

**COURSE OVERVIEW IE0190**

**Process Instrumentation and Automation**

**Course Title**

Process Instrumentation and Automation

**Course Date/Venue**

Session 1: February 16-20, 2025/Boardroom 1,  
Elite Byblos Hotel Al Barsha, Sheikh  
Zayed Road, Dubai, UAE

Session 2: August 18-22, 2025/Fujairah Meeting  
Room, Grand Millennium Al Wahda  
Hotel, Abu Dhabi, UAE



**Course Reference**

IE0190



**Course Duration/Credits**

Five days/3.0 CEUs/30 PDHs

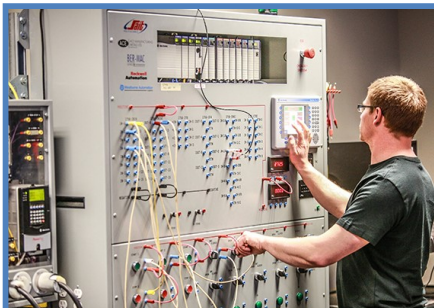
**Course Description**



***This practical and highly-interactive course includes various practical sessions and exercises. Theory learnt will be applied using one of our state-of-the-art simulators.***



This course is designed to benefit you with practical up-to-date information on the application of PLC's and SCADA to the automation and process control of plants and factories. It is suitable for people who have little or no exposure to PLC and SCADA but expect to become involved in some or all aspects of PLC and SCADA installation and Programming.



While the course is ideal for people who are new to PLC and SCADA, it will be of value to those who already have the basic skills, but need to refresh and update their basic knowledge. It aims to give practical advice from experts in the field, to assist you to correctly plan, program and install a PLC with a shorter learning curve and more confidence.

A selection of real world case studies is used to illustrate the key concepts with examples of real world working PLC and SCADA systems in process, utilities and manufacturing industries. The course will be an excellent opportunity to network with your peers as well as gain significant new information and techniques.

This course will cover most popular PLC's used in the industry, such as Quantum, Allen Bradley, Siemens, Bristol, Emersons, Omron and Telemecanique Shneider Modicon with extended case studies for Allen Bradley and Siemens.

### Course Objectives

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

- Apply a comprehensive knowledge on Programmable Logic Controllers (PLC), telemetry and employ SCADA programming in process control
- Analyze the system parts and power supplies of a PLC hardware including the block diagram of a typical PLC, PLC processor module and memory organization
- Discover the underlying principles of a PLC software including the programming devices, number systems, memory components, data structures, operating modes and limitations
- Discuss the PLC systems design, installation and maintenance and review the documentation and troubleshooting techniques used in the system
- Practice PLC programming using Allen Bradley and Siemens Simulators
- Apply the concepts and common elements of IEC 1131-3 including its programming languages, instruction list, function block diagram and sequential function chart
- Employ the principles of data communications, object linking and embedding in Process Control (OPC) and be able to recognize their importance in PLC and SCADA systems
- Implement the concept of Operator Interfaces (OIU) and describe the operator interface programming such as its configuration, graphical languages, good and bad parts
- Determine the concept, terminology and components of SCADA system and increase in-depth knowledge on SCADA software
- Implement the complete procedures and requirements in SCADA programming and be able to practice how to create and configure a SCADA system using the various utilities, process control, commands and system components

### 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 PLC and SCADA for those who have little or no exposure to PLC and SCADA but expect to become involved in some or all aspects of PLC and SCADA. Further, the course will be of value to those who already have the basic skills but need to refresh and update their basic knowledge.

**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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**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 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 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. Pan Marave, PE, MSc, BEng, is a Senior Electrical & Instrumentation Engineer with over 45 years of extensive experience in Oil, Gas, Petrochemical, Refinery & Power industries. His expertise includes Safety Instrumented Systems (SIS), Safety Integrity Level (SIL), Emergency Shutdown (ESD); DCS, SCADA & PLC; Measurement (Flow, Temperature, Pressure); Process Analyzers & Analytical Instrumentation; Process Control, Instrumentation & Safeguarding; Process Controller, Control Loop & Valve Tuning; Industrial Distribution Systems; Industrial Control & Control Systems, Power Systems Protection & Relaying; Earthing, Bonding, Grounding, Lightning & Surge Protection; Electric Power Substation & Systems; Electrical Engineering Principles; Motor Control Circuit; Electrical Fault Analysis; Electrical Networks & Distribution Cables; Circuit Breakers, Switchgears, Transformers, Hazardous Areas Classification and Detailed Engineering Drawings, Codes & Standards. Furthermore, he is also well-versed in Microprocessors Structure, Lead Auditor (ISO 9000:2000), ISO 9002, Quality Assurance, and Projects & Contracts Management.**

Presently, Mr. Marave is the **Technical Advisor of Chamber of Industry & Commerce** in Greece. Prior to this, he gained his thorough practical experience through several positions as the **Technical Instructor, Engineering Manager, Electronics & Instruments Head, Electrical, Electronics & Instruments Maintenance Superintendent, Assistant General Technical Manager and Engineering Supervisor** of various international companies such as the **Alumil Mylonas, Athens Papermill, Astropol** and the **Science Technical Education**.

