



Content
Community
Connection

United States
The Electricity Forum Inc.
742 Pre Emption Road
Geneva, NY 14456
Tel 289-387-1025

Canada
The Electricity Forum
1885 Clements Rd, Unit 218
Pickering, ON L1W3V4
Tel 905-686-1040
Fax 905-686-1078
Toll Free 855-824-6131

Data Center Power Distribution Equipment - Construction and Operation

[View Course Details](#)

COURSE DATES AND TIMES

Why Data Center Power Distribution Equipment Training Matters

This 12-hour instructor-led course teaches the equipment logic behind that chain: how switchgear, transfer switches, busway, and PDUs are built and how they operate, which UL, IEEE, and NEMA standards govern each device, and how electrical engineers, maintenance technicians, and contractors trace redundancy and standards compliance across the full power distribution path — from the switchgear room to the rack.

Participants will learn the construction and switching operation of low- and medium-voltage switchgear, referencing the actual product standards (IEEE C37.20 series, UL 1558, NEMA SG-5) that govern switchgear construction and testing. The course then covers the critical distinction between automatic transfer switches (ATS), governed by UL 1008, and static transfer switches (STS), which switch loads in a few milliseconds and are standard at the UPS/PDU level in Tier III and IV facilities.

From there, the course moves downstream to busway and busbar trunking — governed by UL 857 in North America and IEC 61439-6 internationally — finishing at the rack with floor PDUs, rack PDUs (rPDUs), branch-circuit monitoring, and A/B feed redundancy.

Standards & Codes Referenced in This Course

This course reviews the following real, current product standards and codes — it does not reproduce or substitute for their full text; students working on actual specifications should consult current editions directly.

NFPA 70E	Electrical Safety in the Workplace — governs safe switching, racking, and PPE requirements for all equipment in this course
NEC (NFPA 70) Article 645	Information Technology Equipment — relevant to PDU and branch-circuit wiring within qualifying IT equipment rooms
IEEE C37.20.2	Standard for Metal-Clad Switchgear
IEEE C37.20.7	Guide for Testing Metal-Enclosed Switchgear for Internal Arcing Faults
UL 1558	Metal-Enclosed Low-Voltage Power Circuit Breaker Switchgear
NEMA SG-5	Power Switchgear Assemblies
UL 1008 / UL 1008A	Standard for Transfer Switch Equipment (ATS), including medium-voltage transfer switches
NEMA ICS 10	Electromechanical AC Transfer Switch Equipment
IEC 60947-6-1	Low-Voltage Switchgear and Controlgear — Automatic Transfer Switching Equipment (international)
IEEE 446 (Orange Book)	Recommended Practice for Emergency and Standby Power Systems for Commercial and Industrial Applications
UL 857	Standard for Busways and Associated Fittings (North American busway standard)
IEC 61439-6	Busbar Trunking Systems (international busway standard)

Learning Outcomes

- Describe LV and MV switchgear construction and classifications
- Identify common data center circuit breaker types
- Explain safe breaker switching and racking procedures
- Distinguish ATS and STS operation and applications
- Compare busway and cable-based power distribution
- Describe busway construction and grounding requirements
- Distinguish floor PDUs from rack PDUs
- Explain branch monitoring and A/B rack redundancy

- Trace power distribution from switchgear to the rack

WHO SHOULD ATTEND

- Electrical engineers
- Critical facilities engineers
- Facility engineers
- Electrical maintenance technicians
- Electrical contractors
- Electrical project managers
- Commissioning engineers
- Data center operations personnel
- Field service technicians
- Maintenance supervisors

STUDENTS RECEIVE

- Data Center Power Distribution Equipment Training Certificate
- 1.2 Continuing Education Units (CEUs) / 12 Professional Development Hours (PDHs)
- FREE 100-Page Digital Electrical Safety Handbook (Value \$20)
- \$100 Coupon Toward Any Future Electricity Forum Event (Restrictions Apply)
- FREE Magazine Subscription (Value \$25)
- Course Materials in PDF Format

