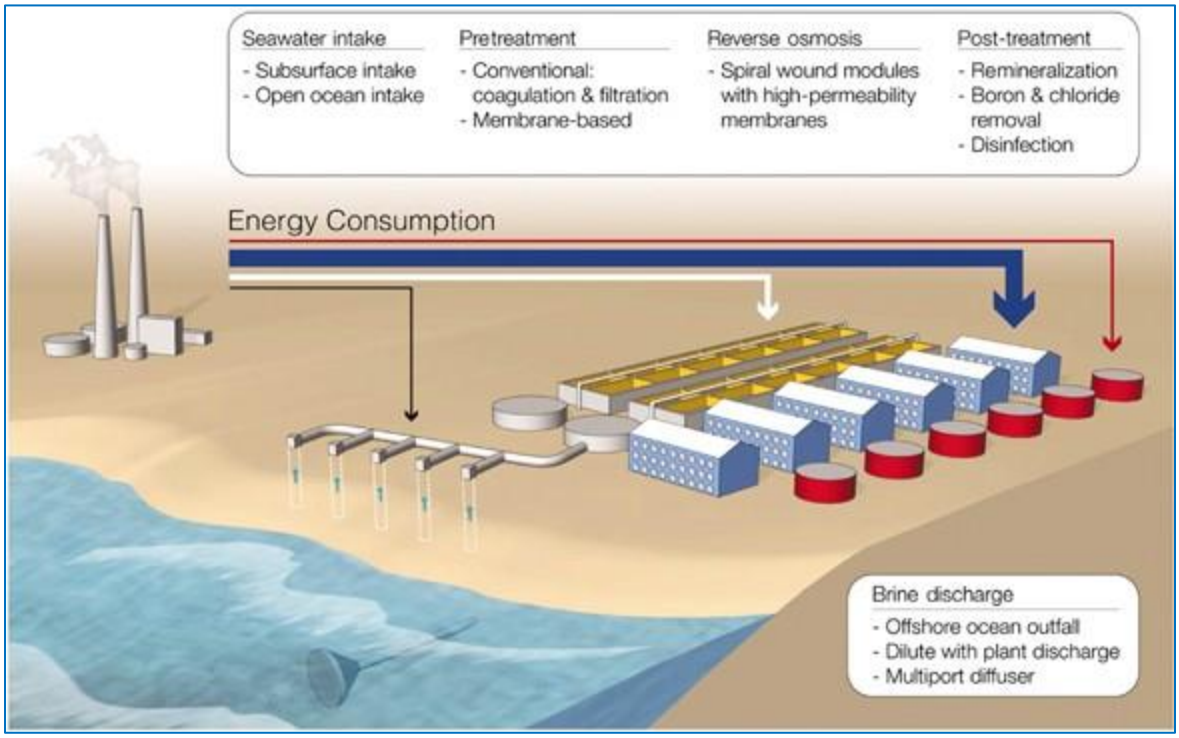
Tel No:+97126654546 | Fax No:+97126654182 | Email: training@cmc-me.com | www.cmc-me.com



WE124:
Membranes Desalination Technologies

Tel No:+97126654546 | Fax No:+97126654182 | Email: training@cmc-me.com | www.cmc-me.com

Training Introduction:

This training course provides theoretical and practical knowledge on the design and operation of reverse osmosis systems applied in desalination of seawater and brackish water. Specific topics such as membrane fouling, scaling, and cleaning are dealt with in detail, including pre-treatment options and the latest developments in monitoring and controlling fouling.

Training Objectives:

By the end of the training, participants will be able to:

- ✓ Understand the role and limitations of desalination technology in alleviating water scarcity. And, understand the basic principles, advantages and limitations of both thermal and membrane based desalination systems.
- ✓ Understand the basic principles of low pressure membrane technology such as ultrafiltration and microfiltration and their practical application in water treatment. And, be able to judge MF/UF operation and select appropriate pre-treatment and cleaning.
- ✓ Have in-depth knowledge on process design and operation of reverse osmosis plants for brackish and seawater desalination applications.
- ✓ Be able to select pre-treatment and post-treatment processes required to meet reverse osmosis design guidelines depending on raw water (surface, ground or wastewater) quality and desired permeate quality in potable and industrial applications.
- ✓ Be able to select and use appropriate water quality methods and models to monitor and predict fouling in reverse osmosis and MF/UF systems.

