Process Intensification Techniques in Chemical 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

In today’s rapidly evolving chemical engineering landscape, Process Intensification (PI) has emerged as a game-changing approach to optimize efficiency, sustainability, and safety in chemical processes. By integrating advanced process design, modular technologies, and novel equipment, chemical industries can drastically reduce energy consumption, capital costs, and environmental footprint. Process Intensification Techniques in Chemical Engineering Training Course equips professionals with cutting-edge skills in reactor engineering, heat and mass transfer optimization, and microreactor technologies, ensuring they stay at the forefront of industrial innovation and competitiveness.

Participants will gain a comprehensive understanding of emerging trends and transformative technologies, including hybrid reactors, process modularization, and intensified separation techniques, enabling them to implement high-efficiency, low-waste chemical processes. Through a combination of hands-on case studies, simulations, and real-world industrial examples, this course empowers engineers, researchers, and managers to drive operational excellence and sustainable growth. By mastering these advanced process intensification strategies, attendees will be prepared to tackle complex chemical challenges while contributing to green chemistry and smart manufacturing initiatives.

Programme Curriculum

Process Intensification Techniques in Chemical Engineering Training Course

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Course Duration

5 days

Course Objectives

1. Understand fundamentals of process intensification in chemical engineering.
2. Explore novel reactor designs for enhanced chemical conversion.
3. Analyze microreactor and millireactor technologies.
4. Optimize heat and mass transfer processes for industrial efficiency.
5. Implement modular and compact process systems.
6. Apply membrane and separation intensification techniques.
7. Evaluate safety, sustainability, and energy efficiency metrics.
8. Integrate hybrid and multifunctional reactors into chemical processes.
9. Conduct process simulation and computational modeling.
10. Design energy-efficient chemical plants using PI principles.
11. Solve real-world industrial case studies in process intensification.
12. Implement green chemistry strategies to reduce emissions and waste.
13. Enhance process scalability, reliability, and cost-effectiveness.

Target Audience

1. Chemical Engineers
2. Process Design Engineers
3. Plant Managers & Supervisors
4. Research & Development Professionals
5. Industrial Safety and Environmental Engineers
6. Academicians and Graduate Students in Chemical Engineering
7. Consultants in Process Optimization
8. Professionals in Energy and Sustainability Sectors

Course Modules

Module 1: Introduction to Process Intensification

- Fundamentals and principles of PI
- Historical evolution and industry relevance
- Types of process intensification techniques
- Key performance indicators for PI

- **Case Study:** Energy reduction in a petrochemical reactor

Module 2: Intensified Reactor Design

- Microreactors, millireactors, and compact reactors
- High surface-to-volume ratio benefits
- Multi-phase and multiphysics reaction optimization
- Reactor integration for continuous processes
- **Case Study:** Scale-up of microreactor for pharmaceutical synthesis

Module 3: Heat and Mass Transfer Intensification

- Enhanced heat exchangers and compact heat transfer units
- Mass transfer augmentation techniques
- Process integration for thermal efficiency
- Application of advanced simulation tools
- **Case Study:** Intensified cooling system in chemical distillation

Module 4: Separation and Membrane Intensification

- Membrane separation technologies
- Hybrid separation processes
- Solvent and extractive intensification
- Energy-efficient purification techniques
- **Case Study:** Membrane-based biofuel separation process

Module 5: Modular Process Design

- Advantages of modular chemical plants
- Plug-and-play process equipment
- Reducing footprint and capital cost
- Process flexibility and scalability
- **Case Study:** Modular plant design for specialty chemicals

Module 6: Hybrid and Multifunctional Reactors

- Concept of multifunctional reactors
- Integration of reaction and separation
- Catalytic and reactive distillation systems
- Energy and material savings through hybrid systems
- **Case Study:** Reactive distillation for esterification process

Module 7: Simulation and Modeling for PI

- Computational fluid dynamics (CFD) applications
- Process simulation for design optimization
- Sensitivity and risk analysis
- Scale-up and predictive modeling techniques
- **Case Study:** CFD-based optimization of microreactor flow

Module 8: Sustainability, Safety, and Green Chemistry

- Energy-efficient and low-waste processes

- Regulatory and safety compliance in PI
- Environmental and sustainability assessment
- Life cycle analysis and carbon footprint reduction
- **Case Study:** Green chemistry implementation in solvent recovery

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
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

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