AMERICAN GLOBAL INSTITUTE
FOR PRIVATE TRAINING

External Training Course

Smart SCADA Systems: Powering Industrial Automation

From 27 Oct. To 31 Oct. 2025
From 17 Nov. To 21 Jul. 2025
From 08 Dec. To 12 Dec. 2025

Movenpick Hotel Amsterdam City Centre, Amsterdam, Netherlands

Mr. Ghanem F. Al-Otaibi
GM & Institute Owner
Tel.: 00965 22248901 **Fax: 00965 22204999**
Mob.: 00965 65548855 **Mob.: 00965 97273712**
Email: admin@agi-kw.com **Email: agi-kw@hotmail.com**
W/SITE: WWW.AGI-KW.COM

American Global
Institute For Private Training

Tel. 00965 - 22248901
Mob. 00965 - 65548855
Email admin@agi-kw.com
W/Site www.agi-kw.com

External Training Course:

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Course Overview

Supervisory Control and Data Acquisition (SCADA) systems are the backbone of industrial automation and process control. This course provides a comprehensive and practical understanding of smart SCADA systems, covering their architecture, hardware and software components, communication protocols, integration with field devices, and cybersecurity. Participants will explore real-world industrial applications in sectors such as oil & gas, power, water treatment, and manufacturing. The program also addresses emerging trends including Cloud SCADA, Industrial IoT (IIoT), and AI-driven predictive systems.

Course Objectives

By completing this course, participants will be able to:

- Explain SCADA architecture, functions, and key components.
- Configure and optimize Human-Machine Interfaces (HMI).
- Apply communication protocols (Modbus, DNP3, OPC UA, IEC 61850).
- Integrate SCADA with PLCs, RTUs, and intelligent field devices.
- Troubleshoot SCADA hardware, software, and communication issues.
- Implement preventive and corrective maintenance strategies.
- Secure SCADA systems against cyber threats.
- Adapt to future trends: Cloud SCADA, IIoT, and AI applications.

Training Methodology

Interactive lectures and visual presentations.
Real-world case studies and industry examples.
Hands-on practice using SCADA simulation tools.
Group workshops and problem-solving sessions.
System design and troubleshooting exercises.
Continuous Q&A and expert feedback.

Organizational Impact

Improved reliability and efficiency of operations.
Reduced downtime through predictive maintenance strategies.
Enhanced decision-making via real-time data access.
Stronger cybersecurity resilience.
Optimized integration of industrial devices and systems.
Cost reduction through smarter operations and resource use.

Course Content & Outline

Day 1: Fundamentals of Smart SCADA Systems

- Introduction to SCADA: definition, evolution, and importance.
- SCADA system architecture and data flow.
- Key functions: monitoring, control, data acquisition, reporting.
- Differences between SCADA, PLC, and DCS systems.
- Industrial applications across multiple sectors.
- Transition from traditional SCADA to Smart SCADA.

Day 2: SCADA Components & Architecture

- Field instruments: sensors, actuators, transducers.
- Remote Terminal Units (RTUs): design and configuration.
- Programmable Logic Controllers (PLCs): functions and applications.
- Human-Machine Interface (HMI): design principles and visualization.
- Servers, clients, and data historian systems.
- SCADA software platforms: features and configuration.
- Redundancy and high availability concepts.

Day 3: Communication Protocols & Networking

- Overview of industrial communication in SCADA.
- Protocols: Modbus, DNP3, OPC UA, Profibus, IEC 61850.
- LAN, WAN, and industrial Ethernet for SCADA.
- Wireless communication and IoT integration.
- Data logging, trending, and historian database management.
- Network reliability, redundancy, and design considerations.
- Case study: communication failures and resolution.

Day 4: SCADA Operations, Integration & Troubleshooting

- Integration of SCADA with PLCs, RTUs, and sensors.
- Alarm management: design, prioritization, and handling.
- Event management and historical reporting.
- Troubleshooting hardware, software, and communication failures.
- Preventive and corrective maintenance practices.
- Root Cause Analysis (RCA) in SCADA environments.
- Simulation and practical troubleshooting exercises.

