Pathway Enrichment & Topology Analysis (KEGG/Reactome) — Hands-on

Connect differential metabolites to biological stories. This module focuses on pathway enrichment and topology analysis for metabolomics so that you can translate feature level changes into pathway level hypotheses using KEGG and Reactome, and present clear, publication ready pathway tables and visual summaries.

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Session Index

Session 1

Fee: Rs 8800 Apply Now

Pathway Enrichment Foundations for Metabolomics

From differential metabolites to pathway hypotheses

feature lists and statistics **linking to pathway databases** **single vs multi omics context**

Metabolite to pathway mapping with KEGG and Reactome

metabolite identifiers and synonyms **pathway collections and hierarchies** **choice of background**

universe

Over representation analysis (ORA) concepts for pathways

contingency tables | hypergeometric and Fisher ideas | p values and multiple testing

Session 2

Fee: Rs 11800 Apply Now

Quantitative & Topology Aware Pathway Methods

Quantitative pathway scores beyond simple hit counts

using fold change and p values | rank based enrichment ideas | single sample style scores

Pathway topology and impact style concepts

nodes, edges and directionality | degree and betweenness ideas | subpathways and bottlenecks

Overview of pathway tools for metabolomics workflows

MetaboAnalyst style workflows | Reactome pathway views | exporting tables and figures

Session 3

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Visualization & Multi Omics Context

Pathway result visual styles and interpretation

bar and dot plots | enrichment maps and networks | pathway diagrams with overlays

Integrating metabolomics with transcriptomics or proteomics

shared pathway backbones | overlaying multiple data layers | consistency and conflict signals

Handling overlapping and redundant pathway sets

clustered enrichment views | collapsing to meta pathways | choosing key pathways to report

Session 4

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Mini Capstone: Pathway Report & Figures

Running a complete pathway enrichment on example metabolomics data

Theory + Practical

Summarising key pathways, topology impact and uncertainty

ranked pathway tables | impact and FDR columns | caveats and limitations notes

Deliverables: pathway enrichment table & figure bundle

pathway results table (CSV/TSV) | plots for manuscript or slides | short interpretation write up