COURSE OVERVIEW LE0115
Modern Analytical Laboratory
Management, Operations, Analytical Instrumentation, Equipment, Safety & Quality (ISO 17025)

Course Title
Modern Analytical Laboratory: *Management, Operations, Analytical Instrumentation, Equipment, Safety & Quality (ISO 17025)*

Course Date/Venue
Session 1: June 15-19, 2025/Boardroom 1, Elite Byblos Hotel Al Barsha, Sheikh Zayed Road, Dubai, UAE
Session 2: November 09-13, 2025/Crowne Meeting Room, Crowne Plaza Al Khobar, KSA

Course Reference
LE0115

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

Course Description


This practical and highly-interactive course includes practical sessions and exercises where participants will visit the laboratory and they will be introduced to various lab instruments and modern laboratory practices. Practical sessions will be performed using one of the lab equipment in order to apply the theory learnt in the class.

The fast-paced modern technology has confronted the analytical laboratories with a host of new and increasingly complex materials, and has posed more stringent demands for greater sensitivity, reliability, and speed. On the other hand, the new developments in instrumentation have provided laboratories with new techniques, instruments, procedures, and reagents for dealing with these problems. This very expansion of equipment, reagents, and methodology has, however greatly complicated the task of the laboratory management and staff.

Further, the new business models, industry consolidation, staffing demographics, society and regulatory expectations, and other factors are transforming nearly most aspects of the classical laboratory system.

This course takes a strategic view of the laboratory system in the context of current quality management philosophies to determine options for achieving best practices. Experiences will be shared to provide insight into the obstacles and expected outcomes for the various approaches.

Further, this course discusses the roadmap to improve quality, performance and evaluation of the laboratory. You will learn how modern laboratories are applying current management philosophies to get closer to the business and to streamline operations. Practical details of laboratory management such as cost control, maintaining analysis quality, improving laboratory reputation, effective staffing, capital budget justification, and so forth will be discussed but the emphasis will be on systems rather than daily operational issues. Participants are expected to share experiences and best practices.

This course covers the major operations performed in the analytical laboratory. It describes the major equipment, analytical instrumentation and process analyzers used in the analytical laboratory, their operations, validations, calibration and maintenance. The course concentrates on Standard Operation Procedures (SOP) which includes development, revisions, standards and implementations. Various Quality standards will be discussed. However, the course concentrates on ISO 17025. Finally, the course demonstrates the safety practices and its critical impact in the analytical laboratory. OSHA standards and regulations will be discussed and related videos will be shown to course participants.

This course links together an understanding of performance characteristics with an appreciation of the limitations imposed by analytical instrument design, leading to the interplay of the validation and qualification processes within quality assurance systems. The course includes unique framework of topics covers the major instrumental techniques of spectrophotometry, chromatography, capillary electrophoresis and atomic emission spectroscopy. The use of case studies, exercises and practical applications, will help participants to develop a thorough understanding of the various concepts that underpin the different techniques.
In addition to the wealth of knowledge provided to course participants, each participant will go back to his/her laboratory equipped with an outstanding manual that includes typical SOPs that can be modified and used within participant's laboratory. Further, participants will be given 12 video tapes, compressed in one CD that can be used by the participant in training colleagues and subordinate on laboratory safety.

This outstanding course is a must for every laboratory professional. The updated knowledge and techniques covered during the 5 days of this course, will dramatically improve not only the participant's skills, but will also improve the performance of the participant's laboratory as a whole. However, if you are looking to improve the performance of your laboratory, then you have to commit yourself to pass the knowledge gained in this course to your subordinates and colleagues back in your laboratory as Haward Technology will give you all the tools needed for this purpose; knowledge, skills, manual, power point slides, videos, forms and Standard Operation Procedures (SOP).

Course Objectives

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

- Implement a modern management system of the analytical laboratory in the context of latest quality management philosophies and standards and determine the available options for best practices
- Apply an in-depth knowledge and skills of proven technologies in the analytical laboratories including analytical instrumentation, analytical techniques, process analyzers, laboratory equipment, operational procedures, management style, good laboratory practices (GLP), method validation, quality and safety management systems
- Use the major analytical laboratory instruments, equipment and process analyzers and understand their performance characteristics, capabilities, accuracies, reliabilities, speed and limitations including UV/VIS spectrophotometers, atomic absorption spectroscopy, ICP-OES, flow injection, infrared/raman spectroscopy, ion chromatography, pH probes, and gas chromatography
- Develop and modify the laboratory standard operating procedures (SOP) and interpret the requirements of the ISO 17025 quality system
- Calculate uncertainty, practice data & method validation, test laboratory efficiency and understand the latest certified reference standards and traceability

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 a wider understanding and deeper appreciation of laboratory testing and management for all analytical laboratory professionals, laboratory managers, superintendents, supervisors, engineers, chemists, analysts 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.

