This one-day short course is designed for investigators with minimal experience in metabolomics, but with background in mass spectrometry. The course will focus on untargeted profiling of metabolites with LC/MS approaches, providing a detailed overview of each step of the workflow. The discussion will start with considerations related to experimental design and highlight advantages/disadvantages to using various extraction protocols, separation strategies, ionization methods, and data-analysis tools. A survey of bioinformatic resources currently available to interpret metabolomic data will be provided and the application of these tools to translate raw data into biology explored. Finally, the challenges of performing metabolomics will be outlined and technologies being developed to overcome these barriers highlighted. The course will conclude with an overview of isotope-based approaches being used to investigate metabolic dynamics.