Haward Technology Middle East

COURSE OVERVIEW LE0032
Emerging Technologies in Water Quality Analysis

Course Title
Emerging Technologies in Water Quality Analysis

Course Date/Venue
Session 1: February 24-28, 2025/Ajman Meeting Room, Grand Millennium Al Wahda Hotel, Abu Dhabi, UAE
Session 2: September 22-26, 2025/Ajman Meeting Room, Grand Millennium Al Wahda Hotel, Abu Dhabi, UAE

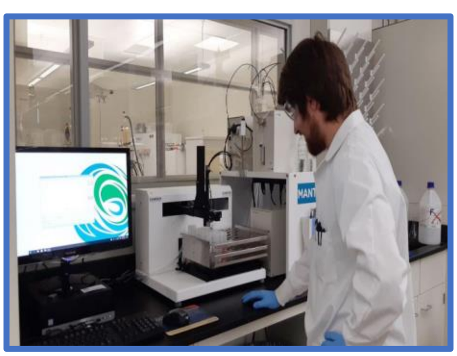
Course Reference
LE0032

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

3.0 CEUs (30 PDHs) AWARD

H-STK© INCLUDED

Course Description



This practical and highly-interactive course includes real-life case studies and exercises where participants will be engaged in a series of interactive small groups and class workshops.

This course is designed to provide participants with a detailed and up-to-date overview of the Emerging Technologies in Water Quality Analysis. It covers the importance of water quality monitoring, key parameters in water quality, current challenges in traditional water quality analysis and regulatory frameworks and standards; the difference between traditional and emerging technologies; the basics of internet of things (IoT) and sensor networks, role of IoT in remote and continuous water monitoring and examples of IoT devices for water quality analysis; and the artificial intelligence (AI), machine learning (ML) applications and advanced sensors for water quality.

Further, the course will also discuss the spectroscopy techniques, chromatography methods, nanotechnology in water quality analysis, DNA-based techniques and electrochemical techniques; the continuous monitoring systems including the components of continuous water quality monitoring systems, deployment of monitoring buoys and stations, data logging and real-time alerts; the remote sensing technologies and satellite-based water quality assessment; and the water sampling and analysis utilizing drones.

During this interactive course, participants will learn the autonomous underwater vehicles (AUVs) for water sampling, robotics for pollutant identification and integrating AI in robotic monitoring systems; the blockchain for water data management, predictive analytics in water quality and biosensors in water quality analysis; the microplastics and their detection, analysis of pharmaceuticals and personal care products (PPCPs) and techniques for detecting endocrine-disrupting chemicals (EDCs); the advanced sampling techniques and cloud-based data management; the energy-efficient systems, industrial and irrigation water quality monitoring, addressing nitrate pollution from agriculture and technologies for reuse of agricultural wastewater; and the municipal and urban water systems.

Course Objectives

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

- Apply and gain an in-depth knowledge on the emerging technologies in water quality analysis
- Discuss the importance of water quality monitoring, key parameters in water quality, current challenges in traditional water quality analysis and regulatory frameworks and standards
- Differentiate traditional versus emerging technologies and discuss the basics of internet of things (IoT) and sensor networks, role of IoT in remote and continuous water monitoring and examples of IoT devices for water quality analysis
- Carryout artificial intelligence (AI), machine learning (ML) applications and advanced sensors for water quality
- Employ spectroscopy techniques, chromatography methods, nanotechnology in water quality analysis, DNA-based techniques and electrochemical techniques
- Recognize continuous monitoring systems including its components, deployment of monitoring buoys and stations, data logging and real-time alerts
- Identify remote sensing technologies and apply satellite-based water quality assessment as well as water sampling and analysis utilizing drones
- Carryout autonomous underwater vehicles (AUVs) for water sampling, robotics for pollutant identification and integrating AI in robotic monitoring systems
- Apply blockchain for water data management, predictive analytics in water quality and biosensors in water quality analysis
- Recognize microplastics and their detection, analysis of pharmaceuticals and personal care products (PPCPs) and techniques for detecting endocrine-disrupting chemicals (EDCs)
- Employ advanced sampling techniques and cloud-based data management as well as discuss energy-efficient systems
- Carryout industrial water monitoring, irrigation water quality monitoring, addressing nitrate pollution from agriculture and technologies for reuse of agricultural wastewater

