Network Inference & Microbial Ecology Models — Hands-on

Learn how to move from microbiome abundance tables to interpretable ecological networks. You will explore association frameworks, build sparse co-occurrence networks, interpret topology and keystone taxa, and summarize microbial ecology models in a way that supports hypothesis generation, intervention design and downstream simulation work.

Network Inference and Microbial Ecology Models

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Session Index

Session 1

Fee: Rs 8800 Apply Now

Microbial Ecology Concepts & Network Thinking

Microbial ecology interactions and community structure

competition, mutualism and commensalism | **niche vs neutral perspectives** | **stability, resilience and regime shifts**

Why use networks for microbiome data

moving beyond univariate associations | **capturing multi taxon interaction patterns** | **bridging to**

dynamical models and simulations

Limitations of naive co occurrence and correlation views

compositionality and spurious correlations | indirect vs direct associations mindset | confounding by environment and host factors

Session 2

Fee: Rs 11800 Apply Now

From Abundance Tables to Association Matrices

Preparing microbiome feature tables for network inference

choice of taxonomic or functional resolution | prevalence and abundance filtering ideas | transformations and scale considerations

Association and correlation frameworks for microbiomes

Spearman and rank based thinking | compositionality aware ideas (log ratios, proportionality) | sparsity and zero inflation awareness

Sparsity oriented and graphical model perspectives

partial correlation and conditional dependence | graphical model style inference concepts | controlling density and multiple testing

Session 3

Fee: Rs 14800 Apply Now

Network Topology, Keystone Taxa & Ecology Models

From association matrices to graphs and layouts

edge filtering and thresholding ideas | signed vs unsigned networks | visualization and layout choices

Network topology and keystone taxon concepts

degree, centrality and hubs | modules, communities and guilds | candidate keystone taxa thinking

Ecological interpretation and links to dynamical models

network robustness and perturbation ideas | hypothesis generation for interventions | network views as inputs to simulation models

Session 4

Fee: Rs 18800 Apply Now

Mini Capstone: Microbial Ecology Network Report

End to end network inference on a cohort

Theory plus guided practical

Interpreting modules, hubs and keystone candidates with metadata

linking network features to phenotypes | clinical, environmental and industrial examples | caveats on causality and over interpretation

Deliverables: adjacency tables, network plots & methods block

association and adjacency matrices | network and module visualization panels | reusable network analysis methods text