COURSE OVERVIEW TE0349
Advanced Desalination Processes: Desalination & Membrane Technology

Course Title
Advanced Desalination Processes: Desalination & Membrane Technology

Course Date/Venue
October 26-30, 2026/Glasshouse Meeting Room, Grand Millennium Al Wahda Hotel, Abu Dhabi, UAE

Course Reference
TE0349

Course Duration/Credits
Five days/3.0 CEUs/30 PDHs

Course Description

This practical and highly-interactive course includes various practical sessions and exercises. Theory learnt will be applied using our state-of-the-art simulators.

This course is designed to provide participants with a detailed and up-to-date overview of Advanced Desalination Processes: Desalination and Membrane Technology. It covers the desalination technologies, basics of membrane technology, types of membrane processes and principles of reverse osmosis; the water chemistry in desalination, feed water sources and characteristics; the membrane materials and fabrication and membrane module configurations; the pre-treatment processes and advanced pre-treatment technologies; the fouling and scaling mechanisms, chemical treatment strategies and reverse osmosis system design; the nanofiltration and hybrid systems, thermal desalination and energy consumption in desalination; and the energy recovery devices (ERDS).

During this interactive course, participants will learn the brine management and disposal, operation of membrane systems and membrane cleaning techniques; the membrane degradation and lifespan, advanced monitoring and control systems; the health, safety and environmental considerations and troubleshooting and performance analysis; the advanced membrane technologies, sustainable desalination practices and digitalization in desalination; the economic and financial considerations, capital and operational costs and cost optimization strategies; and the ROI and payback analysis and policy and incentives.

Course Objectives/Outcomes & Benefits for the Participants

Upon the successful completion of this course, each participant will be able to:-

- Apply and gain an advanced knowledge on desalination and membrane technology
- Discuss desalination technologies, basics of membrane technology, types of membrane processes and principles of reverse osmosis
- Recognize water chemistry in desalination, feed water sources and characteristics as well as membrane materials and fabrication
- Carryout membrane module configurations, pre-treatment processes and advanced pre-treatment technologies
- Apply fouling and scaling mechanisms, chemical treatment strategies and reverse osmosis system design
- Recognize nanofiltration and hybrid systems, thermal desalination, energy consumption in desalination and energy recovery devices (ERDS)
- Employ brine management and disposal, operation of membrane systems and membrane cleaning techniques
- Discuss membrane degradation and lifespan, advanced monitoring and control systems including health, safety and environmental considerations
- Apply troubleshooting and performance analysis, advanced membrane technologies, sustainable desalination practices and digitalization in desalination
- Discuss economic and financial considerations covering capital and operational costs, cost optimization strategies, ROI and payback analysis and policy and incentives

Exclusive Smart Training Kit - H-STK®

Participants of this course will receive the exclusive "Haward Smart Training Kit" (H-STK®). The H-STK® consists of a comprehensive set of technical content which includes electronic version of the course materials conveniently saved in a Tablet PC.

Who Should Attend

This course provides an overview of all significant aspects and considerations of advanced desalination processes: desalination and membrane technology for water and process engineers, chemical engineers, environmental engineers, process engineers, desalination plant operators, water treatment technicians, maintenance engineers, water treatment consultants, desalination project developers, technology evaluators, government water authority staff, municipal water planners, infrastructure decision makers, equipment manufacturers, R&D engineers, energy and desalination industry professionals and other technical staff.

Course Fee

US$ 5,500 per Delegate + **VAT**. This rate includes H-STK® (Haward Smart Training Kit), buffet lunch, coffee/tea on arrival, morning & afternoon of each day.

Course Certificate(s)

Internationally recognized certificates will be issued to all participants of the course who completed a minimum of 80% of the total tuition hours.

