Metabolic Network Reconstruction & GEM Building — Hands-on

Go from genome annotations and pathway tables to curated, analysis ready genome scale metabolic models. This module walks through metabolic network reconstruction, GEM building, annotation, and quality control so that your constraint based models are robust inputs for FBA, FVA and downstream systems biology analyses.

Metabolic Network Reconstruction & GEM Building

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Session 1 — Metabolic Networks & Stoichiometry Foundations Session 2 — Draft GEM Reconstruction & Annotation Session 3 — Model Curation, Gap Filling & Consistency Checks Session 4 — Mini Capstone: From Draft GEM to Analysis Ready Model

Session 1
Fee: Rs 8800 Apply Now
Metabolic Networks & Stoichiometry Foundations

Basics of metabolic pathways and reaction stoichiometry

metabolites, reactions, compartments stoichiometric coefficients exchange and transport reactions

Stoichiometric matrix and flux space intuition

S matrix structure mass balance constraints steady state assumption

From pathways to draft network graphs and matrices

mapping KEGG / MetaCyc reactions reaction directionality boundary conditions overview

Session 2
Fee: Rs 11800 Apply Now
Draft GEM Reconstruction & Annotation

Genome based draft model generation

annotation sources (KEGG, RAST, eggNOG) gene–protein–reaction (GPR) rules automated reconstruction tools overview

Metabolite and reaction annotation best practices

InChI, ChEBI, KEGG IDs gene and protein identifiers cross references and ontology tags

Model formats and toolchain for GEMs

SBML Level 3 FBC COBRApy / COBRA Toolbox memote and validation tools

Session 3
Fee: Rs 14800 Apply Now
Model Curation, Gap Filling & Consistency Checks

Checking mass and charge balance of reactions

formula and charge annotation identifying imbalanced reactions strategies for correction

Detecting dead ends, blocked reactions and gaps

network connectivity checks gap filling methods curating transport and exchange sets

Quality metrics and model reports (memote style)

basic memote scores   documentation of changes
versioning curated models

Session 4
Fee: Rs 18800 Apply Now

Mini Capstone: From Draft GEM to Analysis Ready Model

Start from a draft reconstruction and perform curation

Theory + Practical

Prepare the model for FBA style analyses

set objective and media constraints   test growth and
key phenotypes   sanity checks on fluxes

Deliverables: SBML model, report and README

final SBML FBC file   quality report (memote or
similar)   curation and assumptions document