

**ELECTIVE COURSE III (EC) : MOLECULAR TAXONOMY AND PHYLOGENY**

**Unit – I: Microbial Taxonomy**

Introduction to microbial taxonomy – morphological taxonomy, biochemical taxonomy, and molecular taxonomy. Numerical taxonomy – basic concepts of taxonomy. Positive and negative aspects of each taxonomical methods. Morphological phylogeny

**UNIT- II: Biochemical & molecular taxonomy**

Chemotaxonomy - fatty acid, protein finger printing, Isozyme typing, pigments & polyamines. Biochemical phylogeny. Molecular taxonomy – G +C content, DNA –DNA hybridization, Plasmid profiles, RFLP, RAPD, STRR & LTRR, REP –PCR, rRNA based DNA finger printing methods

**Unit – III: 16S rRNA based finger printing**

Types of rRNA - 23s rRNA, 16S rRNA & 5S rRNA. Importance of 16SrRNA in microbial identification and taxonomy. Methods of 16S rRNA / rDNA fingerprinting - Isolation of rRNA, RT- PCR, Isolation of DNA, amplification of 16S rDNA using PCR, Cloning, transformation, Blue-white screening, Plasmid isolation, Dot blot/Southern blot hybridization using specific probes Sequencing of 16S rDNA using chain-termination method.

**UNIT – IV: Sequence analysis.**

Submission of rDNA sequences in GenBank – Bankit & Sequin guidelines. NCBI, EMBL & DDBJ – retrieving sequences. RNA structure prediction, Restriction enzyme patterns. Ribosomal Database Project - Designing primers & probes. Sequence comparison, alignment and data base searching – ClastalW, FASTA & BLAST. DNA barcoding.

**UNIT – V: Molecular phylogeny.**

Introduction to Molecular phylogeny – tree terminology, software programs for making phylogenetic trees – MEGA, Phylip, RAPDistance. Cladogram, additive trees and ultrametric trees, rooted, unrooted trees and tree shapes.

**References:**

Roderic D. M. Page, Edward C. Holmes (1998). Molecular Evolution: A Phylogenetic Approach. Blackwell publishing, USA.  
Principles of Genome Analysis: A Guide to Mapping and Sequencing DNA from Different Organisms by S. B. Primrose (Paperback - Jan 1998)  
Microbial Genome Methods by Kenneth W. Adolph (Hardcover - Oct 28, 1996)  
Genome Mapping and Sequencing by Ian Dunham (Hardcover - Sep 1, 2003).  
Brendan Wren (Editor), Nick Dorrell (2002) Functional Microbial Genomics (Volume 33) (Methods in Microbiology), Academic Press, UK.  
Sandy B. Primrose Richard M. Twyman (2005) Principles of Genome Analysis and Genomics, Blackwell Publishing, USA.