Certificate Accreditations

Haward's certificates are accredited by the following international accreditation organizations: -

- British Accreditation Council (BAC)

  Haward Technology is accredited by the **British Accreditation Council** for **Independent Further and Higher Education** as an **International Centre**. Haward's certificates are internationally recognized and accredited by the British Accreditation Council (BAC). BAC is the British accrediting body responsible for setting standards within independent further and higher education sector in the UK and overseas. As a BAC-accredited international centre, Haward Technology meets all of the international higher education criteria and standards set by BAC.

- The International Accreditors for Continuing Education and Training (IACET - USA)

  Haward Technology is an Authorized Training Provider by the International Accreditors for Continuing Education and Training (IACET), 2201 Cooperative Way, Suite 600, Herndon, VA 20171, USA. In obtaining this authority, Haward Technology has demonstrated that it complies with the **ANSI/IACET 2018-1 Standard** which is widely recognized as the standard of good practice internationally. As a result of our Authorized Provider membership status, Haward Technology is authorized to offer IACET CEUs for its programs that qualify under the **ANSI/IACET 2018-1 Standard**.

  Haward Technology's courses meet the professional certification and continuing education requirements for participants seeking **Continuing Education Units** (CEUs) in accordance with the rules & regulations of the International Accreditors for Continuing Education & Training (IACET). IACET is an international authority that evaluates programs according to strict, research-based criteria and guidelines. The CEU is an internationally accepted uniform unit of measurement in qualified courses of continuing education.

  Haward Technology Middle East will award **3.0 CEUs** (Continuing Education Units) or **30 PDHs** (Professional Development Hours) for participants who completed the total tuition hours of this program. One CEU is equivalent to ten Professional Development Hours (PDHs) or ten contact hours of the participation in and completion of Haward Technology programs. A permanent record of a participant's involvement and awarding of CEU will be maintained by Haward Technology. Haward Technology will provide a copy of the participant's CEU and PDH Transcript of Records upon request.

Accommodation

Accommodation is not included in the course fees. However, any accommodation required can be arranged at the time of booking.

Course Instructor(s)

This course will be conducted by the following instructor(s). However, we have the right to change the course instructor(s) prior to the course date and inform participants accordingly:

Mr. Kyle Bester is a **Senior Water Engineer** with extensive years of practical experience within the **Oil & Gas**, **Power & Water Utilities** and other **Energy** sectors. His expertise includes **Water Reservoir**, **Water Tanks**, **Water Pumping** Station, **Water Distribution** System, **Water Network** System, **Water Pipes & Fittings**, **Water Hydraulic** Modelling, **Water Storage Reservoir**, **Reservoirs & Pumping** Stations Design & Operation, **Pumping** Systems, Interconnecting **Pipelines**, **Water Network Hydraulic** Simulation Modelling, **Water Supply** Design, **Water Balance Modelling**, **Water Distribution Network**, **Water Network** System Analysis, **Water Forecasts** Demand, **Water Pipelines** Materials & Fittings, **Water Network** System Design, Pump Houses & Booster Pumping Stations, **Potable Water Transmission**, **Water Distribution Network**, Districts Meters Areas (DMAs), **Water Supply & Desalination Plants** Rehabilitation, **Water Reservoirs & Pumping Stations**, **Water Network System** Extension, Water Network System Replacement & Upgrade, **Water Networks** Optimization, **Water Supply & Distribution** Systems Efficiency & Effectiveness, **Pipe** Materials & Fittings, **Service Reservoir** Design & Operation, **Pipes & Fittings**, **Water Network** System Design & Operation, **Supply Water Network** Rehabilitation, **Water Loss** Reduction, **Main Water** System Construction, **Main Water Line** Construction, Transmission & Distribution **Pipelines**, **Water Distribution** Design & Modelling, **Water Supply** System, Oilfield **Water Treatment**, Best Practice in **Sewage** & Industrial **Wastewater Treatment** & Environmental Protection, **Water Distribution** Design & Modelling, **Desilting**, Treating & Handling Oily **Water**, **Water Chemistry** for **Power Plant**, **Water** Sector Orientation, Environmental Impact Assessment (**EIA**), **Potable Water**, **Reverse Osmosis** Treatment Technology and **Chlorination** System, **Well** Inventory, Monitoring & Conservation, **Qualitative Analysis** of Soil & Ground Water, **Water** Networking, **Hydraulic Modelling** Systems, **Pumping** Stations, **Centrifugal Pumps**, **Pipelines & Pumping**, **Water Reservoirs**, **Water Storage Tanks**, Extended Activated **Sludge** Treatment, **Sewage & Industrial Wastewater** Treatment & Environmental Protection, Supervising & Monitoring **Sewage Works**, **Water Desalination** Technologies, **Water Distribution & Pump** Station, Best **Water Equipment** Selection & Inspection, **Hydraulic Modelling** for Water Network Design, **Water Utility** Industry, **Water Desalination** Technologies & New Development, **Water Hydrology**, **Water Conveyors**, **Water Networks** Rehabilitation. He is currently the **Part Owner & Manager** of Extreme Water SA wherein he manages, re-designed and commissioned a water and wastewater treatment plants.

