

COURSE OVERVIEW LE0015(KJ1)
Laboratory Analysis of the Chemical & Physical Properties of Water

Course Title

Laboratory Analysis of the Chemical & Physical Properties of Water

Course Date/Venue

Session 1: April 07-11, 2025/Fujairah Meeting Room, Grand Millennium Al Wahda Hotel, Abu Dhabi, UAE

Session 2: September 28-October 02, 2025/ Boardroom 1, Elite Byblos Hotel Al Barsha, Sheikh Zayed Road, Dubai, UAE



Course Reference

LE0015(KJ1)

Course Duration/Credits

Five days/3.0 CEUs/30 PDHs

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.



The course presents an overview of the need for analysis of water, how analytical methods are developed and quality control is applied and how the results of analysis are used. It will describe the physical, chemical and other relevant properties of water components and will also cover sampling, cleanup, extraction and derivatization procedures. Older techniques that are still in use will be compared to recently developed techniques and participants will be directed to future trends. A similar strategy will be followed for discussion of detection methods. In addition, the applications of analysis of water types (potable water, tap water, wastewater, seawater) will be reviewed.



Because water is an excellent solvent, it dissolves many substances. To get correct results and values, analysts have to follow sample strategies. Sampling has become a quality-determining step. If samples can't be analyzed directly they have to be stored and preserved. Physical, chemical or biological activities in a water sample can distort the chemical composition in water. Statistical treatment of data ensures the reliability of the results. Statistical methods will also be reviewed in this course.



The course will deal with the water characteristics (physical, chemical and organoleptical) and their analysis methods. Physical characteristics of water, such as temperature, color, turbidity, etc., will be discussed, in addition to hardness, acidity, alkalinity, antioxidant demand and how dissolved oxygen is detected.

Humans both consume and pollute large quantities of water. This course will deal with injurious or toxic substances of domestic, agricultural and industrial sources: sulfuric compounds, ammonia, nitrites, nitrates, organic nitrogen, phosphates, organic acids, phenolic compounds, cyanides, metals, pesticides, PCBs, dioxins, PAHs, BTEX compounds, oils, greases, petroleum hydrocarbons, asbestos, silicates and surfactants. This course will also discuss new technologies on radionuclides and their possible health hazards in water and the whole environment.

Water is a living element housing a lot of organisms, wanted or unwanted, harmful or harmless. Some of these organisms produce toxic substances. This course will discuss bacteriological and algal analysis. It will give participants detailed information on most of the cited techniques, sample preparation, separation and detection methods.

Course Objectives

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

- Apply an in-depth knowledge and skills on water analysis and quality control techniques
- Select proper water samples from different sources including seawater, MSF, boiler feed water, boiler blowdown water, boiler water, produced steam, condensated water and drain effluent water
- Practice proper water analysis methods and use the correct analytical equipment to achieve the required results of pH value, conductivity, P&M alkalinity, chlorides, total hardness, NH₃ content, total dissolved salts, free chlorine & combined chlorine, dissolved oxygen, biological oxygen demand (BOD), chemical oxygen demand (COD), silica content, iron content, phosphate, hydrazine, turbidity, sulphate content, copper content, nitrates & nitrites content, color scale, oils & hydrocarbons
- Implement the various laboratory methods and technology in water analysis including qualitative/quantitative analysis, titrimetric, potentiometry, voltammetry, polarography, colorimetry, spectrophotometry, chromatography, spectrofluorimetry, infrared spectrophotometry, atomic absorption and flame emission spectroscopy, electronic emission spectroscopy
- Calculate errors, limitation and accuracy of the various analytical methods and calibrate the analytical equipment
- Employ a proper water quality monitoring program and carry out a quality assessment of water

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 analysis and quality control for regulators and water industry professionals who plan and use the results of water monitoring programmes and those who are carrying out water analysis. It is particularly aimed at young professionals and those who want to update their knowledge of water analysis. The course is important for those in charge of water analysis in the oil and gas fields.

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 completed a minimum of 80% of the total tuition hours.


Certificate Accreditations

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**. 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:



Dr. Tarek Awad, PhD, MSc, PGDip, BSc, is a Senior Analytical Chemist with over 25 years of experience within the Oil, Gas, Refinery & Petrochemical industries. His experience widely covers in the areas of Mercury Removal & Analysis Techniques, Mercury (Hg) Analyzer, Mercury Vapor Analyzers, Natural Gas & LNG, Analytical Laboratory Management, Gas Chromatography (GC), Laboratory Quality Management, Lab Management Systems, Product & Chemical Analysis, QA/QC, Analytical Management Activities/Techniques, Crude Oil Testing & Equipment, IP/ASTM Test Methods, Crude Oil Sample Analysis, Analysis of Water Quality Specification, Water Sampling Techniques, Water Analysis & Quality Control, Laboratory Environmental Analysis (Soil, Water, Air), Health & Safety and Laboratory Operations. Further, he is well-versed in Six Sigma Analysis, Six Sigma Technology, Tool Landscape, Lean Six Sigma, DMAIC, Statistical Process Control, Measurement System Analysis, Business Analysis, Corporate Strategies, Budget Preparations & Follow-Up, Capital & Resources Planning & Management, Planning Claims Management, Quality Assurance & Control, Total Quality Management, Project Management, Quality Management System, Analytical Problem-Solving & Decision Making and Communication & Leadership Skills. He is a Certified Data Analyst, Lean Six Sigma Black Belt (LSSBB), and Certified Lead Auditor in accordance with ISO 9001, ISO14001, OHSAS 18001 and ISO 17025.

