

Introduction to microbial fermentation processes

Industrial fermentation processes. Fermentors technologies and scale-up. Batch, continuous, fed-batch and perfusion operations. Fermentations costs

ONLINE COURSE

On-demand

COURSE FEE

350 € per session

COURSE ORGANIZATION

Course divided in 8 sessions

Sessions can be taken individually

Session scheduling: suggested one per week

Effort: 4 - 6 h per session

COURSE DESCRIPTION

The course provides a comprehensive overview of industrial fermentation processes, including their technologies, operations, scale-up, and cost analysis. It introduces the kinetics of microbial transformations and of oxygen transfer. It compares the fermentations batch, continuous, fed-batch, and perfusion operations.

The course features a combination of methodological presentations, fermentations case studies, and quizzes.

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 quizzes
- Online collective or one-to-one tutoring

COURSE PROGRAM

Session 1: Industrial fermentation processes

Microorganisms, media, products. Upstream and downstream operations. Fermentors technologies and operations

Session 2: Microbial kinetics

Kinetic analysis in batch and continuous fermentors. Microbial kinetic laws

Session 3: Fermentors aeration and oxygen transfer

Fermentors aeration technologies. Oxygen solubility and transfer kinetics. Determination of oxygen transfer coefficient k_{La}

Session 4: Fermentations simulation, scale-up, and cost optimization

Fermentations influencing phenomena and simulation models. Fermentors scale-up. Cost evaluation and optimization

Session 5: Batch fermentations

Batch fermentation principles, kinetics, productivity limitations, and operational optimization

Session 6: Continuous fermentations

Continuous fermentation principles, kinetics, productivity limitations, and operational optimization

Session 7: Fed-batch fermentations

Fed-batch fermentation principles, kinetics, productivity limitations, and operational optimization

Session 8: Perfusion high-density fermentations

Perfusion fermentation principles and technologies, kinetics, productivity limitations, and operational optimization