- Recognize municipal and urban water systems covering monitoring drinking water distribution systems, addressing urban water pollution challenges and smart cities and water quality technology
- Discuss the advancements in sensor miniaturization, AI and robotics in autonomous monitoring, climate change impacts on water quality monitoring and emerging contaminants and future detection methods

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 emerging technologies in water quality analysis for water treatment engineers, environmental scientists and specialists, laboratory technicians and analysts, utility and plant managers, regulatory officials and inspectors, research and development professionals, consultants in water resource management, municipal and industrial water professionals 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.

Course Certificate(s)

(1) Internationally recognized Competency Certificates and Plastic Wallet Cards will be issued to participants who completed a minimum of 80% of the total tuition hours and successfully passed the exam at the end of the course. Certificates are valid for 5 years.

Recertification is FOC for a Lifetime.

Sample of Certificates

The following are samples of the certificates that will be awarded to course participants:-

(2) Official Transcript of Records will be provided to the successful delegates with the equivalent number of ANSI/IACET accredited Continuing Education Units (CEUs) earned during the course.

* Haward Technology * CEUs * Haward Technology * CEUs * Haward Technology * CEUs * Haward Technology *

CEUs

Haward Technology Middle East

Continuing Professional Development (HTME-CPD)

CEU Official Transcript of Records

TOR Issuance Date: **15-Nov-23**

HTME No. **74851**

Participant Name: **Waleed Al Habeeb**

Program Ref.	Program Title	Program Date	No. of Contact Hours	CEU's
LE0032	Emerging Technologies in Water Quality Analysis	November 11-15, 2023	30	3.0

Total No. of CEU's Earned as of TOR Issuance Date **3.0**

TRUE COPY

Jaryl Castillo
Academic Director

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

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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. Paul Patsi, MSc, BSc, is a **Senior Analytical Chemist** and an **International Expert** in **Water & Waste Water Treatment Technology** with over **25 years** of extensive experience in **Analytical Laboratory** and **Water & Wastewater Treatment Engineering.** His expertise covers **Chemical Analysis**, **Water Analysis Techniques**, **Microbiological Analysis of Water & Waste Water**, **Waste Water Treatment Analysis**, **Advanced Sampling Techniques**, **Water Chemistry**, **Predictive Analytics** in Water Quality, **Laboratory Assessment**, **Microbiological Quality Assurance**, **Analytical Chemistry**, **Statistical Analysis**, **Laboratory Safety**, **Equipment & Infrastructure Management**, **Budgeting & Planning of Laboratory Consumables**, **Business Administration**, **Personnel Management**, **Laboratory Management**, **Laboratory Auditing**, **Risk Assessment**, **HACCP**, **ISO 22000**, **ISO 17025**, **ISO 9001**, Good Manufacturing Practice (**GMP**), Good Hygiene Practice (**GHP**) and Good Laboratory Practice (**GLP**). He is also an expert in microbiological indoor air quality, water biology, food sampling and calibration. He is currently the **Head of Industrial Analytical Laboratory** of PINDOS wherein he is in-charge of the budgeting, auditing, consumables, suppliers, personnel management, equipment and infrastructure management along with waste water treatment and water/environmental legislation.

During his career life, Mr. Paul has held key positions such as the **Head of Microbiology & Chemical Laboratory**, **Head of Quality Control**, **Technical Consultant**, **Research Projects Specialist**, **Scientific Consultant**, **Biologist-Scientific Expert** and **Biologist** for multi-billion companies like the **European Union**, **Help LTD**, **Lake Pamvotis Municipality Company**, **Hellenic Centre for Marine Research**, **Cargill** and **Nestle** just to name a few.

Mr. Paul has a **Master's** degree in **Food Science and Food Technology** from the **University of Ioannina** (**Greece**) and a **Bachelor's** degree in **Biology** from the **Aristotle University of Thessaloniki** (**Greece**). He is a **Certified Instructor/Trainer** and a **Member** of the **Society for Applied Microbiology**, **Society of Biological Scientist** and the **Global Coalition for Sustained Excellence in Food & Health Protection**.