Mr. Marave is a **Registered Professional Engineer** and has **Master's and Bachelor's** degrees in **Electrical Engineering** from the **Polytechnic Institute of New York and Pratt Institute of New York (USA)** respectively. Further, he is a **Certified Instructor/Trainer, a Certified Internal Verifier/Assessor/Trainer** by the **Institute of Leadership & Management (ILM)** and an active member of the **Technical Chamber** and the **Institute of Electrical and Electronics Engineer (IEEE)** in Greece. He has presented and delivered **numerous international** courses, conferences, trainings and workshops worldwide.

### 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	<b>PRE-TEST</b>
0830 – 0930	<b>Introduction</b> Goal and Plan of the Course • Introduction and Brief History of PLC • Industrial Control Systems and the PLC Part • Why is PLC so Widely Used • PLC Concerns and Alternatives
0930 – 0945	Break
0945 – 1200	<b>Fundamentals of PLC Hardware</b> Block Diagram of Typical PLC • PLC Processor Module, Memory Organization • Input and Output Modules, Types, Power Supply • Power Supplies
1200 – 1230	<b>Fundamentals of PLC Software</b> Programming Devices, On-Line and Off-Line Programming • Number Systems and the Computer World • PLC Numbers Handling • Memory Components, Data Structure and Addressing • Methods of Representing Logic, Boolean Algebra, Instruction Code, Graphical Presentation - Functional Logic Diagrams and Ladder Logic
1230 – 1245	Break
1245 – 1330	<b>Fundamentals of PLC Software (cont'd)</b> Typical Ladder Logic Instruction Set • Comparison of Different Manufacturers, Memory and Data Representation and Instruction Code • System Software, System Scanning, Watch Dog Timer, Self Test • Internal Errors, Fault Table for PLC and I/O, Errors Handling • Operating Modes, Use and Limitations
1330 – 1420	<b>PLC Systems Design, Installation &amp; Maintenance</b> Process and Mechanical Control Diagrams • Process and Machine Control Descriptions • Selection of PLC and Modules • Control System Diagram • Wiring Diagrams • Control Panel Design, Equipment Layout, Good Installation Practice • Programming, Start-Up, Testing, Commissioning • Documentation, Maintenance, Troubleshooting, Techniques and Examples • Wrap up of the PLC Basics, Specific Terminology, Practical Queries
1420 - 1430	<b>Recap</b>
1430	Lunch & End of Day One

#### Day 2

0730 – 0900	<b>PLC Programming</b> System Introduction • Basics Functions • DC Motor Run/Jog • Tools, Forcing and Toggling, On-line Changes
0900 – 0930	<b>PRACTICAL SESSION #1</b>
0930 – 0945	Break
0945 – 1045	<b>Lab Programming on Siemens SIMATIC &amp; WinCC</b> Timers and Counters • Motor Forward/Reverse • Pipeline Pumping Station • Data Operations • Tracking Numbers in Storage
1045 – 1100	<b>PRACTICAL SESSION #2</b>



1100 – 1200	<b>Lab Programming on Siemens SIMATIC &amp; WinCC (cont'd)</b> Motor Demand Start • Move Operations • Tracking Part Number with a Shift Register • Pulse Generator/Cookie Filling • 16 Bit Drum Sequencing • Bit Operations • Good Parts/Bad Parts
1200 – 1230	<b>PRACTICAL SESSION #3</b>
1230 – 1245	Break
1245 – 1400	<b>Lab Programming on Siemens SIMATIC &amp; WinCC (cont'd)</b> Motor Sequencing • Motor Sequencing 2 • Fault References and PLC Troubleshooting • Time of Day Display • Fault References
1400 – 1420	<b>PRACTICAL SESSION #4</b>
1420 - 1430	<b>Recap</b>
1430	Lunch & End of Day Two