COURSE OUTLINE

Data Center Power Distribution Equipment Course Outline

DAY 1 (6 Hours)

Module 1: The Data Center Critical Power Chain

- Overview of the full power path: utility service to MV switchgear to transformers to LV switchgear to standby generators to transfer switches (ATS/STS) to UPS systems to distribution (busway/PDU) to rack-level power to IT load
- Roles and responsibilities at each stage of the chain
- Reading a simplified data center one-line diagram
- Key terminology: normal power, standby power, critical load, non-critical load, A/B power paths

Module 2: Codes & Standards Part 1 — Enforceable Electrical Codes

- NEC Article 645: scope, applicability, and why most IT rooms don't actually require it
- NEC Article 708 (COPS): risk assessment, mitigation strategy, and testing/commissioning requirements
- NFPA 75: the companion standard referenced by NEC 645
- NFPA 110 and NFPA 111: emergency and standby power system classifications referenced by NEC 708
- NFPA 70B: preventive maintenance practice referenced by NEC 708

Module 3: Codes & Standards Part 2 — Industry Standards & Reliability References

- ANSI/TIA-942-C and ANSI/BICSI 002: how these two voluntary standards complement each other
- Uptime Institute Tier Standard as a proprietary, voluntary framework rather than an adopted code
- IEEE Std 493 (Gold Book): reliability analysis for industrial and commercial power systems
- IEEE Std 3006.7: reliability practices for 7×24 continuous-power facilities
- Class discussion: matching the appropriate standard to the project scenario

Module 4: Tier Classification and Redundancy Models

- Four-tier framework: Basic Capacity, Redundant Capacity, Concurrently Maintainable, Fault Tolerant
- Redundancy models: N, N+1, 2N, and 2N+1
- Distribution path requirements for higher-reliability facilities
- Redundancy vs. concurrent maintainability

Module 5: Load Estimation, Capacity Planning & Diversity

- Estimating IT and mechanical loads for new or expanding facilities
- Diversity factors and actual demand versus nameplate capacity
- Planning for phased growth without overbuilding
- Power Usage Effectiveness (PUE) as a design and operating metric

Module 6: Utility Service and Medium-Voltage Design Considerations

- Single vs. dual utility feeds and redundancy options
- Medium-voltage switchgear and its role in system reliability
- Service entrance considerations: metering, protective relaying, and utility interconnection

- Group discussion: matching utility service strategy to reliability requirements

DAY 2 (6 Hours)

Module 7: Standby and Backup Power Systems

- Generator sizing, paralleling, and synchronization basics
- Standby vs. emergency classifications under NFPA 110 and NFPA 111
- Fuel storage, runtime planning, and load-step considerations
- Generator failure scenarios and redundancy strategies

Module 8: UPS Systems and Battery Backup Strategy

- UPS topologies and reliability objectives
- VRLA vs. lithium-ion battery considerations
- Ride-through requirements and generator start time
- UPS sizing for present load and future growth

Module 9: Reliability Engineering — Single Points of Failure & Concurrent Maintainability

- Identifying single points of failure
- Applying concurrent maintainability principles
- Group exercise: identifying failure points on a sample one-line diagram

Module 10: Reliability Engineering — Sequence of Operations & Metrics

- Utility failure sequence: UPS ride-through, generator start, synchronization, ATS transfer, and return to utility
- Introduction to MTBF and MTTR reliability metrics
- Applying reliability metrics to design and maintenance decisions

Module 11: AI/HPC Loads and Emerging Design Trends

- High-density AI/HPC loads and rapid load changes
- Effects on transformer and UPS sizing
- Retrofitting existing facilities for higher power densities
- Emerging data center electrical design trends

Module 12: Capstone Case Study, Course Review & Q&A

- Group case study applying redundancy, standards, and reliability concepts
- Review of key concepts from Days 1 and 2
- Open Q&A
- Certificate of completion

COURSE SCHEDULE

Start: 10 a.m. Eastern Time

Finish: 4:30 p.m. Eastern Time

Contact us Today for a FREE quotation to deliver this course at your company's location.

[Request Quote](#)