

Gene Regulatory Networks & Transcriptional Control — Hands-on

Learn how to construct, infer, and interpret gene regulatory networks (GRNs) that explain how transcription factors, enhancers, and regulatory modules control gene expression programs. You will work with omics and ChIP style data, apply GRN inference algorithms, and explore dynamical behaviour and perturbation effects using practical workflows in R, Python, and Cytoscape.

Gene Regulatory Networks & Transcriptional Control

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Session 1

Fee: Rs 8800 [Apply Now](#)

GRN Concepts & Data Sources

Concepts of gene regulatory networks and transcriptional control

[transcription factors and targets](#) [enhancers and promoters](#) [motifs and modules](#)

Data types for GRN construction and validation

[bulk and single cell expression](#) [ChIP like binding datasets](#) [TF motif databases \(JASPAR\)](#)

Toolchain and resources for GRNs

Cytoscape for GRN visualisation **R / Bioconductor basics** **Python / pandas data handling**

Session 2

Fee: Rs 11800 Apply Now

GRN Inference Algorithms

Correlation and information based GRN methods

co expression networks **mutual information approaches** **ARACNe style workflows**

Regression, tree and Bayesian based GRNs

LASSO and Elastic Net based inference **tree based methods (GENIE3 style)** **Bayesian network preview**

Practical GRN inference toolchain

R packages for GRN inference **Python workflows for GRNs** **Cytoscape import and styling**

Session 3

Fee: Rs 14800 Apply Now

Dynamical GRN Models & Control

Boolean and logical models of gene regulation

on off regulatory logic **state transition graphs** **attractors and cell states**

ODE style regulatory dynamics and perturbations

simple ODE GRN examples **feedback loops and oscillations** **knockout and overexpression scenarios**

Toolchain for GRN dynamics exploration

Python / SciPy for simulations **R based simulation**

workflows **visualisation of trajectories**

Session 4

Fee: Rs 18800 Apply Now

Mini Capstone: Build & Analyse a GRN

Construct a GRN for a pathway or phenotype of interest

Theory + Practical

Infer edges, identify key regulators and simulate perturbations

regulator ranking tables **subnetwork visualisation**
perturbation scenario summaries

Deliverables: notebooks, GRN files & report

R / Python notebook **network files (SIF / GraphML)**
PDF/HTML GRN summary