Chemoenzymatic Glycan Synthesis and Glycoengineering — Hands-on

Learn how to combine chemical and enzymatic methods to build defined glycans and engineer glycosylation on proteins, lipids and cells. This module covers glycosyltransferases and glycosidases as tools, donor and acceptor design, one pot reaction strategies, and practical glycoengineering workflows for biotherapeutics, vaccines and cell based systems.

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Session Index

Session 1

Fee: Rs 8800 Apply Now

Principles of Chemoenzymatic Glycan Synthesis

Chemical versus enzymatic glycan synthesis strategies

protecting group heavy routes **enzyme catalyzed glycosylation** **hybrid chemoenzymatic approach**

Building blocks and linkage control in glycans

monosaccharide donors and acceptors **anomeric configuration and selectivity** **regioselectivity through**

enzyme choice

Design logic of stepwise and one pot schemes

sequential addition of monosaccharides | cascade reactions with multiple enzymes | avoiding side reactions and hydrolysis

Session 2

Fee: Rs 11800 Apply Now

Enzymes, Donors and Reaction Engineering

Glycosyltransferases and glycosidases as synthesis tools

enzyme families and substrate scope | wild type versus engineered variants | temperature, pH and cofactor needs

Donor substrates and in situ regeneration systems

nucleotide sugar donors (UDP, GDP, CMP) | cheap donor precursors and recycling | balancing donor, acceptor and enzyme ratios

Reaction setup, monitoring and optimization basics

batch versus continuous formats | LC–MS or HPLC monitoring of products | yield, conversion and productivity metrics

Session 3

Fee: Rs 14800 Apply Now

Glycoengineering of Proteins, Cells and Biologics

Remodeling glycans on therapeutic proteins ex vivo

trimming and rebuilding Fc glycans | sialylation and galactosylation tuning | impact on stability and effector function

Metabolic and enzymatic labeling of cell surface glycans

sugar analog incorporation strategies **bioorthogonal handles and click tags** **tracking and targeting engineered cells**

Applications in vaccines, cell therapies and bioprocessing

glycooptimized antibodies and Fc fusions **cell surface engineering for CAR and NK cells** **process integration for glyco controlled biologics**

Session 4

Fee: Rs 18800 Apply Now

Mini Capstone: Glycoengineering Workflow Design

Defining a glycan target and engineering objective

Theory plus Practical

Choosing enzymes, donors and reaction sequence

mapping starting and desired glycoforms **selecting trimming and building steps** **simple cost and feasibility considerations**

Deliverables: schematic workflow and monitoring plan

diagram of chemoenzymatic steps **table of enzymes, donors and conditions** **QC readouts and success criteria summary**