

# MEMBRANE BIOREACTOR SYSTEM DESIGN & OPTIMIZATION



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Courtesy Photo: Koch Membrane Systems

## This seminar is an intermediate level seminar which assumes

a basic understanding of MF/UF and has been designed to follow on from the DHP MF/UF basics seminar. The seminar is complementary to the MF/UF System Design and Optimization seminar. Students will gain benefit from attending both intermediate seminars, though each of the two intermediate seminars could be attended separately.

## Who Should Attend

Anyone wanting to know the latest, UNBIASED information on membrane water treatment technologies (DHP is a training company, NOT an equipment vendor). Anyone wanting to obtain a more advanced understanding of microfiltration/ultrafiltration and membrane bioreactors.

## Technologies Covered

- Membrane Bioreactors (MBR)



Courtesy Photos: Hydranautics, Koch Membrane Systems, Norit

## Why You Should Attend

Decisions made today affect your design, operation and budget tomorrow. It's hard to get unbiased information about which membrane product to use and the risks and benefits of different membrane products. As the world's leader in advanced water treatment training, David H. Paul, Inc. has trained and consulted in hundreds of facilities and knows what works and what doesn't. This seminar has been designed to offer you an unbiased, fact-finding, well-rounded experience that will put membrane water treatment in perspective and in a way that is simple to understand. David H. Paul, Inc. has no affiliation with any membrane manufacturers or OEMs.

This seminar is presented in an easy-to-understand, step-by-step, interesting and educational format, delivered without a sales pitch and taught by an unbiased industry expert. Return to your facility with the ability to make the right decisions based on what you learned.

## What You'll Receive

- 8 hrs of enjoyable, interesting, easy-to-understand membrane water treatment training
- 8 hours training including the latest in multimedia training
- A highly illustrated workbook
- Break refreshments

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## Instructors



**Dr Graeme K. Pearce** is a membrane technology specialist with 30 years experience in the membrane industry. A graduate of Oxford University in chemistry and chemical engineering, Dr Pearce's introduction to membrane technology started in BP in 1980. In 1991, Dr Pearce was Technical Director of the start up

Kalsep, a buy-out from BP. The company was a key participant in the development of the UK membrane filtration market for drinking water.

Dr Pearce joined Hydranautics in 2000, where he was responsible for the development and marketing of the ultrafiltration (UF) and microfiltration (MF) technology.

In 2005, Dr Pearce left Hydranautics to form an independent consultancy, Membrane Consultancy Associates (MCA), working with a broad spectrum of users and providers of membrane technology, to improve the knowledge base and application of membranes in water, wastewater, and process industries.

Dr Pearce has authored numerous papers and articles on membranes, and has provided the membrane filtration contribution to two books, namely 'The Guidebook to Membrane Desalination Technology' and 'The Guidebook to Membrane Technology for Wastewater Reclamation'.

## Overview of Topics

- MBR Module Formats
- Fouling in Membrane Filtration and MBR
- MBR Process Design
- Plant Optimization
- Case Histories

## What You'll Learn

This one day seminar has been designed to provide attendees with an intermediate level understanding of MBR system design, and performance of MF/UF membranes in wastewater treatment duties. Attendees will learn:

- How to select the most suitable MBR format for a particular application
- How to perform an outline system design, and make key decisions on equipment selection, sizing, and layout

- How to select a sustainable flux and ensure stable long term operation through permeability monitoring

## Certificate of Completion

Each attendee will receive a DHP certificate of completion following the course.

## What Others Say About DHP Training Seminars

DHP has trained over 16,000 water treatment professionals worldwide since 1988. Trainees include industrial, governmental and drinking water clients. The average rating given by attendees for all DHP seminars, including this one, is over 9 (on a scale of 1-10, with 1 being a terrible rating and 10 being an outstanding rating).

### The following are typical comments from attendees of DHP Seminars:

**"Great Course! Well worth the time."**

Bob Castle - Water Quality Manager, Marin Municipal Water District

**"Excellent training materials and presentation."**

Gary Trent - Abbott Laboratories

**"Excellent... got what I was interested in and more, especially in the inner workings of UF."**

Eric Lozano - Austin Energy

**"Well presented and well worth the investment."**

John Countz - Operations Manager, Consolidated Water Co.

**"Excellent! More than I expected."**

Mark Hall - Texas Water Development Board

**"It was great!"**

Trent Hughes - Civil Engineer, Black & Veatch

**"Great Course."**

Joe Gonzales - Xcel Energy

**"Most Excellent!"**

Mike Milner - Alternative H2O Solution

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## Detailed Agendum

**7:45 Refreshments (Provided)**

**8:00 Introductions**

**8:15 MBR Module Formats**

- Hollow fiber and flat sheet submerged and tubular side-stream options
- Suitability of different formats for various applications
- Brief review of commercial MBR products and new developments

**9:00 Break (Refreshments Provided)**

**9:15 Fouling in Membrane Filtration and MBR**

- Fouling mechanisms, critical and sustainable flux
- Evaluation of sustainable flux from pilot and main plant data
- Permeability monitoring and process optimization

**10:15 Break (Refreshments Provided)**

**10:30 MBR Process Design**

- System Components
- Layout Options
- Flux Selection
- Aeration and pump requirements

**11:30 Lunch**

**12:30 Membrane Fouling Control Exercise**

- Exercise Setup
- Perform Fouling Control Exercise in Groups

**1:45 Break (Refreshments Provided)**

**2:00 Plant Optimization**

- Fouling control exercise presentation and feedback
- Influence of design choices on performance and operational issues

**3:15 Break (Refreshments Provided)**

**3:30 Case Histories**

- Application experience in membrane filtration in wastewater reuse
- MBR case histories
- Coagulation, disinfection, performance, and bio-fouling

**4:30 Summary & Conclusions**

- Final Questions & Answers
- Seminar Evaluation

**5:00 End**