applications of Mass Spectrometry (examples from the invited professors' own research activities: single cell proteomics; antibiotic resistant bacteria)

### **Afternoon: Practical Bioinformatics session:**

- Analysis of data obtained during the course, identification, quantitative label-free proteomics analysis (SC vs XIC) General discussion - Analysis of the results; comparing different strategies used. Final remarks on the practical course.

## **Friday**

### **Morning: Open Lectures**

- Applications of Mass Spectrometry (examples from the invited professors' own research activities)

### **Afternoon:**

Final Examination (1 hr)

Poster session (3 hr)