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 *(For Normal courses)*

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:

Dr. Yousef Al-Mashni, PhD, MSc, BSc, is an **International Expert** in **Analytical Laboratory** with over **30 years** of extensive experience. He is an **authority** in **Laboratory Equipment**, **Laboratory Quality Management Systems** (**ISO 17025** and **ISO 15189**), **Lab Safety & Health**, Good Laboratory Practice (**GLP**) and **Safety Procedure** in **Laboratories**. His wide expertise also covers **Water Analysis** & **Reporting**, **Water Sampling** & **Testing**, **Water Analyzer**, **Medical Laboratory Auditing**, **ISO 15489**, **Infection Control**, Internal **Quality Control** for **Microbiologists**, **Analytical Techniques**, **Biochemical**, **Hematological**, **Parasitological**, **Biochemical**, **Microbiological** & **Serological Analysis** of **Clinical Specimens**, **Helmith Ova** & **Salmonella** in **Waste Water** & **Sludge**, **Microbiological** Aspects & **Analysis** of **Wastewater**, Microbiology of **Wetlands**, Microbiological **Indoor Air Quality**, **Entrococcus**, **Pseudomonas** & **Aeromonas**, **Sulfate Reducing Bacteria**, **Fluorescense Microscopy**, **Planktology** of **Ambient Environment**, **Oral**, **Medical** & **Diagnostic Microbiology** and **Oral** & **Dental Hygiene**. Further, he is also well-versed in the areas of **Food Hygiene** and **HACCP**, **Food Safety**, **Food Poisoning**, **First Aid & CPR** and **Fire Safety**. He is currently the Deputy **Principal** & **Chief Technical Instructor** of **UNRWA** wherein he is responsible in developing and managing operations at the college/centre including building workshops and laboratories capacity, curriculum development and introducing new courses.

During his long career life, Dr. Yousef worked for many international companies handling key positions such as ICDL Centre **Manager**, **Deputy Principal**, **Chief Technical Instructor**, **Acting Principal**, **Laboratory Supervisor**, **Technical Instructor**, **Technical & Vocational Instructor**, **Senior Medical Laboratory Technician** and **Medical Laboratory Technician**.

Dr. Yousef has a **PhD** degree in **Natural Health Sciences** from the **University of Florida** (**USA**), **Master** degree in **Clinical Microbiology** and **Bachelor** degree **with Honours** in **Microbiology**. Further, he has **Diploma** in Vocational Education (**UNRWA & UNESCO**) and received several **certifications** like **ICDL** and Training of Trainers (**TOT**) in **Cambridge University** (**England**). He is a **Certified Internal Verifier/Assessor/Trainer** by the **Institute of Leadership & Management** (**ILM**), a **Certified Instructor/Trainer** and an active **member** of **Jordan Medical Laboratories Society**, Technical **Accreditation Committee of Medical Laboratories** (**Jordan Institution & Metrology**) and the Technical **Accreditation Committee for Granting ISO 15189 Certificate**. Furthermore, he has also published numerous technical papers and books including **Medical & Diagnostic Microbiology**, **Practical Competencies in Medical Laboratory Technology**, **Safety in Medical Laboratory Science** and **Quality Control in Medical Laboratory Science** just to name a few.

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 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	***Analytical Chemistry & Analytical Professionals*** *Classical Domain • Modern Domain • Classification of Analytical Chemistry • Measurements • Definitions of Analytical Chemistry and Chemical Analysis • Nature of Analytical Tools • Wide Array of Tools Used in Analytical Chemistry • Classification of Analytical Measurement Tools • Complete Measurement System • The Analytical Process (Unit Operations) • The Practicing Analytical Professionals • General Daily Operations/Tasks • Type of Work (Role) within an Analytical Laboratory • Role Player Between the Clients (Customers) and Analytical Laboratory • Source of New Developments in the Analytical Domain*
0930 – 0945	*Break*
0945 – 1100	***The Analytical Laboratory as a Business Activity*** *The Business Environment in Perspective • The Analytical Laboratory in the Micro-Environment • Objectives and Strategy • Vision and Mission • Vision and Mission Document • Organization (or Re-organization) • Possible Ways to Organize (to Re-organize) • Tasks Descriptions • Advantages • Disadvantages*
1100 – 1230	***Analytical Laboratory Management*** *Human Resource Management • Communication Management • Purchasing and Inbound Logistics Management*
1230 – 1245	*Break*
1245 – 1330	***Analytical Laboratory Management (cont'd)*** *Space Management • Management and Leadership • Organization and Decision-Making*
1330 – 1420	***Analytical Laboratory Management (cont'd)*** *Operation Management • Performance Management • Quality Management*
1420 – 1430	***Recap***
1430	*Lunch & End of Day One*

