Chemical Engineering Fundamentals Refresher 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

Chemical Engineering Fundamentals Refresher Training Course is designed to strengthen core competencies in process engineering, thermodynamics, fluid mechanics, heat transfer, reaction engineering, and process safety management. As modern chemical industries evolve toward digital transformation, sustainability, energy efficiency, and smart manufacturing, engineers are required to continuously refresh foundational knowledge to remain competitive. This training bridges academic principles with real-world industrial applications, ensuring participants can confidently solve complex engineering problems in refineries, petrochemical plants, pharmaceuticals, fertilizers, and manufacturing industries.

This course emphasizes practical mastery of process optimization, plant operations, simulation tools, troubleshooting techniques, and safety compliance standards such as HAZOP and OSHA guidelines. Through structured modules, case-based learning, and industry simulations, participants will develop strong analytical and decision-making skills aligned with current trends like green chemistry, carbon footprint reduction, process intensification, and Industry 4.0 integration. The program is ideal for professionals seeking to enhance productivity, reduce operational risks, and improve plant performance in high-demand industrial environments.

Programme Curriculum

Chemical Engineering Fundamentals Refresher Training Course

Introduction

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Course Duration

5 days

Course Objectives

1. Strengthen understanding of Chemical Engineering Fundamentals & Core Principles
2. Enhance skills in Process Design and Optimization Techniques
3. Master Thermodynamics and Phase Equilibrium Applications
4. Improve competency in Fluid Mechanics and Transport Phenomena
5. Develop expertise in Heat Transfer Operations and Energy Efficiency
6. Build proficiency in Chemical Reaction Engineering & Kinetics
7. Apply Process Control and Instrumentation Systems
8. Strengthen Process Safety Management (PSM) and Risk Assessment
9. Understand Industrial Separation Processes
10. Improve Plant Troubleshooting and Operational Efficiency
11. Integrate Sustainability and Green Engineering Practices
12. Utilize Simulation Tools
13. Prepare for Industry 4.0 Smart Manufacturing and Digital Process Engineering

Target Audience

1. Graduate Chemical Engineers
2. Process Engineers in Manufacturing Industries
3. Petrochemical and Refinery Technicians
4. Plant Operators and Shift Supervisors
5. Industrial Chemists transitioning into Engineering roles
6. Safety and Process Compliance Officers
7. Maintenance Engineers in Process Industries
8. Technical Consultants and Project Engineers

Course Modules

Module 1: Chemical Engineering Principles & Mass Balance

- Fundamentals of unit operations and systems thinking
- Material balance in batch and continuous systems
- Steady-state and unsteady-state analysis
- Process flow diagram (PFD) interpretation

- Case Study: Mass balance optimization in a fertilizer plant reducing raw material loss by 12%

Module 2: Thermodynamics & Phase Equilibria

- Laws of thermodynamics in chemical processes
- Gibbs free energy and equilibrium concepts
- Vapor-liquid equilibrium (VLE) principles
- Application in distillation column design
- Case Study: Crude oil fractionation efficiency improvement in refinery operations

Module 3: Fluid Mechanics & Transport Phenomena

- Fluid flow behavior and Bernoulli's equation
- Laminar vs turbulent flow analysis
- Pipe network design and pressure drop calculations
- Pumps, compressors, and fluid transport systems
- Case Study: Pipeline optimization in chemical transport reducing energy loss by 18%

Module 4: Heat Transfer & Energy Systems

- Conduction, convection, and radiation mechanisms
- Heat exchanger design and performance
- Energy integration and heat recovery systems
- Thermal efficiency improvement strategies
- Case Study: Heat exchanger network optimization in petrochemical plant

Module 5: Chemical Reaction Engineering

- Reaction kinetics and rate laws
- Reactor design
- Catalysis and reaction mechanisms
- Conversion and yield optimization
- Case Study: Reactor optimization in ammonia production increasing yield by 9%

Module 6: Process Control & Instrumentation

- Feedback and feedforward control systems
- Sensors, transmitters, and control valves
- PID tuning and automation basics
- DCS and SCADA systems overview
- Case Study: Automated control system reducing downtime in polymer plant

Module 7: Separation Processes & Unit Operations

- Distillation, absorption, and extraction techniques
- Filtration and membrane separation
- Crystallization and drying operations
- Efficiency and energy optimization in separations
- Case Study: Distillation column revamp in ethanol production plant

Module 8: Process Safety, Sustainability & Industry 4.0

- HAZOP studies and risk analysis

- OSHA compliance and safety standards
- Green chemistry and sustainability practices
- Digital twin and smart plant technologies
- Case Study: Safety incident reduction through HAZOP implementation in refinery

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

21 Sep 2026	25 Sep 2026	Online	$1,000
21 Sep 2026	25 Sep 2026	Physical	$1,500
21 Sep 2026	25 Sep 2026	Physical	$0
21 Sep 2026	25 Sep 2026	Physical	$0
21 Sep 2026	25 Sep 2026	Physical	$0
21 Sep 2026	25 Sep 2026	Physical	$0
21 Sep 2026	25 Sep 2026	Physical	$0
21 Sep 2026	25 Sep 2026	Physical	$0

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

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