Advanced Power System Operations Training Course

Professional Development Training Course Outline

Category	Renewable Energy	**Duration**	10 Days
Base Fee	$3,000 USD	**Delivery Mode**	Online / On-site Hybrid

Course Introduction

Advanced Power System Operations Training Course is designed to equip professionals with advanced knowledge of modern power system management, smart grid operations, renewable energy integration, grid resilience, and real-time system control. With the rapid transformation of global energy networks, power utilities are adopting digital grid technologies, AI-driven operational strategies, advanced SCADA systems, energy management systems (EMS), and automated control solutions to ensure reliable, secure, and efficient electricity delivery. This course provides practical insights into power system stability, transmission and distribution operations, load forecasting, grid optimization, and emerging energy transition challenges.

The program focuses on developing expertise in advanced grid operations, power system protection coordination, renewable power integration, demand-side management, operational analytics, and intelligent energy systems. Participants will explore industry best practices, international grid standards, and real-world operational challenges through case studies, simulations, technical exercises, and practical applications. The course enables professionals to enhance grid reliability, operational efficiency, cybersecurity awareness, and sustainable power system performance in today’s evolving energy landscape.

Programme Curriculum

Advanced Power System Operations Training Course

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Course Duration

10 days

Course Objectives

By the end of this Advanced Power System Operations Training Course, participants will be able to:

1. Understand advanced concepts of modern power system operations and grid management.
2. Develop skills in real-time power system monitoring and control strategies.
3. Apply advanced techniques for power system stability assessment and optimization.
4. Improve operational decision-making using SCADA, EMS, and digital grid technologies.
5. Analyze challenges related to renewable energy integration and grid flexibility.
6. Implement advanced approaches for load forecasting and demand response management.
7. Enhance knowledge of transmission and distribution system operations.
8. Apply best practices in power system reliability and resilience improvement.
9. Understand advanced frequency control, voltage regulation, and reactive power management.
10. Utilize modern tools for grid analytics, automation, and predictive operations.
11. Strengthen knowledge of power system cybersecurity and operational risk management.
12. Develop strategies for smart grid transformation and energy transition initiatives.
13. Improve technical leadership skills for future-ready power system operations.

Target Audience

1. Power System Engineers
2. Grid Operations Engineers
3. Transmission System Operators
4. Distribution Network Engineers
5. Control Room Operators
6. Utility Managers and Supervisors
7. Renewable Energy Integration Specialists
8. Electrical Engineering Consultants

Course Modules

Module 1: Fundamentals of Advanced Power System Operations

- Overview of modern power system operational frameworks
- Evolution from conventional grids to smart grids
- Power system operational challenges and opportunities
- Grid reliability, resilience, and flexibility concepts

- International operational standards and practices
- **Case Study:** Analysis of how European transmission operators improved grid reliability through advanced operational planning.

Module 2: Power System Control Center Operations

- Control center architecture and operational responsibilities
- Real-time monitoring and decision-making processes
- Operator interfaces and advanced visualization systems
- Emergency response and contingency management
- Integration of automated control technologies
- **Case Study:** Control center modernization project implemented by a national utility.

Module 3: SCADA and Energy Management Systems (EMS)

- SCADA system architecture and applications
- EMS functionalities in modern grids
- Data acquisition and operational analytics
- Automated generation control integration
- Digital transformation of control rooms
- **Case Study:** Implementation of EMS-based optimization in a large transmission network.

Module 4: Power System Stability Analysis

- Voltage, frequency, and transient stability concepts
- Stability monitoring techniques
- Dynamic simulation applications
- Stability improvement strategies
- Real-time stability assessment tools
- **Case Study:** Preventing large-scale blackouts through advanced stability monitoring.

Module 5: Advanced Load Forecasting and Demand Management

- Short-term and long-term load forecasting
- Artificial intelligence in demand prediction
- Demand response programs
- Peak load management strategies
- Consumer-side energy optimization
- **Case Study:** AI-based load forecasting application for utility demand optimization.

Module 6: Renewable Energy Integration Operations

- Operational challenges of renewable generation
- Solar and wind power variability management
- Grid balancing techniques
- Renewable forecasting methods
- Energy storage integration strategies
- **Case Study:** Managing high renewable penetration in a national power grid.

