

Bioinformatics

Syllabus for Ph.D Pre-Registration Qualifying Entrance Examination

Unit-I

Computer System: Storage devices, Hardware, Software, Input devices, Output devices; Processing Unit: Types of processing, Modern Computers; Operating system: Windows, Linux, UNIX commands; Internet: Web browsers, Internet protocols; Data Security; Antivirus, Firewall.

Unit-II

Mendelian Laws, Structure and functions of Cell organelles, Nucleus organization and nuclear transport; Structure, compositions and functions of Biological Membrane; Nucleic Acid Structure: Different forms of DNA helix (A, B, Z); DNA Replication in Prokaryotes and Eukaryotes; Mutations and Mutagenesis, Repair mechanisms.

Unit-III

Organization of Gene in Prokaryotes and Eukaryotes, Transcription and Translation in Prokaryotes and Eukaryotes, Regulation of gene expression; Post-Transcriptional Modification, Protein synthesis, Genetic code. Membrane transport: Protein sorting, insertion, folding and processing; Molecular control of cell cycle; Genome sequencing methods, Strategies for genome sequencing; RFLP, RAPD and AFLP techniques.

Unit-IV

Sequence Analysis: MSA, ClustalW, Phylip, BLAST, FASTA, ExPASy Tools; Databases: Structure databases – PDB, MMDB, CATH, SCOP, PDBsum; Sequence databases – NCBI, DDBJ, EMBL, Uniprot, Prodom, NEBcutter - Primer3 - Visualization tools - Modeller - Ramachandran Plot.

Unit-V

Homology modeling, Molecular Docking, Structure based drug design, Protein-ligand Interactions, Protein-Protein Interactions, Force fields, inter and intra-molecular interactions, Molecular Dynamics Simulations, QSAR, QSPR, Active site analysis, Combinatorial Library Design and Atomic constant, Pharmacophore, Virtual Screening and Hit lead optimization.