SUBSTATION

Engineering Design Course

Sargent & Lundy conducts four-day substation design training for utility clients. Engineers specializing in utility substation design and engineering present the training onsite at our Chicago office.

WHAT YOU'LL LEARN

This four-day course covers the fundamentals of substation physical design, protection and control systems, civil/structural design, tele-communications, electrical testing, and commissioning. It's tailored to specific tasks and applications of substation design. Participants will complete calculation and design exercises to apply the principles learned.

Each session draws on recent experience from a range of projects, including enclosed GIS substations in urban areas and extensive upgrades to existing facilities.

WHO SHOULD ATTEND?

Utility engineers, project managers, and other professionals involved in substation projects, as well as entry-level engineers or experienced professionals new to this area of the electric utility industry.

32 PROFESSIONAL DEVELOPMENT HOURS

Participants receive a certificate of completion and one professional development hour (PDH) for every hour of classroom instruction. Refer to specific state requirements for applicable PDH credits.

COURSE FEES

The course fee is $2,300 per person.

The fee is reduced to $2,200 if payment is received one week before the course start date. Credit card payments are accepted via PayPal on our website.

The course is also available for utilities seeking an onsite presentation for their employees. A minimum of 18 students is required for exclusive onsite sessions. Please call for more information and pricing.

FOR INFORMATION CONTACT:

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423-475-4766

SUBSTATION ENGINEERING DESIGN COURSE DETAILS

Day 1: Power System Analysis and Electrical Design

Session 1 introduces students to electric power systems and factors influencing substation design. Session 2 introduces students to functions and design of various substation components.

Session 1: Electric Power Systems

- Electricity basics
- Power grid operation
- Types of studies
- Power grid configuration

Session 2: Substation Components

- Substation types
- Substation equipment
- Equipment standards and ratings
- Substation material

Day 2: Substation Electrical Design

Session 3 reviews the fundamentals of relay protection, as well as introduces participants to the principles of protection schemes for major substation equipment. Session 4 covers the single line development process and includes in-class development of a single line.

Session 3: Protective Relaying Principles

- PLC components
- Transformers
- Buses
- Lines
- Breaker failure

Session 4: Single Line Development

- Bus arrangements
- One-line diagrams
- Protection zones

Day 3: Substation Physical Design, Grounding, and Communications

Session 5 covers design inputs, layout options and selection, and air- and gas-insulated substation design. Session 6 covers grounding principles and substation grounding design. Sessions 7 and 8 present SCADA concepts and telecom methods. Session 9 discusses the use of voltage control and power flow equipment in power grid operation.

Session 5: Substation Layout

- Design inputs
- Substation layout selection
- Air-insulated substations
- Gas-insulated substations

Session 6: Substation Grounding

- Purpose of the grounding system
- Touch and step potentials
- Grounding system design

Session 7: SCADA Concepts

- Typical network
- Equipment
- Communication protocols

Session 8: Telecom

- Telecommunications network functions
- Main types of communication
- Substation telecom networks and components

Session 9: Voltage Control/ Power Flow Equipment

- Capacitors and reactors
- Phase shifting transformers
- Synchronous condensers
- Static VAR compensators and STATCOMs

Day 4: Civil/Structural/Commissioning, and Testing

Sessions 10-14 cover key tasks performed by civil/structural engineers in substation design. Session 15 identifies the steps required to verify equipment functionality, ensure readiness for energization, and enable safe energization and commissioning of newly installed equipment.

Session 10: Site Development

- Grading and drainage

Session 11: Foundations

- Soil types
- Foundation types

Session 12: Bus Structural Design

- Strain bus
- Rigid bus

Session 13: Structures

- Types
- Loadings

Session 14: Substation Buildings

- Construction alternatives
- Cost factors

Session 15: Commissioning and Testing

- Objectives of commissioning and testing
- Testing and commissioning caveats
- Coordination and support requirements
- Equipment and component testing
- Equipment and circuitry functional testing
- In-service testing/commissioning

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