Module 7: Smart Grid Technologies and Digitalization

- Smart grid architecture and applications

- Internet of Things (IoT) in power systems
- Advanced metering infrastructure (AMI)
- Digital substations
- Data-driven grid optimization
- **Case Study:** Smart grid deployment improving distribution reliability.

Module 8: Transmission System Operations

- Transmission network operational planning
- Power flow management
- Congestion management techniques
- Interconnected grid operations
- Cross-border electricity exchange
- **Case Study:** Regional transmission coordination for improved grid stability.

Module 9: Distribution System Operations

- Modern distribution network management
- Distribution automation systems
- Distributed energy resources (DER) management
- Microgrid operations
- Distribution reliability improvement
- **Case Study:** Utility deployment of automated distribution networks.

Module 10: Frequency and Voltage Control

- Frequency regulation methods
- Automatic generation control (AGC)
- Voltage optimization techniques
- Reactive power management
- Grid balancing mechanisms
- **Case Study:** Frequency stabilization strategies after renewable integration.

Module 11: Power System Protection Coordination

- Advanced protection philosophies
- Relay coordination principles
- Digital protection systems
- Fault analysis and response
- Adaptive protection strategies
- **Case Study:** Modern protection upgrade preventing cascading failures.

Module 12: Grid Resilience and Emergency Operations

- Emergency operating procedures
- Black start planning
- Disaster recovery strategies
- Grid restoration techniques
- Resilient infrastructure planning
- **Case Study:** Successful grid restoration following a major power outage.

Module 13: Artificial Intelligence and Predictive Grid Operations

- AI applications in power system operations
- Machine learning for fault prediction
- Predictive maintenance strategies
- Intelligent operational decision support
- Big data analytics for utilities
- **Case Study:** AI-based predictive maintenance reducing equipment failures.

Module 14: Power System Cybersecurity and Risk Management

- Cyber threats in modern power grids
- Critical infrastructure protection
- Secure communication networks
- Operational technology (OT) security
- Cyber risk mitigation strategies
- **Case Study:** Cybersecurity enhancement program for a smart grid operator.

Module 15: Future Power Systems and Energy Transition

- Future trends in electricity networks
- Carbon-neutral grid development
- Energy storage technologies
- Hydrogen and emerging energy systems
- Preparing operators for next-generation grids
- **Case Study:** Energy transition roadmap of a leading global utility.

Training Methodology

- Interactive lectures and presentations.
- Group discussions and brainstorming sessions.
- Hands-on exercises using real-world datasets.
- Role-playing and scenario-based simulations.
- Analysis of case studies to bridge theory and practice.
- Peer-to-peer learning and networking.
- Expert-led Q&A sessions.
- Continuous feedback and personalized guidance.

Register as a group from 3 participants for a Discount

Send us an email: info@fineskilltrainingcenter.org or call *+254769199797*

Certification

Upon successful completion of this training, participants will be issued with a globally- recognized certificate.

Tailor-Made Course

We also offer tailor-made courses based on your needs.

Key Notes

a. The participant must be conversant with English.

b. Upon completion of training the participant will be issued with an Authorized Training Certificate

c. Course duration is flexible and the contents can be modified to fit any number of days.

d. The course fee includes facilitation training materials, 2 coffee breaks, buffet lunch and A Certificate upon successful completion of Training.

e. One-year post-training support Consultation and Coaching provided after the course.

f. Payment should be done at least a week before commence of the training, to Fineskill Training Center account, as indicated in the invoice so as to enable us prepare better for you.

Upcoming Scheduled Sessions

Start Date	End Date	Location	Price
23 Nov 2026	04 Dec 2026	Online	$2,000
23 Nov 2026	04 Dec 2026	Physical	$3,000
23 Nov 2026	04 Dec 2026	Physical	$6,000
23 Nov 2026	04 Dec 2026	Physical	$6,000
23 Nov 2026	04 Dec 2026	Physical	$12,000
23 Nov 2026	04 Dec 2026	Physical	$9,000
23 Nov 2026	04 Dec 2026	Physical	$12,000
23 Nov 2026	04 Dec 2026	Physical	$12,000

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