Dr. Tarek gained his expertise through his long-term dedication as a **Senior Laboratory Analyst in SEGAS LNG**. He was in-charge of plant optimization, Quality, Environmental & OHSAS Standards. Prior to this, he was the **Laboratory Manager, an Advisor** for a reputable oil, gas and LNG company in the Middle East and was the **Senior Corrosion & QC Chemist of WEPSCO** wherein his duties involved quality control, corrosion control and chemical optimization for oilfield. He has built-up a formidable reputation with his professionalism and practical problem-solving abilities and has performed significant contribution to his fields.

Dr. Tarek has **PhD in Analytical Chemistry, a Post Graduate Diploma and Master's degree in Material Science (Corrosion) and Bachelor's degree in Chemistry**. Further, he is a **Certified Instructor/Trainer, a Certified Internal Verifier/Assessor/Trainer** by the **Institute of Leadership & Management (ILM)**, a **Certified CLSSBB Lean Six Sigma, a Certified ISO Auditor/Lead Auditor (QMS), a Certified IEMA Auditor (EMS)** and an active member of International Register of Certificated Auditors (**IRCA**), American Center Library, Egyptian Accreditation Council (**EGAC**), Technical Assistance Center (**TAC**), Egyptian Corrosion Society, Egyptian Arab Society of Material Science, Egyptian Syndicate of Scientific Profession and Egyptian Petroleum Association. He has further published various scientific papers, technical journals as well as delivered numerous trainings, courses, seminars and workshops worldwide.



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	Water Samples Seawater • Multistage Flash Evaporation • Boiler Feed Water • Boiler Water
0930 – 0945	Break
0945 – 1100	Water Samples (cont'd) Blowdown from Boiler • Produced Steam • Condensation • Drain Effluent Water
1100 – 1230	Analysis Methods & Equipment pH Value • Conductivity • P&M Alkalinity
1230 – 1245	Break
1245 – 1420	Analysis Methods & Equipment (cont'd) Chlorides • Total Hardness • NH3 Content
1420 – 1430	Recap
1430	Lunch & End of Day One

Day 2

0730 – 0930	Analysis Methods & Equipment (cont'd) Total Dissolved Salts • Free Chlorine & Combined Chlorine • Dissolved Oxygen
0930 – 0945	Break
0945 – 1100	Analysis Methods & Equipment (cont'd) Biological Oxygen Demand (BOD) • Chemical Oxygen Demand (COD) • Silica Content • Iron Content
1100 – 1230	Analysis Methods & Equipment (cont'd) Phosphate • Hydrazine • Turbidity • Sulphate Content
1230 – 1245	Break
1245 – 1420	Analysis Methods & Equipment (cont'd) Copper content • Nitrates & Nitrites Content • Color Scale • Oils & Hydrocarbons
1420 – 1430	Recap
1430	Lunch & End of Day Two

Day 3

0730 – 0930	Laboratory Methods & Technology (Principles/Limitations) Qualitative Analysis • Quantitative Analysis
0945 – 1100	Break
0945 – 1100	Laboratory Methods & Technology (Principles/Limitations) (cont'd) Titrimetric Methods • Potentiometry
0945 – 1100	Laboratory Methods & Technology (Principles/Limitations) (cont'd) Voltammetry • Polarography



0945 - 1100	Break
0945 - 1100	Laboratory Methods & Technology (Principles/Limitations) (cont'd) Colorimetry • Spectrophotometry
0945 - 1100	Recap
0945 - 1100	Lunch & End of Day Three

Day 4

0730 - 0930	Laboratory Methods & Technology (Principles/Limitations) (cont'd) Chromatography
0945 - 1100	Break
0945 - 1100	Laboratory Methods & Technology (Principles/Limitations) (cont'd) Spectrofluorimetry • Infrared Spectrophotometry
0945 - 1100	Laboratory Methods & Technology (Principles/Limitations) (cont'd) Atomic Absorption and Flame Emission Spectroscopy
0945 - 1100	Break
0945 - 1100	Laboratory Methods & Technology (Principles/Limitations) (cont'd) Electronic Emission Spectroscopy
0945 - 1100	Recap
0945 - 1100	Lunch & End of Day Four

Day 5

0730 - 0930	Errors in Analysis Limitation of Analytical Methods • Classification of Errors • What is the Meaning and Differences of Accuracy and Precision? • Minimization of Errors • Mean and Standard Deviation
0930 - 0945	Break
0945 - 1100	Errors in Analysis (cont'd) Comparison of Results • Reliability of Results • Errors in Sampling • Calibration of Equipment and Reagents
1100 - 1230	Water Quality Assessment Water Quality and Monitoring; Natural Water Quality and Water Pollution; Designing and Optimization of Water Quality Monitoring Programmes; Physico-Chemical and Biological Water Quality Assessment; Groundwater Quality Monitoring
1230 - 1245	Break
1245 - 1345	Water Quality Assessment (cont'd) Data Analysis and Presentation: Descriptive Statistics; Statistical Testing; Using Significance Levels in Water Quality Monitoring; Regression Analysis; Exercises; Presentation of Data
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

Practical Sessions

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



Course Coordinator

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