Separation Process Simulation 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

Separation processes form the backbone of modern chemical, petrochemical, pharmaceutical, oil & gas, and environmental engineering industries. The ability to efficiently design, model, and optimize separation units such as distillation columns, absorption towers, extraction systems, membranes, and crystallizers is critical for achieving high process efficiency, energy optimization, sustainability, and cost reduction. Separation Process Simulation Training Course is designed to equip engineers, technologists, and researchers with advanced skills in process modeling, dynamic simulation, thermodynamic property analysis, and digital twin integration using leading process simulation tools.

With the growing demand for Industry 4.0, AI-driven process optimization, carbon footprint reduction, and energy-efficient separation technologies, simulation has become an essential engineering competency. Participants will gain hands-on expertise in building robust simulation models, troubleshooting process bottlenecks, performing sensitivity analysis, and optimizing separation performance under real industrial conditions. The course emphasizes real-world industrial case studies, plant-based scenarios, and simulation-driven decision-making, ensuring learners can translate theoretical knowledge into practical engineering solutions across upstream and downstream operations.

Programme Curriculum

Separation Process Simulation Training Course

Introduction

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Course Duration

5 days

Course Objectives

1. Master process simulation fundamentals for separation systems
2. Apply thermodynamic modeling and property package selection
3. Design and optimize distillation column simulation models
4. Perform multiphase separation and flash calculations
5. Develop skills in gas-liquid absorption and stripping simulation
6. Optimize liquid-liquid extraction processes using simulation tools
7. Understand membrane separation and hybrid systems modeling
8. Implement energy-efficient separation and heat integration techniques
9. Conduct process sensitivity and what-if analysis in simulation environments
10. Build steady-state and dynamic simulation models for industrial systems
11. Apply process optimization techniques for CAPEX and OPEX reduction
12. Integrate digital twin concepts in separation process systems
13. Enhance decision-making using AI-assisted process simulation analytics

Target Audience

1. Chemical Engineers
2. Process Engineers in Oil & Gas industry
3. Petrochemical Plant Operators and Technologists
4. Refinery Engineers and Production Supervisors
5. Research Scientists in Separation Technology
6. Graduate Students in Chemical / Process Engineering
7. Environmental Engineers working on water and gas treatment
8. Simulation and Process Optimization Consultants

Course Modules

Module 1: Fundamentals of Separation Processes Simulation

- Overview of separation technologies
- Introduction to process simulation environments
- Flow sheeting concepts and simulation workflow
- Steady-state vs dynamic simulation
- Case study: Crude oil pre-fractionation unit modeling

Module 2: Thermodynamics & Property Package Selection

- Equations of state
- Activity coefficient models
- Phase equilibrium fundamentals
- Property estimation and validation techniques
- Case study: LNG cryogenic separation modeling

Module 3: Distillation Column Design & Simulation

- Tray vs packed column modeling
- Reflux ratio optimization
- Column convergence and troubleshooting
- Energy integration in distillation systems
- Case study: Ethanol-water azeotropic separation plant

Module 4: Gas Absorption & Stripping Systems

- Absorber column design principles
- Mass transfer modeling and efficiency analysis
- Solvent selection criteria
- Stripping gas optimization
- Case study: CO? removal from natural gas streams

Module 5: Liquid-Liquid Extraction Systems

- Solvent extraction fundamentals
- Distribution coefficient analysis
- Stage-wise extraction modeling
- Mixer-settler and column extractors
- Case study: Aromatics extraction in petrochemical refinery

Module 6: Membrane & Advanced Separation Technologies

- Membrane separation principles
- Hybrid separation systems
- Permeability and selectivity modeling
- Fouling and performance degradation analysis
- Case study: Seawater desalination plant optimization

Module 7: Dynamic Simulation & Process Control

- Time-dependent process modeling
- Control strategies for separation units
- Startup and shutdown simulation
- Disturbance and stability analysis
- Case study: Distillation column control in refinery operations

Module 8: Process Optimization & Digital Twin Integration

- Energy optimization techniques
- Pinch analysis integration

- AI-assisted process simulation
- Digital twin modeling for separation units
- Case study: Smart refinery separation network optimization

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

Start Date	End Date	Location	Price
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

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

Register Online Now

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