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Course Name

Best Practices Operation & Troubleshooting of RO Plant Process

Sector Name

Mechanical Engineering

Document Type

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Course Introduction

Since the development of the first practical cellulose acetate membranes in the early 1960s and the subsequent development of thin-film, composite membranes, the uses of reverse osmosis have expanded to include not only the traditional desalination process but also a wide variety of wastewater treatment applications. In addition, RO systems can replace or be used in conjunction with other treatment processes such as Oxidation, Adsorption, Stripping, or Biological Treatment (as well as many others) to produce a high-quality product water that can be reused or discharged.

To understand how Reverse Osmosis works, it helps to understand the process of osmosis, which is ubiquitous in nature. When two solutions having different dissolved mineral concentrations are separated by a semipermeable membrane, water flows from the less concentrated solution to the more concentrated solution.

The course shall present a strategy to preserve RO Plant function, predict RO Plant Performance, and avoid the Failure of RO Plant Components, and ensure the highest Permeate Productivity with the best salt rejection. It shall assist attendees to understand and manage properly any RO Plant with best practices and the most cost-effective method. This should result in maximizing membranes

and components' life, reducing operating cost, and maintaining productivity and quality

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Target Audience

This course is designed for Utility Engineers, Consulting Engineers, Highly Qualified Operators, and Chemists who work in Reverse Osmosis Desalination Plants.

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Learning Objectives

- ✓ Understand and Specify Water Quality.
- ✓ Different Membrane Configurations used for Membrane Filtration (MF & UF) and RO Applications.
- ✓ Understand Osmosis & Reverse Osmosis
- ✓ Understand RO Principles of Operations.
- ✓ RO Plant Configuration System.
- ✓ Control Scaling, Fouling, and Chemical attack by using appropriate Pretreatment Technologies
- ✓ Start Up, Shutdown & Daily Operation Instructions
- ✓ Reverse Osmosis Preventive Maintenance
- ✓ Reverse Osmosis Membranes Cleaning

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Course Outline

✓ 01 DAY ONE

Module (01) Water Sources

- ✓ Open Intake Sea Water
- ✓ High, Medium, Low Brackish Water
- ✓ Surface Water
- ✓ Municipal Water

Module (02) Water Basics

- ✓ Water Make-up
- ✓ Interpreting Water Analysis
- ✓ Water Biology
- ✓ Suspended Solids, Turbidity, and SDI
- ✓ Special Situations, Iron, Manganese, and Aluminum

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Course Outline

✓ 02 DAY TWO

Module (03) Membranes Configurations

- ✓ Difference between Cross flow & Depth Flow
- ✓ Microfiltration
- ✓ Ultrafiltration
- ✓ Reverse Osmosis
- ✓ Membranes Pore Size
- ✓ Membrane Materials & Structure
- ✓ Reverse Osmosis Definitions
- ✓ Factors Affecting RO Performance

Module (04) RO Plant Configuration

- ✓ Pretreatment System Components
- ✓ ROMAS (Reverse Osmosis Membrane Assembly)
- ✓ Post Treatment System
- ✓ Orientation to R.O Plant" RO Equipment"
- ✓ Instrumentation
- ✓ Corrosion Control
- ✓ Flush/ Cleaning System
- ✓ Feed Water Specs
- ✓ Alarms and Protections

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Course Outline

✓ 03 DAY THREE

Module (05) RO Plant Operation

- ✓ Start Up
- ✓ RO Shutdown
- ✓ Daily Operation Instructions
- ✓ Chemicals Preparation
- ✓ Back Wash Process
- ✓ Cartridge Filters Replacement
- ✓ Membrane Flow & Probe Test
- ✓ Membrane Replacement
- ✓ SDI Test

Module (06) RO Plant Technical Techniques

- ✓ Unit’s conversion
- ✓ Net Driving Pressure NDP
- ✓ HPP & ERT Efficiency Calculations
- ✓ Recovery Calculations
- ✓ Membranes Performance
- ✓ Pump Selection" dozing, feed, etc."
- ✓ Proper Installation of Flow Meters

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Course Outline

✓ 04 DAY FOUR

Module (07) RO Plant Maintenance

- ✓ Preventive Maintenance
- ✓ Condition Monitoring for Equipment
- ✓ High-pressure Pump & Motor
- ✓ Membranes
- ✓ Pressure Vessels
- ✓ Feed/ Sea Water Intake / Flushing Pumps
- ✓ Pump /Motors Replacement & Alignment
- ✓ Equipment’s Lubrication

Module (08) RO Plant Administrative

- ✓ Daily Log Report
- ✓ Weekly Trending
- ✓ Monthly Monitoring
- ✓ Performance Trends
- ✓ Housekeeping

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Course Outline

✓ 05 DAY FIVE

Module (09) Troubleshooting RO & NF Systems

- ✓ Importance of Record Keeping
- ✓ General Rule of Troubleshooting
- ✓ Signs of Trouble
- ✓ Causes and Corrective Measures
- ✓ Taking the Total System Approach

Module (10) Cleaning RO and NF Membrane Elements

- ✓ Introductory Remarks
- ✓ Defining a Foulant and a Scalant
- ✓ PH and Temperature Limits
- ✓ FT30 Resistance to Cleaning Agents
- ✓ Cleaning System
- ✓ Chemical Attack
- ✓ Permeate Back Pressure
- ✓ The Cleaning Process
- ✓ Permeate Back Pressure
- ✓ Cleaning Process

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Confirmed Sessions

FROM	TO	DURATION	FEES	LOCATION
Sept. 14, 2026	Sept. 18, 2026	5 days	5950.00 $	switzerland , Geneva
June 28, 2027	July 2, 2027	5 days	4250.00 $	UAE , Abu Dhabi
Dec. 28, 2026	Jan. 1, 2027	5 days	4250.00 $	UAE , Dubai
Jan. 10, 2027	Jan. 14, 2027	5 days	4250.00 $	KSA , Dammam

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