4 Day Intensive and Interactive Master Course

REVERSE OSMOSIS & ULTRAFILTRATION
Pre-treatment, Membrane Fouling and Scaling

Prof. Jan C. Schippers, PhD, MSc
August 20 – 23, 2018, Rome, Italy

Jan Schippers, Professor Em. in Water Supply Technology at IHE Institute for Water Education, UNESCO in Delft and consultant will give this interactive course. He has extensive professional experience in drinking and industrial water supply projects in Morocco, Qatar, United Emirates, Gabon, Cab Verde, Namibia, Uzbekistan, France and The Netherlands.

His specializations are: Consultancy, research, training and education.in the field of integral drinking and industrial water treatment and desalination/membrane related technologies.

Gave courses on Membrane Technology, Fouling, scaling and pre-treatment in membrane technology, Aquatic Chemistry, Conventional filtration Techniques and Membrane Bio Reactors in Cyprus, Morocco, China, Jordan, Yemen, Bahrain, Iran, Oman, Saudi Arabia, Chile, Italy and The Netherlands.

ACCOMMODATIONS AND VENUE

Accommodations and course venue will be at the AllTime Relais & Sport Hotel
Via Don Pasquino Borghi 100, 00144 Rome, Italy

Rome is the capital of the Italian Republic. It is the most populous and largest municipality in Italy and is among Europe's major capitals in terms of the amount of terrain it covers.It is the city with the highest concentration of historical and architectural riches in the world. Its historical centre, outlined by the enclosing Aurelian Walls, layering nearly three thou- sand years of antiq- uity, is an invaluable testimony to the European western world's cultural, artistic and his- torical legacy and in 1980 it was, together with the Holy See's property beyond the confines of the Vatican State as well as the Basilica of St. Paul outside the Walls, were added to UNESCO's World Heritage List .

Over 16% of the world's cultural treasures are located
In Rome (70% in all of Italy)

Advance program

Monday, 20 August 2018

08.30 – 09.00	**Registration and Workbook**
09.00 – 10.45	1. Introduction membrane technology
	2. Advanced pre-treatment for Reverse osmosis Basic principles micro- and ultrafiltration
10.45 – 11.00	**Coffee break**
11.00 – 12.30	3. Overview MF/UF elements and systems
12.30 – 13.30	**Lunch**
13.30 – 15.00	4. Fouling MF/UF fouling control in Ultra – microfiltration and pre-treatment
	5. Basic principles reverse osmosis and nanofiltration
15.00 – 15.15	**Coffee Break**
15.15 – 17.00	5. Basic principles reverse osmosis and nanofiltration
	6. Overview RO and NF membranes and elements

Tuesday, 21 August, 2018

09.00 – 11.00	7. Basic principles of process design RO systems with spiral wound elements
11.00 – 11.15	**Coffee break**
11.15 – 12.30	8. Normalizing data in RO/NF systems to monitoring fouling reverse osmosis membranes, temperature, pressure, osmotic pressure Trouble shooting
12.30 – 13.30	**Lunch**
13.30 – 15.00	9. Fouling in RO/NF systems. Contaminants: 10. Conventional pre-treatment techniques for RO/NF Intakes; wells, screens, strainers, chlorination, sand filtration, coagulation, sedimentation and dissolved air flotation (DAF).
15.00 – 15.15	**Coffee break**
15.15 – 17.00	10. Conventional pre-treatment techniques for RO/NF (continued) 11. Fouling due to particulate matter; monitoring, SDI and MFI

Wednesday, 22 August, 2018

9.00 – 11.00	11. Fouling due to particulate matter. SDI and MFI 12. MFI-UF; prediction fouling rate in Reverse Osmosis
11.00 – 11.15	**Coffee break**
11.15 – 12.30	13. Fouling in Ultrafiltration and Reverse Osmosis due to algae and Transparent Exo-Polymers (TEP) 14. Fouling of RO membranes due to coagulants
12.30 – 13.30	**Lunch**
13.30 – 15.00	15. Removal particulate colloidal and suspended matter in practice Comparing Advanced (Ultrafiltration) , Conventional (Sand filtration) and combinations of pre-treatment processes for surface water treatment e.g. DAF & UF. 16. Removal of iron and manganese from ground water
15.00 – 15.15	**Coffee break**
15.15 – 17.00	16. Removal of iron and manganese from ground water (continued) 17. Biofouling in Reverse Osmosis systems; Principles and contaminations causing biofouling, prediction rate of fouling and pre-treatment in full scale. plants.

Thursday, 23 August, 2018

9.00 – 11.00	17. Biofouling; in Reverse Osmosis systems (continued); Comparing Advanced (ultrafiltration) and Conventional (sand filtration) Pre-treatment and combinations for surface water and waste water treatment.
	18. Organic fouling: Transparent Exo Polymers, oil compounds, coagulant aids
11.00 – 11.15	**Coffee break**
11.15 – 12.30	19. Fouling and control in membrane bioreactors as a pre-treatment for Reverse Osmosis.
	20. Principles of scaling in RO systems; Homogeneous and heterogeneous nucleation, calcium carbonate, sulfate, silica
12.30 – 13.30	**Lunch**
13.30 – 15.00	21. Manual scaling calculations
	22. Calcium carbonate: Langelier and Stiff & Davis Index
	23. Demonstration; scaling predictions with Computer Program
15.00 – 15.15	**Coffee break**
15.15 – 16.45	24. Scaling in seawater reverse osmosis
	25. Scaling Control, monitoring and anti-scalants
	26. Trouble shooting in Reverse Osmosis systems and cleaning RO membranes
16.45 – 17.00	Closing and Certificates

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REGISTRATION FORM

Surname _____ Name _____

Affiliation _____

Address _____

_____

Country _____ Telephone _____

Fax _____ Email _____

Registration fee:

☐ EDS members **€2,500**

☐ Non-members **€2,700**

The fee includes 4 nights accommodation, lunches, coffee, dinners and course workbook.

Payment can be made by:

Credit card ☐ Visa ☐ Mastercard

Bank Transfer to be sent to the address below and a copy emailed to us.
Please take care of your own bank charges

Card No. _____

Exp. date _____ Security code _____

Account name: European Desalination Society
Account No. 11863.19
Banca Monte dei Paschi di Siena
67100 L'Aquila, Italy
ABI: 01030 *CAB:* 03600
Swift code: PASCITMMAQU
IBAN code: IT 92 I 01030 03600 000001186319

Cardholder name _____

Signature _____

Please fill in the form and send as an attachment to:
balabanmiriam@gmail.com or fax to: +1 928 543 3066