**Day 3**

0730 – 0930	<b>Introduction to IEC 1131-3</b> Concepts • Common Elements • Top-Bottom and Bottom-Up Approaches • Programming Languages: Structured Text • Instruction List • Function Block Diagrams • Sequential Function Chart • Ladder Diagrams
0930 – 0945	Break
0945 – 1015	<b>Data Communications</b> Serial Interface Standards: RS-232C, RS-422 (RS-423) and RS-485 • Communication Links – Status, Errors, Timeout (Watchdog) • Protocols – Proprietary and Standard, Modbus, DH+ • Local Area Network, Topology, Ethernet, Control Networks • ISO/OSI Communications Standard
1015 – 1100	<b>Object Linking &amp; Embedding in Process Control (OPC)</b> Introduction to OPC Standards • Confirmed and Developing Specifications • Practical Control System Benefits from OPC Compliance
1100 – 1200	<b>Operator Interfaces (OIU)</b> Status and Alarm Messages • Operator Control Actions • Linking Displays to the PLC • PLC Manufacturer or Third Party – Depend on Connectivity
1200 – 1215	Break
1215 – 1300	<b>Operator Interface Programming</b> System Introduction • Configuration
1300 – 1400	<b>Operator Interface Programming (cont'd)</b> Graphical Language • PLC Connection • Operator's Push Button • DC Motor Run/Jog • Operator's Indication • DC Motor Running • Good Parts/Bad Parts
1400 – 1420	<b>PRACTICAL SESSION #5</b>
1420 - 1430	<b>Recap</b>
1430	Lunch & End of Day Three

**Day 4**

0730 – 0830	<b>Fundamentals of SCADA</b> Concept, Terminology and Components • SCADA System Hardware • Communication Architecture • Radio and Wireless Basics • SCADA and Telemetry
0830 – 0930	<b>SCADA Software</b> Configuration of SCADA Systems • Best Practice Configuration of Alarms • Rules for SCADA Design • SCADA and OPC • Security and Risk Management
0930 – 0945	Break



0945 – 1045	<b>Introduction to GE Cimplicity HMI/SCADA Software</b> Modular Multitasking 32 Bit Design • Distributed Architecture • Microsoft Object Technology, ActiveX Controls • Device Connectivity, Open Data Base Connectivity • Feature Set, Options, Base
1045 – 1130	<b>SCADA Programming Basics</b> Creating a Project, Master and Data • Configuration Data, ISAM Files, idx Files • Security, Users Roles (Privileges) and Resources (Areas) • Devices and Points Assigning to a Resource • System Configuration
1130 – 1215	<b>SCADA Programming</b> Creating a New Cimplicity Project • Configuring Devices, Ports, Protocols, Users, Resources, Roles, Points, Alarm Classes, Alarm Strings and Alarms • Example with 4 Users, 3 PLCs, Robot and Masher
1215 – 1230	Break
1230 – 1300	<b>PRACTICAL SESSION #6</b>
1300 – 1400	<b>SCADA Programming (cont'd)</b> Access a Point Control Panel • Configuring a Point Control Panel • Modifying Points and their Alarms • Saving a Point Control Panel as a File • Creating and Configure a Graphic Screen • Configuring SmartObjects, Animation • Creating Events and Actions in Objects • Linking SmartObjects
1400 – 1420	<b>PRACTICAL SESSION #7</b>
1420 - 1430	<b>Recap</b>
1430	Lunch & End of Day Four

**Day 5**

0730 – 0830	<b>SCADA Programming (cont'd)</b> Creating Automated Events and Actions • Displaying and Trigger Events and Actions in the BCEUI (Basic Control Engine User Interface) • Configuring a Simple Script Using Wizards • Configuring a New Button to Trigger an Event that Runs the Script • Creating New Tables in Database Logger • Configuring Logging and Maintenance Options in the Tables • Adding Points to the New Tables • Logging Alarms and Events
0830 – 0900	<b>PRACTICAL SESSION #8</b>
0900 – 0915	Break
0915 – 1015	<b>SCADA Programming (cont'd)</b> Executing a Quick Trend from your Project's Workbench • Creating an Embedded Trend Chart to display Historical Data • Applying ActiveX Trend Methods to a Trend Chart • Creating a Stand Alone Alarm Viewer • Creating and Configure an Embedded Alarm Viewer • Adding Alarm Sounds to Alarm Classes
1015 – 1045	<b>PRACTICAL SESSION #9</b>
1045 – 1145	<b>SCADA Programming (cont'd)</b> Using the Import/Export Command Utility • Using the IDTPOP Utility to View Tables in the Database • Using Process Control to Display Project Processes, Start/Stop Processes • Opening Project Status Logs to View Project and System Error Messages • Accessing the Windows NT Performance Monitor and Create a Graphic Display, View Running Applications and Processes • Accessing the Point Cross Reference Tool to View the Use and Locations of Pints in the Project
1145 – 1215	<b>PRACTICAL SESSION #10</b>
1215 – 1230	Break

