

Kinetic Modeling, ODE Parameter Estimation & Identifiability — Hands-on

Learn how to convert pathway diagrams and time course data into executable kinetic models. This module covers ODE based modeling, parameter estimation, identifiability and uncertainty analysis so that your dynamic systems models are calibrated, robust and ready for downstream simulation and decision support in systems biology and network medicine.

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Session 1

Fee: Rs 8800 [Apply Now](#)

ODE Modeling & Kinetic Foundations

From biochemical reactions to ODEs

[state variables and rates](#) [mass action kinetics](#)
[Michaelis-Menten forms](#)

Kinetic parameters and scaling considerations

[rate constants and \$K_m\$ / \$V_{max}\$](#) [dimension and units](#)
[checking](#) [non dimensionalisation basics](#)

Qualitative behaviour of simple ODE systems

steady states and trajectories **stability intuition**
timescales and stiffness overview

Session 2

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Building & Simulating Kinetic Models

Model construction workflows and tools

SBML based models **COPASI / tellurium /**
libRoadRunner **Python / R ODE solvers**

Numerical integration and solver settings

explicit vs implicit schemes **stiff and non stiff**
solvers **tolerances and step sizes**

Basic simulation experiments and plots

dose response curves **time courses and phase plots**
parameter sweeps

Session 3

Fee: Rs 14800 Apply Now

Parameter Estimation & Identifiability

Formulating parameter estimation problems

objective functions and residuals **least squares and**
likelihoods **noise models and weighting**

Optimisation algorithms and practical fitting

gradient based methods **global search heuristics**
overview **initial guesses and bounds**

Identifiability and uncertainty analysis basics

structural vs practical identifiability **profile**

likelihood intuition **confidence intervals for parameters**

Session 4

Fee: Rs 18800 Apply Now

Mini Capstone: Calibrated Kinetic Pathway Model

From pathway diagram and data to calibrated model

Theory + Practical

Parameter estimation, validation and scenario testing

fit to time course or dose response data **goodness of fit plots** **simulation of interventions**

Deliverables: model files, fit report and README

SBML model or equivalent **notebook with estimation workflow** **documentation of assumptions and limits**