Accommodation

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

Course Program

The following program is planned for this course. However, the course instructor(s) may modify this program before or during the course 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 Analysis*** *Importance of Water Quality Monitoring • Key Parameters in Water Quality (Physical, Chemical, Biological) • Current Challenges in Traditional Water Quality Analysis • Regulatory Frameworks & Standards (e.g., WHO, EPA)*
0930 – 0945	*Break*
0945 – 1045	***Traditional versus Emerging Technologies*** *Limitations of Traditional Water Quality Methods • Overview of Emerging Technologies in Water Monitoring • Role of Real-Time Monitoring in Decision-Making • Case Studies Showcasing Technology Transitions*
1045 – 1145	***IoT (Internet of Things) in Water Quality Monitoring*** *Basics of IoT & Sensor Networks • Role of IoT in Remote & Continuous Water Monitoring • Examples of IoT Devices for Water Quality Analysis • Data Acquisition & Cloud Integration*
1145 – 1230	***Artificial Intelligence (AI) & Machine Learning (ML) Applications*** *Introduction to AI & ML in Environmental Monitoring • Predictive Modeling for Water Quality Trends • Anomaly Detection in Water Quality Data • Applications of AI in Decision Support Systems*
1230 – 1245	*Break*
1245 – 1330	***Advanced Sensors for Water Quality*** *Principles of Smart Sensors • Electrochemical & Optical Sensors • Sensors for Specific Contaminants (e.g., Heavy Metals, Nitrates) • Sensor Calibration & Maintenance*
1330 – 1420	***Hands-On Workshop: Water Quality Basics*** *Testing Basic Parameters Using Traditional Methods • Introduction to a Digital Water Quality Analyzer • Comparing Traditional & Emerging Techniques • Q&A Session*
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	***Spectroscopy Techniques*** *Basics of UV-Vis Spectroscopy • Role of Fluorescence Spectroscopy in Detecting Pollutants • Applications of Atomic Absorption Spectroscopy (AAS) • Portable Spectroscopy Devices for Field Use*
0830 – 0930	***Chromatography Methods*** *Overview of Chromatography in Water Analysis • Gas Chromatography (GC) for Volatile Compounds • High-Performance Liquid Chromatography (HPLC) for Organic Contaminants • Emerging Portable Chromatography Systems*

0930 – 0945	*Break*
0945 – 1100	***Nanotechnology in Water Quality Analysis*** *Introduction to Nanotechnology in Environmental Monitoring • Nanosensors for Pollutant Detection • Applications of Nanomaterials for Water Purification • Case Studies: Nanoscale Techniques in Real-World Scenarios*
1100 – 1230	***DNA-Based Techniques*** *Principles of eDNA (Environmental DNA) Analysis • Microbial Source Tracking Using DNA Barcoding • qPCR & its Role in Pathogen Detection • Advances in Sequencing Technologies for Waterborne Pathogens*
1230 – 1245	*Break*
1245 – 1330	***Electrochemical Techniques*** *Fundamentals of Electrochemical Analysis • Amperometric & Potentiometric Sensors • Applications for Detecting Heavy Metals & Pesticides • Integration of Electrochemical Sensors with IoT Systems*
1330 – 1420	***Laboratory Session*** *Practical Applications of Spectroscopy & Chromatography • Demonstration of Electrochemical Sensor Usage • Sample Preparation for DNA-Based Analysis • Discussion & Troubleshooting*
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	***Continuous Monitoring Systems*** *Components of Continuous Water Quality Monitoring Systems • Deployment of Monitoring Buoys & Stations • Data Logging & Real-Time Alerts • Case Studies: River & Lake Monitoring*
0830 – 0930	***Remote Sensing in Water Quality*** *Introduction to Remote Sensing Technologies • Satellite-Based Water Quality Assessment • Applications of Drones in Water Sampling & Analysis • Limitations & Future Advancements*
0930 – 0945	*Break*
0945 – 1100	***Robotics in Water Quality*** *Autonomous Underwater Vehicles (AUVs) for Water Sampling • Robotics for Pollutant Identification • Integrating AI in Robotic Monitoring Systems • Applications in Industrial & Natural Water Bodies*
1100 – 1230	***Blockchain for Water Data Management*** *Basics of Blockchain Technology • Ensuring Data Transparency & Integrity • Blockchain in Collaborative Water Management • Challenges & Adoption Barriers*
1230 – 1245	*Break*
1245 – 1330	***Predictive Analytics in Water Quality*** *Time-Series Analysis for Water Quality Prediction • AI-Driven Predictive Maintenance • Risk Assessments Using Predictive Models • Visualization Tools for Predictions*