During his career life, Mr. Bester has gained his practical and field experience through his various significant positions and dedication as the **Project Manager**, **Asset Manager**, **Manager**, **Water Engineer**, **Supervisor**, **Team Leader**, **Analyst**, **Process Technician**, **Landscape Designer** and **Senior Instructor/Trainer** for various international companies, infrastructures, water and wastewater treatment plants from New Zealand, UK, Samoa, Zimbabwe and South Africa, just to name a few.

Mr. Bester holds a **Diploma** in **Wastewater Treatment** and a **National Certificate** in **Wastewater & Water Treatment**. Further, he is a **Certified Instructor/Trainer**, an **Approved Chemical Handler** and has delivered numerous courses, trainings, conferences, seminars and workshops internationally.

Training Methodology

All our Courses are including **Hands-on Practical Sessions** using equipment, State-of-the-Art Simulators, Drawings, Case Studies, Videos and Exercises. The courses include the following training methodologies as a percentage of the total tuition hours:-

30% Lectures
20% Practical Workshops & Work Presentations
30% Hands-on Practical Exercises & Case Studies
20% Simulators (Hardware & Software) & Videos

In an unlikely event, the course instructor may modify the above training methodology before or during the course for technical reasons.

Learning Design & Customization

This course can be customized to the exact requirements of clients. Haward Technology is so proud of our huge capabilities in tailoring our courses to the training needs of our valued clients.

Course Program

The following program is planned for this course. However, the course instructor(s) may modify this program before or during the workshop for technical reasons with no prior notice to participants. Nevertheless, the course objectives will always be met:

Day 1: ***Monday, 26th of October 2026***

0730 – 0800	*Registration & Coffee*
0800 – 0815	*Welcome & Introduction*
0815 – 0830	***PRE-TEST***
0830 – 0930	***Introduction to Desalination Technologies*** *Global Water Scarcity & Desalination Demand • Thermal versus Membrane Desalination Processes • Applications (Municipal, Industrial, Offshore) • Overview of Large-Scale Desalination Plants*
0930 – 0945	*Break*
0945 – 1030	***Basics of Membrane Technology*** *Definition & Classification of Membranes • Membrane Structure & Materials • Transport Mechanisms (Diffusion, Convection) • Selectivity & Permeability*
1030 – 1130	***Types of Membrane Processes*** *Microfiltration (MF) • Ultrafiltration (UF) • Nanofiltration (NF) • Reverse Osmosis (RO)*
1130 – 1215	***Principles of Reverse Osmosis*** *Osmosis versus Reverse Osmosis • Semi-Permeable Membrane Function • Osmotic Pressure Concept • Driving Force & Separation Process*
1215 – 1230	*Break*
1230 – 1330	***Water Chemistry in Desalination*** *Total Dissolved Solids (TDS) • Hardness, Alkalinity, pH • Scaling & Fouling Agents • Biological Contaminants*

