COURSE OVERVIEW TE0297
Water Quality Modelling

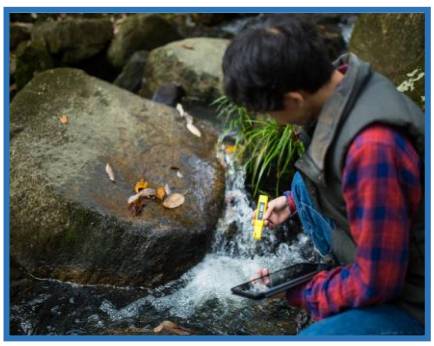
Course Title
Water Quality Modelling

Course Date/Venue
Session 1: May 19-23, 2025/Glasshouse Meeting Room, Grand Millennium Al Wahda Hotel, Abu Dhabi, UAE
Session 2: September 22-26, 2025/Glasshouse Meeting Room, Grand Millennium Al Wahda Hotel, Abu Dhabi, UAE

Course Reference
TE0297

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 Water Quality Modelling. It covers the water quality parameters, chemical parameters, biological parameters and physical parameters; the importance of seawater desalination and types and methods of water quality models comprising of empirical models, mechanistic models, hybrid models and model selection criteria for specific application; the model validation techniques and performance evaluation metric for water quality models; and the tools and software for water quality modelling and seawater as a source of drinking water.

Further, the course will also discuss the costal water quality issues in the UAE and key pollutants affecting seawater quality; modelling coastal dynamics and water exchange rates and nutrient loading and its implications for water quality; the impact of desalination on seawater quality and salinity and temperature distribution in seawater including microbial contaminants in seawater; the advanced water quality modelling techniques and steps involved in the post-treatment of desalinated water; the transport and distribution of desalinated water; and the impact of storage tanks on water quality and optimizing tank design for maintaining water quality.

During this interactive course, participants will learn the real-time water quality monitoring and control, risk assessment in water quality and regulations and standards for water quality in UAE; the environmental impact of desalination on marine ecosystems and sustainability of desalination as a water source; the socio-economic implications of desalinated water and social acceptance of desalinated water; educating the public about desalination process and risk communication strategies for water quality issues; the emerging technologies in desalination and water quality and integrating climate change effects in water quality modelling; using data for water quality predictions, modelling the future of water quality in UAE and the common issue in water quality modelling and their solutions; and optimizing models for accuracy and performance.

Course Objectives

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

- Apply and gain an in-depth knowledge on water quality modelling
- Identify water quality parameters covering chemical parameters, biological parameters, and physical parameters
- Discuss the importance of seawater desalination, including the types and methods of water quality models comprising of empirical models, mechanistic models, hybrid models and model selection criteria for specific application
- Apply model validation techniques and performance evaluation metric for water quality models
- Identify the tools and software for water quality modelling and discuss seawater as a source of drinking water
- Recognize costal water quality issues in the UAE, key pollutants affecting seawater quality, modelling coastal dynamics and water exchange rates and nutrient loading and its implications for water quality
- Model the impact of desalination on seawater quality and discuss the salinity and temperature distribution in seawater including microbial contaminants in seawater
- Illustrate advanced water quality modelling techniques and steps involved in the post-treatment of desalinated water
- Model the transport and distribution of desalinated water including the impact of storage tanks on water quality and optimize tank design for maintaining water quality
- Apply real-time water quality monitoring and control, risk assessment in water quality and regulations and standards for water quality in UAE
- Discuss environmental impact of desalination on marine ecosystems, sustainability of desalination as a water source and socio-economic implications of desalinated water
- Describe social acceptance of desalinated water, educate the public about desalination process and apply risk communication strategies for water quality issues
- Explain the emerging technologies in desalination and water quality and integrate climate change effects in water quality modelling
- Use data for water quality predictions, model the future of water quality in UAE, identify the common issues in water quality modelling and their solutions and optimize models for accuracy and performance

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 water quality modelling for environmental engineers and scientists, water resource managers and planners, government agencies and regulators, consulting firms, utility & wastewater treatment operators and other technical staff.

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.

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.

Accommodation

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

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

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**. 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.

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.

