

Syllabus for BBMB 542
Introduction to Molecular Biology Techniques: Section F: Metabolomics
Spring 2009

Objectives: To introduce qualitative and quantitative data gathering of small molecules in a complex mixture biological samples. This requires the integration of analytical chemistry biology and computer sciences. Chromatographic methods along with tandem mass spectrometry will be used as the main analytical tools.

- GC-MS as the analytical technique for analyzing volatile compounds (non-polar compounds).
- LC-MS enables to analysis of wide range of molecules where polarity of the molecule is not an issue.

Day 1 (3hr)

Introductory lectures (Basil Nikolau & Ann Perera)

- a. Analytical separations
Basics of HPLC and GC
Column selection
- b. Mass spectrometry
GC-MS and LC-MS
Detectors, mass analyzers

Day 2 (3hr) (Ann Perera)

Metabolomics

- c. Lecture- metabolomics, extraction protocols & derivatization requirements
- d. Lab- extraction
Non-targeted metabolite extraction

Day 3 (3hr) (Ann Perera)

Lab- non targeted profiling using GC-MS
Targeted metabolite profiling

Day 4 (3hr) (Ann Perera)

Data analysis

- e. Lecture- how to read mass spectra
- f. Lab- GC-MS data analysis

Day 5 (3hr) (Ann Perera)

LC-MS

- g. Lecture- how to interpret LC/MS mass spectra
Strategies for obtaining LC/MS mass spectra
- h. Lab- separation of mixture of phenolics MS/MS analysis

Day 6 (3hr) (Ann Perera)

LC-MS

- i. MS/MS experiment
- j. Unknown compound analysis

Day 7 (3hr) (Philip Dixon)

Statistical methods to mine data sets

There will be an independent study component in which students do a “mini project” to make the course content 30 hours (1 credit).