

# Overhead Transmission Line

## Engineering Design Course

Sargent & Lundy



Sargent & Lundy conducts four days of training in transmission line design for our clients in the utility industry. Training is offered to utility personnel as either an onsite presentation or remotely via an online presentation by S&L engineers engaged in utility transmission line design and engineering.

### What You'll Learn

This four-day course provides a comprehensive overview of the fundamentals of transmission line engineering. Each day of the course covers specific tasks and activities pertaining to line design. For example, in the structure spotting session the information necessary to perform structure spotting is reviewed and participants design a section of line. In the session on structure types, the various materials and configurations for transmission structures are addressed and the engineer evaluates alternate structure types in a project-based case study. Throughout the course, attendees participate in design examples and case studies to apply the principles learned.

Throughout each session, new information is derived from recent experience on a wide variety of projects, including new overhead and underground lines and upgrades to existing lines.

### Who Should Attend?

Utility engineers, project managers, and other professionals involved with transmission line projects, as well as entry level engineers or experienced professionals who are new to this area of the electric utility business.

### Course Fees

The four-day course is offered at a price of \$1,950 per person. The price is reduced to \$1,850 if payment is received by Sargent & Lundy one week prior to the course start date. Credit card payment is accepted through our website.

The course is available to utilities looking to provide an onsite or online presentation exclusively for their employees. Exclusive online presentations require a minimum of 15 students. Please call for information and pricing.

### 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.

Online participants must sign in/out each day and be in attendance for the entirety of the course to be eligible for PDH credits.

FOR INFORMATION CONTACT:

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# Overhead Transmission Line Course Details

## Day 1: Power System Analysis, Route Selection & Design Criteria

Session 1 provides students with an introduction to power system analysis and factors influencing transmission line design, including insulation coordination, sharing rights-of-way, and transmission access. Session 2 provides an overview of Underground Transmission. In Sessions 3 and 4, the engineering aspects of selecting a transmission line route are covered. Students gain an understanding of the parameters to be included in the design criteria for a line and learn how these criteria can impact the cost of a project.

### Session 1 – Power System Analysis

- Types of studies
- Data requirements and sources
- Study results and implications
- Relation to equipment selection
- Insulation coordination

### Session 2 – Underground Transmission

- High Voltage Cables
- Underground Transmission Line Design
- Relative Costs
- Underground Transmission Line Installation
- Underground Transmission Line Testing
- Underground Transmission Line Limitations

### Session 3 – Route Selection

- Routing objectives
- Identifying information sources
- Compiling/interpreting information
- Evaluating alternatives
- Selecting final alignment

### Session 4 – Design Criteria

- Applicable codes and standards
- Establishing clearances
- Structural loading conditions
- Lightning performance
- Sag/tension limits
- Environmental effects

## Day 2: Structure Spotting, Conductors, Insulators & Hardware

Session 5 covers the fundamentals of structure spotting, and students participate in the selection of structure locations in a sample line section. Sessions 6, 7 and 8 cover the characteristics of the various types of conductors and overhead ground wires. Considerations for selecting types of insulators are discussed, including comparisons of the characteristics of porcelain and polymer insulators. Students gain an understanding of the requirements for the various hardware components used on a line and the factors that should be considered in selecting components for insulator and hardware assemblies.

### Session 5 – Structure

- Plan and profile requirements
- Structure and line design information
- Cost considerations
- Site-specific conditions
- Applying spotting concepts-computerized methods

### Session 6 – Conductors

- Types and material comparisons
- Strength and ampacity
- Sizes and codes
- Configurations
- Corona

### Session 7 – Insulators

- Types and general selection criteria
- Contamination and degradation
- Testing and specifying

### Session 8 – Hardware

- Materials, strength & safety factors
- Testing

## Day 3: Transmission Line Structures

Sessions 9, 10 and 11 cover the types of structures used for transmission lines. Students learn how to evaluate these structures for applications on specific types of projects. The concepts involved in developing the structure configuration and design loadings are also addressed. Additionally, the fundamentals of structure design are presented. Students participate in case studies that illustrate these concepts.

### Session 9 – Structure Types

- Circuit/structure configurations
- Materials
- Evaluating costs
- Structure families
- Construction/maintenance considerations

### Session 10 – Structure Design Criteria

- Codes
- Standards
- Design guides
- Climatic loads
- Construction and maintenance loads
- Security loads
- Displacements
- Reliability considerations
- Load combinations and overload factors

### Session 11 – Structure Design

- Design guides and standards
- Pole, lattice, framed, and guyed structures
- Structure/foundation interaction
- Computer software
- Structure detailing and testing
- Review vendor designs and details

## Day 4: Foundation Design

The types of foundations used to support transmission line structures are covered in Sessions 12, 13, and 14. Students learn how to evaluate these various types of foundations for use in specific applications. Specification and interpretation of subsurface investigations are addressed, and the fundamentals of foundation design methods are presented. Students participate in several design examples using the concepts covered in the course.

### Session 12 – Foundation Types & Applications

- Typical foundation configurations
- Relationship of structure and foundation types
- Material
- Construction and maintenance considerations
- Evaluating costs

### Session 13 – Design Parameters

- Codes and design guides
- Loads and overload factors
- Displacements
- Reliability considerations
- Specifying subsurface investigations for soil data

### Session 14 – Foundation Design

- Design guides and standards
- Moment and axially loaded foundations
- Steel reinforcement design
- Computer software
- Foundation testing

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