Day 5: Cybersecurity & Future of Smart SCADA

- Cybersecurity risks and common vulnerabilities in SCADA.
- Security standards: NIST, IEC 62443, ISO 27001.
- Best practices for securing industrial control systems.
- Cloud-based SCADA: benefits, challenges, and risks.
- IIoT integration with SCADA systems.
- AI and Machine Learning in predictive SCADA operations.
- Future roadmap: Industry 4.0 and next-generation automation.
- Final group project: design and secure a SCADA system.

Course Agenda:

(1st Day) Agenda

8.30	9.00	Opening Remarks (30 Min.).
9.00	11.30	DISCUSS COURSE OBJECTIVES: • Fundamentals of Smart SCADA Systems. • SCADA Components & Architecture. • Communication Protocols & Networking. • SCADA Operations, Integration & Troubleshooting. • Cybersecurity & Future of Smart SCADA.
11.30	12.00	Coffee Break
12.00	14.00	Fundamentals of Smart SCADA Systems: • Introduction to SCADA: definition, evolution, and importance. • SCADA system architecture and data flow. • Key functions: monitoring, control, data acquisition, reporting. • Differences between SCADA, PLC, and DCS systems. • Industrial applications across multiple sectors. • Transition from traditional SCADA to Smart SCADA.
14.00	14.30	Questions and Discussion
14.30		Buffet Lunch

(2nd Day) Agenda

9.00	11.30	SCADA Components & Architecture: • Field instruments: sensors, actuators, transducers. • Remote Terminal Units (RTUs): design and configuration. • Programmable Logic Controllers (PLCs): functions and applications. • Human-Machine Interface (HMI): design principles and visualization.
11.30	12.00	Coffee Break
12.00	14.00	SCADA Components & Architecture: • Servers, clients, and data historian systems. • SCADA software platforms: features and configuration. • Redundancy and high availability concepts.
14.00	14.30	Questions and Discussion
14.30		Buffet Lunch

(3rd Day) Agenda

9.00	11.30	Communication Protocols & Networking: • Overview of industrial communication in SCADA. • Protocols: Modbus, DNP3, OPC UA, Profibus, IEC 61850. • LAN, WAN, and industrial Ethernet for SCADA. • Wireless communication and IoT integration.
11.30	12.00	Coffee Break
12.00	14.00	Communication Protocols & Networking: • Data logging, trending, and historian database management. • Network reliability, redundancy, and design considerations. • Case study: communication failures and resolution.
14.00	14.30	Questions and Discussion
14.30		Buffet Lunch

(4th Day) Agenda

9.00	11.30	SCADA Operations, Integration & Troubleshooting: • Integration of SCADA with PLCs, RTUs, and sensors. • Alarm management: design, prioritization, and handling. • Event management and historical reporting. • Troubleshooting hardware, software, and communication failures.
11.30	12.00	Coffee Break
12.00	14.00	SCADA Operations, Integration & Troubleshooting: • Preventive and corrective maintenance practices. • Root Cause Analysis (RCA) in SCADA environments. • Simulation and practical troubleshooting exercises.
14.00	14.30	Questions and Discussion
14.30		Buffet Lunch

(5th Day) Agenda

9.00	11.30	Cybersecurity & Future of Smart SCADA: • Cybersecurity risks and common vulnerabilities in SCADA. • Security standards: NIST, IEC 62443, ISO 27001. • Best practices for securing industrial control systems. • Cloud-based SCADA: benefits, challenges, and risks.
11.30	12.00	Coffee Break
12.00	14.00	Cybersecurity & Future of Smart SCADA: • IIoT integration with SCADA systems. • AI and Machine Learning in predictive SCADA operations. • Future roadmap: Industry 4.0 and next-generation automation. • Final group project: design and secure a SCADA system.
14.00	14.30	Questions and Discussion
14.30		Buffet Lunch