Quantitative Metabolite Measurement for Clinical Chemistry and Clinical Metabolomics

:: A 5-Day Hands-On Metabolomics Course

Produced by: TMIC, WishartLab™ and MSACL

Dates: May 26 - 30, 2025

Location: University of Alberta, Edmonton, Alberta, Canada.

Instructors: David Wishart, Allen Zhang, Tammy Zheng, Sindhu Nair

Course Format: Mix of lectures and hands-on laboratory work

Length: 5 days

Prerequisites: Participants are expected to have had some hands-on experience in mass spectrometry.

Travel, meals and accommodations: Participants are expected to cover the cost of their travel, meals and accommodations. Assume hotel costs of CAD$70-200/night, meal costs of CAD$40/day.

Lodging Available:
Campus Tower Hotel (~CAD$232)
On-Campus Dormitory Style Accommodations (CAD$70-80)

Course Registration Cost (does not include food, travel or accommodation):
Early Bird : USD$1100 (~CAD$1480)
Regular : USD$1400 (~CAD$1880)

Enrollment: up to 12 participants

Application Deadlines:
Early Bird : March 7, 2025
Final : April 7, 2025

Notice of Acceptance: April 14, 2025

If accepted, you will be invoiced directly based on the address information included in your application. Payment is required within 2 weeks of invoicing, otherwise your position may be offered to another participant. Refunds are not available once payment has been completed.

Application to participate

Syllabus: This is a 5-day lecture/lab course that is intended to introduce participants to the practice of robust, absolute quantitation of chemicals via mass spectrometry (MS). All attendees will first be introduced to general concepts of quality management and quality control (QM/QC) in laboratory practice and how ISO 17025 and ISO 15189 certification for laboratory assays can be obtained. Participants will be given a general lab orientation and practice sessions will be conducted on common laboratory steps needed for quantitative MS. Participants will then be introduced to two quantitative methods for measuring phenylpyruvic acid (a marker for PKU) in urine. One will be a colorimetric assay and the other will be an MS-based assay. Participants will be shown how to conduct both assays and will be allowed to repeat the assays for themselves. For the MS-based assay students will be shown how to determine physiological concentration ranges, how to prepare ^{13}C labeled phenylpyruvate, how to optimize chromatographic conditions, how to prepare multipoint calibration curves, how to determine retention time parameters and how to generate parent-product-ion pairs. In addition to single compound quantification via MS, participants will be shown how to prepare and run multi-compound, fully quantitative MS-based assays. Specifically, participants will be introduced to the theory and methods behind these assays and then shown how to conduct a 140-compound assay (called TMIC Prime) on both a Sciex Qtrap (triple quad) MS instrument and a Thermo Orbitrap MS instrument. Participants will have the opportunity to partially prepare and run these assays themselves.

Course Materials: Participants will be provided with lectures slides, protocols and general notes which they can take home or copy on to their computers.

Expectations: By the end of the course participants are expected to have a solid understanding of how to implement ISO-level, quantitative metabolite measurement assays on LC-MS systems. Metabolomics specialists will gain an appreciation of how to conduct clinical-grade targeted metabolomics while clinical chemists will have an appreciation of how to implement in-house, quantitative, laboratory developed tests (LDTs) for multiple compounds.

Day 1

9:00 -10:00 am	Lab tour and lab orientation
10:00 -11:00 am	Lab safety review
11:00-11:15 am	Coffee/BioBreak
11:15-12:00 pm	Lecture on QM and QC part 1
12:00-1:00 pm	Lunch
1:00-2:00 pm	Lecture on QM and QC (ISO certifications) part 2
2:00-3:00 pm	Lab (skills practice and training)
3:00-3:30 pm	Coffee/BioBreak
3:30-4:30 pm	Lab (Phenylpyruvate test – colorimetric)

Day 2

9:00 -10:00 am	MS instrument (Qtrap) orientation
10:00 -11:00 am	Lecture on how to conduct Phenylpyruvate test (MS)
11:00-11:15 am	Coffee/BioBreak

11:15-12:00 pm	Prep work for Phenylpyruvate test (MS) part 1
12:00-1:00 pm	Lunch
1:00-2:00 pm	Prep work for Phenylpyruvate test (MS) part 2
2:00-3:00 pm	Conduct Phenylpyruvate test (MS)
3:00-3:30 pm	Coffee/BioBreak
3:30-4:30 pm	Conduct Phenylpyruvate test (MS) cont'd
4:30-5:00 pm	Discussion

Day 3

9:00 -10:00 am	MS instrument (Orbitrap) orientation
10:00 -11:00 am	Lecture on Multi-metabolite test (MS)
11:00-11:15 am	Coffee/BioBreak
11:15-12:00 pm	Demonstration of TMIC Prime test (Orbitrap)
12:00-1:00 pm	Lunch
1:00-2:00 pm	Demonstration of TMIC Prime test (Orbitrap) and LC-AutoFit
2:00-3:00 pm	Demonstration of TMIC Prime test (Qtrap)
3:00-3:30 pm	Coffee/BioBreak
3:30-4:30 pm	Demonstration of TMIC Prime test (Qtrap) and LC-AutoFit
4:30-5:00 pm	Discussion and Review

Day 4

9:00 -10:00 am	Group split into 2 groups (A + B), Training videos on TMIC Prime test (MS)
10:00 -11:00 am	Operation of TMIC Prime test (Group A: Orbitrap, Group B: Qtrap)
11:00-11:15 am	Coffee/BioBreak
11:15-12:00 pm	Operation of TMIC Prime test (Group A: Orbitrap, Group B: Qtrap)
12:00-1:00 pm	Lunch
1:00-2:00 pm	Operation of TMIC Prime test (Group A: Orbitrap, Group B: Qtrap)
2:00-3:00 pm	Operation of TMIC Prime test (Group A: Orbitrap, Group B: Qtrap)
3:00-3:30 pm	Coffee/BioBreak
3:30-4:30 pm	Operation of TMIC Prime test (Group A: Orbitrap, Group B: Qtrap)
4:30-5:00 pm	Discussion and Review

Day 5

9:00 -10:00 am	Operation of TMIC Prime test (Group A: Qtrap, Group B: Orbitrap)
10:00 -11:00 am	Operation of TMIC Prime test (Group A: Qtrap, Group B: Orbitrap)
11:00-11:15 am	Coffee/BioBreak
11:15-12:00 pm	Operation of TMIC Prime test (Group A: Qtrap, Group B: Orbitrap)
12:00-1:00 pm	Lunch
1:00-2:00 pm	Operation of TMIC Prime test (Group A: Qtrap, Group B: Orbitrap)
2:00-3:00 pm	Operation of TMIC Prime test (Group A: Qtrap, Group B: Orbitrap)
3:00-3:30 pm	Coffee/BioBreak
3:30-4:30 pm	Data Analysis with LC-AutoFit
4:30-5:00 pm	Discussion and Review