INTERACTOMICS : BASICS & APPLICATIONS

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TYPE OF COURSE : Rerun | Elective | UG/PG
COURSE DURATION : 12 weeks (24 Jan' 22 - 15 Apr' 22)
EXAM DATE : 23 Apr 2022

INTENDED AUDIENCE : Biology or biotechnology students having interest in latest technologies,(BE/B.Tech) , B.Sc. & students from science background. But course is open to all.
INDUSTRIES APPLICABLE TO : GE Healthcare, Pall Life Sciences, Thermofisher Scientific, Illumina

COURSE OUTLINE :

Interactomics essentially involves the study of interactions between biomolecules, particularly proteins and the consequences of those interactions in a biosystem. Through this course, we aim to provide an interface between distinguished scientists involved in interactomics research, industrial partners, faculties and students. This course would feature an intensive lecture series followed by some demonstrations designed to provide the much needed training required to explore the endless possibilities in interactomics research using genomics and proteomics approach, that can be useful for a researcher at any stage.

ABOUT INSTRUCTOR:

Prof. Sanjeeva is a Professor and group head of proteomics laboratory at the Indian Institute of Technology, Bombay. He obtained his Ph.D. from the University of Alberta and post-doc from the Harvard Medical School in the area of proteomics, stress physiology and has specialized expertise in applications of data enabled sciences in global health, developing country and resource limited settings. He joined IIT Bombay in 2009 as an Assistant Professor and currently working as Professor.

COURSE PLAN :

Week 1: Introduction to Proteomics, Interactomics, High throughput platforms of interactomics: Protein arrays, Cell-free expression based protein microarrays, NAPPA: Recombinational Cloning, Basic workflow, Surface Chemistry, Printing and Assessment.
Week 2: NAPPA Technology and Protein Arrays-I, II, Biomarkers: Harnessing the immune system for early detection of disease-I, II, III.
Week 3: NAPPA & its applications in study of antibody immune response in disease & in drug screening-I, II, III, Using functional proteomics to identify biomarkers and therapeutic targets-I, II.
Week 4: Applications of protein microarrays in Malaria Research-I, II, Introduction to Bioprinting and Iris™ Optical QC Benefits-I, II, Screening of autoantibody signatures in cancer patients: Lab demonstration.
Week 5: Basics of Image Scanning and data acquisition, Applications of protein arrays in the identification of autoantibody signatures-I, II, Applications of protein microarrays in deciphering PTMs and biological networks, Basics and Applications of Reverse Phase Protein Arrays-I.
Week 6: Basics and Applications of Reverse Phase Protein Arrays-II, III, An overview of label-free technologies, Surface Plasmon Resonance- Principles and Assays-II.
Week 7: Basics of SPR: Surface chemistry, Experimental design, Protein immobilization for protein-protein interaction studies, Protein-protein interaction study: Binding analysis, Kinetic analysis.
Week 8: Use of SPR in unravelling domain motif interactions of proteasomal assembly chaperones, Protein-small molecule interaction study: Immobilization Immobilisation & binding analysis, Kinetic analysis, An introduction to biolayer interferometry (BLI) and its applications in protein research.
Week 9: Biomolecular interactions using Bio-Layer Interferometry (BLI)-II, Lab session- An introduction to Bio-Layer Interferometry (BLI) and its applications in protein research, Mass Spectrometry coupled Interactomics-I.
Week 10: Mass Spectrometry coupled Interactomics-II, Next-Generation Sequencing Technology- Ion Torrent™, NGS Technology - Bioinformatics and data analysis-I, II.
Week 11: Agilent complete NGS target enrichment workflow for exomes, targeted panels and beyond, The Human Pathology Atlas: A Pathology Atlas of the Human Transcriptome-I, II, Statistical Analysis-I, II.
Week 12: Secondary Data Analysis, Pathway Enrichment and Network Analysis, Data Repositories and Databases, Application of multi-omics approach for better understanding of cancers, Integrated Omics and Systems Biology- Conclusion.