Training Designed for:

This course is intended for those professionals in water treatment companies, consulting agencies, ministries, and equipment suppliers. Preferably participants should have a background on: civil, chemical, environmental, or sanitary engineering.

Prerequisites:

BSc or MSc in chemical, civil, environmental engineering. Experience in treatment on drinking water and industrial water.

Training Requirement:

"Hand's on practical sessions, equipment and software will be applied during the course if required and as per the client's request."

Contents can be adapted to your specific wishes. It is therefore possible to focus on specific modules of the training course as per client's learning needs and objectives. Further, it should be forwarded to us a month prior to the course dates.

Training Program:

FIVE DAYS:

- ❖ Introduction
- ❖ Desalination and membrane related technologies

- Water sources, applications, capacities and cost
- Ultra- and microfiltration
- Principles. Membrane materials, pore size, flux, normalizing permeability, and fouling mechanisms
- Overview ultra- and micro-filtration elements and systems
- Fouling in MF/UF systems, fouling control and pre-treatment
- Reverse osmosis (and nano-filtration)
- Principles. Flux, salt passage, rejection and concentration polarization
- Overview of RO and NF membranes and elements. Single and multiple staging
- Summarizing process design of RO systems with spiral wound elements
- Osmotic pressure, Net driving pressure
- Permeate quality and flux
- Normalizing data in RO and NF systems in practice
- Fouling in RO and NF systems. Spacer and bundle fouling
- Suspended and colloidal matter, iron and manganese, biofouling, organic fouling and scaling
- Particulate fouling and pre-treatment (Fouling due to suspended and colloidal matter. Mechanisms of fouling. Parameters to predict fouling. SDI/MFI (0.45) and MFI-UF. Value of fouling predictions with SDI/MFI (0.45) in RO/NF and UF systems.)
- Fouling due to algae and Transparent exo polymers in RO/NF and UF systems
- Pre-treatment in practice for removal of suspended and colloidal matter for RO/NF
- Bio-fouling and pre-treatment
- Pre-treatment for bio-fouling, principles, parameters AOC and BDOC, membrane fouling simulator, biocides
- Fouling due to organic matter. Oil compounds, anti-scalants and coagulant aids
- Scaling and anti-scalants (Principles of scaling and prediction with computer program. Manual calculations of scaling due to silica, calcium, barium strontium sulphate and calcium fluoride.)
- Calculation of the Stiff and Davis Index to predict scaling of calcium carbonate (Scaling in seawater reverse osmosis. Scaling control, monitoring and anti-scalants.)
- Course Conclusion
- POST-ASSESSMENT and EVALUATION

Training Methodology:

This interactive training course includes the following training methodologies as a percentage of the total tuition hours:

- 30% Lectures, Concepts, Role Play
- 70% Workshops & Work Presentations, Techniques, Based on Case Studies & Practical Exercises, Gamification, Software & General Discussions
- Pre and Post Test

Training Certificate(s):

CMCT Internationally recognized certificate(s) will be issued to each participant who completed the course.

Tel No:+97126654546 | Fax No:+97126654182 | Email: training@cmc-me.com | www.cmc-me.com

Training Fees:

TBA as per the course location - This rate includes participant's manual, hand-outs, buffet lunch, coffee/tea on arrival, morning & afternoon of each day.

Note: The 5% VAT (Value Added Tax), will be effective starting 01st of January 2018 as per the new regulation from the UAE Government. The VAT applies for all quotation both for local and abroad.

Training Timings:

Daily Timings:

07:45 - 08:00	Morning Coffee / Tea
08:00 - 10:00	First Session
10:00 - 10:20	Recess (Coffee/Tea/Snacks)
10:20 - 12:20	Second Session
12:20 - 13:00	Recess (Prayer Break & Lunch)
13:00 - 14:00	Last Session

For training registrations or in-house enquiries, please contact:

Aisha Relativo - Training & Career Development Manager
aisha@cmc-me.com / training@cmc-me.com
Tel.: +971 2 665 3945 or +971 2 643 6653 | Mob.: +971 52 2954615