

COURSE OVERVIEW IE0240

Developing and Applying Standard for Instrumentation

Course Title

Developing and Applying Standard for Instrumentation

Course Date/Venue

Session 1: April 06-10, 2025/Boardroom 1,
Elite Byblos Hotel Al Barsha,
Sheikh Zayed Road, Dubai, UAE
Session 2: September 08-12, 2025/Fujairah
Meeting Room, Grand Millennium
Al Wahda Hotel, Abu Dhabi, UAE



Course Reference

IE0240

Course Duration

Five days/3.0 CEUs/30 PDHs

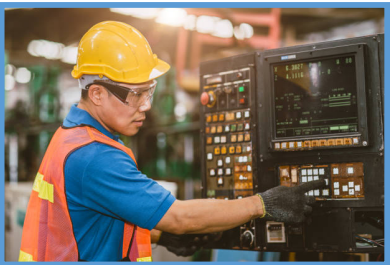


Course Description



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 commences with a brief review of some basic terminology, systems of units, measurement standards, traceability and types of error. The course then covers calibration standards and documents affecting the calibration of instruments.



A brief review is made of statistical analysis and uncertainty analysis, distributions and explanation of common definitions and notations used. Technical requirements in calibration procedures are covered, with content requirements.



The course then covers calibration equipment and techniques in detail, starting with a discussion of electrical instrument calibration with precision instruments such as analog and digital voltmeters, oscilloscopes, oscillators, counters, function generators, power supplies, RF Power Instrumentation, temperature simulation and measuring equipment and other related devices.

Electrical working standards are discussed, such as meter calibrators, oscilloscope calibrators, multi-function calibrators, distortion analyzers, counters, LF Spectrum Analyzers, RCL Meters and substitution boxes and more.

Attention will focus more on generic processes and theory of individual background and theory of precision measurements in voltage, current, resistance, capacitance, inductance, frequency and LF/RF power. Further discussion of measurement and theory in noise, total harmonic distortion, phase angle, modulation and rise time will be pursued in detail.

The instructor presents the course aided by overhead PowerPoint slides. Participants are expected to participate in classroom discussion and exercises.

Course Objectives

Upon the successful completion of this course, participants will have enough knowledge of the following:

- Metrology Terminology
- Technical Requirements in Calibration Standards
- Instrumentation Standards
- Review of Statistical Analysis and Uncertainty
- Technical Requirements in Calibration Procedures
- Electrical Calibration
- Overview of ISO 17025

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 is intended for personnel involved in metrology, instrumentation and various testing activities.

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 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:



Mr. Ihab Al-Mughrabi, BSc, CAP, is a **Senior Instrumentation Engineer** with extensive years of experience in the areas of **Pneumatic & Hydraulic Systems, Motorized & Pneumatic Valve Actuators, Programmable Logic Controllers (PLC), Pneumatic & Hydraulic Diagram, Valve Tuning, Alarm Management Systems, AutoCAD & PROEngineer (2D & 3D), CISCO, MATLAB SimPowerSystems, Instrumentation Control & Automation, Fiscal Metering Systems, Pressure Control Valves, Control Valves Selection & Sizing, Instrument & Telecom Construction & Commissioning, HAZOP, Instrument Calibration & Control, Fiber Optics, Process Instrumentation, Safeguarding & Asset Integrity Systems, Control System Specification, CCTV System, Power Electronics VSD, Electrical Wiring (Control & Power), FATs & SATs, Metering Skid, Distributed Control Systems (DCS), Supervisory Control & Data Acquisition (SCADA) Systems, Safety Instrumented Systems (SIS), Safety Integrity Level (SIL), Emergency Shutdown (ESD), Flowmetering & Custody Measurement, Multiphase Flowmetering, Measurement & Control, Process Control, Control Systems & Data Communications, Instrumentation, Automation, Engine Management System, Fieldbus Systems, P&IDs, Instrument Index & Data Sheets, Loop, Sequence, Hook Up & Control Panel Drawings, Control Philosophy, Cause & Effect Diagrams, System Architecture, Electrical Equipment Installation, Switchgear, Control Gear, Transformer, Panels & Boards, Cabling, Termination & Testing, Instrument, JB, Cabinets & Panel Installation, Instrument Air & Impulse Line Installation, Factory & Site Acceptance Tests for DCS, ESD, Fiscal Metering Skid & Control Valves and Root Cause Analysis.**

During his career life, Mr. Ihab has gained his practical and field experience through his various significant positions and dedication as the **Senior Control Engineer, Electrical & Instrumentation Engineer, Instrumentation Engineer, Electrical Maintenance Department Head and Senior Technical Instructor/Trainer** for numerous international companies like the Arab Aluminum Industry CO. LTD, **Jordan Petroleum Refinery CO.**, Jordan Bromine CO. and **ADNOC Refining Co.**, just to name a few.

Mr. Ihab has a **Bachelor's degree in Mechatronics Engineering.** Further, he is a **Certified Instructor/Trainer, a Certified Automation Professional (CAP)** from the International Society of Automation (ISA), **Safety Instrument System Expert, Certified Project Management Professional, Certified Functional Safety Engineer** and has delivered numerous trainings, courses, seminars and workshops internationally.

