

COURSE OVERVIEW LE0115-4D
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 Reference

LE0115-4D

Course Duration/Credits

Four days/2.4 CEUs/24 PDHs

Course Date/Venue

Session(s)	Date	Venue
1	January 29-February 01, 2024	Jubail Hall, Signature Al Khobar Hotel, Al Khobar, KSA
2	March 04-07, 2024	Cheops Meeting Room, Radisson Blu Hotel, Istanbul Sisli, Turkey, Istanbul Turkey
3	June 24-27, 2024	Boardroom 1, Elite Byblos Hotel Al Barsha, Sheikh Zayed Road, Dubai, UAE
4	September 30- October 03, 2024	Ajman Meeting Room, Grand Millennium Al Wahda Hotel, Abu Dhabi, UAE



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 their calibration process. 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.

Training Methodology

This interactive training course includes the following training methodologies as a percentage of the total tuition hours:-

- 30% Lectures
- 20% Workshops & Work Presentations
- 30% Case Studies & Practical Exercises
- 20% Software, Simulators & Videos

In an unlikely event, the course instructor may modify the above training methodology before or during the course for technical reasons.

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: -

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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 **2.4 CEUs** (Continuing Education Units) or **24 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.

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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.

Accommodation

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

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. Hesham Abdou, PhD, MSc, BSc, is a **Senior Engineer** with over **35 years** of practical experience in various industrial fields. His specialization widely covers in the areas of Management, Operations, SPC & Quality **ISO 17025**, Risk Management & **ISO 17025**, Medical Laboratory Quality Management **ISO 15189:2007**, Lab Instrument Calibration & Troubleshooting Techniques, Modern **Analytical** Laboratory, Safety in **Analytical** Laboratories, **Analytical** Chemistry & Precise Results Generation, **Network** Management & Supervision, **Basics** Waste Water Treatment, Fundamentals of Water **Utility Regulation**, Operation & Maintenance of **Water Networks**, Water Meter Reading System (**MMR**), Operation & Maintenance of **Sewerage System**, **Principles** of Routine & Preventive Maintenance, **Safety Procedures** in Water Networks, **Sewer & Treated Effluent Network** System, **Sewer Network** Repair & Maintenance, **Valve Chamber** Maintenance, **Water** Analysis & Testing, **Water** Sampling Procedures, **Water System Design** & Installation, **Water Networks Design** Procedures, **Water Pumping** Process, **Equipment Handling** Procedures, **Pipes, Fitting & Valves, Pipelines, Pumps, Turbines, Heat Exchangers, Separators, Heaters, Compressors, Storage Tanks, Valves** Selection, **Compressors, Tank & Tank Farms** Operations & Performance, **Piping & Pumping** Operations, **Pump** Performance Monitoring, **Rotor Bearing** Modelling, **Hydraulic** Repairs & Cylinders, **Root Cause Analysis, Vibration & Condition** Monitoring, **Piping Stress** Analysis, **Gas Conditioning & Processing, Cooling Towers** Operation & Troubleshooting, **PCP & Jet Pump, Acid Gas** Removal, **Chemical Engineering Process** Design, **Hydrocracker Process Unit** Technology, **Hydro-Treating** Technology, **Distillation** Design, **Production Quality & Process** Troubleshooting, **Process Plant** Optimization, **Rehabilitation, Revamping & Debottlenecking, Heat Medium Fired Heater** Troubleshooting & Maintenance, **Hydro-Treating** Technology, **Process Plant** Performance & Efficiency, **Hydro Treating & Hydrocracker** Technology, Basics of Operation and Supervision of **Water Tanks Filling Stations, Amine Gas Sweetening & Sulfur Recovery, Heat & Mass** Transfer and Fluid Mechanics.

During his career life, Dr. Hesham held significant positions and dedication as the **General Manager, Operations Manager, Maintenance Manager, Section Head, Process Engineer** and **Mechanical Engineer** in various companies.

Dr. Hesham has a **PhD** and **Master's** degree in **Mechanical Engineering** and a **Bachelor's** degree in **Process Engineering**. Further, he is a **Certified Instructor/Trainer** and a **Peer Reviewer**. Dr. Hesham is a member of Egyptian Engineering Syndicate. Moreover, he has published technical papers and journals and has delivered numerous trainings, workshops, courses, seminars and conferences internationally.

Course Fee

Al Khobar	US\$ 4,500 per Delegate + VAT . This rate includes H-STK® (Howard Smart Training Kit), buffet lunch, coffee/tea on arrival, morning & afternoon of each day.
Istanbul	US\$ 5,000 per Delegate + VAT . This rate includes Participants Pack (Folder, Manual, Hand-outs, etc.), buffet lunch, coffee/tea on arrival, morning & afternoon of each day.
Dubai	US\$ 4,500 per Delegate + VAT . This rate includes H-STK® (Howard Smart Training Kit), buffet lunch, coffee/tea on arrival, morning & afternoon of each day
Abu Dhabi	US\$ 4,500 per Delegate + VAT . This rate includes H-STK® (Howard 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 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 • Space Management • Management and Leadership • Organization and Decision-Making • Operation Management • Performance Management • Quality Management • Good Laboratory Practice (GLP) • Financial Management • Information Management • Benchmarking • Future Developments • Approach to Improving the Analytical Laboratory

1230 – 1245	Break
1245 – 1330	Sampling & Sample Handling Sampling Errors • Representative Sampling • Sample Contamination and Sample Preservation • Sample Accountability
1300 - 1420	Equipment/Analytical Instrumentation: UV/VIS Spectrophotometers Spectrophotometer Architecture • Sources, Filters and Detectors • Sampling Devices • Fibre Optic Probes • Miniature Spectrophotometers
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 – 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 – 1420	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
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 – 0930	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
0930 – 0945	Break



0945 – 1100	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
1100 – 1230	ISO 17025 & Method Validation ISO 17025 Standard and Accreditation • Why Standardise? • Technical Competence • Validation of Analytical Methods • IQ, OQ and PQ • Validation Strategy • Validation of Standard Methods • Revalidation
1230 – 1245	Break
1245 – 1420	Safety Videos A Series of Chemical Laboratory Safety Videos
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 – 0930	Data Validation & Uncertainty Data Validation and Reporting • Measurement Uncertainty • Summary Recommendations
0930 – 0945	Break
0945 – 1030	SOP's & 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
1030 – 1230	Laboratory Efficiency Testing & 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
1230 –1245	Break
1245 – 1330	Certified Reference Standards & Traceability Certified Standards • Applications of Certified Standards • Types of Reference Materials • Regulatory and Standards Requirements • Laboratory Requirements
1330 – 1400	Safety Videos A Series of Chemical Laboratory Safety Videos
1400 – 1415	Course Conclusion Using this Course Overview, the Instructor(s) will Brief Participants about the Course Topics that were Covered During the Course
1415 – 1430	POST-TEST
1430	Lunch & End of Course



Practical Sessions/Site Visit

Site visit will be organized during the course for delegates to practice the theory learnt:-



Course Coordinator

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