

# Planning Course CH-419: Protein mass spectrometry and proteomics

## Week 1-Week 4

- **1. Proteomics and mass spectrometry**

Introduction to protein analysis and proteomics; Reminders in mass spectrometry; Why proteomics and mass spectrometry?; Ionization sources, analysers, and detectors used in proteomics; Latest generation of mass spectrometers used in proteomics

+ exercise session

## Week 4-Week 5

- **2. Mass spectrometry-based proteomic strategy and workflows**

Bottom-up versus top-down strategies; Data-dependent acquisition (DDA) and data-independent acquisition (DIA) approaches; Sample preparation

+ exercise session

## Week 6-Week 7

- **Lab visit of the Proteomics Laboratory at Nestlé Research (EPFL Innovation Park)**

The class will be divided into two groups to ensure a better experience during the lab visit.

## Week 8-Week 9

- **3. Quantitative proteomic workflows**

Label-free methods; Labelling-based techniques; Other quantitative techniques

+ exercise session

## Week 10-11

- **4. Proteomic bioinformatics**

Databases; Identification of protein; Quantification of proteins; Bioinformatics tools; Practical examples

+ exercise session

## Week 12-Week 13

- **5. Applications to biology, clinical research, and beyond**

What strategy?; Experimental design & randomization; Biomarker discovery; Industrialized and population proteomics; Forensics; Targeted mass spectrometry-based approaches; Other biological applications of mass spectrometry; Advanced innovations (single-cells, 4D proteomics, multi-omics) and emerging technologies; Limitations and ethical consideration

+ Additional support/information on **Separations techniques in proteomics**