

COURSE OVERVIEW TE0349

Advanced Desalination Processes: Desalination & Membrane Technology

Course Title

Advanced Desalination Processes: Desalination & Membrane Technology

Course Date/Venue

October 26-30, 2026/Glass House Meeting Room, Grand Millennium Al Wahda Hotel, Abu Dhabi, UAE

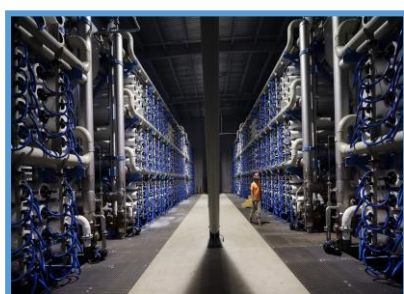
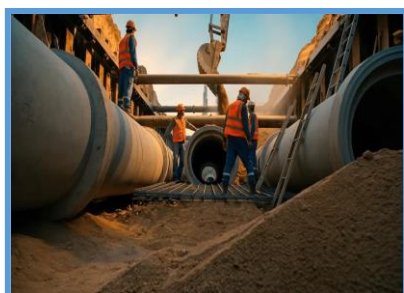
Course Reference

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: -

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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.

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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. Karl Thanasis, PEng, MSc, MBA, BSc, is a **Senior Water Engineer** with over **30 years** of practical experience within the **Oil, Gas, Refinery, Petrochemical, Utilities** and related industries. His expertise widely includes in the areas of **Advanced Desalination Processes, Desalination & Membrane Technology, Membrane-Based Desalination Systems, Reverse Osmosis Desalination Systems, RO Membrane Systems Design & Operation, Desalination Plant Process Optimization, Desalination Plant Operation & Maintenance, Desalination Plant Performance Assessment, Membrane Fouling & Scaling Control, RO Membrane Pretreatment & Process Control, Desalination Feedwater Pretreatment, Membrane Cleaning & Maintenance Strategies, Desalination System Energy Optimization, Desalination Plant Troubleshooting, Desalination Water Quality Management, Water Distribution System, Water Reservoir, Water Tanks, Water Pumping Station, Water System Optimization, Water Network System, Water Pipes & Fittings, Water Hydraulic Modelling, Water Network Hydraulic Simulation Modelling, Water Balance Modelling, Water Distribution Network, Water Network System Design, Water Network System Analysis, Water Forecasts Demand, Water Network System Extension, Water Network System Replacement & Upgrade, Water Networks Optimization, Water Distribution Systems & Pumping Stations, Reservoirs & Pumping Stations Design & Operation, Water Reservoirs & Pumping Stations, Water Storage Reservoir, Pumping Systems, Interconnecting Pipelines, Pump Houses & Booster Pumping Stations, Water Pipelines Materials & Fittings, Waste Water Effluent Treating Facilities, Sewage & Industrial Waste Water Treatment & Environmental Protection Best Practices, Oily Water Treatment Technology, Water Equipment Selection & Inspection, Effluent Treatment & Slurry Handling, Water Testing & Commissioning Techniques, Wastewater Treatment, Water Supply Design, Potable Water Transmission, Districts Meters Areas (DMAs), Water Supply & Desalination Plants Rehabilitation, Water Supply & Distribution Systems Efficiency & Effectiveness, Water Treatment Technology, Reverse Osmosis, MSF Plants, Industrial Water Treatment in Refineries & Petrochemical Plants, Piping System, Water Movement, Water Filtering, Mud Pumping, Sludge Treatment and Drying, Aerobic Process of Water Treatment that includes Aeration, Sedimentation and Chlorination Tanks. His strong background also includes **Design and Sizing** of all **Waste Water Treatment Plant Associated Equipment** such as **Sludge Pumps, Filters, Metering Pumps, Aerators and Sludge Decanters**.**

Mr. Thanasis has acquired his thorough and practical experience as the **Water Engineer, Project Manager, Plant Manager, Area Manager - Equipment Construction, Construction Superintendent, Project Engineer, Design Engineer, Mechanical Engineer, Maintenance Engineer** and **Senior Instructor/Lecturer**. His duties covered **Plant Preliminary Design, Plant Operation, Write-up of Capital Proposal, Investment Approval, Bid Evaluation, Technical Contract Write-up, Construction and Sub-contractor Follow up, Lab Analysis, Sludge Drying and Management of Sludge Odor and Removal**. He has worked in various companies worldwide in the **USA, Germany, England and Greece**.

