Subject Code : P8GT10

CORE COURSE X: STRUCTURAL AND FUNCTIONAL GENOMICS

UNIT -I

Structural and functional genomics- definition, historical prospective and strategies. Genome Structure: genome sizes – microbial and organelle genome – genome physical mapping and sequencing – tools in genome analysis; Structural and functional annotations of genes and genomes. An overview of genome projects : human, plant, animal and microbial genomes. Analysis of Human Genome Map repositories: NCBI – Entrez Human genome map viewer, OMIM – Online Mendelian Inheritance in Man. Practical uses of genome maps: Locating genomic regions, Target identification, Arrangement of genes, SNP diagnosis, Positional specific cloning,

UNIT -II

Protein conformation, Ramachandran plot and principle of protein folding. protein structure databanks – internal and external co ordinate system-DNA and Protein Data banks.
Protein structure determination – X ray crystallography, protein crystallization, x ray diffraction. molecular replacement and direct method – atomic co ordinates and electron density maps, analysis and correctness of structure. Protein prediction by homology modeling – fold recognition – ab initio methods.

UNIT- III

Methods for comparison of 3D structures of protein. Conformational energy – Molecular mechanisms and molecular dynamics. simulation of free energy charges – force fields, mixed selection, Structure refinement and structure – function relationship. sequence analysis of protein and nucleic acid – restriction analysis, consensus sequences. Structural analysis and homology modeling.

UNIT - IV

Microarray: protein and DNA, transcriptomics - applications and advantages. Proteomics: DNA Polymorphisms as expressed in proteins; Proteomics tools – 2D gels, Mass spectroscopy, computational pattern – protein network and pathways. Human genome project – Functional genomics, role in drug design and personalized therapies.

UNIT- V

Landmarks of human genome: Morbid anatomy of genome comprising allelic disorders, relation to oncogene, malformation syndrome, specific susceptibility/resistance. maternal-fatal incompatibility, functional attributes and other disorders associated with chromosomes 1-10, 11-22 and sex chromosomes in humans.

REFERENCES:

1. Necia Grant Cooper; (Ed.) 1994.The Human Genome Project; Deciphering the Blueprint of heredity University Science books, CA, USA.
2. Gary zweiger, 2003. Transducing the Genome; Information, Anarchy and Revolution in Biomedical Sciences.. Tata McGraw-Hill Publishers, New Delhi.
3. Howard L McLeod1 and William E Evans. 2001. PHARMACOGENOMICS: Unlocking the Human Genome for Better Drug Therapy. *Annu. Rev. Pharmacol. Toxicol.* 41:101–121.
4. Evans W.E. and Relling, M.V. 1999. Pharmacogenomics: Translating Functional Genomics into Rational Therapeutics. *Science* 286:487
5. Satoskar, R.S., Bhandarkar, S.D and Annapure, S.S. 1999. Pharmacology and Pharmacotherapeutics, Popular Prakashan, Mumbai.
6. Branden, C and J.Troze, 1999. Introduction to Protein Structure. Second Edition.Garland Publishing, New Delhi.
7. Baxevanis, A.D and Ouellette, B.F.F. Eds. 2001. Bioinformatics: A Practical Guide to the Analysis of Genes and Proteins. Wiley Interscience. New York.
8. Higgins, D and Taylor, W (Eds). 2000. Bioinformatics: Sequence, Structure and Databnks.Oxford University Press, Oxford.