Move beyond associations and learn how to reason about cause and effect in biomedical and omics studies. This module introduces directed acyclic graphs (DAGs), potential outcomes, backdoor criteria, instrumental variables and propensity score methods, with hands-on implementation in R and Python for real world observational datasets.

Causal Inference in Biomedicine — DAG, IV, PSM

Help Desk · WhatsApp

Session Index

Session 1 — Causal Thinking, DAGs & Confounding   Session 2 — Identification, Backdoor Paths & Do Calculus Intuition   Session 3 — Propensity Scores, Matching & Weighting   Session 4 — Instrumental Variables, Sensitivity & Reporting

Session 1
Fee: Rs 8800   Apply Now

Causal Thinking, DAGs & Confounding

Association vs causation in biomedical studies

questions framed as causal effects   target trial emulation mindset   randomized vs observational designs

DAG vocabulary and drawing practice

nodes, arrows and paths   confounders, mediators,

colliders examples from clinical questions

Bias mechanisms in DAG language

confounding bias collider and selection bias measurement error intuition

Session 2
Fee: Rs 11800 Apply Now

Identification, Backdoor Paths & Do Calculus Intuition

Backdoor criterion and adjustment sets

backdoor paths definition minimal sufficient adjustment sets what not to adjust for (colliders)

Concept of do operator and identifiability

$P(Y \mid do(X))$ vs $P(Y \mid X)$ simple do calculus intuition example calculations from DAGs

Potential outcomes and average treatment effect

counterfactual notation $Y(1)$, $Y(0)$ consistency, positivity, exchangeability link to regression adjustment

Session 3
Fee: Rs 14800 Apply Now

Propensity Scores, Matching & Weighting

Estimating propensity scores

logistic regression and ML based estimation variable choice based on DAG overlap and positivity diagnostics

Matching and weighting strategies

nearest neighbour and caliper matching inverse probability weighting (IPW) stabilised weights and

trimming

Balance checks and effect estimation

standardized mean differences love plots and covariate balance ATE, ATT and risk difference estimates

Session 4
Fee: Rs 18800 Apply Now

Instrumental Variables, Sensitivity & Reporting

Instrumental variable (IV) concepts

IV assumptions in DAG form two stage least squares idea weak instrument issues

Sensitivity analyses and robustness checks

unmeasured confounding sensitivity alternative adjustment sets negative controls idea

Deliverables: causal analysis plan and report

DAG diagram and adjustment set justification R / Python scripts for PSM or IV causal effect estimates with caveats