

COURSE OVERVIEW LE1016

Laboratory Analysis of the Chemical & Physical Properties of Water

Course Title

Laboratory Analysis of the Chemical & Physical Properties of Water

Course Date/Venue

September 28-October 02, 2025/The Kooh I Noor Meeting Room, The H Dubai Hotel, Sheikh Zayed Rd - Trade Centre, Dubai, UAE

Course Reference

LE1016

Course Duration/Credits

Five days/3.0 CEUs/30 PDHs



Course Description



This practical and highly-interactive course includes real-life case studies 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 Laboratory Analysis of the Chemical & Physical Properties of Water. It covers the types of water sources and the importance of water quality analysis, regulatory standards and key chemical and physical indicators; the laboratory safety procedures, sampling techniques and preservation, calibration and standardization of instruments; and the analytical techniques, laboratory quality control (QC) and quality assurance (QA), temperature measurement and turbidity analysis.



Further, the course will also discuss the color determination, conductivity and total dissolved solids (TDS) measurement, pH measurement and odor and taste evaluation; the alkalinity and acidity testing, hardness determination, chloride determination, fluoride analysis and sulfate determination; the nitrate and nitrite analysis, dissolved oxygen (DO) measurement, biochemical oxygen demand (BOD) and chemical oxygen demand (COD); the ammonia nitrogen (NH₃-N) determination, trace metals by atomic absorption spectroscopy (AAS) and heavy metal testing using ICP-OES; and the phosphorus and phosphate analysis and oil and grease determination.



During this interactive course, participants will learn the total suspended solids (TSS) and volatile solids (VS); the microbiological indicators of water quality covering total coliforms and E. coli detection, incubation and identification, interpretation of results and sterile sampling procedures; and the interpretation of laboratory results through statistical validation of data, detection limits and uncertainty, comparing with regulatory standards and trend analysis.

Course Objectives

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

- Apply and gain an in-depth knowledge on laboratory analysis of the chemical and physical properties of water
- Identify the types of water sources and discuss the importance of water quality analysis, regulatory standards and key chemical and physical indicators
- Carryout laboratory safety procedures, sampling techniques and preservation and calibration and standardization of instruments
- Employ analytical techniques, laboratory quality control (QC) and quality assurance (QA), temperature measurement and turbidity analysis
- Apply color determination, conductivity and total dissolved solids (TDS) measurement, pH measurement and odor and taste evaluation
- Carryout alkalinity and acidity testing, hardness determination, chloride determination, fluoride analysis and sulfate determination
- Illustrate nitrate and nitrite analysis, dissolved oxygen (DO) measurement as well as discuss biochemical oxygen demand (BOD) and chemical oxygen demand (COD)
- Apply ammonia nitrogen (NH₃-N) determination, trace metals by atomic absorption spectroscopy (AAS) and heavy metal testing using ICP-OES
- Carryout phosphorus and phosphate analysis and oil and grease determination and discuss total suspended solids (TSS) and volatile solids (VS)
- Recognize microbiological indicators of water quality covering total coliforms and E. coli detection, incubation and identification, interpretation of results and sterile sampling procedures
- Interpret laboratory results through statistical validation of data, detection limits and uncertainty, comparing with regulatory standards and trend analysis

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 laboratory analysis of the chemical and physical properties of water for water quality laboratory technicians, environmental scientists and engineers, water treatment plant operators, chemists and laboratory analysts, health and safety officers, quality control/quality assurance professionals, regulatory and compliance officers, technical staff from water utilities and environmental agencies, researchers and academics in environmental science and professionals from oil and gas, power generation, and industrial sectors involved in water monitoring and testing.

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.

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 Management Consultant and an International Expert in Analytical Chemistry Water & Treatment Technology with over 20 years of extensive experience in Analytical Laboratory and Water & Wastewater Treatment Engineering. His expertise covers 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, Chemical Analysis, Laboratory Auditing, Risk Assessment, Microbiological Analysis of Water & Waste Water, Waste Water Treatment Analysis, Water Chemistry, 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 degree in Food Science and Food Technology** from the **University of Ioannina (Greece)** and a **Bachelor 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**.

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.

Accommodation

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

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 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: Sunday, 28th of September 2025

0730 – 0800	Registration & Coffee
0800 – 0815	Welcome & Introduction
0815 – 0830	PRE-TEST
0830 – 0930	Overview of Water Quality Parameters Types of Water Sources • Importance of Water Quality Analysis • Regulatory Standards (WHO, EPA, Local) • Key Chemical & Physical Indicators
0930 – 0945	Break
0945 – 1030	Laboratory Safety Procedures Chemical Handling & Storage • PPE Selection & Use • Emergency Response Plans • Safe Disposal of Laboratory Waste
1030 – 1130	Sampling Techniques & Preservation Types of Water Samples (Grab, Composite) • Sample Collection Tools & Procedures • Chain of Custody Documentation • Sample Preservation & Holding Times
1130 – 1215	Calibration & Standardization of Instruments Importance of Calibration • Calibration Curves & Methods • Use of Standards & Reference Solutions • Common Calibration Errors
1215 – 1230	Break
1230 – 1330	Basics of Analytical Techniques Gravimetric, Volumetric & Instrumental Methods • Principles of Spectrophotometry • Titrimetric Analysis Basics • Overview of Chromatographic Techniques
1330 – 1420	Laboratory Quality Control (QC) & Quality Assurance (QA) Duplicates, Blanks & Spikes • Control Charts & Accuracy Checks • Instrument Validation • Internal & External Audits
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: Monday, 29th of September 2025