Day 2

0730 – 0830	***Analytical Laboratory Management (cont'd)*** *Good Laboratory Practice (GLP) • Financial Management • Information Management*
0830 – 0930	***Analytical Laboratory Management (cont'd)*** *Benchmarking • Future Developments • Approach to Improving the Analytical Laboratory*
0930 – 0945	*Break*
0945 – 1100	***Sampling & Sample Handling*** *Sampling Errors • Representative Sampling • Sample Contamination and Sample Preservation • Sample Accountability*
1100 – 1230	***Equipment/Analytical Instrumentation: UV/VIS Spectrophotometers*** *Spectrophotometer Architecture • Sources, Filters and Detectors • Sampling Devices • Fibre Optic Probes • Miniature Spectrophotometers*
1230 – 1245	*Break*
1245 – 1420	***Equipment/Analytical Instrumentation: Atomic Absorption Spectroscopy*** *Introduction • Flame AAS • Nebulizer/Burner Systems • Atomisation and Interferences • Graphite Furnace AAS • Pyrolysis and Atomization • The STPF Concept*
1420 – 1430	***Recap***
1430	*Lunch & End of Day Two*

Day 3

0730 – 0930	***Equipment/Analytical Instrumentation: ICP- OES*** *Inductively Coupled Plasma - Optical Emission Spectroscopy • Principals of Optical Emission Spectroscopy • Atomic Spectroscopy Sources • Techniques and Instruments • Analytical Performance • Applications of ICP-OES*
0930 – 0945	*Break*
0945 – 1100	***Equipment/Analytical Instrumentation: Flow Injection Analysis*** *Introduction • Basic Principals • FIA Instrumentation • Dispersion in FIA • Hydride Generation • Sequential Injection Analysis • Lab on Valve Systems*
1100 – 1230	***Equipment/Analytical Instrumentation: Infrared & Raman Spectroscopy*** *Background for Vibrational Spectroscopic Measurements • Comparison of Techniques and Relative Roles • IR Instrumentation • Instrumentation: Design and Performance Criteria • Fourier Transform Instruments • Filter Instrumentation • Laser Based Systems*
1230 – 1245	*Break*
1245 – 1330	***Equipment/Analytical Instrumentation: Ion Chromatography*** *Introduction • Ion Exchange Chromatography • Ion Exclusion Chromatography • Ion Pair Chromatography • Ion Suppression Chromatography • Conductivity/Suppressed Conductivity Detection • Amperometric Detection • Photometric Detection • Critical Instrumental Aspects • Applications • Instrument Modules • Solvent Reservoirs, Non-return Valves, Pumps • Columns, Sample Valves and Sample Loops • Diode Array Detection*
1330 – 1420	***Equipment/Analytical Instrumentation: Electrochemical Techniques*** *Principals of Conductivity • Immersed Electrodes – 2 an 4 Electrode Cells • Electrodeless (Non-contact) Measurement • pH Probes – Theory, Calibration, Measurement and Maintenance • Anodic and Cathodic Stripping Voltammetry*
1420 – 1430	***Recap***
1430	*Lunch & End of Day Three*

Day 4

0730 – 0930	***Equipment/Analytical Instrumentation: Gas Chromatographs*** *Separation Systems • Selection of Carrier Gases • Gas Chromatography Columns • Column Stationary Phases • Injectors and Detectors • Gas Chromatography – Mass Spectrometry • High Speed and Portable GC*
0930 – 0945	*Break*
0945 – 1100	***ISO 17025 and Method Validation*** *ISO 17025 Standard and Accreditation • Why Standardise?*
1100 – 1230	***ISO 17025 and Method Validation (cont'd)*** *Technical Competence • Validation of Analytical Methods • IQ, OQ and PQ*
1230 – 1245	*Break*
1245 – 1330	***ISO 17025 and Method Validation (cont'd)*** *Validation Strategy • Validation of Standard Methods • Revalidation*
1330 – 1420	***Safety Videos*** *A Series of Chemical Laboratory Safety Videos*
1420 – 1430	***Recap***
1430	*Lunch & End of Day Four*

Day 5

0730 – 0830	***Data Validation and Uncertainty*** *Data Validation and Reporting • Measurement Uncertainty • Summary Recommendations*
0830 – 0930	***SOP's and Quality Systems*** *Anatomy of an SOP • SOP Styles • Statistical Quality Control–Testing Frequency and Control Charts • Audits and System Reviews • Audits–Responsibility, Planning, Training, Conducting and Reporting • Responsibilities for Quality*
0930 – 0945	*Break*
0945 – 1115	***Laboratory Efficiency Testing and OSHA Requirements*** *Proficiency Testing Procedure • Evaluation of Proficiency Testing • Advantages for Laboratories and Performance Improvements • OSHA Standard • Chemical Hygiene Plan • Employee Information and Training • MSDS's*
1115 – 1230	***Certified Reference Standards and Traceability*** *Certified Standards • Applications of Certified Standards • Types of Reference Materials • Regulatory and Standards Requirements • Laboratory Requirements*
1230 – 1245	*Break*
1245 – 1345	***Safety Videos*** *A Series of Chemical Laboratory Safety Videos*
1345 – 1400	***Course Conclusion***
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

Mari Nakintu, Tel: +971 2 30 91 714, Email: mari1@haward.org