BioProcess Digital

PROFESSIONAL COURSES IN BIOPROCESS ENGINEERING

Digital scale-up and optimization of microbial fermentations

Fermentation engineering principles. Kinetic analysis. Knowledge simulation models. Digital optimization of batch, continuous and fed-batch fermentations

ONLINE COURSE

On-demand

COURSE FEE

350 € per session

COURSE ORGANIZATION

Course divided in 7 sessions
Sessions can be taken individually

Session scheduling: suggested one per week

Effort: 3 - 6 h per session

COURSE DESCRIPTION

The course provides a comprehensive overview of the concepts and methodologies of bioprocess enginnering for the digital design and optimization of microbial fermentations. It covers fermentation kinetics, oxygen transfer in fermentors, the development of knowledge-driven simulation models, the scale-up and optimal operations of batch, continuous and fed-batch fermentations.

The course combines methodological review presentations with industrial fermentations case studies.

INSTRUCTOR

Jean-Marc Engasser, BioProcess Digital

DIGITAL LEARNING

- Learning platform with course resources
- Live or recorded slideshow videos
- Case studies on spreadsheets templates with guides
- Online collective or one-to-one tutoring

COURSE PROGRAM

Session 1: Fermentation engineering principles

Fermentations influencing phenomena. Microbial kinetics. Mass transfer in fermentors. Mass balances

Session 2: Fermentations kinetic analysis

Kinetic analysis in batch and continuous fermentors. Fermentation and microbial rates. Kinetic laws

Session 3: Oxygen transfer and consumption kinetics

Kientics analysis of oxygen transfer and microbial uptake. Oxygen solubility and transfer rate laws

Session 4: Fermentations simulation models on spreadsheet

Simulation model mass balances, thermodynamic and kinetic laws. Numerical integration on spreadsheet

Session 5: Batch fermentations simulation and optimization

Batch fermentation principles and modeling. Operational variables optimization for maximum productivity

Session 6: Continuous fermentations simulation and optimization

Continuous fermentation principles and modeling. Dynamics and steady-states. Optimization of operational variables

Session 7: Fed-batch fermentations simulation and optimization

Fed-batch fermentation principles and modeling. Optimization of fed-batch operational variables