



WPI

**BIOMANUFACTURING EDUCATION
& TRAINING CENTER**
ENHANCE YOUR SKILLS & ADVANCE YOUR CAREER

Microbial Fermentation Development: Scale-Up and Manufacturing

This program offers hands-on laboratory experience supplemented by lectures and discussions regarding microbial fermentation processes. Topics covered include microbial growth, strain development, growth kinetics, and scale-up strategies. Through laboratory activities such as fermenter preparation, culture monitoring, harvest, and cell disruption, participants will gain the skills and knowledge to design and optimize fermentation processes for bench and pilot scale operations.

SCHEDULE:

Day 1

Lectures (3 hrs.)

- Microbial Growth
- Primary and Secondary Metabolites
- Strain Development and Improvement
- Microbial vs. Mammalian Systems

Labs (4 hrs.)

- Flask Inoculation
- Bench-Scale Fermenter Preparation, Media Addition, Fermenter Sterilization

Day 2

Lectures (3.5 hrs.)

- Kinetics of Fermentation
- Design of Fermenters for Microbial Growth
- Automated Control of Bench-Scale Fermenters

Labs (3.5 hrs.)

- Bench-Scale Fermenter Conditioning, Inoculation, Growth Parameter Settings
- DO Calibration and Off-line pH Determination
- Pilot-Scale Fermenter Preparation, SIP/CIP

Day 3

Lecture (3.5 hrs.)

- Mixing, Aeration, and Oxygen Mass Transfer
- Transport Phenomena
- $k_L a$ Studies
- Scale-Up Considerations
- pH and DO Probe Preparation, Calibration, and Maintenance

Lab (3.5 hrs.)

Bench-Scale Harvest, Centrifugation, Sampling
Pilot-Scale Preparation for Seeding

Day 4

Lecture (1.5 hrs.)

- Recombinant Micro-Organisms, Cryopreservation and Plasmid Stability

Labs (4 hrs.)

- Pilot-Scale Fermenter Harvest, Centrifugation, and Cell Disruption via Homogenization Review (1.5 hrs.)
- Final Discussion / Q&A



Learn More: WPI.edu/+BETC

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