

**SARDAR PATEL UNIVERSITY**  
**Programme: MSc (Genetics)**  
**Semester: II**  
**Syllabus with effect from: June 2010**

<b>Paper Code:</b> PS02CGEN01	<b>Total Credits: 4</b>
<b>Title Of Paper:</b> Biostatistics and Bioinformatics	

Unit	Description in detail	Weightage (%)
<b>1</b>	<b>Biostatistics:</b> Definitions and scope of Biostatistics, Variable in biology, collection, classification and tabulation of data. Graphical and diagrammatic representation, histogram, frequency polygon, frequency curve. Descriptive statistics: Measures of central tendency – Mean (arithmetic, harmonic and geometric), Median and Mode, Measures of dispersion – Standard deviation and standard errors.	<b>25 %</b>
<b>2</b>	Elements of probability theory. Probability distributions – binominal, Poisson and normal distribution. Correlation coefficient. Simple linear regression. Probit and logic analysis. Basic idea of significance test. Statistical hypotheses, types of errors, level of significance, Student's t, chi-square, goodness of fit and F tests. General awareness and use of popular software package for word processing, DBMS, spread sheets, graphics, statistical packages – SPSS, SAS, MATLAB etc.	<b>25 %</b>
<b>3</b>	<b>Introduction to Bioinformatics:</b> Historical overview and applications, Bioinformatics and Internet, Useful databases and websites on bioinformatics, Freeware and shareware software. Public and proprietary bioinformatics. Bioinformatics search engines. <b>Databases:</b> Introduction and types of biological databases, Use of database in biology, NCBI data model, and Nucleic acid sequence databank (Genbank, EMBL), Protein sequence databank (Swiss PROT, PIR), Structural databank (PDB , MMDB) , Structural classification of protein (CATH , SCOP), File format for sequence databanks. <b>Sequence analysis and Tools:</b> Pairwise alignment, Local and Global alignment, Gaps and their significance, scoring matrices, similarity and distance (Hamming Distance), Edit operations, significance of sequence alignment, Multiple sequence alignment. Tools for pairwise alignment, tools for multiple alignment, Tools for database similarity search-BLAST, FASTA. Dynamic programming Algorithm - Needleman and Wunsch, Smith and Watermann.	<b>25 %</b>
<b>4</b>	<b>Protein Analysis:</b> Protein structure and function, Structural Classification, Protein folding, comparison of Protein structures, Prediction of 2 <sup>o</sup> & 3 <sup>o</sup> Protein structures. Comparative genomics, Expressed sequence tags (ESTs), RNA structure prediction, Phylogenetic analysis, Computer Aided Drug Designing	<b>25 %</b>

**Basic Text & Reference Books:**

- Fundamentals of Statistics by S. C. Gupta, Himalaya Publishing House, Mumbai. ISBN: 81-8318-106-6
- Statistical Methods An introductory text by J. Medhi, New Age International (P) Ltd. Publishers, New Delhi ISBN: 978-8122404197



- An introduction to biostatistics by P. S. S. Sudar Rao & J. Richard, Prentice-Hall of India, New Delhi. ISBN: 978-81-203-2876-1
- Bioinformatics – Beginners Guide, Claverie, Jean Michel, Wiley India Pvt Ltd, ISBN: 81-265-0380
- Introduction to Bioinformatics, Lesk and M.Arthur, Springer India, ISBN: 0-19-568525-3
- Bioinformatics methods and applications genomics, proteomics and drug discovery, S C Rastogi, PHI Publication House, ISBN: 978-81-203-3595-0
- Developing Bioinformatics computer skills, Cynthia Gibas, Shroff Publications, ISBN: 81-7366-242-8
- Bioinformatics: Genes, Proteins & Computer ,C. A. Orengo, Taylor and Francis, ISBN: 1-85996-054-5
- Bioinformatics computing, Vikram Singh, Narosa Publications, ISBN: 978-81-7319-794-9
- Bioinformatics- Principles and Applications, Ghosh & Mallick, Oxford Publications, ISBN: 978-0-19-5692303-3

