Biophysical Properties — Stability, Solubility & Aggregation — Hands-on

Quantify and engineer biophysical behavior of proteins before going to the bench. This module connects structure, sequence and environment to stability, solubility and aggregation risk using in-silico biophysics, mutational scanning and developability-style profiling for enzymes, antibodies and other biologics.

Biophysical Properties — Stability, Solubility & Aggregation

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Session Index

Session 1

Fee: Rs 20800 Apply Now

Stability Concepts & In-Silico Probes

Thermodynamic vs kinetic stability for proteins

ΔG, T_m, unfolding curves | **two-state vs multi-state models** | **environmental effects (pH, salt, cosolvents)**

Sequence & structural determinants of stability

core packing and hydrophobic effect | **salt bridges and hydrogen bond networks** | **loops, termini and disorder**

In-silico stability probes and quick checks

empirical stability predictors | packing scores and strain indicators | simple MD / minimization sanity checks

Session 2

Fee: Rs 24800 Apply Now

Solubility, Aggregation & Developability Flags

Determinants of solubility and self-association

surface charge and pI | hydrophobic patches | colloidal vs conformational stability

Aggregation hotspots and prediction tools

linear aggregation motifs | β-sheet prone regions | exposed hydrophobics and interfaces

Developability-style in-silico flagging

charge–hydrophobicity plots | liquid formulation risk indicators | ranking variants by risk profile

Session 3

Fee: Rs 28800 Apply Now

Mutational Scanning & Stability Engineering

In-silico mutational scanning strategies

single point ΔΔG predictions | saturation mutagenesis maps | ranking stabilizing vs destabilizing changes

Design motifs for stability and solubility

core optimization and cavity filling | disulfide and salt-bridge engineering | surface charge and hydrophobic tuning

Balancing stability with activity and expression

avoidance of active-site perturbations | expression host considerations | shortlisting variants for experimental testing

Session 4

Fee: Rs 31800 Apply Now

Biophysical Profiles, Reporting & Case Studies

Putting stability, solubility and aggregation together

multi-metric biophysical dashboards | traffic-light developability views | comparing wild-type vs variants

Case studies: enzymes, antibodies and industrial proteins

stability improvement under process conditions | reducing aggregation in biologics | integrating experimental feedback

Deliverables: biophysical profile & design recommendation pack

summary tables and plots | variant ranking and rationale | slide-ready figures for stakeholders