Mr. Thanasis is a **Registered Professional Engineer** in the **USA and Greece** and has a **Master's and Bachelor's degree in Mechanical Engineering with Honours** from the **Purdue University and SIU in USA** respectively as well as an **MBA** from the **University of Phoenix in USA**. Further, he is a **Certified Instructor/Trainer**, a **Certified Internal Verifier/Trainer/Assessor** by the **Institute of Leadership & Management (ILM)** and 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	<i>Registration & Coffee</i>
0800 – 0815	<i>Welcome & Introduction</i>
0815 – 0830	PRE-TEST
0830 – 0930	Introduction to Desalination Technologies <i>Global Water Scarcity & Desalination Demand • Thermal versus Membrane Desalination Processes • Applications (Municipal, Industrial, Offshore) • Overview of Large-Scale Desalination Plants</i>
0930 – 0945	<i>Break</i>
0945 – 1030	Basics of Membrane Technology <i>Definition & Classification of Membranes • Membrane Structure & Materials • Transport Mechanisms (Diffusion, Convection) • Selectivity & Permeability</i>
1030 – 1130	Types of Membrane Processes <i>Microfiltration (MF) • Ultrafiltration (UF) • Nanofiltration (NF) • Reverse Osmosis (RO)</i>
1130 – 1215	Principles of Reverse Osmosis <i>Osmosis versus Reverse Osmosis • Semi-Permeable Membrane Function • Osmotic Pressure Concept • Driving Force & Separation Process</i>
1215 – 1230	<i>Break</i>
1230 – 1330	Water Chemistry in Desalination <i>Total Dissolved Solids (TDS) • Hardness, Alkalinity, pH • Scaling & Fouling Agents • Biological Contaminants</i>

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

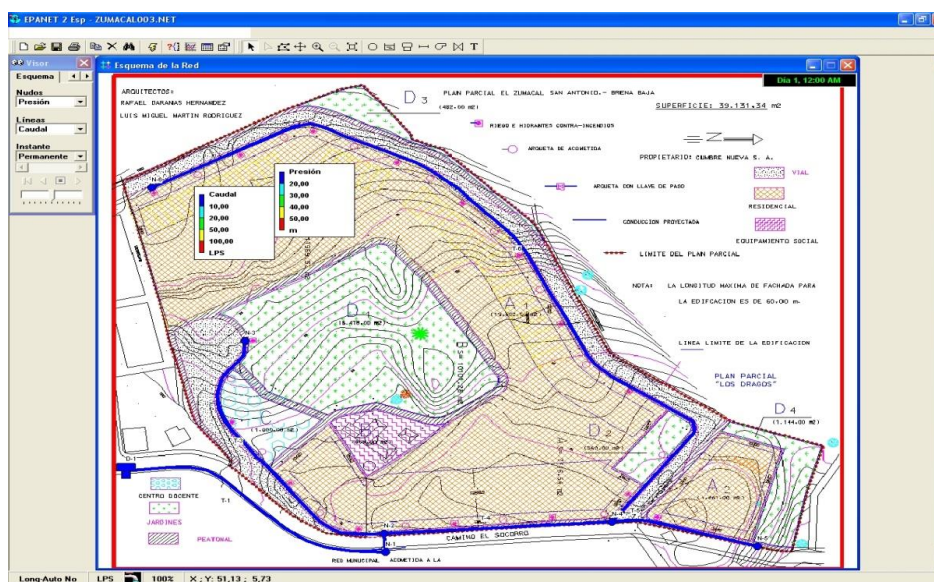
Day 5: Friday, 30th of October 2026

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

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