Integrating Omics into Mechanistic Models — Hands-on

Learn how to turn omics readouts into constraints, parameters and validation targets for mechanistic models. This module walks through mapping multi omics data onto pathways and networks, building omics informed constraints and performing calibration and validation so that your systems biology models are quantitatively anchored to experimental evidence.

Integrating Omics into Mechanistic Models

Help Desk · WhatsApp

Session Index

Session 1

Fee: Rs 8800 Apply Now

Mapping Omics to Pathways & Networks

Omics data types and pre processing snapshots

transcriptomics and proteomics **phospho and PTM omics** **metabolomics and fluxomics**

Annotating entities and linking IDs to models

gene protein metabolite mapping **identifier harmonisation** **using BioMart and mapping tables**

Projecting omics changes onto pathways & networks

overlaying log fold changes | activity signatures for pathways | Cytoscape and pathway visualisation

Session 2

Fee: Rs 11800 Apply Now

Parameterising & Constraining Models with Omics

Using omics as bounds and constraints in models

expression informed flux bounds | enzyme level constraints | activity thresholds from PTMs

Transcriptomics and proteomics into GEMs and FBA

GIMME / iMAT style ideas | condition specific models objective selection and tuning

Using omics to initialise and tune kinetic models

setting initial states from data | informative priors for parameters | linking rates to measured activities

Session 3

Fee: Rs 14800 Apply Now

Multi Omics Integration & Data Assimilation

Strategies for combining multiple omics layers

hierarchical vs joint models | omics derived constraints vs objectives | consistency checks across layers

Time course omics and data assimilation concepts

linking dynamics to snapshots | basic filtering and updating ideas | practical approximations

Toolchains for omics informed model workflows

COBRApy / R for GEM integration | Python / R for

kinetic models reproducible pipelines and notebooks

Session 4

Fee: Rs 18800 Apply Now

Mini Capstone: Omics Calibrated Systems Model

Select a pathway or network and an omics dataset

Theory + Practical

Build a simple omics informed mechanistic model

map omics to model components set constraints or parameters run baseline simulations

Deliverables: model files, omics mapping and report

SBML / GEM or notebook model tables for omics to model mapping methods and interpretation summary