MERCURY

Mastering Power System Protection & Reliability Training Course

26 April – 7 May 2027
Barcelona (Spain)



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Mastering Power System Protection & Reliability Training Course

Ref: 2_327626 **Date:** 26 April – 7 May 2027 **Location:** Barcelona (Spain) **Fees:** 11100 Euro

Introduction:

This course delivers a complete understanding of Digital Power System Relaying and Protection Applications principles, explicitly tailored for power system electrical engineering professionals. The curriculum includes sections that delve into power system projects for electrical engineering, electrical power systems engineering, and reliability-centered maintenance training courses. It equips participants with a robust understanding of the reliability and availability of electrical power systems networks.

It introduces proactive modules essential for power system protection, ensuring safe and efficient operation. It suits professionals aiming to master electrical engineering power systems or those considering a master's degree in electrical engineering power systems. It is a comprehensive power systems certification course focusing on critical electrical engineering power systems components, including a maintenance reliability training course.

Power System Projects for Electrical Engineering:

Within the realm of electrical engineering, power system projects form a cornerstone of the industry's practical applications.

This course facilitates a deep dive into the intricacies of designing, implementing, and managing such projects, providing a solid foundation for professionals to enhance their competence in this domain.

Targeted Groups:

- Electrical Power System Engineers
- Electrical Technicians
- Professionals working in substations, power systems, and electrical companies involved in generation, transmission, and distribution
- Managers keen on understanding the impact of power factor correction on operational costs
- Recent graduates or individuals new to the electrical engineering industry
- Professionals seeking further education in protection relay training courses, power systems certification courses, and electrical system training

Course Objectives:

Upon completing this course, participants will gain the ability to:

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- Comprehend power protection devices and their applications.
- Understand the various fault systems and types that may impact electrical power systems.
- Gain insights into control system reliability and Partial Discharge PD analysis.
- Acquire knowledge about different load types and their impact on network availability.
- Master the fundamentals of Power System Protection, including in-depth power system protection course content.

Targeted Competencies:

- Identification of all protection devices required for safeguarding power systems
- Familiarity with all relevant standards regarding protection devices and their settings
- Proficiency in conducting function tests for protection devices and PD analysis
- A comprehensive understanding of fault types and methodologies for fault studies
- Ability to configure protection relays according to the American National Standards Institute ANSI codes

Course Content:

Unit 1- Voltage Sags and Interruptions:

- Defining power quality and its fundamental components
- Quantitative methods for assessing power quality
- The ITI CBEMA curve and its relevance
- Identifying causes of voltage sags and interruptions
- Strategies for mitigation

Unit 2- Transient Voltage Excursions:

- Motor starting, switching, and traveling wave phenomena
- The impact of capacitor switching
- Lightning, shielding, and grounding best practices
- Ferroresonance effects and mitigation

Unit 3- Reliability Indices, Effects of Fault Clearing on Power Quality:

- IEEE-defined reliability indices
- Interpreting reliability indices
- Strategies for fault clearing and reclosing
- Concepts of fuse saving and blowing philosophy

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Unit 4- Insulation Coordination, Arresters, and Steady-State Voltage Regulation:

- Basics of impulse level, insulation systems, and testing methodologies
- Selection and application of arresters
- Load tap changers and voltage regulators.
- Effects of steady-state voltage on electrical system operation

Unit 5- Harmonics:

- Fundamentals, causes, and impacts of harmonics
- Understanding AC power and power factor
- Techniques for mitigating harmonic effects
- Use of K-factor transformers and harmonic filters

Unit 6- Symmetrical Components and Sequence Networks:

- Introduction to power system protection
- Phasor math and per-unit calculations
- Symmetrical components and sequence network theory
- Fault modeling methodologies

Unit 7- Electromechanical and Digital Relays, Relay Schemes for Radial Systems, Time-Coordinated Overcurrent Protection:

- Principles of electromechanical relay operation
- Implementation of microprocessor-based relays
- Instantaneous and time overcurrent relay mechanisms
- The role of reclosers and sectionalizes
- Time-current curves and device coordination strategies

Unit 8- Relay Schemes for Networked Systems and Device Protection:

- Understanding distance and differential relays
- Application of differential relays for bus, generator, and transformer protection

Unit 9- Effect of Protection on Reliability:

- Reliability indices, fault clearing time, and reclosing strategies
- Impacts of nearby faults on system reliability
- Fuse saving and blowing strategy.
- Implementation of intelligent, protective devices

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Unit 10- Arc Flash Hazard and a Look to the Future:

- Differentiating between shock hazards and burn/blast hazards
- Compliance with IEEE 1584 and NFPA 70E standards
- Personal protective equipment and hazard labeling
- Future trends: Communication-based overcurrent protection
- A look to the future: intelligent sectionalizing