Advanced Energy Storage Systems Training Course

Professional Development Training Course Outline

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

Course Introduction

The global energy sector is undergoing a profound transformation driven by renewable energy integration, smart grids, decarbonization, energy transition, carbon neutrality, grid modernization, digital energy systems, and sustainable power infrastructure. Advanced Energy Storage Systems (AESS) have emerged as a critical enabler for balancing intermittent renewable generation, enhancing grid reliability, supporting electric mobility, and ensuring energy security. Modern storage technologies including Lithium-Ion Batteries, Solid-State Batteries, Flow Batteries, Hydrogen Energy Storage, Thermal Energy Storage, and Hybrid Energy Systems are revolutionizing the way electricity is generated, stored, distributed, and consumed.

Advanced Energy Storage Systems Training Course provides participants with advanced knowledge of battery technologies, energy storage economics, battery management systems (BMS), smart energy networks, grid-scale storage solutions, AI-driven energy optimization, renewable energy storage integration, digital twins, predictive analytics, and next-generation storage innovations. Through real-world case studies, practical applications, and industry best practices, participants will gain the expertise required to design, evaluate, implement, and manage advanced energy storage projects across utility, industrial, commercial, and renewable energy sectors

Programme Curriculum

Advanced Energy Storage Systems Training Course

Introduction

The global energy sector is undergoing a profound transformation driven by renewable energy integration, smart grids, decarbonization, energy transition, carbon neutrality, grid modernization, digital energy systems, and sustainable power infrastructure. Advanced Energy Storage Systems (AESS) have emerged as a critical

enabler for balancing intermittent renewable generation, enhancing grid reliability, supporting electric mobility, and ensuring energy security. Modern storage technologies including Lithium-Ion Batteries, Solid-State Batteries, Flow Batteries, Hydrogen Energy Storage, Thermal Energy Storage, and Hybrid Energy Systems are revolutionizing the way electricity is generated, stored, distributed, and consumed.

Advanced Energy Storage Systems Training Course provides participants with advanced knowledge of battery technologies, energy storage economics, battery management systems (BMS), smart energy networks, grid-scale storage solutions, AI-driven energy optimization, renewable energy storage integration, digital twins, predictive analytics, and next-generation storage innovations. Through real-world case studies, practical applications, and industry best practices, participants will gain the expertise required to design, evaluate, implement, and manage advanced energy storage projects across utility, industrial, commercial, and renewable energy sectors.

Course Duration

10 Days

Course Objectives

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

1. Understand advanced energy storage technologies and market trends.
2. Evaluate Lithium-Ion, Sodium-Ion, Flow Battery, and Solid-State Battery systems.
3. Design grid-scale energy storage solutions for renewable integration.
4. Optimize battery performance using advanced Battery Management Systems (BMS).
5. Analyze energy storage economics and investment strategies.
6. Implement AI and machine learning for storage optimization.
7. Assess energy storage safety, reliability, and risk management practices.
8. Develop hybrid renewable-storage system architectures.
9. Evaluate hydrogen energy storage technologies and applications.
10. Apply predictive maintenance and condition monitoring techniques.
11. Understand regulatory frameworks and energy market participation.
12. Perform lifecycle assessment and sustainability analysis of storage systems.
13. Develop strategic energy storage deployment roadmaps for organizations.

Target Audience

1. Electrical Engineers
2. Energy Engineers
3. Renewable Energy Specialists
4. Power System Engineers
5. Utility and Grid Operators
6. Project Managers and Consultants
7. Energy Policy and Regulatory Professionals
8. Researchers, Academics, and Technology Developers

Course Modules

Module 1: Fundamentals of Energy Storage Systems

- Global energy transition and storage requirements
- Energy storage classifications

- Grid and off-grid applications
- Storage performance metrics
- Future technology outlook
- **Case Study:** Utility-scale storage deployment supporting renewable energy integration.

Module 2: Battery Technologies and Chemistry

- Lithium-Ion battery technologies
- Sodium-Ion battery developments
- Lead-acid and Nickel-based systems
- Battery electrochemistry fundamentals
- Emerging battery materials
- **Case Study:** Comparative performance analysis of battery chemistries.

Module 3: Advanced Battery Management Systems (BMS)

- BMS architecture
- State-of-charge estimation
- State-of-health monitoring
- Thermal management integration
- Fault detection and diagnostics
- **Case Study:** Battery failure prevention using advanced BMS analytics.

Module 4: Grid-Scale Energy Storage Systems

- Utility-scale storage design
- Frequency regulation applications
- Peak shaving strategies
- Grid stabilization methods
- Capacity market participation
- **Case Study:** Large-scale battery storage supporting national grid stability.

Module 5: Renewable Energy Storage Integration

- Solar-plus-storage systems
- Wind energy storage applications
- Hybrid renewable systems
- Microgrid integration
- Energy dispatch optimization
- **Case Study:** Solar farm with integrated battery storage solution.

Module 6: Flow Battery Technologies

- Vanadium redox flow batteries
- Zinc-bromine technologies
- System design principles
- Performance evaluation
- Commercial deployment opportunities
- **Case Study:** Long-duration energy storage implementation using flow batteries.

Module 7: Hydrogen Energy Storage Systems

- Hydrogen production methods
- Electrolyzer technologies
- Hydrogen storage options
- Fuel cell integration
- Power-to-X applications
- **Case Study:** Green hydrogen storage for renewable energy balancing.

Module 8: Thermal Energy Storage Technologies

- Sensible heat storage
- Latent heat storage
- Phase change materials
- Industrial thermal applications
- District energy systems
- **Case Study:** Thermal storage deployment in industrial operations.

Module 9: Energy Storage Economics and Financial Analysis

- Cost-benefit analysis
- Levelized cost of storage
- Business models
- Investment evaluation
- Revenue stream optimization
- **Case Study:** Financial feasibility analysis of a utility-scale battery project.

Module 10: Artificial Intelligence and Digitalization

- AI-based energy forecasting
- Machine learning applications
- Predictive analytics
- Digital twin technology
- Automated energy optimization
- **Case Study:** AI-enhanced battery fleet management system.

Module 11: Safety, Reliability and Risk Management

- Battery safety standards
- Thermal runaway mitigation
- Fire protection systems
- Reliability engineering
- Emergency response planning
- **Case Study:** Investigation and mitigation of battery energy storage incidents.

Module 12: Monitoring, Diagnostics and Predictive Maintenance

- Condition monitoring technologies
- Sensor integration
- Data acquisition systems
- Predictive maintenance models
- Asset performance management
- **Case Study:** Extending battery life through predictive maintenance.

Module 13: Energy Storage Regulations and Standards

- International standards overview
- Grid code compliance
- Environmental regulations
- Safety certification requirements
- Market participation frameworks
- **Case Study:** Regulatory approval process for utility-scale storage projects.

Module 14: Emerging Technologies and Innovation

- Solid-state batteries
- Next-generation battery materials
- Long-duration energy storage
- Gravity-based storage systems
- Future technology trends
- **Case Study:** Commercialization roadmap for emerging storage technologies.

Module 15: Strategic Planning and Capstone Project

- Storage project planning
- Technology selection frameworks
- Risk assessment methodologies
- Deployment strategies
- Future-proofing investments
- **Case Study:** Development of a complete energy storage implementation strategy for a renewable energy project.

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