1330 – 1420	***Group Activity: Real-Time Data Analysis*** *Simulated Data Analysis from IoT Sensors • Building Dashboards for Continuous Monitoring • Identifying Anomalies & Suggesting Interventions •Peer Review & Feedback*
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	***Biosensors in Water Quality Analysis*** *Introduction to Biosensors • Applications in Pathogen Detection • Design of Enzyme-Based & Immunosensors • Integration with Portable Devices*
0830 – 0930	***Emerging Contaminants*** *Understanding Microplastics & Their Detection • Analysis of Pharmaceuticals & Personal Care Products (PPCPs) • Techniques for Detecting Endocrine-Disrupting Chemicals (EDCs) • Case Studies: Addressing Emerging Contaminants*
0930 – 0945	*Break*
0945 – 1100	***Advanced Sampling Techniques*** *Automated Water Sampling Systems • Passive Sampling Methods • Innovations in In-Situ Sample Collection • Challenges in Sampling Diverse Water Bodies*
1100 – 1230	***Cloud-Based Data Management*** *Cloud Platforms for Water Quality Data • Ensuring Cybersecurity in Cloud Systems • Big Data Analytics for Water Quality Trends • Collaborative Platforms for Shared Water Data*
1230 – 1245	*Break*
1245 – 1330	***Energy-Efficient Systems*** *Low-Power Sensors & Devices • Solar-Powered Monitoring Stations • Sustainable Practices in Water Quality Technology • Lifecycle Assessments for Monitoring Systems*
1330 – 1420	***Group Workshop: Emerging Contaminants*** *Hands-on Detection of Microplastics • Sample Preparation for PPCP Analysis • Interpreting Results & Proposing Solutions • Presentation of Findings*
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	***Applications in Industrial Water Monitoring*** *Monitoring Industrial Effluents • Case Studies: Industrial Compliance & Penalties • Role of Emerging Technologies in Reducing Industrial Pollution • Innovations in Industrial Wastewater Treatment*
0830 – 0930	***Agricultural Applications*** *Monitoring Irrigation Water Quality • Addressing Nitrate Pollution from Agriculture • Role of IoT in Precision Agriculture • Technologies for Reuse of Agricultural Wastewater*
0930 – 0945	*Break*

0945 – 1100	***Municipal & Urban Water Systems*** *Monitoring Drinking Water Distribution Systems • Addressing Urban Water Pollution Challenges • Smart Cities & Water Quality Technology • Case Studies: Success Stories in Urban Water Monitoring*
1100 – 1215	***International Case Studies*** *Success Stories in Water Quality Improvements • Lessons from Developing & Developed Nations • Technology Adoption Challenges in Various Regions • Policy Implications & Recommendations*
1215 – 1230	*Break*
1230 - 1300	***Future Trends & Research Areas*** *Advancements in Sensor Miniaturization • AI & Robotics in Autonomous Monitoring • Climate Change Impacts on Water Quality Monitoring • Emerging Contaminants & Future Detection Methods*
1300 – 1315	***Course Conclusion*** *Using this Course Overview, the Instructor(s) will Brief Participants about the Course Topics that were Covered During the Course*
1315 – 1415	***COMPETENCY EXAM***
1415 – 1430	*Presentation of Course Certificates*
1430	*Lunch & End of Course*

Practical Sessions

This practical and highly-interactive course includes real-life case studies and exercises:-

Course Coordinator

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