Solar SCADA Systems and Monitoring 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

Solar SCADA Systems and Monitoring Training Course is designed to develop advanced skills in solar power plant monitoring, SCADA architecture, remote asset management, and renewable energy automation technologies. With the rapid growth of utility-scale solar PV plants, smart grids, energy analytics, and digital renewable energy solutions, professionals need expertise in Solar SCADA design, real-time data acquisition, performance monitoring, fault diagnostics, and operational optimization. This course provides practical knowledge of SCADA systems integration, PLC communication, IoT-based solar monitoring, data visualization platforms, and intelligent energy management systems used in modern solar installations.

The training equips engineers, technicians, operators, and renewable energy professionals with hands-on capabilities in solar plant control systems, SCADA communication protocols, inverter monitoring, weather station integration, alarm management, cybersecurity, and predictive maintenance strategies. Participants will explore real-world applications through solar SCADA case studies, PV plant performance analysis, monitoring dashboards, and troubleshooting scenarios, enabling them to improve solar asset reliability, energy yield optimization, and operational efficiency in the evolving clean energy industry.

Programme Curriculum

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Course Objectives

By completing this Solar SCADA Systems and Monitoring Training Course, participants will be able to:

1. Understand solar SCADA architecture and renewable energy automation frameworks.
2. Learn advanced solar PV plant monitoring and control system technologies.
3. Develop skills in SCADA hardware, software, and communication integration.
4. Configure and analyze real-time solar power plant data acquisition systems.
5. Understand PLC, RTU, HMI, and industrial automation technologies.
6. Implement solar inverter monitoring and performance tracking solutions.
7. Apply IoT-enabled solar monitoring and smart energy management techniques.
8. Analyze solar plant alarms, faults, and operational events.
9. Learn SCADA communication protocols including Modbus, IEC, and OPC technologies.
10. Perform solar performance analytics and energy yield optimization.
11. Understand remote monitoring platforms and cloud-based SCADA solutions.
12. Apply cybersecurity practices for renewable energy control systems.
13. Develop expertise in digital transformation, predictive maintenance, and smart solar operations.

Target Audience

1. Solar PV Engineers
2. SCADA Engineers
3. Renewable Energy Professionals
4. Electrical Engineers
5. Automation and Control Engineers
6. Solar Plant Operators
7. Maintenance Engineers
8. Energy Management Professionals

Course Modules

Module 1: Introduction to Solar SCADA Systems

- Fundamentals of **solar PV plant automation and monitoring**
- Role of SCADA in renewable energy operations
- Solar SCADA architecture overview
- Components of centralized monitoring systems

- Industry trends in smart solar power management
- **Case Study:** Utility-scale solar farm implementing SCADA monitoring to improve plant availability and operational visibility.

Module 2: Solar PV Plant Architecture and Data Flow

- Solar power plant electrical configuration
- Data flow from field devices to control centers
- PV modules, inverters, transformers, and grid interfaces
- Monitoring hierarchy in solar installations
- SCADA integration with solar assets
- **Case Study:** Large PV project analyzing communication flow between inverter stations and control rooms.

Module 3: SCADA Hardware Components

- PLC and RTU applications in solar plants
- Sensors and measurement devices
- Data acquisition systems
- Industrial communication hardware
- Control panels and field instrumentation
- **Case Study:** Implementation of RTU-based monitoring for a remote solar farm.

Module 4: SCADA Software Platforms

- SCADA software architecture
- HMI design principles
- Dashboard development
- Alarm and event management
- Database integration
- **Case Study:** Solar operator using advanced dashboards for real-time energy monitoring.

Module 5: Solar Inverter Monitoring Systems

- Inverter communication fundamentals
- Monitoring inverter parameters
- Performance ratio analysis
- Fault identification techniques
- Inverter data optimization
- **Case Study:** Diagnosing inverter losses through SCADA trend analysis.

Module 6: Communication Protocols for Solar SCADA

- Modbus RTU and TCP/IP
- IEC communication standards
- OPC UA integration
- Ethernet-based industrial networks
- Wireless monitoring technologies
- **Case Study:** Integration of multiple inverter brands using standardized communication protocols.

Module 7: Solar Plant Data Acquisition Systems

- Real-time data collection methods
- Sensor integration
- Weather station monitoring
- Data logging techniques
- Remote data transmission
- **Case Study:** Solar radiation monitoring system improving forecasting accuracy.

Module 8: SCADA Monitoring Dashboards and Visualization

- Creating operator-friendly dashboards
- KPI monitoring
- Energy production visualization
- Performance reporting
- Mobile-based monitoring solutions
- **Case Study:** Development of a centralized dashboard for multi-site solar portfolio management.

Module 9: Solar Alarm Management and Troubleshooting

- Alarm classification techniques
- Fault analysis methods
- Root cause identification
- Maintenance alerts
- SCADA event investigation
- **Case Study:** Reducing downtime through automated solar fault notification systems.

Module 10: Solar Performance Analytics

- Energy yield analysis
- Performance ratio calculation
- Loss analysis
- Efficiency improvement methods
- Data-driven decision-making
- **Case Study:** Using SCADA analytics to improve annual solar energy generation.

Module 11: IoT and Cloud-Based Solar Monitoring

- IoT architecture for solar plants
- Cloud SCADA platforms
- Remote asset monitoring
- Smart sensors
- Digital energy management
- **Case Study:** Cloud-based monitoring system for distributed rooftop solar installations.

Module 12: Cybersecurity in Solar SCADA Systems

- SCADA security fundamentals
- Industrial network protection
- Access control management
- Cyber threat prevention
- Secure remote access practices
- **Case Study:** Protecting renewable energy infrastructure from cyber risks.

Module 13: Predictive Maintenance Using SCADA Data

- Condition monitoring techniques
- Predictive analytics
- Machine learning applications
- Failure prediction methods
- Maintenance optimization
- **Case Study:** Using historical SCADA data to predict inverter failures.

Module 14: Advanced Solar SCADA Integration

- Integration with EMS and grid systems
- Smart grid communication
- Energy storage monitoring
- Hybrid renewable systems
- Advanced automation strategies
- **Case Study:** SCADA integration in solar-plus-battery energy storage projects.

Module 15: Future Trends in Solar Monitoring Technologies

- Artificial Intelligence in solar operations
- Digital twin technology
- Smart renewable energy platforms
- Autonomous solar plant management
- Future SCADA innovations
- **Case Study:** AI-based monitoring platform improving renewable energy reliability.

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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