This course focuses on current and emerging technologies and approaches in protein analysis, and considers applications of these technologies in biology, biotechnology and biomedicine.

**Course Outline**

**March 30, 2015: Class description, Introduction and Protein separation technologies**

  Introduction: protein basics, protein properties, protein modifications, protein structure, complexity of the proteome and challenges associated with proteomic analysis.

**April 1, 2015: Protein separation, visualization and sequencing**

  1) Protein separation & visualization: chromatography, electrophoresis, immunopurification, Western blot.

  2) Protein sequencing I: Protein chemistry, amino acid analysis, Edman degradation, Sanger (insulin)

**April 6, 2015: Protein sequencing II**

  1) Introduction to Mass Spectrometry
  2) Analysis of proteins by mass spectrometry (top-down and bottom-up approaches)
  3) Analysis of MS/MS peptide spectra
     * Assignment: Problem set handed out (due 4/13)

**April 8, 2015: Analysis of protein post-translational modifications**


**April 13, 2015: Comparative and quantitative proteomics**

  * Problem set due

**April 15, 2015: Protein interactions, activity and dynamics**

  1) Protein interaction analysis
  2) Activity based methods and protein arrays
  3) Measurement of protein dynamics.
  4) Fluorescence based technologies

**April 20, 2015: The human proteome, proteogenomics**

**April 22, 2015: Genomic technologies to study proteins**

  * Proposal due.

**April 27 and April 29, 2015: “New Technology” Presentations**

**Class Grades:**

  Class Participation: 30%
  Problem Set: 25%
  Proposal & Presentation: 45%

* Problem set will be a collection of peptide mass spectra that will need to be interpreted. The problem set is due April 15th.

* Proposal and Presentation: Each student will propose a novel technology for characterizing proteins. Any technology that relates to proteins, their structure or their function is acceptable. The technology does not necessarily have to be related to the technologies presented during the class. The assignment consists of a one-page write-up including a brief background section and two specific aims in addition to a 5-minute presentation. The first specific aim should describe the technology to be developed and the second aim should describe an application of the technology. Proposal is due April 22nd.