1330 – 1420	***Feed Water Sources & Characteristics*** *Seawater Properties • Brackish Water Properties • Variability & Seasonal Changes • Impact on Process Design*
1420 – 1430	***Recap*** *Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today and Advise Them of the Topics to be Discussed Tomorrow*
1430	*Lunch & End of Day One*

Day 2: ***Tuesday, 27th of October 2026***

0730 – 0830	***Membrane Materials & Fabrication*** *Polymer-Based Membranes • Thin-Film Composite Membranes • Ceramic Membranes • Fabrication Techniques*
0830 – 0930	***Membrane Module Configurations*** *Spiral-Wound Modules • Hollow Fiber Membranes • Plate-and-Frame Systems • Tubular Modules*
0930 – 0945	*Break*
0945 – 1100	***Pre-Treatment Processes*** *Coagulation & Flocculation • Sedimentation & Filtration • Media Filtration • Cartridge Filtration*
1100 – 1215	***Advanced Pre-Treatment Technologies*** *Ultrafiltration (UF) Systems • Dissolved Air Flotation (DAF) • Chemical Dosing Systems • Pre-Treatment Optimization*
1215 – 1230	*Break*
1230 – 1330	***Fouling & Scaling Mechanisms*** *Organic Fouling • Inorganic Scaling • Biofouling • Particulate Fouling*
1330 – 1420	***Chemical Treatment Strategies*** *Antiscalants • Biocides • pH Control • Dechlorination*
1420 – 1430	***Recap*** *Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today and Advise Them of the Topics to be Discussed Tomorrow*
1430	*Lunch & End of Day Two*

Day 3: ***Wednesday, 28th of October 2026***

0730 – 0830	***Reverse Osmosis System Design*** *Single-Pass versus Multi-Pass Systems • Staging & Array Configuration • Pressure Vessel Design • Design Optimization*
0830 – 0930	***Nanofiltration & Hybrid Systems*** *NF versus RO Comparison • Applications of NF • Hybrid Desalination Systems • Pre-Treatment Integration*
0930 – 0945	*Break*
0945 – 1100	***Thermal Desalination Overview*** *Multi-Stage Flash (MSF) • Multi-Effect Distillation (MED) • Comparison with Membrane Processes • Hybrid Thermal-Membrane Systems*
1100 – 1215	***Energy Consumption in Desalination*** *Energy Requirements of RO Systems • Factors Affecting Energy Use • Optimization Strategies • Energy Cost Considerations*

1215 – 1230	*Break*
1230 – 1330	***Energy Recovery Devices (ERDs)*** *Types of ERDs (Pelton, Isobaric Devices) • Working Principles • Efficiency Improvements • Integration in RO Systems*
1330 – 1420	***Brine Management & Disposal*** *Environmental Impact of Brine • Disposal Methods (Outfall, Evaporation Ponds) • Brine Minimization Techniques • Regulatory Considerations*
1420 – 1430	***Recap*** *Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today and Advise Them of the Topics to be Discussed Tomorrow*
1430	*Lunch & End of Day Three*

Day 4: ***Thursday, 29th of October 2026***

0730 – 0830	***Operation of Membrane Systems*** *Start-Up & Shutdown Procedures • Monitoring Key Parameters • Performance Optimization • Troubleshooting Basics*
0830 – 0930	***Membrane Cleaning Techniques*** *Chemical Cleaning (CIP Systems) • Cleaning Frequency • Fouling Removal Methods • Cleaning Optimization*
0930 – 0945	*Break*
0945 – 1100	***Membrane Degradation & Lifespan*** *Aging Mechanisms • Impact of Operating Conditions • Performance Decline • Replacement Strategies*
1100 – 1215	***Advanced Monitoring & Control Systems*** *SCADA Systems • Real-Time Monitoring • Automation & Control Loops • Data Analytics for Optimization*
1215 – 1230	*Break*
1230 – 1330	***Health, Safety & Environmental Considerations*** *Chemical Handling Safety • High-Pressure System Hazards • Environmental Compliance • Emergency Response*
1330 – 1420	***Troubleshooting & Performance Analysis*** *Identifying Performance Issues • Diagnosing Fouling versus Scaling • Leak Detection • Corrective Actions*
1420 – 1430	***Recap*** *Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today and Advise Them of the Topics to be Discussed Tomorrow*
1430	*Lunch & End of Day Four*

