

Day 1: Introduction to Lipid biology/biochemistry

- Introduction to lipids
- Phospholipid structures and functions
- Neutral lipids (TG, DG, CE)
- Fatty acids and eicosanoids
- Sphingolipids
- Sterols, bile acids, oxysterols
- LIPID MAPS databases, tools and other resources

Day 2: Introduction to MS-based Lipidomics

- Sample preparation and storage considerations
- Chromatography of lipids, introduce different types and what can be measured
- Mass spectrometry instruments
- Shotgun MS/MS lipidomics
- Principles of lipid identification from large lists of MS data (untargeted/targeted), levels of annotation and shorthand notations
- LIPID MAPS nomenclature and classification
- Identifying lipids using MS/MS and retention time, defining a peak when using targeted methods, basic principles

Day 3: Lipid identification and novel technologies

- Novel technologies: REIMS, iKnife, LDI, DESI imaging of lipids
- Lipid Imaging using MS and MS/MS
- Standards for broad lipid categories and for cohort work, including Lipidizer, Splash, etc and how to use them
- Eicosanoids and related standards, how to use them for eicosadomics
- Ion mobility application to lipidomics
- Use of XCMS for processing large MS or MS/MS datasets

Day 4: Lipid quantification using targeted methods, statistics and visualisation

- Cohort lipidomics: Overview of current state of the art, standardization, pitfalls
- Targeted quantification of sphingolipids
- Targeted analysis of sterols and related mediators
- GCMS of lipids

Day 5: Lipidomics data integrations

- Application of biostatistical methods, including visualization
- Biostatistical tools for MS lipidomics
- Systems biology data integration – lipidomics perspectives
- Lipid ontologies

Tutorial sessions on:

- Biopan
- XCMS
- LipidFinder
- LDA
- LipidHunter
- LION/Web