Smart Grid Integration for Buildings Training Course

Professional Development Training Course Outline

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

Course Introduction

Smart Grid Integration for Buildings Training Course is designed to equip professionals with advanced knowledge in intelligent energy systems, smart building automation, renewable energy integration, and digital grid technologies. As global energy systems rapidly evolve toward decarbonization, electrification, and AI-driven energy optimization, buildings are becoming active participants in the energy ecosystem rather than passive consumers. This course provides deep insight into how IoT-enabled infrastructure, smart meters, energy management systems (EMS), and demand response technologies are transforming modern buildings into efficient, grid-responsive assets.

With increasing emphasis on energy efficiency, sustainability, net-zero buildings, and smart city development, this training bridges the gap between traditional building systems and next-generation smart grids. Participants will learn how to design, analyze, and optimize building-grid interaction systems, enabling real-time energy monitoring, predictive load management, and integration of solar PV, battery storage, EV charging infrastructure, and AI-based energy analytics. The course is ideal for professionals aiming to lead in the fields of green energy engineering, smart infrastructure, and digital energy transformation.

Programme Curriculum

Smart Grid Integration for Buildings Training Course

Introduction

Smart Grid Integration for Buildings Training Course is designed to equip professionals with advanced knowledge in intelligent energy systems, smart building automation, renewable energy integration, and digital grid technologies. As global energy systems rapidly evolve toward decarbonization, electrification, and AI-driven

energy optimization, buildings are becoming active participants in the energy ecosystem rather than passive consumers. This course provides deep insight into how IoT-enabled infrastructure, smart meters, energy management systems (EMS), and demand response technologies are transforming modern buildings into efficient, grid-responsive assets.

With increasing emphasis on energy efficiency, sustainability, net-zero buildings, and smart city development, this training bridges the gap between traditional building systems and next-generation smart grids. Participants will learn how to design, analyze, and optimize building-grid interaction systems, enabling real-time energy monitoring, predictive load management, and integration of solar PV, battery storage, EV charging infrastructure, and AI-based energy analytics. The course is ideal for professionals aiming to lead in the fields of green energy engineering, smart infrastructure, and digital energy transformation.

Course Duration

10 days

Course Objectives

1. Master Smart Grid Architecture for Buildings
2. Understand AI-driven Energy Management Systems (EMS)
3. Implement IoT-based Smart Metering Solutions
4. Analyze Building-to-Grid (B2G) Communication Systems
5. Design Net-Zero Energy Building Strategies
6. Integrate Renewable Energy Systems (Solar, Wind)
7. Optimize Demand Response & Load Balancing
8. Deploy Battery Energy Storage Systems (BESS)
9. Apply Predictive Energy Analytics using AI/ML
10. Understand Smart HVAC Optimization Systems
11. Develop Energy-efficient Building Automation Systems (BAS)
12. Implement EV Charging Infrastructure Integration
13. Ensure Cybersecurity in Smart Energy Networks

Target Audience

- Electrical & Energy Engineers
- Building Automation Engineers
- Sustainability & ESG Consultants
- Smart City Planners
- Facility Managers
- Renewable Energy Engineers
- IoT & Data Analytics Professionals
- Government Energy Policy Makers

Course Modules

Module 1: Introduction to Smart Grid Systems

- Evolution of traditional grid to smart grid
- Key components of smart energy networks
- Role of buildings in modern energy systems
- Digital transformation in energy sector

- Smart grid communication protocols
- **Case Study:** Smart grid rollout in a European smart city district

Module 2: Smart Building Fundamentals

- Building energy consumption patterns
- Automation systems in modern buildings
- Smart sensors and actuators
- Energy efficiency principles
- Integration with digital infrastructure
- **Case Study:** Smart office building in Singapore

Module 3: Energy Management Systems (EMS)

- Architecture of EMS platforms
- Real-time energy monitoring
- Data acquisition and analytics
- Load forecasting techniques
- Optimization algorithms
- **Case Study:** AI-based EMS in commercial skyscraper

Module 4: IoT in Smart Buildings

- IoT device architecture
- Sensor networks for energy tracking
- Cloud integration for data storage
- Edge computing applications
- Smart device interoperability
- **Case Study:** IoT-enabled university campus energy system

Module 5: Renewable Energy Integration

- Solar PV systems in buildings
- Wind energy hybrid systems
- Grid-tied vs off-grid systems
- Energy conversion efficiency
- Renewable forecasting models
- **Case Study:** Net-zero residential complex using solar integration

Module 6: Battery Energy Storage Systems (BESS)

- Types of energy storage technologies
- Lithium-ion battery systems
- Load shifting strategies
- Peak shaving techniques
- Storage lifecycle management
- **Case Study:** Hospital backup energy storage system

Module 7: Demand Response Systems

- Demand-side management strategies
- Dynamic pricing models

- Automated load control
- Consumer participation systems
- Grid balancing techniques
- **Case Study:** Industrial demand response program in USA

Module 8: Building Automation Systems (BAS)

- HVAC automation systems
- Lighting control systems
- Smart occupancy sensors
- Integrated control platforms
- Energy optimization logic
- **Case Study:** Smart hotel automation system in Dubai

Module 9: Smart Metering & Data Analytics

- Smart meter architecture
- Real-time energy data collection
- Big data analytics in energy systems
- Visualization dashboards
- Consumption behavior analysis
- **Case Study:** Smart metering rollout in urban residential area

Module 10: EV Charging Infrastructure

- Types of EV charging stations
- Load impact on building grids
- Charging scheduling algorithms
- Smart charging integration
- Vehicle-to-grid (V2G) systems
- **Case Study:** Commercial EV charging hub integration

Module 11: AI & Machine Learning in Smart Grids

- Predictive energy modeling
- Fault detection systems
- AI-based load forecasting
- Neural networks in energy optimization
- Autonomous energy systems
- **Case Study:** AI-controlled smart campus grid

Module 12: Cybersecurity in Smart Energy Systems

- Threats in smart grid networks
- Encryption and data protection
- Secure IoT device management
- Intrusion detection systems
- Risk mitigation strategies
- **Case Study:** Cybersecurity framework in utility smart grid

Module 13: Smart City Energy Integration

- Urban energy planning models
- Smart infrastructure coordination
- City-wide energy monitoring
- Sustainable urban development
- Digital twin applications
- **Case Study:** Smart city energy project in Europe

Module 14: Energy Efficiency & Sustainability

- Green building standards (LEED, BREEAM)
- Carbon footprint reduction strategies
- Energy auditing techniques
- Sustainable materials usage
- Net-zero building concepts
- **Case Study:** LEED Platinum certified commercial tower

Module 15: Future Trends in Smart Grids

- Blockchain in energy trading
- Peer-to-peer energy systems
- Hydrogen energy integration
- Autonomous grid systems
- Next-gen smart infrastructure
- **Case Study:** Blockchain-based energy trading pilot project

Training Methodology

This course employs a participatory and hands-on approach to ensure practical learning, including:

- 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

Ready to enroll or request a customized program? Book online or contact us:

Register Online Now

Email: info@fineskilltrainingcenter.com | Website: www.fineskilltrainingcenter.com