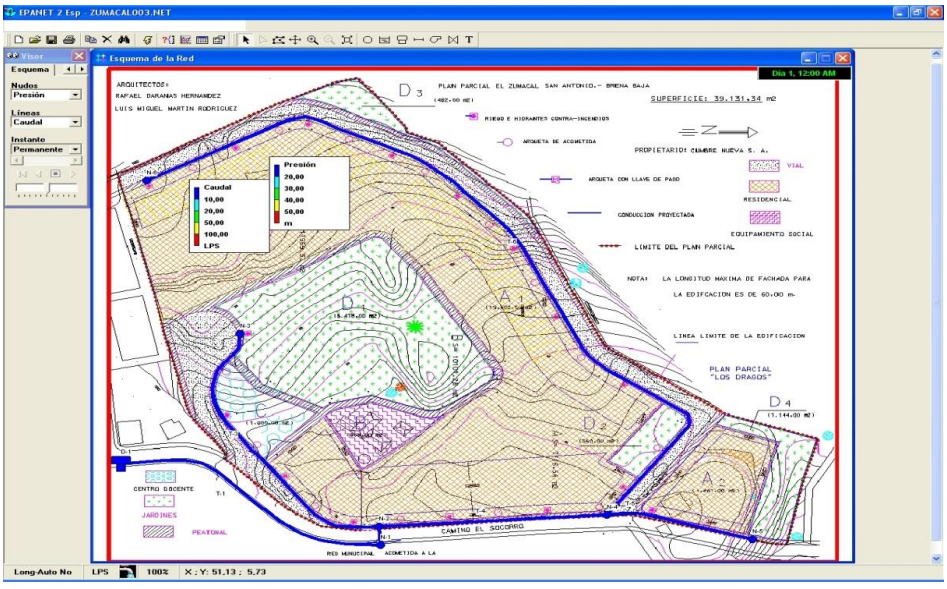
Day 5: ***Friday, 30th of October 2026***

0730 – 0830	***Advanced Membrane Technologies*** *Graphene-Based Membranes • Forward Osmosis (FO) • Membrane Distillation (MD) • Electro-Dialysis*
0830 – 0930	***Sustainable Desalination Practices*** *Energy-Efficient Designs • Renewable Energy Integration • Carbon Footprint Reduction • Water-Energy Nexus*

0930 – 0945	*Break*
0945 – 1100	***Digitalization in Desalination*** *AI & Machine Learning Applications • Predictive Maintenance • Digital Twins • Smart Plant Operations*
1100 – 1230	***Case Studies of Desalination Plants*** *Large-Scale Seawater Desalination • Industrial Desalination Systems • Challenges & Solutions • Lessons Learned*
1230 – 1245	*Break*
1245 – 1315	***Economic & Financial Considerations*** *Capital & Operational Costs • Cost Optimization Strategies • ROI & Payback Analysis • Policy & Incentives*
1315 - 1345	***Capstone Project & Evaluation*** *Designing a Desalination System • Selecting Appropriate Technologies • Evaluating Performance & Cost • Presenting Results & Recommendations*
1345 – 1400	***Course Conclusion*** *Using this Course Overview, the Instructor(s) will Brief Participants about the Course Topics that were Covered During the Course*
1400 – 1415	***POST-TEST***
1415 – 1430	*Presentation of Course Certificates*
1430	*Lunch & End of Course*

Simulator (Hands-on Practical Sessions)

Practical sessions will be organized during the course for delegates to practice the theory learnt. Delegates will be provided with an opportunity to carryout various exercises using the latest revision of "EPANET" simulators.



EPANET Simulator

Course Coordinator

Mari Nakintu, Tel: +971 2 30 91 714, Email: mari1@haward.org