

**Top-Down Proteomics (Saturday one-day course)
AND Mass Spectrometry Data Analysis and Visualization (Sunday one-day course)**

These two one-day courses are related so we bundled them as a two-day course, there is a cost savings in purchasing a twoday course versus two one-day courses. If you are interested in attending just one of the days, please register for the one-day course version.

Note: These are separate courses so the Saturday instructors will not be attending the Sunday course and vice-versa.

**Top-Down Proteomics
(Saturday one-day course Instructors)**



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Top-down mass spectrometry (MS)-based proteomics is arguably a disruptive technology for the comprehensive characterization of proteoforms by providing a “bird’s eye” view of all proteoforms to decipher the post-translational modification codes together with genetic variations that regulate cellular signaling in healthy and diseased states. In the recent years, significant strides have been made to advance top-down MS and bring it to the mainstream in a way that is accessible to the scientific community. As a result, interest in top-down MS has grown considerably with numerous studies demonstrating the potential of top-down proteomics for the unraveling of disease mechanisms and

discovery of new biomarkers. Recently, the burgeoning top-down proteomics field has gained momentum through the creation of the Consortium for Top-down Proteomics (<http://www.topdownproteomics.org/>). CTDP provides the fostering ground for education, collaboration and technology development to further advance top-down proteomics towards comprehensive analysis of proteoforms and to realize its impact in biomedical research and pharmaceutical industry. Each tutorial lecture will be aimed at beginners/newcomers to the top-down proteomics field, and will conclude with a dynamic moderated discussion/quiz session.

Topics:

- 1) Introduction a) History of top-down proteomics b) Concept of proteoforms c) Measurement of Proteoforms and their complexes d) Denatured vs. native mode
- 2) Sample preparation
- 3) Intact protein separation
- 4) Instrumentation, activation and dissociation methods for top-down MS
- 5) Comparison of bottom-up and top-down – pros and cons
- 6) Data interpretation and software tools for top-down proteomics
- 7) Top-down quantitative proteomics – including experimental design
- 8) Biomedical and biopharmaceutical applications of top-down MS 9) Future outlook

Prerequisites: Basic knowledge of mass spectrometry, including familiarity with ESI and mass analyzers, basic knowledge of protein structure

One-Day Course, Sunday only Top-down Mass Spectrometry Data Analysis and Visualization

People attending this course might also be interested in attending Top-Down Proteomics, so we bundled these two one-day courses as a two-day course (there is a cost savings). The bundled two-day course is listed as *Top-Down Proteomics AND Mass Spectrometry Data Analysis and Visualization* under the two-day course section.

Instructors



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Top-down mass spectrometry (MS) has gained increasing attention in the past decade because of its capability to sequence whole proteoforms with combinations of post-translational modifications (PTMs) and other alterations. Because of the complexity of top-down MS data, it is still challenging for MS labs to efficiently use software tools for top-down MS-based proteoform identification, characterization, and quantification. In the short course, we will teach students and researchers several software pipelines for top-down MS data analysis and visualization. We will present computational tools for file format conversion, spectral deconvolution, proteoform identification, PTM localization, proteoform quantification, and visualization of top-down MS data. We will explain the algorithms and statistical methods in the tools and parameter selection for various applications. We will use public top-down MS data to show how to apply the tools to various research problems ranging from modified proteoform identification to proteoform biomarker identification. We will give students and researchers hands-on training to use the tools to analyze top-down MS data sets.

Topics

1. Introduction of top-down MS data
2. Computational methods for top-down MS data analysis
 - Top-down spectral deconvolution
 - Proteoform identification by database search
 - PTM localization
3. Software pipelines for top-down MS data analysis
4. Applications and hands-on demo session