

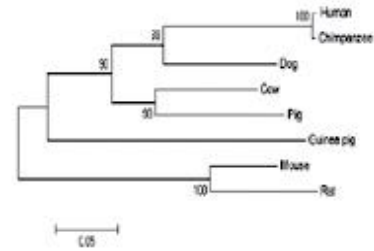
# 16BI301 MOLECULAR PHYLOGENETICS

Hours Per Week :

L	T	P	C
3	1	-	4

Total Hours :

L	T	P	WA/RA	SSH/HSH	CS	SA	S	BS
45	15	-	5	45	2	8	1	5



Source:  
Dr. D. Vijaya Ramu, BT, VU

## Course Description and Objectives:

The course is designed to unravel the molecular data hidden behind the organic evolution. The objective of the course is to find the utility of software packages in inferring the phylogeny.

## Course Outcomes:

The student will be able to:

- analyse the molecular data in relation to organic evolution.
- understand the applications of phylogenetic analysis in the outburst of viral epidemics.
- apply the concepts of phylogeny in the disease outbreaks.
- contribute to the sustainability of species through conservation strategies.

## SKILLS:

- ✓ Differentiate types of speciation.
- ✓ Identify factors influencing speciation.
- ✓ Assess population and gene frequencies using Hardy-Weinberg principle.

**ACTIVITIES:**

- *Case studies on convergence, divergence and speciation.*
- *Case studies on selection and coevolution.*
- *Solve population genetics problems using Hardy-Weinberg principle.*

**UNIT - 1****L-9, T-3**

**SYSTEMATICS AND CLASSIFICATION:** Sympatric population and allopatric population; Sibling species and polytypic species; Phylogeny- clade, phylogenetic branching, homology, parallelism and convergence; Classification - taxon, phenetics and cladistics.

**UNIT - 2****L-9, T-3**

**MECHANISM OF SPECIATION:** Species concepts- examples; Mechanism of genetic isolation; Physical isolation as a barrier to gene flow and polyploidy and other chromosome changes as barriers to gene flow; Mechanism of divergence- genetic flow, genetic drift, mutation, natural selection and sexual selection, synapomorphies, homoplasy and convergent evolution; Choosing characters - morphology and molecules.

**UNIT - 3****L-9, T-3**

**MOLECULAR PHYLOGENIES:** Immunological techniques; Amino acid sequences - haemoglobin, myoglobin-gene duplication; Repetitive DNA sequences; Nucleic acid phylogenies based on DNA-DNA hybridizations; Nucleic acid phylogenies based on restriction enzyme sites; Nucleic acid phylogenies based on nucleotide sequence comparisons and homologies; Rates of molecular change - evolutionary clocks, regulatory genes and evolutionary consequences.

**UNIT - 4****L-9, T-3**

**POPULATIONS, GENE FREQUENCIES AND EQUILIBRIUM:** Mutations and selections; Neo-Darwinian theory; Population and gene frequencies; Hardy-Weinberg principle; Conservation of gene frequencies; Heterozygous advantage; Attainment of equilibrium at two or more loci; Equilibria in natural populations; Inbreeding.

**UNIT - 5****L-9, T-3**

**STRUCTURE AND INTERACTIONS OF POPULATIONS:** Ecological aspects of population growth; Genetic load and genetic death; Genetic attributes of populations; Adaptive peaks; Group selection; Group interaction; Coevolution.

**TEXT BOOKS:**

1. M. W. Strickberger, "Evolution", Jones and Bartlett Publishers, Boston, 1990.
2. S. Freeman and J.C. Herron, "Evolutionary analysis", Prentice Hall, 2004.