Industrial Microbiomes, Fermentation & Bioprocess — Hands-on

Learn how to use microbiome, metagenomics and process data together to monitor and optimise industrial fermentations. This module covers fermenter microbiome dynamics, contamination forensics, strain/community tracking and data-driven bioprocess optimisation for food, enzyme, biofuel and biopharma applications.

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Session Index

Session 1

Fee: Rs 8800 Apply Now

Industrial Microbiomes & Fermentation Foundations

Microbiomes in industrial fermentation systems

food, feed, enzyme and biofuel fermentations **desired production strains vs background flora** **batch, fed batch and continuous modes**

Bioprocess parameters and microbiome interactions

pH, DO, temperature and agitation **substrate feeds**

and by product accumulation | scale up and scale down considerations

Sampling strategies for industrial microbiome monitoring

time course sampling across batches | in process vs startup and shutdown samples | controls and reference healthy batches

Session 2

Fee: Rs 11800 Apply Now

Fermenter Monitoring & Metagenomics Workflows

From fermenter sample to sequencing ready DNA

handling viscous, foamy and high solids matrices | DNA extraction with inhibitors and high biomass | controls for carry over and cross contamination

Amplicon and shotgun metagenomics for tanks and lines

marker panels for bacteria, fungi and yeasts | depth and multiplexing choices per run | linking runs to process batches and events

Baseline QC and profiling outputs for fermenter health

alpha/beta diversity and core community views | abundance of production vs background organisms | simple dashboards for routine monitoring

Session 3

Fee: Rs 14800 Apply Now

Contamination Forensics & Strain/Community Tracking

Detecting and characterising contamination events

unexpected taxa and bloom signatures | linking contamination to tank history | flags based on historical baselines

Strain and community tracking along process streams

comparing seed trains, main fermenters and harvests **MAG and strain level views where applicable** **biofilm, piping and utility microbiomes**

Root cause exploration and corrective action support

overlaying microbiome, CIP and process logs **recurring vs sporadic contamination patterns** **documentation for CAPA and audits**

Session 4

Fee: Rs 18800 Apply Now

Mini Capstone: Fermentation Health & Yield Analytics

End to end analysis of an industrial fermentation dataset

theory plus guided practical with anonymised data

Linking microbiome states to process KPIs and yield

simple correlations and visual overlays **health/yield segments and rule of thumb signals** **candidate levers for process optimisation**

Deliverables: monitoring dashboard sketch and summary report

R or Python analysis notebook **example plots and alert thresholds** **PDF or HTML fermentation microbiome report**