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 - 0810	Welcome & Introduction
0810 - 0915	Introduction and Focus
0915- 0930	Break
0930 - 1115	Metrology Terminology Scope of Metrology • Measurement Processes • Definitions of Measurement - Calibration
1115 - 1130	Break
1130 - 1245	Metrology Terminology (cont'd) VIM • Glossaries • International System of Units ("SI")
1245 - 1300	Break
1300 - 1420	Metrology Terminology (cont'd) Measurement Standards • Traceability • Measurement error
1420 - 1430	Recap
1430	Lunch & End of Day One

Day 2

0730 - 0800	Review Home work for Day One
0800 - 0930	Instrumentation Standards Management vs. technical requirements • Technical requirements, MIL-STD 45662A, ANSI Z540-1-1994 • Calibration requirements in ISO 9000 series quality documents • Technical Requirements in ISO Guide 25 & Standard 17025 • Applicable Quality Standards
0930 - 0945	Break
0945 - 1100	Instrumentation Standards (cont'd) Types of Standards: Meter Calibrators, Oscilloscope Calibrators, Multifunction Calibrators, Distortion Analyzers, Counters, LF Spectrum

	<i>Analyzers & FFTs , RCL Devices , Ancillary Equipment</i>
1100 - 1115	<i>Break</i>
1115 - 1245	Instrumentation Standards (cont'd) <i>ANSI X33.4-1986, American National Standard Code for Information Interchange Coded Character Set – 7-Bit • ANSI X3.42-1990, American National standard Representation of numeric Values in Character Strings for Information Interchange</i>
1245 - 1300	<i>Break</i>
1300 - 1420	Instrumentation Standards (cont'd) <i>IEEE Std 260-1978, (Reaff 1985). IEEE Standard Letter Symbols for Units of measurement (SI Units, Customary Inch-Pound Units, and Certain Other Units) (ANSI, DoD) • IEEE Std 488.1-1987, IEEE sTandard Digital Interface for Programmable Instrumantation (ANSI) • IEEE STD 754-1985 (Reaff 1991), IEEE Standard for Binary Floating-point Arithmetic • IEEE 488.2," IEEE Transactions on Instrumentation and Measurement. Vol. IM-39, pp. 146-150, Feb. 1990</i>
1420 – 1430	Recap
1430	<i>Lunch & End of Day Two</i>

Day 3

0730 - 0800	<i>Review Home work for Day One</i>
0800 – 0930	Instrumentation Standards ((cont'd) <i>ISO 31-1: 1992, Quantities and units – Part 1: Space and time • ISO 31-2: 1992, Quantities and units – Part 2: Periodic and related phenomena • ISO 31-3: 1992, Quantities and units – Part 3: Mechanics • ISO 31-4: 1992, Quantities and units – Part 4: Heat</i>
0930 - 0945	<i>Break</i>
0945 - 1100	Instrumentation Standards (cont'd) <i>ISO 31-5: 1992, Quantities and units – Part 5: Electricity and magnetism • ISO 31-6: 1992, Quantities and units – Part 6: Light and related electromagnetic radiations • ISO 31-7: 1992, Quantities and units – Part 7: Acoustics • ISO 31-8: 1992, Quantities and units – Part 8: Physical chemistry and molecular physics.</i>
1100-1115	<i>Break</i>
1115-1245	Instrumentation Standards (cont'd) <i>ISO 31-9: 1992, Quantities and units – Part 9: Atomic and nuclear physics • ISO 31-10: 1992, Quantities and units – Part 10: Nuclear Reactions and ionizing radiations • ISO 31-11: 1992, Quantities and units – Part 11: Mathematical signs and symbols for use in the physical sciences</i>
1245 - 1300	<i>Break</i>
1300 - 1420	Instrumentation Standards (cont'd) <i>ISO 31-12: 1992, Quantities and units – Part 12: Characteristic numbers • ISO 1000: 1992, SI units and recommendations for the use of their multiples and of certain other units • ISO 2955: 1983, Information processing – Representation of SI and other units in systems with limited character sets.</i>
1420 – 1430	Recap
1430	<i>Lunch & End of Day Three</i>

Day 4

0730 - 0800	Review Home work for Day Three
0800 - 0900	Review of Statistical Analysis and Uncertainty Categories of Uncertainty Components • Statistics of Measurement • Purpose of a Measurement
0900 - 0915	Break
0915 - 1045	Technical Requirements in Calibration Procedures Procedure content requirements
1045 - 1100	Break
1100 - 1245	Electrical Calibration VOM Devices • Oscilloscopes • Synthesizers/Sweepers • Counters • Function Generators & Pulse Generators • Power Supplies • Temperature/ Humidity Simulation & Measure • Spectrum and Network Analyzers • Impedance Bridges • Amplifiers
1245 - 1300	Break
1300 - 1420	Electrical Calibration Logic Analyzers • Angle Position Indicators • RF Power Measurement Vibration Equipment • Class Suggested Devices/Concerns
1420 - 1430	Recap
1430	Lunch & End of Day Four

Day 5

0730 - 0800	Review Home work for Day Four
0800 - 0930	Overview of ISO 17025 Material Review Boards
0930 - 0915	Break
0915 - 1015	Overview of ISO 17025 Corrective Action
1015 - 1030	Break
1030 - 1145	Overview of ISO 17025 Preventive Action
1145 - 1200	Break
1200 - 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

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