



# BIOENGINEERING: AN INTERFACE WITH BIOLOGY AND MEDICINE

## PROF. SANJEEVA SRIVASTAVA

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IIT Bombay

**INTENDED AUDIENCE :** Standard X, XI and XII, First Year Engineering (BE/B.Tech) Students, B.Sc students, Science Background; but course is open to all.

**INDUSTRIES APPLICABLE TO :** GE healthcare, Pall Life Science, ThermoFisher Scientific

### COURSE OUTLINE :

This is a basic biology course for students of engineering background. Course would provide basic understanding of biological concepts and also motivate students why understanding biology is crucial for several applications.

### ABOUT INSTRUCTOR :

Prof. Sanjeeva Srivastava Dr. Sanjeeva Srivastava 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. Current research in his group centers on biomarker and drug target discovery and deciphering the protein interaction networks in complex human diseases (gliomas) and infectious diseases (malaria) using high throughput proteomics, protein microarrays and mass spectrometry. Dr. Srivastava is an active contributor to global proteomics science and innovation. He serves on the Executive Council of Human Proteome Organization (HUPO) and Proteomics Society, India (PSI). He has organized three successful international conferences & workshops at IIT Bombay PSI-2014, Targeted Proteomics International Symposium in 2015 and 2018. He has published four special issues as editor, Proteomics in India for Journal of Proteomics; Proteomics Research in India for Nature India, Protein Arrays for Proteomics and Neglected Tropical Infectious Diseases for Proteomics Clinical Applications. Having an extensive teaching experience at IITB and experience of conducting proteomics courses at CSHL, New York provided him with the background to increase proteomics education for the global community. One of his special contributions has been the development of e-learning resources (MOOC mass spectrometry and interactomics courses; Virtual Proteomics Laboratory). He has made first ever proteomics documentaries Proteomics: Translating the Code of Life and Human Proteome Project (HPP). He has directed HUPO Perspective in Proteomics video interview series, which is hosted on HUPO website. Recently we have signed a MOU on clinical proteogenomics cancer research with National Cancer Institute, along with Tata Memorial Centre and India has now become 12th country to join the International Cancer Proteogenome Consortium (ICPC). Dr. Srivastava continues to develop proteomics & omics science and innovation together with and for the next generation of keen students, researchers and the research and education commons in Asia and global OMICS community. Click here to view Faculty Profile: <http://www.bio.iitb.ac.in/~sanjeeva/> About the Instructor: <https://youtu.be/sb4faypvWwk>

### COURSE PLAN :

**Week 1 :** Why biology for engineers: Part-I, Why biology for engineers: Part-II, Life processes & Cell, Cell and its properties, Clinician's Perspective-I

**Week 2 :** DNA Tools-Gene cloning, DNA Tools-Gene cloning-II, DNA Tools & Biotechnology, DNA Tools & Biotechnology-II,

**Week 3 :** DNA Tools & Biotechnology-III, DNA Tools & Biotechnology-IV, DNA Tools & Biotechnology-V, DNA Tools & Biotechnology-VI, Clinician's Perspective-III

**Week 4 :** Genetics-I, Genetics-II, Genetics-III, Genetics-IV, Clinician's Perspective-IV

**Week 5 :** Chromosomal basis of inheritance, Linkage, chromosomal disorders, Classical Genetics experiments, Bacteria and Viruses, Clinician's Perspective-V

**Week 6 :** Cell cycle, Cell cycle dysregulation & Cancer, Developmental Biology, Principles and application of Animal Cloning, Evolution & Bioinformatics

**Week 7 :** Amino acids & proteins, Proteins & Proteomics, Techniques to Study Protein & Proteome-I,II,III

**Week 8 :** Techniques to Study Protein & Proteome-IV, Protein Interactions & Microarrays, Protein interactions & Systems biology, Bioinformatics, Ethics in Research and Publications