

CONTROL SYSTEMS DESIGN FOR ELECTRICAL/POWER UTILITIES

"Designing robust and efficient control systems for modern electrical and power utility operations."

Schedule

Date	Venue	Fees
11 - 15 Oct 2026	Riyadh, KSA	USD 3495 per delegate

► Available delivery methods: Face-to-Face & Online Training

Introduction

Control systems are the backbone of electrical and power utility operations, ensuring the safe, reliable, and efficient delivery of electricity. A well-designed control system enables utilities to monitor performance, optimize energy distribution, prevent faults, and respond effectively to system disturbances. As the complexity of electrical networks increases, engineers must have the knowledge and skills to design, implement, and manage advanced control systems.

This 5-day intensive training provides participants with a comprehensive understanding of control system design principles, components, and applications in electrical and power utilities. Through a combination of theoretical insights, case studies, and practical exercises, participants will gain hands-on experience in designing control systems that enhance reliability, efficiency, and operational performance.

Objectives

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

- Understand the principles of electrical and power utility control systems.
- Design and implement control strategies for stable and efficient operations.
- Analyze system performance and optimize control loops.
- Integrate monitoring, protection, and automation into utility systems.
- Apply best practices to ensure reliability, safety, and compliance.

Why Attend

- Gain in-depth knowledge of control system design for utilities.
- Learn to enhance system stability, efficiency, and safety.
- Apply practical techniques for monitoring, protection, and automation.
- Reduce operational risks and system downtime.
- Build professional competence in modern electrical and power utility operations.

Target Audience

This program is designed for:

- Electrical engineers and control system engineers.
- Power system operators and maintenance personnel.
- Automation and instrumentation engineers in utilities.
- Supervisors and technical managers in electrical and power sectors.
- Professionals responsible for design, operation, and optimization of control systems.

Individual Benefits

Key competencies that will be developed include:

- Ability to design and analyze electrical control systems.
- Understanding of instrumentation and automation in utilities.
- Skills to optimize control loops and system performance.
- Enhanced problem-solving and troubleshooting capabilities.
- Increased confidence in applying best practices for utility control systems.

Organizational Benefits

Upon completing the training course, participants will demonstrate:

- Improved reliability and efficiency of electrical and power utility operations.
- Reduced system downtime and operational disruptions.
- Optimized integration of monitoring, protection, and automation systems.
- Enhanced technical capability of engineering teams.
- Stronger compliance with safety and industry standards.

Instructional Methodology

The course follows a blended learning approach combining theory with practice:

- Strategy Briefings - Principles of control systems, electrical networks, and automation.
- Case Studies - Real-world examples of control system design and operational challenges.
- Workshops - Hands-on exercises in control loop design, monitoring, and troubleshooting.
- Peer Exchange - Group discussions on challenges, best practices, and lessons learned.
- Tools - Design templates, calculation guides, and monitoring checklists.

MAWA EVENTS

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Course Outline

Detailed 5-Day Course Outline

Training Hours: 7:30 AM – 3:30 PM Daily Format: 3–4 Learning Modules | Coffee breaks: 09:30 & 11:15 | Lunch Buffet: 01:00 – 02:00

Day 1: Fundamentals of Control Systems in Power Utilities

Module 1: Introduction to Control Systems (07:30 – 09:30)

- Overview of electrical and power utility control systems
- Key components and architecture
- Importance of control systems in operational reliability

Module 2: Control System Principles (09:45 – 11:15)

- Feedback, feedforward, and control loops
- Stability, accuracy, and response dynamics
- Practical examples from utility operations

Module 3: Instrumentation and Measurement (01:00 – 02:30)

- Sensors, transducers, and measurement techniques
- Data acquisition and monitoring
- Integration with control loops

Module 4: Case Study and Discussion (02:45 – 03:30)

- Practical examples of control system design and performance analysis

Day 2: Control System Design and Implementation

Module 5: Designing Control Loops (07:30 – 09:30)

- PID controllers and tuning techniques
- Designing for stability and optimal performance

Module 6: Digital Control and SCADA Systems (09:45 – 11:15)

- Supervisory Control and Data Acquisition (SCADA) principles
- Integration of digital control in utility operations

Module 7: Simulation and Modeling (01:00 – 02:30)

- Modeling techniques for control systems
- Using simulation for performance validation

Module 8: Workshop – Control Loop Design (02:45 – 03:30)

- Hands-on exercises in designing and tuning loops

Day 3: Automation, Protection, and Safety

Module 9: Automation in Utilities (07:30 – 09:30)

- Automation strategies and implementation
- PLCs, RTUs, and intelligent devices

Module 10: Protection Systems (09:45 – 11:15)

- Protective relays and safety devices
- Fault detection and response mechanisms

Module 11: Safety and Compliance (01:00 – 02:30)

- Regulatory and industry standards
- Risk assessment and mitigation strategies

Module 12: Case Studies (02:45 – 03:30)

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Analysis of real-world automation and protection scenarios

Day 4: Optimization and Troubleshooting

Module 13: Performance Monitoring (07:30 – 09:30)

- KPIs and operational dashboards
- Monitoring techniques for control systems

Module 14: Troubleshooting Techniques (09:45 – 11:15)

- Identifying and resolving operational issues
- Preventive and corrective maintenance strategies

Module 15: Optimization Strategies (01:00 – 02:30)

- Enhancing system efficiency and reliability
- Case examples of optimization

Module 16: Workshop – Troubleshooting and Optimization (02:45 – 03:30)

- Hands-on problem-solving exercises

Day 5: Advanced Applications and Review

Module 17: Advanced Control Strategies (07:30 – 09:30)

- Model predictive control and adaptive systems
- Integration with smart grid technologies

Module 18: Case Studies and Best Practices (09:45 – 11:15)

- Lessons learned from utility projects
- Industry standards and guidelines

Module 19: Action Planning and Q&A (01:00 – 02:30)

- Developing actionable strategies for control system implementation
- Group discussion and knowledge sharing

Module 20: Course Review and Closing (02:45 – 03:30)

- Recap of key concepts
- Final Q&A and feedback

Certification

Participants will receive a Certificate of Completion in Control Systems Design for Electrical/Power Utilities, validating their expertise in control system design, automation, optimization, and safety practices in utility operations.

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Interested in running this course for your team?

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