AMERICAN GLOBAL INSTITUTE
FOR PRIVATE TRAINING

External Training Course

Advanced Petroleum Instrumentation & SCADA Maintenance with AI

From 29 Sep. To 03 Oct. 2025
From 10 Nov. To 14 Nov. 2025
From 08 Dec. To 12 Dec. 2025

Holiday Inn Express Singapore Katong by IHG Hotel, Singapore

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External Training Course:

Advanced Petroleum Instrumentation & SCADA Maintenance with AI

From 29 Sep. To 03 Oct. 2025 Fees: 1900 KD
From 10 Nov. To 14 Nov. 2025 Fees: 1900 KD
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Course Overview

This advanced program is tailored for petroleum and energy sector professionals responsible for the reliability, safety, and performance of critical instrumentation and SCADA systems. The course integrates AI-driven predictive maintenance, advanced diagnostics, and digital transformation practices into traditional oil & gas automation, providing participants with the expertise to address today's operational challenges. Through hands-on workshops, scenario-based exercises, and cyber-drills, participants will gain in-depth knowledge of next-gen instrumentation, SCADA fault resilience, and AI applications in predictive maintenance and operational optimization.

Key Learning Outcomes

Participants will learn to:

- Apply AI and machine learning models for predictive maintenance in petroleum facilities.
- Diagnose and resolve complex instrumentation and SCADA failures.
- Engineer high-availability and fault-tolerant SCADA architectures.
- Integrate digital twins, IoT-enabled devices, and smart sensors in petroleum systems.
- Strengthen cybersecurity measures aligned with IEC 62443 and NIST standards.
- Conduct root cause failure analysis (RCFA) and reliability-centered maintenance (RCM).
- Align petroleum asset management with Industry 4.0 transformation strategies.

Target Audience

Senior Instrumentation & Control Engineers in Petroleum Facilities.
SCADA System Engineers & Operators in Oil & Gas Plants.
Maintenance & Reliability Engineers in Refining, Production, and Transport.
ICS/SCADA Cybersecurity Specialists.
Engineering Team Leaders & Technical Supervisors in Petroleum Operations.

Organisational Impact

Reduced downtime and optimized performance of petroleum assets.

Enhanced system reliability, safety, and cybersecurity resilience.

Integration of AI-driven predictive maintenance for cost savings.

Workforce capable of leveraging Industry 4.0 technologies in petroleum operations.

Personal Impact

Mastery of advanced petroleum instrumentation & SCADA maintenance techniques.

Proficiency in AI-based predictive analytics and digital twins.

Expertise in cybersecurity practices for critical petroleum operations.

Recognition as a specialist capable of leading digital transformation projects in oil & gas.

Course Content & Outline

Day 1: Advanced Instrumentation in Petroleum Operations

- Evolution of instrumentation systems in oil & gas.
- Intelligent sensors & smart transmitters for petroleum facilities.
- Advanced field communication protocols (HART-IP, Foundation Fieldbus, OPC-UA).
- Wireless instrumentation for remote petroleum sites.
- Hands-on Workshop: Configuring smart petroleum instruments for real-time data.

Day 2: Reliability-Centered Instrumentation Maintenance

- Maintenance optimization in petroleum asset-intensive environments.
- FMEA & RCFA for critical petroleum instrumentation failures.
- AI-enabled condition monitoring of pumps, compressors, and valves.
- Instrument lifecycle management in upstream, midstream, and downstream operations.
- Case Study: Instrumentation failure in a refinery – diagnosis & resolution.

Day 3: SCADA Architectures for Petroleum Facilities

- High-availability SCADA in exploration, drilling, refining, and pipelines.
- SCADA network architecture: RTUs, PLCs, data historians.
- Redundancy, virtualization, and cloud/edge integration.
- Alarm management optimization in petroleum SCADA.
- Diagnostic Workshop: Troubleshooting complex SCADA failure in a refinery network.

