Machine Learning for Systems Biology — Hands-on

Learn how to bring machine learning and predictive modeling into systems biology workflows. This module focuses on engineering features from networks and pathways, training and validating models on omics and systems data, and interpreting predictions in terms of mechanisms, modules and dynamic behaviours using practical R and Python notebooks.

Machine Learning for Systems Biology

Help Desk · WhatsApp

Session Index

Session 1

Fee: Rs 8800 Apply Now

ML Foundations for Systems Biology Data

Types of systems biology data for machine learning

omics matrices and time series | **networks and pathway features** | **simulation outputs and summary curves**

Supervised vs unsupervised learning in systems biology

classification and regression tasks | **clustering and dimensionality reduction** | **labels from phenotypes and perturbations**

Toolchain for ML ready datasets and workflows

R (tidyverse plus ML packages) **Python (pandas plus scikit learn style)** **notebook based exploratory workflows**

Session 2

Fee: Rs 11800 Apply Now

Feature Engineering from Networks & Pathways

Turning networks and pathways into ML features

topological measures as predictors **module and pathway activity scores** **summary features from dynamic simulations**

Data preprocessing and leakage safe workflows

normalisation and scaling choices **train versus test split discipline** **handling imbalance and rare phenotypes**

Implementation toolkit for feature engineering pipelines

R recipes style or similar workflows **Python pipeline objects for transforms** **feature importance and screening views**

Session 3

Fee: Rs 14800 Apply Now

Predictive Modeling & Network Aware ML

Core algorithms for systems biology prediction tasks

regularised linear and logistic models **tree based ensembles and gradient boosting** **simple neural network style models (concept)**

Network aware ML ideas at concept level

using network metrics as covariates **embeddings**

from networks and pathways | overview of graph style learning concepts

Model evaluation and interpretation for systems questions

ROC, PR and calibration style checks | feature importance and partial dependence views | relating drivers back to modules and pathways

Session 4

Fee: Rs 18800 Apply Now

Mini Capstone: ML Driven Systems Analysis

Frame a systems biology ML problem and data design

Theory + Practical

Build, validate and interpret a predictive model end to end

feature engineering and model training | evaluation and error analysis | mechanistic interpretation of ML findings

Deliverables: notebook, feature and model artefacts & summary

R or Python ML notebook | saved model and feature tables | PDF/HTML systems ML report