



## **4-Day Master Course on Reverse Osmosis and Ultrafiltration Pre-treatment, Membrane Fouling and Scaling**

Lecturer Prof. Jan C. Schippers, PhD, MSc  
21–24 September 2020, Rome, Italy



Jan Schippers, Professor Emeritus 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 Arab Emirates, Gabon, Cape Verde, Namibia, Uzbekistan, France, Chile 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 bioreactors in Cyprus, Morocco, China, Jordan, Yemen, Bahrain, Iran, Oman, Saudi Arabia, Chile, Italy and The Netherlands.

# PROGRAM

## Monday 21 September 2020

- 08.45–9.00**      **Registration and Workbook**
- 09.40–10.45      1. Introduction to desalination and membrane-related technology  
2. Advanced pre-treatment for reverse osmosis and nanofiltration  
Basic principles of ultrafiltration
- 10.45–11.00**      **Coffee**
- 11.00–12.30      3. Overview of ultrafiltration elements and system
- 12.30–13.30**      **Lunch**
- 13.30–15.00      4. Fouling and fouling control in ultrafiltration  
5. Basic principles of reverse osmosis and nanofiltration
- 15.00–15.15**      **Tea**
- 15.15 – 17.00      5. Basic principles of reverse osmosis and nanofiltration  
6. Overview of reverse osmosis and nanofiltration membranes  
and elements

## Tuesday 22 September 2020

- 09.00–11.00      7. Basic principles of process design of reverse osmosis systems  
with spiral wound elements
- 11.00–11.15**      **Coffee**
- 11.15–12.30      8. Normalization data of reverse osmosis plants for operation  
and maintenance
- 12.30–13.30**      **Lunch**
- 13.30–15.00      9. Fouling in reverse osmosis and nanofiltration; Contaminants  
10. Conventional pre-treatment for reverse osmosis
- 15.00–15.15**      **Tea**
- 15.15 – 17.00      10. Conventional pre-treatment for reverse osmosis  
11. Fouling due to colloidal and suspended matter.  
Silt Density Index (SDI) and Modified Fouling Index (MFI)

## Wednesday 23 September 2020

- 09.00–11.00 11. Fouling due to colloidal and suspended matter. SDI and MFI.  
12. Prediction of fouling rate in reverse osmosis and ultrafiltration.  
Modified Fouling Index – constant flux.
- 11.00–11.15 Coffee**
- 11.15–12.30 13. Fouling due to algae and transparent exo-polymers  
14. Fouling due to coagulants
- 12.30–13.30 Lunch**
- 13.30–15.00 15. Removal of colloidal and suspended matter in practice  
Advanced and conventional processes  
16. Fouling due to iron and manganese. Removal
- 15.00–15.15 Tea**
- 15.15–17.00 16. Fouling due to iron and manganese Removal  
17. Biofouling: Principles, monitoring, prediction and pre-treatment

## Thursday 24 September 2020

- 09.00–11.00 17. Biofouling: Principles, monitoring, prediction and pre-treatment  
18. Fouling due to transparent exo-polymers, oil and coagulant aids.
- 11.00–11.15 Coffee**
- 11.15–12.30 19. Fouling and control in membrane bioreactors  
20. Principles of scaling
- 12.30–13.30 Lunch**
- 13.30–15.00 21. Manual scaling calculations; silica, calcium sulfate  
22. Calcium carbonate; Langelier and Stiff & Davis Index  
23. Scaling predictions with Projection program
- 15.00–15.15 Tea
- 15.15–16.45 24. Scaling in seawater reverse osmosis  
25. Scaling monitoring, control and antiscalants  
26. Troubleshooting and cleaning-in-place of reverse  
osmosis 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**

### *Payment can be made by:*

Credit card

Visa

Mastercard

**Bank Transfer** to be sent to the address  
below and a copy emailed to us.

Card No. \_\_\_\_\_

Please take care of your own bank charges

Exp. date \_\_\_\_ Security code \_\_\_\_\_

*Account name:* European Desalination Society

Cardholder name \_\_\_\_\_

*Account No.* 11863.19

Banca Monte dei Paschi di Siena

Signature \_\_\_\_\_

67100 L'Aquila, Italy

*ABI:* 01030 *CAB:* 03600

*Swift code:* PASCITMMAQU

*IBAN code:* IT 92 | 01030 03600 000001186319

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