Day 4: Cybersecurity & Operational Resilience

- Cyber threat landscape in petroleum ICS/SCADA systems.
- Defending against ransomware, malware & insider threats.
- IEC 62443/NIST standards compliance for petroleum sector.
- Secure remote monitoring in offshore and onshore sites.
- Cyber Drill: Responding to a simulated cyber-attack on an oil & gas SCADA system.

Day 5: AI-Driven Predictive Maintenance & Digital Transformation

- AI/ML algorithms for petroleum asset health monitoring.
- Digital twins for drilling rigs, refineries, and transport systems.
- Big Data analytics for predictive maintenance in petroleum operations.
- Future of AI-driven SCADA: Cloud, IoT & edge computing applications.
- Capstone Project: Designing an AI-powered predictive maintenance roadmap for a petroleum facility.

Course Agenda:

(1st Day) Agenda

9.00	11.30	Discuss Major Points Of Course: • Advanced Instrumentation in Petroleum Operations. • Reliability-Centered Instrumentation Maintenance. • SCADA Architectures for Petroleum Facilities. • Cybersecurity & Operational Resilience. • AI-Driven Predictive Maintenance & Digital Transformation.
11.30	12.00	Coffee Break
12.00	14.00	Advanced Instrumentation in Petroleum Operations: • Evolution of instrumentation systems in oil & gas. • Intelligent sensors & smart transmitters for petroleum facilities. • Advanced field communication protocols (HART-IP, Foundation Fieldbus, OPC-UA). • Wireless instrumentation for remote petroleum sites. • Hands-on Workshop: Configuring smart petroleum instruments for real-time data.
14.00	14.30	Questions and Discussion
14.30		Buffet Lunch

(2nd Day) Agenda

9.00	11.30	Reliability-Centered Instrumentation Maintenance: • Maintenance optimization in petroleum asset-intensive environments. • FMEA & RCFA for critical petroleum instrumentation failures. • AI-enabled condition monitoring of pumps, compressors, and valves.
11.30	12.00	Coffee Break
12.00	14.00	Reliability-Centered Instrumentation Maintenance: • Instrument lifecycle management in upstream, midstream, and downstream operations. • Case Study: Instrumentation failure in a refinery – diagnosis & resolution.
14.00	14.30	Questions and Discussion
14.30		Buffet Lunch

(3rd Day) Agenda

9.00	11.30	SCADA Architectures for Petroleum Facilities: • High-availability SCADA in exploration, drilling, refining, and pipelines. • SCADA network architecture: RTUs, PLCs, data historians. • Redundancy, virtualization, and cloud/edge integration.
11.30	12.00	Coffee Break
12.00	14.00	SCADA Architectures for Petroleum Facilities: • Alarm management optimization in petroleum SCADA. • Diagnostic Workshop: Troubleshooting complex SCADA failure in a refinery network.
14.00	14.30	Questions and Discussion
14.30		Buffet Lunch

(4th Day) Agenda

9.00	11.30	Cybersecurity & Operational Resilience: • Cyber threat landscape in petroleum ICS/SCADA systems. • Defending against ransomware, malware & insider threats. • IEC 62443/NIST standards compliance for petroleum sector.
11.30	12.00	Coffee Break
12.00	14.00	Cybersecurity & Operational Resilience: • Secure remote monitoring in offshore and onshore sites. • Cyber Drill: Responding to a simulated cyber-attack on an oil & gas SCADA system.
14.00	14.30	Questions and Discussion
14.30		Buffet Lunch

(5th Day) Agenda

9.00	11.30	AI-Driven Predictive Maintenance & Digital Transformation: • AI/ML algorithms for petroleum asset health monitoring. • Digital twins for drilling rigs, refineries, and transport systems. • Big Data analytics for predictive maintenance in petroleum operations.
11.30	12.00	Coffee Break
12.00	14.00	AI-Driven Predictive Maintenance & Digital Transformation: • Future of AI-driven SCADA: Cloud, IoT & edge computing applications. • Capstone Project: Designing an AI-powered predictive maintenance roadmap for a petroleum facility.
14.00	14.30	Questions, Discussion & Conclusion Training Course.
14.30		Buffet Lunch