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

0730 – 0800	*Registration & Coffee*
0800 – 0815	*Welcome & Introduction*
0815 – 0830	***PRE-TEST***
0830 – 0930	***Overview of Water Quality Modelling*** *Definition and Purpose of Water Quality Modelling • Types of Water Bodies and their Relevance to Modelling • Applications of Water Quality Models • Challenges in Modelling Water Quality in Arid Regions Like the UAE*
0930 – 0945	*Break*
0945 – 1030	***Water Quality Parameters*** *Chemical Parameters (e.g., pH, TDS, Turbidity) • Biological Parameters (e.g., DO, BOD, COD) • Physical Parameters (e.g., Temperature, Salinity) • Nutrient Concentrations and their Impact on Water Quality*
1030 – 1130	***Importance of Seawater Desalination in UAE*** *The Desalination Process and Water Quality Concerns • Desalinated Water as a Primary Source of Drinking Water • Impact of Desalination Plants on Marine Ecosystems • Regulatory Standards for Desalinated Water Quality in UAE*
1130 – 1230	***Water Quality Models: Types & Methods*** *Empirical Models • Mechanistic Models • Hybrid Models • Model Selection Criteria for Specific Applications*
1230 – 1245	*Break*
1245 – 1330	***Model Calibration & Validation*** *Importance of Calibration in Water Quality Models • Techniques for Model Validation • Case Studies of Model Calibration in Desalination Contexts • Performance Evaluation Metrics for Water Quality Models*
1330 – 1420	***Tools & Software for Water Quality Modelling*** *Overview of Popular Modelling Software (e.g., QUAL2K, SWAT, EFDC) • Selection Criteria for Software Tools • Integration of Field Data into Software Tools • Hands-on Session: Introduction to Basic Model Setup*
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

0730 – 0830	***Seawater as a Source of Drinking Water*** *Characteristics of Seawater in the UAE • Impact of Seawater Conditions on Desalination Processes • Seasonal Variations and their Impact on Water Quality • Pre-Treatment Methods for Seawater Before Desalination*
0830 – 0930	***Marine Environment & Coastal Water Quality*** *Coastal Water Quality Issues in the UAE • Key Pollutants Affecting Seawater Quality • Modelling Coastal Dynamics and Water Exchange Rates • Nutrient Loading and its Implications for Water Quality*
0930 – 0945	*Break*

0945 – 1100	***Modelling the Impact of Desalination on Seawater Quality*** *Thermal Discharge from Desalination Plants • Chemical Discharge and its Effect on Marine Life • Managing Brine Disposal to Minimize Environmental Impact • Long-Term Environmental Monitoring for Desalination Plants*
1100 – 1230	***Salinity & Temperature Distribution in Seawater*** *Modelling Salinity Variations in Coastal Areas • The Effect of Temperature on Desalination Efficiency • Temperature Gradients and their Role in Water Quality • Case Study: Modelling Temperature Effects in UAE Coastal Waters*
1230 – 1245	*Break*
1230 – 1330	***Microbial Contaminants in Seawater*** *Types of Microbial Contaminants in Seawater • Pathogen Removal in Desalination Processes • Modelling Microbial Contamination and Risk Assessment • Case Study: Microbial Modelling in Desalination Plants*
1330 – 1420	***Advanced Water Quality Modelling Techniques*** *3D Modelling of Coastal and Marine Water Quality • Use of GIS for Spatial Data Integration • Modelling the Interaction Between Desalination and the Marine Ecosystem • Hands-on Session: Setting Up a Simple Model for Seawater Quality*
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

0730 – 0830	***Post-Desalination Water Treatment*** *Steps Involved in the Post-treatment of Desalinated Water • Modelling the Chemical Addition Processes (e.g., Chlorine, Lime) • Balancing Post-Treatment Parameters for Drinking Water Quality • Challenges in Maintaining Consistent Water Quality*
0830 – 0930	***Modeling the Transport & Distribution of Desalinated Water*** *Hydraulic Modelling of Water Distribution Systems • Impact of Pipe Material, Age and Design on Water Quality • Modelling Water Quality Degradation in Pipelines • Integration of Desalination Model with Distribution System Model*
0930 – 0945	*Break*
0945 – 1100	***Water Quality in Storage Systems*** *Modelling the Impact of Storage Tanks on Water Quality • Water Age, Stagnation and its Effect on Microbial Growth • Optimizing Tank Design for Maintaining Water Quality • Case Study: Water Quality Management in Storage Reservoirs*
1100 – 1230	***Real-Time Water Quality Monitoring & Control*** *Importance of Real-Time Monitoring for Water Quality Assurance • Technologies for Continuous Water Quality Monitoring • Data Collection Techniques and Sensor Integration • Case Study: Real-Time Monitoring in UAE Desalination Plants*
1230 – 1245	*Break*
1230 – 1330	***Risk Assessment in Water Quality*** *Identifying Potential Risks in Desalinated Water Supply • Modelling the Likelihood of Contamination Events • Evaluating the Impact of Water Quality Deviations • Risk-Based Decision-Making in Water Treatment Processes*
1330 – 1420	***Regulations & Standards for Water Quality in UAE***

	Overview of UAE Drinking Water Standard • Regulatory Bodies and their Role in Ensuring Water Quality • Compliance with International Standards (e.g., WHO, NSF) • Hands-on Session: Applying UAE Regulations to Water Quality Models
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