0730 – 0830	Temperature Measurement & Significance Use of Digital & Mercury Thermometers • Thermocouple Probes • Influence on Chemical Solubility • Recording & Interpreting Trends
0830 – 0930	Turbidity Analysis Nephelometric Method (NTU) • Calibration of Turbidimeters • Sources of Turbidity • Regulatory Limits & Reporting

0930 – 0945	<i>Break</i>
0945 – 1100	Color Determination <i>Visual & Instrumental Methods (APHA Units) • Effect of Organic Matter & Metals • Sample Preparation • Impact on Consumer Perception</i>
1100 – 1215	Conductivity & Total Dissolved Solids (TDS) <i>Measurement Principles Using Conductivity Meters • Relationship Between EC & TDS • Sources of Dissolved Solids • Conversion Formulas</i>
1215 – 1230	<i>Break</i>
1230 – 1330	pH Measurement <i>Electrometric Method Using pH Meters • Buffer Calibration • Temperature Compensation • Interpretation in Environmental Context</i>
1330 – 1420	Odor & Taste Evaluation <i>Threshold Odor Number (TON) • Sensory versus Instrumental Techniques • Odor-Causing Compounds • Public Health Relevance</i>
1420 – 1430	Recap <i>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</i>
1430	<i>Lunch & End of Day Two</i>

Day 3: Tuesday, 30th of September 2025

0730 – 0830	Alkalinity & Acidity Testing <i>Titration Methods Using Standard Acids/Bases • Bicarbonate & Carbonate System • Indicators Used (Methyl Orange, Phenolphthalein) • Role in Buffering Capacity</i>
0830 – 0930	Hardness Determination <i>EDTA Titration Technique • Differentiating Calcium & Magnesium • Complexometric Indicators • Impact on Scaling & Soap Usage</i>
0930 – 0945	<i>Break</i>
0945 – 1100	Chloride Determination <i>Argentometric Titration (Mohr Method) • Use of Silver Nitrate & Potassium Chromate • Interferences • Chloride in Potable & Industrial Water</i>
1100 – 1215	Fluoride Analysis <i>SPADNS Colorimetric Method • Ion-Selective Electrodes • Health Effects of Fluoride • Regulatory Standards</i>
1215 – 1230	<i>Break</i>
1230 – 1330	Sulfate Determination <i>Turbidimetric Method • Use of Barium Chloride • Calibration Curve Preparation • Sulfate in Natural & Wastewater</i>
1330 – 1420	Nitrate & Nitrite Analysis <i>Spectrophotometric Methods • Cadmium Reduction Technique • Interference Elimination • Nutrient Pollution Relevance</i>
1420 – 1430	Recap <i>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</i>
1430	<i>Lunch & End of Day Three</i>

Day 4: Wednesday, 01st of October 2025

0730 – 0830	Dissolved Oxygen (DO) Measurement <i>Winkler Method • Membrane Electrode Method • Sample Preservation • Role in Aquatic Ecosystems</i>
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0830 – 0930	Biochemical Oxygen Demand (BOD) 5-Day Incubation Method • Seeding & Dilution Techniques • Blank Corrections • Significance in Wastewater Analysis
0930 – 0945	Break
0945 – 1100	Chemical Oxygen Demand (COD) Dichromate Reflux Method • Use of Open & Closed Reflux • Reagents Preparation • Comparison with BOD
1100 – 1215	Ammonia Nitrogen (NH₃-N) Determination Nesslerization or Ion-Selective Method • Sources of Ammonia • Role in Nitrogen Cycle • Impact on Aquatic Life
1215 – 1230	Break
1230 – 1330	Trace Metals by Atomic Absorption Spectroscopy (AAS) Sample Digestion Methods • Flame versus Graphite Furnace • Calibration & Sensitivity • Common Metals: Lead, Cadmium, Iron
1330 – 1420	Heavy Metal Testing Using ICP-OES Principles of ICP-OES • Multi-Element Analysis • Sample Matrix Interferences • Advantages over AAS
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: Thursday, 02nd of October 2025

0730 – 0830	Phosphorus & Phosphate Analysis Molybdenum Blue Method • Colorimetric Detection • Orthophosphate versus Total Phosphorus • Eutrophication Concerns
0830 – 0930	Oil & Grease Determination Hexane Extraction & Gravimetric Method • Soxhlet Extraction • Interferences from Surfactants • Environmental Discharge Standards
0930 – 0945	Break
0945 – 1100	Total Suspended Solids (TSS) & Volatile Solids (VS) Filtration & Drying Technique • Determining Fixed & Volatile Fractions • Sample Pretreatment • Effect on Sedimentation
1100 – 1215	Microbiological Indicators of Water Quality Total Coliforms & E. Coli Detection (MPN, Membrane Filtration) • Incubation & Identification • Interpretation of Results • Sterile Sampling Procedures
1215 – 1230	Break
1230 – 1300	Interpretation of Laboratory Results Statistical Validation of Data • Detection Limits & Uncertainty • Comparing with Regulatory Standards • Trend Analysis
1300 – 1345	Final Report Preparation & Presentation Structure of a Water Analysis Report • Data Visualization (Tables, Charts) • Recommendations & Corrective Actions • Client Communication Protocols
1345 – 1400	Course Conclusion Using this Course Overview, the Instructor(s) will Brief Participants about Topics that were Covered During the Course
1400 – 1415	POST-TEST
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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