INTRODUCTION TO PROTEOGENOMICS

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IIT Bombay

TYPE OF COURSE : New | Elective | UG/PG
COURSE DURATION : 12 weeks (20 Jul'20 - 9 Oct'20)
EXAM DATE : 18 Oct 2020

INTENDED AUDIENCE : Students with science or engineering background but course is open to all.
INDUSTRIES APPLICABLE TO : Thermofisher Scientific, Illumina

COURSE OUTLINE :
This course is a part of a workshop by experts in the fields of proteomics and proteogenomics in cancer research from the Broad Institute of MIT and Harvard and Indian Institute of Technology Bombay. The course will comprise interactive lectures with case studies, hands-on sessions and demonstrations on proteogenomics aimed at accelerated understanding of cancer. This course will cover the principles of proteogenomics followed by experimental sessions, where proteomics data using LC-MS/MS will be processed and analyzed.

ABOUT INSTRUCTOR :
Prof. Sanjeeva Srivastava completed Ph.D in University of Alberta, Canada (2006). He has his Post-doc, at Harvard Institute of Proteomics, Harvard Medical School, USA (2007-2009). He worked as an Assistant Professor, Department of Biosciences and Bioengineering, IIT Bombay (2009-2014) and currently is an Associate Professor in the Department.

COURSE PLAN :
Week 1: Proteogenomics overview- Part I and II, Introduction to Genomics- Part I, II and III ; SL1 and SL2
Week 2: Introduction to Genomics IV, Gene expression & Phenotype - Part I and II, An overview of NGS technology, SH1 and SH2
Week 3: Introduction to Proteomics, Introduction to MS-based Proteomics- Part I and II, Applications of NGS – Ion Torrent SL 3 and SL4
Week 4: Introduction to MS-based Proteomics- Part I and II (Hands-on), Data analysis: Normalization Batch Correction and Missing values, Statistical Tests, SH3 and SH4 NGS- Ion Torrent
Week 5: Machine learning and Clustering, Hypothesis testing, ProTIGY- Part I and II, Proteogenomics approach to unravel proteoforms, SL5 and SL6: Genomic Analysis using Droplet PCR
Week 6: Workflow to Automated Data Processing, Introduction to Fire Cloud and Data Model, Bioinformatics solutions for ‘Big Data’ Analysis- Part I and II, SH5 and SH6: Genomic Analysis using Droplet PCR
Week 9: Introduction to Proteogenomics-Part I and II, Sequence centric proteogenomics, Gene Variant Analysis, Proteomics in Clinical studies, SH8: ProTIGY
Week 11: Biological Network Analysis- Part I and II, Mutation and Signaling - Part I and II Pathway Enrichment, SH10: Pathway Enrichment and Network Analysis
Week 12: Gene Set Enrichment Analysis (GSEA), Pathway enrichment: GSEA, Linked Omics, (Hands-on), Proteogenomics Conclusions, SL10: Topics in Proteogenomics- Malaria and Cancer case study