

# Synthetic Ecology & Consortia Design (In Silico) — Hands-on

Engineer synthetic microbial consortia using rigorously validated in silico methods. This hands-on module covers generalized Lotka–Volterra (gLV) and genome-scale, constraint-based community modeling to predict interactions, cross-feeding, growth, and productivity. You will use COBRApy/MICOM/SMETANA/COMETS and design strategies (OptKnock/OptCouple/OptAux) to optimize media, fluxes, and stability, culminating in a reproducible design dossier ready for bench testing.

## Synthetic Ecology & Consortia Design (In Silico)

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### Session 1

**Fee: Rs 8800** [Apply Now](#)

#### Interaction Models: gLV & Data Fitting

Pairwise & multispecies gLV models

[competition, mutualism, parasitism](#) [stability & equilibria](#) [parameter identifiability](#)

Fitting to time-series/absolute abundance

regularization & cross-validation  
compositional→absolute via refs forecasting &  
uncertainty

Perturbation & control concepts

invasibility & resilience feedback & set-point shifts  
designable attractors

### Session 2

Fee: Rs 11800 Apply Now

## GEMS & Community FBA (COBRA/MICOM)

Genome-scale metabolic models (GEMs)

ModelSEED/KBase drafts gapfilling & curation  
exchange/bounds setup

Community FBA & coupling

MICOM/SMETANA/OptCom Pareto fronts & trade-offs  
secretion/uptake constraints

dFBA & spatial simulations (overview)

COMETS-style dynamics batch vs chemostat  
bioreactor heuristics

### Session 3

Fee: Rs 14800 Apply Now

## Cross-Feeding, Media & Design Algorithms

Metabolite exchange & niches

SMETANA scores auxotrophies & complementarity  
syntrophy vs competition

Media & intervention optimization

OptKnock/OptCouple/OptAux feed strategies &  
supplements target metabolite yield

Safety & constraints

**containment objectives** **antagonists/kill-switch**  
**proxies** **off-target metabolite limits**

**Session 4**

**Fee: Rs 18800** Apply Now

**Dynamics, Robustness & Reproducible Design Dossier**

Dynamic & spatial scenarios

**dFBA chemostat/batch** **biofilm/plug-flow heuristics**  
**shock & invasion tests**

Sensitivity & robustness

**Morris/variance-based SA** **parameter/posterior**  
**sweeps** **fail-safe criteria**

Design dossier & deliverables

**Quarto report + model cards** **SBML/JSON models &**  
**env files** **SOPs & testable hypotheses**