

Course Title: Proteomics

Course Code: ABS-839

Course Objectives:

The main objective of this course is to offer basic to advance knowledge of proteomics and its applications.

Course Outcomes:

The information obtained during the course should be helpful to understand the current trends in proteome science and use of advance bioinformatics tools for protein functional and structural attributes. The students will learn how proteomics application in biological research can benefit in solving the complex biological and biochemical processes regardless of the type of organism which is the model for the research.

Course Contents:

- Introduction to Proteomics
- Basic of protein structures and folding
- Proteomics classification
- Proteomics Techniques
- Protein Purification techniques
- Protein Separation:
 - SDS-PAGE and Two Dimensional Gel Electrophoresis
 - Liquid Chromatography
- Mass Spectrometry
- Basics of Mass spectrometry
 - Tandem MS/MS spectrometry
 - MALDI-TOF and ESI-QTOF
- Post-Translational modifications
- Protein-Protein Interactions
- Emerging Proteomics Technologies
- Major online databases and their Practical use
 - BLAST, FASTA. Clustal W. BOXSHADE, InterPro, UniProt, Pride, Pfam
 - Interaction network databases
- Similarity, homology, local and global sequence alignment
- Scoring matrices (PAM, BLOSUM), Pairwise alignment, Dot sequence alignment, docking
- Applications of Proteomics
 - Human Disease, Medicine and Drug Discovery, Agriculture and Industry

Recommended / Reference Books:

- Principles of Proteomics: Richard M. Twyman, Garland Science (Taylor and Francis Group), 2014, pp. 260.
- Proteomics: Introduction to methods and applications. Agnieszka Kraj and Jerzy Silberring. 2008. pp 376.
- Introducing Proteomics: From Concepts to Sample Separation, Mass Spectrometry and Data Analysis. Josip Lovric. 2011. pp 296.
- Proteomics in Practice: A Guide to Successful Experimental Design, 2nd, Completely Revised Edition. Reiner Westermeier, Tom Naven, Hans-Rudolf Hopker. 2008. pp 502.
- Proteomics: Methods and Protocols. Reinders, Jörg, Sickmann, Albert. 2009. pp 431.
- Proteome Bioinformatics. Hubbard, Simon J., Jones, Andrew R. 2010. pp 393.