



Instrumentation & Controls

SCADA Programming, Maintenance & Troubleshooting

Course Introduction

This course is designed to provide a thorough understanding of the fundamental concepts and the practical issues of SCADA systems. Particular emphasis has been placed on the practical aspects of SCADA systems with a view to the future. Formulae and details that can be found in specialized manufacturer manuals, have been purposely committed in favour of concepts and definitions. It provides an introduction to the fundamental principles and terminology used in the field of SCADA. It is a summary of the main subjects to be covered throughout the course. SCADA (supervisory control and data acquisition) has been around as long as there have been control systems.

Network Security

The first 'SCADA' systems utilized data acquisition by means of panels of meters, lights and strip chart recorders. The operator manually operating various control knobs exercised supervisory control. These devices were and still are used to do supervisory control and data acquisition on plants, factories and power generating facilities. The second part of this course covers the application of SCADA systems for the monitoring and control of manufacturing facilities within a single site. It also covers the additional elements that are common to all SCADA systems. These include Alarm Management, Human Management Interface (HMI), Network Security, SCADA Historians, Troubleshooting, Maintenance and Specification issues.

Target Audience

- Control & Instrumentation Engineer
- Controls Technologist
- Instrumentation Technician / Systems Control Tech
- Senior Control & Instrumentation Engineer
- Maintaining Equipment Engineer
- Facilities I&E / Controls Engineer
- Offshore Instrumentation Engineer

Learning Objectives

- Develop their existing understanding of SCADA system. Recognize the different components of a SCADA system
- Appreciate the basic principles of data communications
- Evaluate requirements for PLC-to-SCADA Communications and understand the importance of the ISO OSI Model
- Appreciate the use of wireless communications in the Industrial environment and recognize the various wireless communication standards.
- Apply radio telecommunications in a practical manner and make use of troubleshooting techniques
- Apply Modbus in a practical manner and make use of troubleshooting techniques
- Understand the construction, the arc extinguishing principles of Surface Production Facilities Operations
- Acquire the skills and practical knowledge to identify the requirements for SCADA system.
- Develop their existing understanding of Surface Equipment Facilities Troubleshooting

Course Outline

- **01 Day One**

- Module (01) Networking and Data Communication**

- 1.1 Network Communication
 - 1.2 Network Structure
 - 1.3 Point-to-point Communication
 - 1.4 Broadcast 'Multiple Drop' Communication
 - 1.5 ISO OSI (Open System interconnection) Reference
 - 1.6 Local Area Network (LAN)
 - 1.7 LAN Characteristics & Topologies
 - 1.8 LAN's Components
 - 1.9 Transmission Media
 - 1.9.1 Twisted Pair
 - 1.9.2 Coaxial Cable

- 1.9.3 Optical Fiber Cable

Module (02) Medium Access Control Techniques

- 2.1 CSMA (Carrier Sense Multiple Access)
- 2.2 CSMA with Collision Detection (CSMA/CD)
- 2.3 Token Bus
- 2.4 Token Ring

• 02 Day Two

Module (03) Wide Area SCADA Systems

- 3.1 Hardware Alternatives (RTU/PLC)
- 3.2 Communication Concentrators
- 3.3 Communication Alternatives
- 3.4 Communication Architectures
- 3.5 Communication Philosophies

Module (04) SCADA System Hardware/Software

- 4.1 Hardware Components
- 4.2 Operation and Selection Issues
- 4.3 SCADA Software Functions
- 4.4 Response Times
- 4.5 Redundancy Issues
- 4.6 Specification and Configurations Issues

Module (05) Communication Protocols

- 5.1 RS-232/RS-485 interface Standards
- 5.2 MODBUS Protocol
- 5.3 DNP 3.0 Protocol

• 03 Day Three

Module (06) Communication for SCADA Systems

- 6.1 Serial Communication
 - 6.1.1 Alternatives
 - 6.1.2 Dimensioning Issues
 - 6.1.3 Configuration
- 6.2 LAN/WAN Communication
 - 6.2.1 Alternatives
 - 6.2.2 Dimensioning Issues
 - 6.2.3 Configuration

Module (07) Process Plant SCADA Systems

- 7.1 Hardware Alternatives (DCS/PLC/Fieldbus)
- 7.2 Communication Alternatives
- 7.3 Fieldbus / Profibus
- 7.4 Foundation Fieldbus
- 7.5 Adjusting Pressure

• 04 Day Four

Module (08) SCADA Configuration

- 8.1 TCP/IP
- 8.2 Modbus TCP
- 8.3 Open process Control (OPC)
- 8.4 SCADA Installation & Commissioning

Module (09) SCADA Network

- 9.1 Alarm Layout and Organization
- 9.2 Alarm Priorities
- 9.3 Alarm processing and Reporting
- 9.4 Human Management Interface (HMI)
- 9.5 SCADA Network Security
- 9.6 SCADA Historian
- 9.7 Archiving Plant Data

• 05 Day Five

Module (10) SCADA Maintenance & Troubleshooting

- 10.1 Maintenance Activities
- 10.2 Problem Isolation
- 10.3 Testing Methodology
- 10.4 Noise Issues
- 10.5 Communication Testing

Confirmed Sessions

FROM	TO	DURATION	FEES	LOCATION
June 30, 2025	July 4, 2025	5 days	5950.00 \$	USA - Los Angeles
Sept. 15, 2025	Sept. 19, 2025	5 days	4250.00 \$	UAE - Dubai
Dec. 29, 2025	Jan. 2, 2026	5 days	4250.00 \$	UAE - Dubai
Feb. 9, 2025	Feb. 13, 2025	5 days	4250.00 \$	KSA - Jeddah