

Comparative Genomics & Evolution — Hands-on

Gain expertise in comparative genomics and evolutionary relationships—from orthology inference and synteny to whole-genome alignment, pan-genomes, and selection tests.

Comparative Genomics & Evolutionary Relationships

[Help Desk](#) · [WhatsApp](#)

Session Index

[Session 1 — Orthology, Paralogy & Synteny](#) [Session 2 — Whole-Genome Alignments & Pan-genomes](#) [Session 3 — Selection Tests, dN/dS & Conservation](#) [Session 4 — Mini Capstone: CompGen Pipeline](#)

Session 1

Fee: Rs 6300 [Apply Now](#)

Orthology, Paralogy & Synteny

Homology concepts: orthologs vs paralogs; synteny blocks

Theory

Orthogroup inference & clustering at scale

[OrthoFinder](#) [OrthoMCL](#) [MMseqs2](#)

Synteny detection & visualization

[MCScanX](#) [MUMmer](#) [Circos](#)

Session 2

Fee: Rs 8400 Apply Now

Whole-Genome Alignments & Pan-genomes

Pairwise & multi-genome alignment strategies

minimap2 **progressiveMauve** **LAST**

Pan-genome construction, core/dispensable genes & ANI/AAI

Roary **Panaroo** **pyANI**

Structural variants & rearrangements across genomes

SyRI **svariant**

Session 3

Fee: Rs 11200 Apply Now

Selection Tests, dN/dS & Conservation

Codon alignment & synonymous/nonsynonymous rates (dN/dS)

PAL2NAL **codeml (PAML)** **HyPhy**

Conservation scoring & constraint metrics across clades

phastCons **phyloP** **MSA-based stats**

Gene gain/loss & duplication events on species trees

CAFE **ETE Toolkit**

Session 4

Fee: Rs 14000 Apply Now

Mini Capstone: Comparative Genomics Pipeline

Design end-to-end comparative analysis & evaluation plan

Theory

Automate orthology→alignment→pan-genome with QC reports

Snakemake **Conda/Mamba** **MultiQC**

Deliver figures: synteny plots, pan-genome curves & selection tables

pandas **matplotlib** **JupyterLab**