

Gene Regulatory Network Inference & Validation — Hands-on

Build a rigorous, reproducible GRN workflow from data sourcing and preprocessing through multi-method inference, consensus building, biological validation, and clear reporting. Work with bulk RNA-seq, time-series, and single-cell data to reconstruct transcriptional programs and evaluate them using motifs, perturbation evidence, and gold-standard references.

Gene Regulatory Network Inference & Validation (GRN)

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Session 1

Fee: Rs 8800 [Apply Now](#)

Data, Preprocessing & Problem Framing

Data modalities & design

[bulk RNA-seq / time-series](#) [single-cell RNA-seq](#)
[ATAC/ChIP evidence](#)

Preprocessing & QC

[normalization & batch correction](#) [TF list curation \(JASPAR/TFClass\)](#) [feature filtering & variance](#)

Toolchain

R: minet, GENIE3, glmnet **Python:** sklearn, pandas
ARACNe-AP

Session 2

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GRN Inference Methods (Bulk/Time-Series)

Association & information-theoretic

correlation / partial correlation **MI, CLR, ARACNe**
PIDC

Supervised & regression-based

Lasso/Elastic Net **Random Forest / GENIE3** **XGBoost**
ranking

Dynamic & probabilistic models

time-lagged inference **Bayesian networks** **ODE-based**
inference (Inferelator)

Session 3

Fee: Rs 14800 Apply Now

Single-Cell GRNs, Consensus & Validation

Single-cell pipelines

SCENIC/pySCENIC **GRNBoost2** **pseudotime &**
trajectory

Consensus networks & stability

rank aggregation **stability selection** **thresholding**
strategies

Validation & interpretation

motif enrichment (JASPAR/TRANSFAC) **perturb-**
seq/CRISPR evidence **benchmarking (DREAM)**

Session 4

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Mini Capstone: End-to-End GRN Project

From expression matrix to validated GRN

Theory + Practical

Packaging & reporting

ranked edge list + confidence **Cytoscape session & styles** **notebook + results archive**

Deliverables

PDF/HTML report **edge list (.csv/.tsv)** **.cys / .graphml**
+ env files