Metabolomics Foundations — Design & QC — Hands-on

Establish a strong foundation in metabolomics by focusing on what matters most at the start of any small-molecule study: design, biospecimen handling, QC strategy and platform selection. This module prepares you to plan reproducible GC–MS, LC–MS and NMR metabolomics experiments that can scale into downstream statistics, pathway analysis and flux modeling.

Metabolomics Foundations — Design & QC

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Session Index

Session 1

Fee: Rs 8800 Apply Now

Metabolomics Concepts & Study Design

Metabolome, metabolomics and study types

targeted vs untargeted | **discovery vs validation** | **cross-sectional vs longitudinal**

Experimental design for metabolomics

biological vs technical variation | **replication, randomization, blocking** | **confounders and covariates**

Sample size, power and effect sizes

pilot vs definitive studies | **variance estimation**

balanced designs

Session 2

Fee: Rs 11800 Apply Now

Biospecimens, Extraction & QC Strategy

Biospecimen types and pre-analytical factors

serum / plasma / urine | tissues and cell pellets | fasting, time-of-day, diet

Sample collection, storage and extraction

SOPs and labelling | freeze–thaw control | protein precipitation and solvent mixes

QC/QA strategy for metabolomics

pooled QCs and study QCs | blanks and carryover checks | system suitability and internal standards

Session 3

Fee: Rs 14800 Apply Now

Platforms: GC–MS, LC–MS & NMR Basics

Instrument options and trade-offs

GC–MS vs LC–MS vs NMR | sensitivity and coverage | throughput and cost

Chromatography and ionization basics

RP / HILIC modes | derivatization for GC–MS | ESI, APCI and polarity switching

Acquisition and basic QA readouts

full scan vs SIM/MRM | MS/MS overview | retention time and peak shapes

Session 4

Fee: Rs 18800 Apply Now

Mini Capstone: Study & QC Blueprint

Use-case driven study design

disease vs control or intervention

Randomization, batching and QC layout

injection order plans **QC frequency and placement** **blank and standard runs**

Metadata, data dictionary and reporting checklist

minimal metadata fields **sample manifest** **MIRAGE and FAIR readiness**