

## Syllabus of B.Sc. (Bioinformatics)

Subject- Bioinformatics (as one subject)

B.Sc. I Year *wef. 2014-15*

### Semester I

Paper I: Basic of Bioinformatics

85 marks

Practicals

50 marks

### Semester II

Paper II: Mathematics I

85 marks

Practicals

50 marks

B.Sc. II Year

Semester III *wef. 2015-16*

Paper III: Structural Bioinformatics

85 marks

Practicals

50 marks

### Semester IV

Paper IV: Mathematics II

85 marks

Practicals

50 marks

B.Sc. III Year *wef. 2016-17*

### Semester V

Paper I: Computer graphics, Machine learning and Bioperl

85 marks

Practicals

50 marks

### Semester VI

Paper I: Informatics in omics and application

85 marks

Practicals

50 marks

15 marks CCE as per higher education norms in each semester.  
Practicals based on theory are to be designed by the concerned teacher.

*Minimum Passing marks will be 28/85*

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## Session 2014-15

B.Sc. Part - I Semester - I

Wef. 2014 - 15

### Paper I –Basics of Bioinformatics

Max. Marks-85

#### Unit I Introduction to bioinformatics

Introduction to bioinformatics, history of bioinformatics, Scope of bioinformatics  
Bioinformatics- a multidisciplinary approach and its relation with molecular  
biology. Bioinformatics in India-The flourishing future  
Applications of Bioinformatics

#### Unit II Biological Database and its Types

General Introduction of Biological Databases;

Nucleic acid databases (GenBank, DDBJ, and EMBL).

Protein databases (Primary, Composite, and Secondary).

Specialized Genome databases: (SGD, TIGR, and ACeDB).

Structure classification databases (CATH, SCOP, and PDBsum)

Structure database (PDB)

#### Unit III Data storage and retrieval and Interoperability

Flat files, relational, object oriented databases and controlled vocabularies. File Format  
(Genbank, DDBJ, FASTA, PDB, SwissProt).

Introduction to Metadata and search; Indices, Boolean, Fuzzy, Neighboring search.

#### Unit IV Sequence Alignments and Visualization

Introduction to Sequences, alignments and Dynamic Programming;



Local alignment and Global alignment (algorithm and example),

Pairwise alignment (BLAST and FASTA Algorithm and Tool) and multiple  
sequence alignment (ClustalW algorithm and tool). Methods for presenting large quantities  
of biological data: sequence viewers (Artemis, SeqVISTA), 3D structure viewers (Rasmol,  
Ligand Explorer SPDBv, Chime, Cn3D, PyMol), Anatomical visualization.

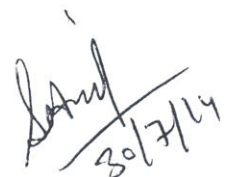
#### Unit V Gene Expression and Representation of patterns and relationship

General introduction to Gene expression in prokaryotes and eukaryotes, transcription factors  
binding sites. SNP, EST, STS.

Introduction to Regular Expression, Hierarchies, and Graphical models (including Marcov  
chain and Bayes notes).

   
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**B.Sc. Part - I  
Semester - II**

**Session 2014-15**

**Paper II –Mathematics I**

**Max. marks-85**

**Unit I**

Sets, Types of Sets, Subsets, Complement of Sets, union and Intersection of Sets, Difference of Sets, Demorgan's Law, Cartesian product of Sets.

Basics of Probability, addition and multiplication law of probability, conditional Probability, Permutation and Combination.

**Unit II**

Introduction to data. data types and Source. Population and sample, Classification and Presentation of Data. Quality of data, private and public data sources. Measure of central tendency and dispersion: Mean, median, mode, range, standard deviation, Quartile deviation, variance

**Unit III**

Correlation and Regression: Definition, its Types, classification Karl-Pearson's correlation, Spearman's Rank correlation, Regression equation and fitting

**Unit IV**

Probability Distribution: Basics of Binomial, Poisson and Normal distributions and their application in biology.

Random Variable; Discrete and Continuous Probability Distribution, Probability mass function, probability Density function, Mathematical Expectation.

**Unit V**

Matrices, Types of Matrices, Addition of matrices, Subtraction of matrices and Product of matrices.

Properties of Matrix Multiplication. Transpose of Matrix, Symmetric and Skew-symmetric Matrices, Inverse of Matrix

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