

**SARDAR PATEL UNIVERSITY**  
**Programme & Subject : B.Sc. (Bioinformatics)**  
**Semester : III**

**Syllabus with effect from: June – 2019**

<b>Paper Code: US03CBNF21</b>		<b>Total Credit: 4 (4 lectures/wk)</b>
<b>Title of Paper: Basics in Bioinformatics</b>		
<b>Unit</b>	<b>Description in detail</b>	
<b>1</b>	<b>Introduction to Bioinformatics</b> Definition and history of bioinformatics Goals, Fields, Applications and Limitations in Bioinformatics. Important Software, databases and web sites in bioinformatics Freeware and shareware software. Introduction to Data Mining; Application of data mining in Bioinformatics. Sequence formats: Genbank, FASTA, GCG, MSF and ASN	
<b>2</b>	<b>Biological databases and applications I</b> Database: Definition, Types: Flat file database, relational databases and object-oriented databases and their significance. Biological database: Definition, Types: Primary databases, Secondary databases and specialized databases and their significance. Nucleic acid databases: GenBank, EMBL, DDBJ Protein databases: Uniprot-KB: SWISS-PROT, TrEMBL, PDB, PROSITE	
<b>3</b>	<b>Biological databases and applications II</b> National Centre for Biotechnology Information (NCBI) data model. Search engine: Introduction, tools for web search. <b>Literature databases-</b> PubMed, PubMed Central; OMIM, OMIA, Journal databases, MeSH. Information retrieval from biological databases: Entrez and Sequence Retrieval Systems (SRS) and their applications. Structure classification database: CATH, SCOP Algorithm: Definition, Type and importance. Introduction to biological algorithm	
<b>4</b>	<b>Number Systems</b> Block diagram of a Computer. Significance of different functional units. Introduction to hardware and software. Application of Computer Instruction execution cycle, CPU Organization. Introduction to Number System: Binary, Octal, Decimal, Hexadecimal Conversions of Number System : Binary, Octal, Decimal, Hexadecimal Arithmetic of Binary System : Addition, Subtraction	

**Basic Text & Reference Books**

- 1) Developing Bioinformatics Computer Skills. Oreilly Publications.
- 2) An Introduction to Bioinformatics Algorithms, Neil C Jones & Pavel A. Pevzner, Ane Books, 2015.
- 3) Introduction to Bioinformatics by Aurthur M lesk.
- 4) Bioinformatics: Sequences, structure and databanks by Des Higgins and Willie Taylor, Oxford University Press, 2000.
- 5) Computer Fundamentals by Rajaraman

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**Syllabus with effect from: June – 2019**

<b>Paper Code: US03CBNF22</b>	<b>Total Credit: 4</b> <b>(4 lectures/wk)</b>
<b>Title of Paper: Cell Biology</b>	

Unit	Description in detail
<b>1</b>	<b>Cell organelles</b> Structure and function of Prokaryotic cell and Eukaryotic cell (plant and animal cells) and their components, Nucleus: Ultra structure & functions of nuclear envelope, nucleolus, mitochondria, Endoplasmic reticulum, Ribosomes, Golgi apparatus, lysosomes, vacuoles, chloroplast, microfilaments, microtubules, intermediate filaments, centrioles, cilia and flagella.
<b>2</b>	<b>Plasma membrane and membrane transport</b> Ultra structure of plasma membrane (Danielli-Davson model, Robertson model and fluid mosaic model). Fluidity of the membranes. Membrane lipids, membrane proteins and carbohydrates. Membrane transport by active and passive transport (Simple diffusion, Facilitated diffusion). Cell recognition, cell adhesion and cell junction in Eukaryotic membrane, membrane excitability in animals, neurotransmission and gated channels, vesicular transport and membrane fusion.
<b>3</b>	<b>Chromosomes and cell division</b> Structure and types of chromosome. Euchromatin, heterochromatin, Barr body, Specialized chromosomes-salivary gland chromosome, Lampbrush chromosome. Cell cycle - (G, M, S Phases), An overview of cell cycle: Components of cell cycle control system. Mitosis: Stages and Significance of mitosis, Meiosis: Stages, Genetic recombination and significance of meiosis, Gametogenesis and fertilization in plants and animals.
<b>4</b>	<b>Structure and functions of nucleic acid</b> Evidences- DNA as a genetic material, Chemical basis of heredity (DNA as genetic material) Griffith's experiment on transformation. Experiment of Avery, McCleod and McCarty Experiment of Hershey and Chase, X-ray diffraction analysis, Chargaff's base pair rule experiment. Nucleoside, nucleotide and poly-nucleotide, DNA double helix structure (Watson and Crick model). Physical, chemical and biological properties of DNA. RNA its types and Functions [Genetic RNA (Viral RNA), Non-genetic RNA (r RNA, t RNA and m RNA)]

**Basic Text & Reference Books**

1. Principles of Biochemistry - Lehninger, Cox, M. M., & Nelson, D.L., 5<sup>th</sup> Ed., W. H. Freeman, New York.
2. Genes IX – Benjamin Lewin, Oxford University Press
3. Principles of Genetics – D. Peter Snustad and Michael J. Simmons, John Wiley & Sons, Inc
4. Genetics - Peter J. Russel 5<sup>th</sup> Ed. Benjamin Cummings Publishing Company.
5. Genetics - P.K. Gupta 3<sup>rd</sup> Ed. Rastogi Publications.
6. Instant Notes in Genetics- P.C.Winter, G.I.Hickey & H.L.Fletcher, 2<sup>nd</sup> Ed. Viva Books Pvt. Ltd.
7. Principles of Genetics – Eldon J Gardner, John Wiley & Sons, Canada.
8. Genetics - Strickberger 3<sup>rd</sup> Ed. Prentice Hall of India Pvt. Ltd.
9. Principles of Genetics – D. Peter Snustad & Michael J. Simmons, John Wiley & Sons. Inc

**SARDAR PATEL UNIVERSITY**  
**Programme & Subject : B.Sc. Bioinformatics (Practical syllabus)**  
**Semester : III Total Credit: 2**  
**Syllabus with effect from: June – 2019**  
**Paper Code: US03CBNF23**

1. Fundamental of bioinformatics: Fields and scope.
2. Acquainted with Power point presentation and MS Word.
3. Different Search engines and their importance. (Boolean logic)
4. Entrez: NCBI search engine.
5. Sequence retrieval in Fasta format.
6. Sequence submission in NCBI
7. NCBI – Its important databases.
8. Databases (Important features)
  - GenBank
  - EMBL
  - Swiss Prot
  - PDB
  - SCOP
9. Making search for the scientific literature (Pubmed, PubMed Central, OMIM)

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**Programme & Subject: B.Sc. Bioinformatics (Practical syllabus)**  
**Semester : III Credits--2**  
**Syllabus with effect from: June – 2019**

1. Introduction to lab instruments (microscopes, spectrophotometer).
2. Study of different kinds of cells from leaf peels, flower stamens, petals, staining with nuclear stain to show cytoplasm & nucleus.
3. Osmosis, plasmolysis & deplasmolysis demonstration with leaf peels in different concentration of glycerin.
4. Study of cell divisions, identification of different stages of mitosis
5. Identification of different stages of meiosis
6. Special types of chromosomes
  - a. salivary gland chromosome
  - b. supernumerary chromosome
7. Estimation of RNA by orcinol
8. Estimation of DNA by UV and DPA method
9. Estimation of protein by Folin's method
10. Physiological experiments: Oxygen evolution during photosynthesis