

NOC:Interactomics: Protein Arrays & Label-free Biosensors - Video course

COURSE OUTLINE

Proteins are the key effectors of any living system and are largely responsible for the functioning of a cell. Intricate cell signaling and molecular triggers are dependent on interactions involving proteins at the cellular level. It is due to this very reason that, in an age where clinical biology is thriving to make an impact in global health-care and biomedical diagnostics, there has been a surge of interest in the area of Interactomics. Interactomics essentially involves the study of interactions between biomolecules, particularly proteins and the consequences of those interactions in a biosystem.

This course of interactomics focuses on two powerful platforms: 1. Protein microarrays and 2. Label free biosensors involving Surface Plasmon Resonance (SPR) and Biolayer Interferometry (BLI). While the former is a high-throughput tool for discovery-based interactomics, the later is proving itself to be an instrumental resource for validation based studies. This course details the overlapping domains of proteomics and interactomics, which form the focus of researchers making an impact in the clinical biomarker and pharmaceutical arena across the globe. Students would benefit hugely from this unique course-model designed for budding scientists as well as seasoned researchers new to this area of research.

COURSE DETAIL

Week	Topics
1.	Lecture 1 : Introduction to interactomics Lecture 2 : An overview of label-free technologies Lecture 3 : An overview of surface plasmon resonance (SPR) Lecture 4 : An overview of surface plasmon resonance imaging Lecture 5 : Basics of SPR: Surface chemistry



NP-TEL

NPTEL

<http://nptel.ac.in>

Biotechnology

Pre-requisites:

B.Sc. Or M.Sc. The target audiences of this course are required to have a basic biology and biochemistry background.

Coordinators:

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2.	<p>Lecture 6 : Basics of SPR: Experimental design</p> <p>Lecture 7 : Protein immobilization for protein-protein interaction studies</p> <p>Lecture 8 : Protein-protein interaction study: Binding analysis</p> <p>Lecture 9 : Protein-protein interaction study: Kinetic analysis</p> <p>Lecture 10 : Protein-small molecule interaction study: Immobilization & binding analysis</p>
3.	<p>Lecture 11 : Protein-small molecule interaction study: Kinetic analysis</p> <p>Lecture 12 : SPR: Interactive Session-I</p> <p>Lecture 13 : SPR: Interactive Session-II</p> <p>Lecture 14 : An overview of ellipsometry and interferometry techniques</p> <p>Lecture 15 : An introduction to BioLayer Interferometry (BLI) and its applications in protein research</p>
4.	<p>Lecture 16 : Kinetic analysis of protein-protein interaction using BLI</p> <p>Lecture 17 : Label-free quantification of proteins using BLI</p> <p>Lecture 18 : Diffraction-based biosensors I</p> <p>Lecture 19 : Diffraction-based biosensors II</p> <p>Lecture 20 : Nanotechniques in proteomics I</p> <p>Lecture 21 : Nanotechniques in proteomics II</p>
5.	<p>Lecture 22 : High throughput platforms of interactomics: Protein arrays</p> <p>Lecture 23 : Conventional label based detection techniques for Protein microarrays</p> <p>Lecture 24 : Novel detection techniques for Protein microarrays</p> <p>Lecture 25 : Recombinational cloning and its application for Protein microarrays</p> <p>Lecture 26 : An introduction to Cell-free protein synthesis</p>
6.	<p>Lecture 27 : Cell-free synthesis based protein microarrays: PISA and NAPPA</p> <p>Lecture 28 : Cell-free synthesis based protein microarrays: MIST, DAPA and Halotag Arrays</p> <p>Lecture 29 : Digging deeper into NAPPA: Basic Workflow</p> <p>Lecture 30 : Digging deeper into NAPPA: Surface Chemistry, Printing and Assessment</p> <p>Lecture 31 : Application of cell free expression protein microarrays in biomarker discovery</p>

7.	Lecture 32 : Application of cell free expression protein microarrays in immunological studies Lecture 33 : Basics of microarray image scanning Lecture 34 : Software for Image scanning and data processing Lecture 35 : Microarray Data Analysis: Part I Lecture 36 : Microarray Data Analysis: Part II	
8.	Lecture 37 : Application of protein microarray in biomarker discovery-I Lecture 38 : Application of protein microarray in biomarker discovery-II Lecture 39 : Systems biology and networks Lecture 40 : Challenges in proteomics	