1230 – 1315	<b>SCADA Programming (cont'd)</b> <i>Configuring Project for Broadcast • Creating a Remote Project to Enable Enterprise Server • Configuring Text Objects for Point By Address • Configuring Command Line Switches on Screen Shortcuts</i>
1315 – 1345	<b>PRACTICAL SESSION #11</b>
1345 – 1400	<b>Course Conclusion</b>
1400 – 1415	<b>POST-TEST</b>
1415 – 1430	<i>Presentation of Course Certificates</i>
1430	<i>Lunch &amp; End of Course</i>



**Simulator (Hands-on Practical Sessions)**

Practical sessions will be organized during the course for delegates to practice the theory learnt. Delegates will be provided with an opportunity to carryout various exercises using one of our state-of-the-art simulators “Allen Bradley SLC 500”, “AB Micrologix 1000 (Digital or Analog)”, “AB SLC5/03”, “AB WS5610 PLC”, “Siemens S7-1200”, Siemens S7-400” “Siemens SIMATIC S7-300”, “Siemens S7-200” “GE Fanuc Series 90-30 PLC”, “Schneider Electric Magelis HMISTU”, “Siemens SIMATIC Step 7 Professional Software”, and “HMI SCADA”.



**Allen Bradley SLC 500 Simulator**



**Allen Bradley Micrologix 1000 Simulator (Digital)**



**Allen Bradley Micrologix 1000 Simulator (Analog)**



**Allen Bradley SLC 5/03**



**Allen Bradley WS5610 PLC Simulator PLC5**



**Siemens S7-1200 Simulator**



**Siemens S7-400 Simulator**



**Siemens SIMATIC S7-300**



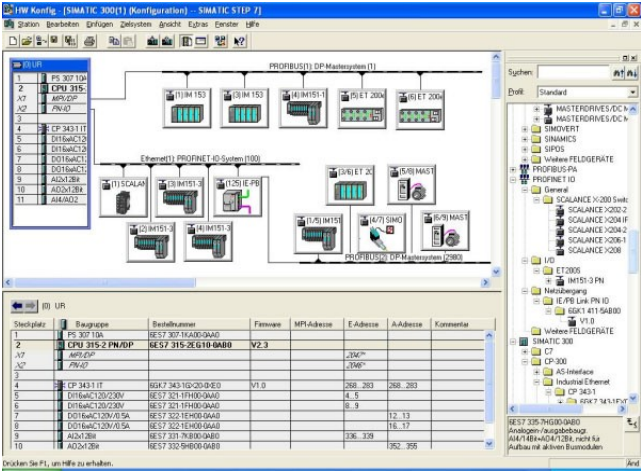
**Siemens S7-200 Simulator**



**GE Fanuc Series 90-30 PLC Simulator**

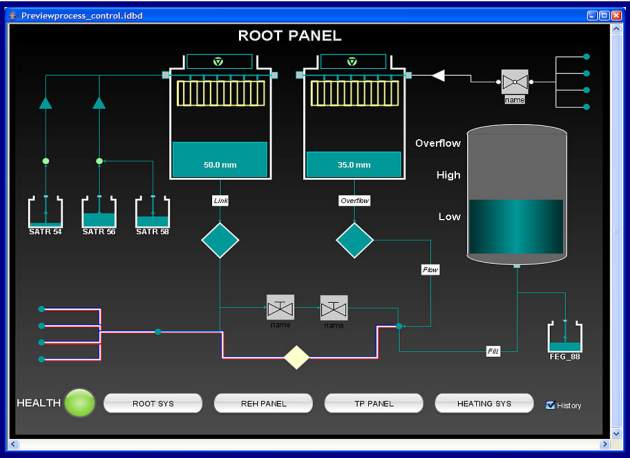


**Schneider Electric Magelis HMISTU**



**Siemens SIMATIC Step 7 Professional Software**

Slotplatz	Bezeichnung	Bestellnummer	Firmware	MPI-Adresse	E-Adresse	A-Adresse	Kommentar
1	PS 307 10A	6ES7 307 1EA00AA0					
2	CPU 315-2 PN/DP	6ES7 315-2EG10-0AB0	V2.3				
3	PS 307 5A	6ES7 307 1EA00AA0					
4	CP 343-1 IT	6ES7 343-1EX30-0AB0	V1.0		288, 289	288, 289	
5	DI16xDC12V/0.5A	6ES7 321-1BH03-0AA0			4, 5		
6	DI16xDC12V/0.5A	6ES7 321-1BH03-0AA0			6, 7		
7	DI16xDC12V/0.5A	6ES7 321-1BH03-0AA0			8, 9	12, 13	
8	DI16xDC12V/0.5A	6ES7 321-1BH03-0AA0			10, 11	14, 15	
9	AOx12Bit	6ES7 331-7KE02-0AB0			136, 139	132, 135	
10	AOx12Bit	6ES7 331-7KE02-0AB0			140, 143	136, 139	

**HMI SCADA**

**Course Coordinator**

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