Battery Energy Storage Systems (BESS) Design Training Course

Professional Development Training Course Outline

Category	Renewable Energy	**Duration**	5 Days
Base Fee	$1,500 USD	**Delivery Mode**	Online / On-site Hybrid

Course Introduction

The rapid global transition toward renewable energy integration, grid modernization, and decarbonization has positioned Battery Energy Storage Systems (BESS) as a cornerstone technology in the evolving energy landscape. Battery Energy Storage Systems (BESS) Design Training Course is designed to equip professionals with advanced knowledge in energy storage system design, lithium-ion battery technology, grid-scale storage solutions, smart energy management, and sustainable power systems. Participants will gain hands-on insights into battery architecture, system sizing, safety standards, power electronics integration, and real-world deployment strategies, enabling them to confidently design and implement high-performance energy storage systems across various applications.

With increasing demand for renewable energy storage, microgrid solutions, EV infrastructure, and energy resilience, this course emphasizes cutting-edge technologies, AI-driven energy optimization, battery lifecycle management, and grid stability solutions. Through industry-aligned modules, practical case studies, and interactive learning, participants will develop expertise in BESS project planning, financial feasibility, regulatory compliance, and advanced system modeling tools, preparing them to lead innovation in the fast-growing clean energy sector.

Programme Curriculum

Battery Energy Storage Systems (BESS) Design Training Course

Introduction

The rapid global transition toward renewable energy integration, grid modernization, and decarbonization has positioned Battery Energy Storage Systems (BESS) as a cornerstone technology in the evolving energy landscape. Battery Energy Storage Systems (BESS) Design Training Course is designed to equip professionals with advanced knowledge in energy storage system design, lithium-ion battery technology, grid-scale storage

solutions, smart energy management, and sustainable power systems. Participants will gain hands-on insights into battery architecture, system sizing, safety standards, power electronics integration, and real-world deployment strategies, enabling them to confidently design and implement high-performance energy storage systems across various applications.

With increasing demand for renewable energy storage, microgrid solutions, EV infrastructure, and energy resilience, this course emphasizes cutting-edge technologies, AI-driven energy optimization, battery lifecycle management, and grid stability solutions. Through industry-aligned modules, practical case studies, and interactive learning, participants will develop expertise in BESS project planning, financial feasibility, regulatory compliance, and advanced system modeling tools, preparing them to lead innovation in the fast-growing clean energy sector.

Course Duration

5 days

Course Objectives

1. Understand Battery Energy Storage Systems architecture and design principles
2. Master lithium-ion battery technologies and emerging storage innovations
3. Analyze grid integration and smart grid energy solutions
4. Design scalable and modular BESS systems for utility and commercial use
5. Apply energy management systems (EMS) and AI-based optimization
6. Evaluate battery performance, degradation, and lifecycle analytics
7. Ensure compliance with global safety standards and regulatory frameworks
8. Develop financial models and ROI analysis for energy storage projects
9. Integrate renewable energy sources with storage systems effectively
10. Utilize simulation tools for system sizing and performance modeling
11. Implement cybersecurity and digital monitoring in energy systems
12. Optimize microgrid and hybrid energy system configurations
13. Gain expertise in future trends: solid-state batteries, hydrogen storage, and V2G systems

Target Audience

1. Electrical and Power System Engineers
2. Renewable Energy Professionals
3. Project Managers in Energy Sector
4. Utility and Grid Operators
5. Energy Consultants and Analysts
6. EV Infrastructure Developers
7. Researchers and Academics in Energy Storage
8. Policymakers and Sustainability Professionals

Training Modules

Module 1: Fundamentals of Energy Storage Systems

- Overview of energy storage technologies
- Role of BESS in renewable integration
- Energy density and efficiency concepts
- Market trends and global adoption

- Case Study: Utility-scale storage deployment in California

Module 2: Battery Technologies and Chemistry

- Lithium-ion, solid-state, and flow batteries
- Battery components and materials
- Performance characteristics
- Safety considerations
- Case Study: Tesla Megapack deployment

Module 3: BESS Architecture and Components

- System design and configurations
- Battery management systems (BMS)
- Power conversion systems (PCS)
- Thermal management solutions
- Case Study: Commercial BESS design in Europe

Module 4: System Sizing and Design Calculations

- Load analysis and energy demand forecasting
- Capacity sizing methodologies
- Peak shaving and load shifting
- Optimization techniques
- Case Study: Industrial peak demand reduction project

Module 5: Power Electronics Integration

- Inverters and converters
- Grid synchronization
- Harmonics and power quality
- Control strategies
- Case Study: Hybrid solar + storage system

Module 6: Energy Management Systems (EMS)

- Smart energy optimization
- AI and machine learning applications
- Real-time monitoring and control
- Data analytics in BESS
- Case Study: AI-driven microgrid system

Module 7: Grid Integration and Smart Grids

- Grid stability and frequency regulation
- Demand response strategies
- Ancillary services
- Smart grid technologies
- Case Study: Grid balancing project in Germany

Module 8: Safety, Standards, and Compliance

- International safety standards (IEC, UL)

- Fire safety and risk mitigation
- Environmental regulations
- System certification
- Case Study: BESS safety incident analysis

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	27 Nov 2026	Online	$1,000

Start Date	End Date	Location	Price
23 Nov 2026	27 Nov 2026	Physical	$1,500
23 Nov 2026	27 Nov 2026	Physical	$3,000
23 Nov 2026	27 Nov 2026	Physical	$3,000
23 Nov 2026	27 Nov 2026	Physical	$6,000
23 Nov 2026	27 Nov 2026	Physical	$4,500
23 Nov 2026	27 Nov 2026	Physical	$6,000
23 Nov 2026	27 Nov 2026	Physical	$6,000

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

Register Online Now

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