Multiphase Reactor Engineering Training Course

Professional Development Training Course Outline

Category	General Training	**Duration**	5 Days
Base Fee	$1,500 USD	**Delivery Mode**	Online / On-site Hybrid

Course Introduction

Multiphase Reactor Engineering is at the forefront of process innovation in chemical, petrochemical, and biochemical industries. Multiphase Reactor Engineering Training Course equips engineers, researchers, and process designers with advanced knowledge to optimize the design, operation, and scale-up of gas-liquid, liquid-liquid, and solid-liquid reactors. Participants will gain hands-on expertise in tackling challenges such as mass transfer, reaction kinetics, fluid dynamics, and multiphase flow modeling, bridging the gap between theoretical concepts and industrial applications.

The course emphasizes practical skills through real-world case studies, simulation exercises, and experimental data analysis. By integrating advanced computational fluid dynamics (CFD), process intensification strategies, and sustainable reactor design principles, participants will learn to enhance reactor efficiency, safety, and scalability. This training is ideal for professionals seeking to stay ahead in the rapidly evolving landscape of multiphase reaction technology, energy-efficient processing, and green chemical engineering.

Programme Curriculum

Multiphase Reactor Engineering Training Course

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Course Duration

5 days

Course Objectives

By the end of this course, participants will be able to:

1. Understand fundamentals of multiphase flow dynamics in reactors.
2. Apply advanced mass transfer and heat transfer principles to reactor design.
3. Optimize gas-liquid, liquid-liquid, and solid-liquid reactors for industrial applications.
4. Perform reaction kinetics modeling and residence time distribution analysis.
5. Utilize CFD simulation tools for reactor performance prediction.
6. Implement process intensification techniques for enhanced productivity.
7. Design safety-compliant multiphase reactors in accordance with global standards.
8. Analyze scale-up challenges and solutions from laboratory to industrial scale.
9. Evaluate catalyst performance and multiphase catalytic reactions.
10. Apply green chemistry principles to minimize environmental impact.
11. Interpret experimental data and pilot plant results for informed decision-making.
12. Solve industrial reactor troubleshooting problems using case-based learning.
13. Stay updated with emerging trends in digital twins, AI-driven reactor optimization, and Industry 4.0 applications.

Target Audience

1. Chemical Engineers
2. Process Engineers
3. Reactor Design Engineers
4. Biochemical Engineers
5. R&D Scientists
6. Production Managers in Chemical & Petrochemical Industries
7. Graduate and Postgraduate Engineering Students
8. Industrial Consultants in Process Optimization

Course Modules

Module 1: Introduction to Multiphase Reactor Engineering

- Fundamentals of multiphase flows
- Types of multiphase reactors-bubble columns, slurry, trickle bed
- Gas-liquid, liquid-liquid, and solid-liquid interactions
- Key performance indicators and process parameters
- Case Study: Scale-up of a gas-liquid bubble column

Module 2: Fluid Dynamics in Multiphase Reactors

- Laminar and turbulent flow in multiphase systems
- Hydrodynamics and flow regimes
- CFD modeling basics for multiphase reactors
- Interphase momentum transfer
- Case Study: CFD analysis of slurry reactors

Module 3: Mass Transfer and Heat Transfer

- Mass transfer coefficients and correlations
- Heat transfer in multiphase systems
- Interfacial area and contact efficiency
- Combined heat and mass transfer optimization
- Case Study: Heat integration in gas-liquid reactors

Module 4: Reaction Kinetics and Mechanisms

- Reaction rate laws for multiphase reactions
- Catalyst selection and effectiveness
- Modeling of complex reaction networks
- Residence time distribution (RTD) analysis
- Case Study: Kinetic modeling of biodiesel production

Module 5: Design of Multiphase Reactors

- Reactor sizing and design equations
- Design of bubble columns, trickle bed, and slurry reactors
- Scale-up strategies and industrial considerations
- Safety and hazard analysis
- Case Study: Design of a multiphase oxidation reactor

Module 6: Process Intensification Techniques

- Microreactors and structured reactors
- High-gravity reactors and spinning disk reactors
- Enhanced mixing and mass transfer strategies
- Energy-efficient reactor design
- Case Study: Intensified Fischer-Tropsch synthesis reactor

Module 7: Simulation and Digital Tools

- CFD for multiphase reactors
- Process simulation software integration
- Digital twin applications in reactor monitoring
- Sensitivity analysis and optimization
- Case Study: Digital twin application for chemical reactor troubleshooting

Module 8: Industrial Applications and Troubleshooting

- Gas-liquid, liquid-liquid, and solid-liquid industrial reactors
- Scale-up and pilot plant integration
- Common industrial challenges and mitigation strategies
- Data-driven decision-making and predictive maintenance

- Case Study: Resolving foaming issues in chemical production

Training Methodology

This course employs a participatory and hands-on approach to ensure practical learning, including:

- Interactive lectures and presentations.
- Group discussions and brainstorming sessions.
- Hands-on exercises using real-world datasets.
- Role-playing and scenario-based simulations.
- Analysis of case studies to bridge theory and practice.
- Peer-to-peer learning and networking.
- Expert-led Q&A sessions.
- Continuous feedback and personalized guidance.

Register as a group from 3 participants for a Discount

Send us an email: info@fineskilltrainingcenter.org or call *+254769199797*

Certification

Upon successful completion of this training, participants will be issued with a globally- recognized certificate.

Tailor-Made Course

We also offer tailor-made courses based on your needs.

Key Notes

a. The participant must be conversant with English.

b. Upon completion of training the participant will be issued with an Authorized Training Certificate

c. Course duration is flexible and the contents can be modified to fit any number of days.

d. The course fee includes facilitation training materials, 2 coffee breaks, buffet lunch and A Certificate upon successful completion of Training.

e. One-year post-training support Consultation and Coaching provided after the course.

f. Payment should be done at least a week before commence of the training, to Fineskill Training Center account, as indicated in the invoice so as to enable us prepare better for you.

Upcoming Scheduled Sessions

Start Date	End Date	Location	Price
23 Nov 2026	27 Nov 2026	Online	$1,000
23 Nov 2026	27 Nov 2026	Physical	$1,500

Start Date	End Date	Location	Price
23 Nov 2026	27 Nov 2026	Physical	$3,000
23 Nov 2026	27 Nov 2026	Physical	$3,000
23 Nov 2026	27 Nov 2026	Physical	$6,000
23 Nov 2026	27 Nov 2026	Physical	$4,500
23 Nov 2026	27 Nov 2026	Physical	$6,000
23 Nov 2026	27 Nov 2026	Physical	$6,000

Ready to enroll or request a customized program? Book online or contact us:

Register Online Now

Email: info@fineskilltrainingcenter.com | Website: www.fineskilltrainingcenter.com