Unit III 14 hrs

Microbial Genetics and Overexpression of recombinant proteins: Para sexual process in bacteria and its significance: Transformation, transfection, transduction and conjugation. Endospore formation (differentiation). Genetic analysis of bacteria: Importance and uses of mutation analysis. isolating mutants, selecting mutants, mutant enrichment. Reversions versus suppression. Complementation tests, recombination tests and gene replacements. Overexpression and tagging of recombinant proteins in E.coli, driven by lac, T7 and Tet-regulatable promoters. Overexpression systems in S.cerevisiae, P.pastoris. Baculovirus over expression system.

Course Outcome

- Student capable of explaining role of microbes in ecological balance.
- Use of microbes in synthesis of commercially important compounds and over expression of proteins

References

1. Albert G. Moat and John W. Foster, Microbial Physisology, Wiley-Liss, A John Wiley& Sons, Inc. Publications.
2. Roberts, K., Lewis J., Alberts B., Walter P., Johnson A., and Raff. M., Molecular Biology of the Cell, 5th Edition, Garland Publishing Inc., 2008.
3. Lodish, H., Berk A., Kaiser C. A., Krieger M., Scott M.P., Bretscher A., Ploegh H., and Matsudaira P., Molecular Cell Biology, 6th Edition, Freeman, W. H. and Co., 2008.
4. Molecular Genetics of Bacteria by Larry Snyder and Wendy Champness, 3rd edition; ASM press; 2007.
5. Fundamental Bacterial Genetics by Nancy Trun and Janine Trempy, 1st edition; Blackwell Science Publishers; 2004.
6. Stanbury PF, Hall SJ, Whitaker A (1999). Principles of Fermentation Technology, Butterworth Heinemann, 2nd edition.
7. Creuger and Creuger (2001). Biotechnology- A textbook of Industrial Microbiology, Sinauer Associates,Inc.

BCS 555: BIOINFORMATICS, BIOSTATISTICS & NANOBIOTECHNOLOGY: SOFTCORE

Lecture Hours: 42 **Total Credits: 03**

Course objectives:

- To learn the all the basic concepts of statistics.
- To understand the fundamental and necessary aspects of bioinformatics.
- To understand the basic concept of nanotechnology.
- To synthesize nanoparticles and know their applications.
- To study the applications of nanotechnology in various industries.

29/01/2020

Chairperson, UG & PG Board of Studies in Biochemistry
Department of Studies in Biochemistry
Mangalore University, PG Centre
Chikka Aluvara, Thorenoor Post
Somavarpet Taluk, Kodagu – 571 232

Unit I **18 hrs.**

History, Scope and Importance ,Aims and tasks of Bioinformatics - applications of Bioinformatics - challenges and opportunities - introduction to NCBI data model - Various file formats for biological sequences. Databases -Tools and their uses Primary sequence databases - Composite sequence databases - Secondary databases - Nucleic acid sequence databases - Protein sequence data bases – Structural databases –- Protein structure visualization tools (RasMol, Swiss PDB Viewer).**Sequence Alignment Methods**:Sequence analysis of Biological data - Significance of Sequence alignment – Pairwise sequence alignment methods - Use of Scoring matrices and Gap penalties in sequence alignments - Multiple sequence alignment methods – Tools and application of multiple sequence alignment. **Proteomics and Genomics.** Genome projects: E.coli, D.melanogaster, A. thaliana and mouse. The human genome project: goals, mapping strategies, markers, sequencing technologies, potential benefits and risks, ethical, legal and social issues(ELSI).

UnitII **14 hrs.**

Measures of central value - Mean, mode and median; Statistics of Dispersion; Coefficient of variation; standard deviation, standarderror Concepts of moments, skewness and kurtosis; Simple correlation and regression; Concept of sampling and sampling methods. Probability and Probability distributions (binomial, poisson and normal); Tests of statistical significance (t –Test, Chi-square test); Analysis of variance.Representation of statistical data line graph, histogram, bar diagram, pie chart.

Unit III **10 hrs.**

Introduction, Definition, and Nanoscale, Classification of Nanomaterials: Quantum Dots, Wells and Wires. Carbon-based Nanomaterials - Nanotubes, Metal based Nanomaterials (Nanogold, Nanosilver and metal oxides). Properties of nanostructuredMaterials.Biological methods of Synthesis: Use of Plant extracts, bacteria, fungi, yeast and other biological particles.Applications of Nanotechnology in Biomedical and Pharmaceutical Industries-Bionanomagnetism,Biosensors,Nanomedicine.

Course outcome:

• Student will have knowledge of statistics such as measures of central value, coefficient of variation, sampling, probability, tests of significance and analysis of variance. This would help the student during data analysis especially if he intends to do MPhil/PhD.

• Student will become more computer savvy after knowing the hardware and software.

• Use of bioinformatics tools to substantiate the results especially during research.

• This paper will have a lot of impact on the student to critically analyze the data and draw a conclusion of the experimental results.

- Student learns about biosensors, nanotechnology and its applications.

• Nanotechnology in Food packaging, agriculture, farming,

• Potential of nanofertilizers.

REFERENCES:

1. Bioinformatics - Concepts, Skills, and Applications" S.C. Rastogi & others 2003,"CBS Publishing
2. Discovering Genomics, Proteomics and Bioinformatics – Campell&Heyer, Benjamin / Cummings pub.
3. Bioinformatics for Dummies, Jean-Michel Claverie, Cedric Notredame (2003) John Wiley &Sons.
4. An Introduction to Biostatistics N .Gurumani (2011), MJP Publishers.
5. Statistics, Basic Concepts and Methodology for the Health Sciences Daniel WW, Pub Wiley,India.
6. Elementary Statistical Methods by S.P. Gupta, Sultan Chand & Sons

20/6/2020