0730 – 0830	***Environmental Impact of Desalination on Marine Ecosystems*** *Effects of Brine and Chemical Discharges on Marine Life • Thermal Pollution and its Impact on Coastal Ecosystems • Modelling the Dispersion of Brine and Pollutants • Mitigation Strategies for Reducing Environmental Impact*
0830 – 0930	***Sustainability of Desalination as a Water Source*** *Energy Consumption and Environmental Cost of Desalination • Strategies for Improving the Sustainability of Desalination Plants • Use of Renewable Energy in Desalination Processes • Case Study: Sustainability Initiatives in UAE Desalination Plants*
0930 – 0945	*Break*
0945 – 1100	***Socio-Economic Implications of Desalinated Water*** *Cost of Desalinated Water and its Economic Impact • Access to Clean Water and its Importance to Societal Development • Balancing Demand and Supply of Desalinated Water • Modelling Water Scarcity and its Impact on Water Pricing*
1100 – 1230	***Public Perception of Desalination & Water Quality*** *Social Acceptance of Desalinated Water • Educating the Public About Desalination Processes • Risk Communication Strategies for Water Quality Issues • Case Study: Public Outreach Programs in UAE*
1230 – 1245	*Break*
1230 – 1330	***Emerging Technologies in Desalination & Water Quality*** *Innovations in Desalination Technology (e.g., Forward Osmosis, Solar Desalination) • Advancements in Water Quality Monitoring and Control • Use of AI and Machine Learning in Water Quality Predictions • Future Trends in Desalinated Water Production*
1330 – 1420	***Integration of Climate Change Effects in Water Quality Modelling*** *Impacts of Climate Change on Seawater Quality and Desalination • Modelling Long-Term Changes in Water Quality Due to Climate Shifts • Adaptive Strategies for Maintaining Desalinated Water Quality • Case Study: Climate Resilience in UAE's Water Sector*
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*

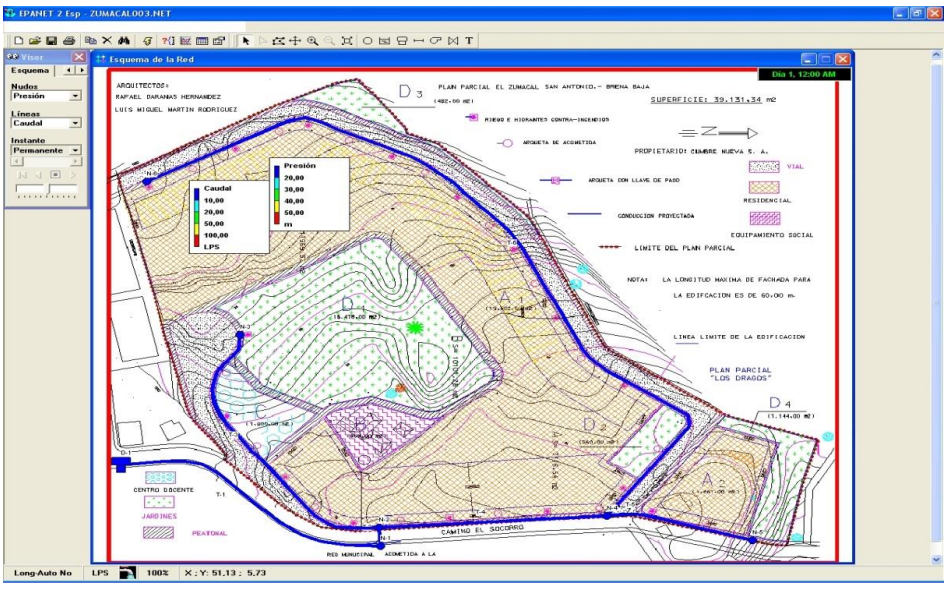
Day 5

0730 – 0830	***Case Study: Water Quality Modelling in UAE Desalination Plants*** *Overview of Key Desalination Plants in UAE • Challenges Faced in Maintaining Water Quality • Lessons Learned and Best Practices • Hands-on Session: Model Setup for a UAE Desalination Plant*

0830 – 0930	***Using Data for Water Quality Predictions*** *Types of Data Used in Water Quality Modelling • Data Collection from Desalination Plants and Coastal Stations • Data Preprocessing and Integration Techniques • Hands-on Session: Importing Real-World Data into Water Quality Models*
0930 – 0945	*Break*
0945 – 1100	***Modelling the Future of Water Quality in UAE*** *Projections for Water Demand and Desalinated Water Supply • The Role of Modelling in Ensuring Future Water Sustainability • Scenario Planning and Future Water Quality Challenges • Case Study: Long-Term Planning for Water Quality in UAE*
1100 – 1230	***Practical Application & Troubleshooting*** *Common Issues in Water Quality Modelling and their Solutions • Optimizing Models for Accuracy and Performance • Troubleshooting Case Studies and Practical Exercises • Q&A Session and Feedback on Hands-on Activities*
1230 – 1245	*Break*
1245 – 1345	***Final Project: Creating a Water Quality Model for the UAE*** *Participants Will Work in Groups to Develop a Comprehensive Water Quality Model • Consideration of Desalination, Distribution and Environmental Factors • Presentation and Peer Review of Group Projects*
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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