# Desalination Technologies in Chemical Engineering Training Course

Professional Development Training Course Outline

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

## Course Introduction

Desalination technologies have become a critical engineering solution for global water scarcity, especially in arid and coastal regions where freshwater resources are limited. With rising demand for sustainable water treatment systems, seawater desalination, reverse osmosis (RO), and advanced membrane technologies, chemical engineering plays a central role in designing, optimizing, and scaling efficient desalination plants. Desalination Technologies in Chemical Engineering Training Course provides a comprehensive understanding of modern water purification technologies, brine management, energy-efficient desalination systems, and hybrid thermal-membrane processes that are shaping the future of global water security.

The course is designed to equip participants with cutting-edge knowledge in industrial desalination engineering, process design, chemical process optimization, and environmental sustainability practices. Learners will explore real-world applications in multi-stage flash (MSF), multi-effect distillation (MED), electrodialysis (ED), nanofiltration, and solar desalination systems, supported by case studies from leading desalination projects worldwide. Emphasis is placed on innovation, energy recovery systems, and AI-driven optimization for next-generation smart desalination plants and sustainable water infrastructure development

## Programme Curriculum

**Desalination Technologies in Chemical Engineering Training Course**

**Introduction**

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**Course Duration**

5 days

**Course Objectives**

1. Understand global water scarcity solutions and desalination innovation trends
2. Master reverse osmosis (RO) system design and optimization techniques
3. Analyze multi-stage flash (MSF) and multi-effect distillation (MED) processes
4. Evaluate membrane technology advancements in water treatment engineering
5. Apply energy recovery systems in desalination plant efficiency improvement
6. Design sustainable seawater desalination plants using green technologies
7. Optimize brine disposal and zero liquid discharge (ZLD) systems
8. Integrate renewable energy (solar/wind) in desalination processes
9. Develop skills in process simulation using Aspen HYSYS / Aspen Plus
10. Understand chemical pretreatment and fouling control in membrane systems
11. Assess environmental impact and life cycle analysis (LCA) of desalination
12. Explore AI and IoT-based smart desalination plant monitoring systems
13. Implement cost-effective large-scale industrial desalination strategies

**Target Audience**

1. Chemical Engineers in water treatment and process industries
2. Environmental Engineers focusing on sustainable water solutions
3. Industrial Plant Operators in desalination and utilities sectors
4. Graduate and postgraduate chemical engineering students
5. Government water resource and infrastructure planners
6. Renewable energy professionals working on hybrid water-energy systems
7. Researchers in membrane science and separation technologies
8. Consultants in industrial water management and sustainability

**Course Modules**

**Module 1: Fundamentals of Desalination Engineering**

- Water scarcity and global demand trends
- Thermodynamics of saline water treatment
- Overview of desalination technologies
- Chemical engineering principles in separation processes
- Case Study: Israel’s National Water Carrier desalination integration

**Module 2: Reverse Osmosis (RO) Technology**

- RO membrane structure and function
- Pressure-driven separation mechanisms
- Energy consumption and efficiency optimization
- Fouling, scaling, and cleaning strategies
- Case Study: Sorek Desalination Plant (Israel) – world’s largest RO plant

**Module 3: Thermal Desalination Systems (MSF & MED)**

- Multi-stage flash distillation process design
- Multi-effect distillation thermodynamic cycles
- Heat recovery and steam utilization
- Operational challenges in thermal systems
- Case Study: Jebel Ali Desalination Plant (UAE)

**Module 4: Membrane Filtration & Advanced Separation**

- Nanofiltration and ultrafiltration systems
- Membrane materials and performance optimization
- Pretreatment technologies for seawater intake
- Chemical dosing and anti-fouling strategies
- Case Study: Singapore NEWater advanced membrane reuse system

**Module 5: Energy Efficiency & Recovery Systems**

- Energy recovery devices (ERD) in RO plants
- Pressure exchanger technology
- Hybrid solar desalination systems
- Process integration for energy minimization
- Case Study: Carlsbad Desalination Plant (USA)

**Module 6: Brine Management & Environmental Control**

- Brine concentration and disposal methods
- Zero Liquid Discharge (ZLD) systems
- Marine ecosystem impact mitigation
- Chemical treatment of brine streams
- Case Study: Saudi Arabia industrial brine management systems

**Module 7: Process Simulation & Digital Desalination**

- Aspen Plus simulation of desalination systems
- Process optimization techniques
- Digital twin technology for desalination plants
- IoT sensors and predictive maintenance
- Case Study: UAE smart water infrastructure projects

**Module 8: Renewable Energy & Future Desalination Systems**

- Solar desalination technologies
- Wind-powered desalination integration

- Green hydrogen and water nexus
- AI-driven optimization of water production
- Case Study: Australia solar-powered desalination pilot plants

### 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**

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