

WAGO PLC Programming – Advanced

Course Duration

40 Hours

Course Description

This advanced course focuses on professional-level PLC application development using WAGO controllers and the CODESYS ecosystem. Participants will learn advanced Structured Text programming, object-oriented programming (OOP), industrial networking, OPC UA, MQTT, advanced visualization, data logging, diagnostics, cybersecurity, and Industry 4.0 integration concepts.

The course emphasizes scalable and maintainable software architecture, industrial communication standards, and real-world project implementation practices used in modern manufacturing and process automation environments.

Target Audience

- PLC Programmers
- Automation Engineers
- Control System Engineers
- System Integrators
- Commissioning Engineers
- Industrial IoT Engineers

Pre-Requisites

Mandatory

- Completion of WAGO PLC Programming Essentials or equivalent
- Practical experience with PLC programming
- Knowledge of IEC 61131-3 fundamentals

Learning Outcomes

By the end of this course, participants will be able to:

- Develop advanced Structured Text applications
- Implement object-oriented PLC architectures
- Create reusable libraries and function blocks
- Configure OPC UA and MQTT communications

- Develop advanced visualizations
 - Implement data logging and reporting
 - Optimize PLC performance
 - Apply cybersecurity best practices
 - Integrate PLCs with Industry 4.0 platforms
 - Execute enterprise-level automation projects
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Course Contents

Module 1 – Advanced Structured Text Programming

Topics

- Advanced ST Syntax
 - Arrays
 - Structures
 - Enumerations
 - Loops
 - String Manipulation
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Module 2 – Advanced Program Architecture

Topics

- Modular Design
 - Reusable Components
 - User Defined Data Types
 - Libraries
 - Programming Standards
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Module 3 – Object-Oriented Programming

Topics

- Classes
- Objects
- Methods

- Properties
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Module 4 – Advanced Industrial Communication

Topics

- Modbus TCP Master
 - Modbus TCP Slave
 - OPC UA
 - MQTT
 - Ethernet/IP Concepts
 - Industrial Networking Best Practices
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Module 5 – Advanced Visualization Development

Topics

- Multi-Screen Design
 - User Management
 - Alarm Management
 - Trends
 - Recipes
 - Responsive Visualization
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Module 6 – Data Logging & File Handling

Topics

- CSV File Generation
 - File Read/Write Operations
 - Historical Data Storage
 - Report Generation
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Module 7 – Diagnostics & Performance Optimization

Topics

- System Diagnostics
 - Network Diagnostics
 - Memory Monitoring
 - Performance Tuning
 - Error Handling
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Module 8 – Cybersecurity for Industrial Automation

Topics

- PLC Security Fundamentals
 - User Authentication
 - Secure Communications
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Module 9 – Industry 4.0 Integration

Topics

- Industrial IoT Concepts
 - Cloud Connectivity
 - Edge Computing
 - Node-RED Integration
 - Dashboard Development
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Module 10 – Capstone Project & Assessment (4 Hours)

Project Options

- Smart Energy Monitoring System
- Water Treatment Plant Automation
- Industrial IIoT Monitoring System
- Material Handling Automation System