APPA ACADEMY
AMERICAN PUBLIC POWER ASSOCIATION

Agenda

Overhead Distribution Principles and Applications

All times below are **Eastern.**

Wednesday, September 4

Session 1: Introduction to Overhead Distribution

Noon **Course Introduction**
- Purpose, agenda, and learning objectives
- Logistics

12:15 p.m. **The Overhead Distribution System**
- Business purpose and technical function
- Overhead line and equipment electrical ratings
- Overhead line components
- Overhead line equipment**1:15 p.m. Break**

1:30 p.m. **The Overhead Distribution System** *(continued)*
- Overhead Line Equipment

2:00 p.m. **The Legal, Regulatory & Business Context for Overhead Distribution**
- Risk exposures and management strategies
- Design and operating accountabilities
- Laws and Regulations

2:45 p.m. **Break**

3:00 p.m. **The Legal, Regulatory & Business Context for Overhead Distribution** *(cont.)*
- Design & operating criteria
- Design & construction standards
- Other considerations

3:15 p.m. **NESC Overview**
- Introduction, abstract and forward
- Brief historical context

3:45 p.m. **Session 1 Kahoot Quiz, Wrap-Up & Q&A**

4:00 p.m. **Adjourn for the day**

Thursday, September 5

Session 2: Overhead Line Conductors/Cables and NESC Clearances

Noon **Review of Check-Up Quiz and Session 1 Questions**

12:15 p.m. **NESC Overview** *(continued)*
- Introduction, abstract & forward
- History, interpretations, references

12:40 p.m. **Overhead line Conductors & Cables**
- Conductor/cable types

1:15 p.m. **Break**

1:30 p.m. **Overhead line Conductors & Cables** *(continued)*
- Electrical properties of conductors/cables
- Mechanical loading conditions on conductors
- Basic conductor sag & tension calculations

2:45 p.m. **Break**

3:00 p.m. **Introduction to NESC Clearances**
- Clearance requirements, clearance zones, ruling span
- General requirements, conductor/cable types, Uniform System of Clearances

3:45 p.m. **Session 2 Kahoot Quiz, Wrap-Up, Q & A**

4:00 p.m. **Adjourn for the Day**

Tuesday, September 10

Session 3: Overhead Line Structure Loading and Strength, Part 1

Noon **Start-up/Q&A, Review Session 2 Kahoot Quiz**

12:15 p.m. **Loading & Strength – Part 1**
- Introduction
- Conductor configurations & support hardware
- Conductor configurations & support hardware
- Hardware Mechanical forces on structures

1:15 p.m. **Break**

1:30 p.m. **Loading & Strength – Part 1** *(continued)*
- Mechanical forces on structures

- Overview of NESC mechanical loading and strength requirements

2:45 p.m. **Loading & Strength – Part 1** *(continued)*
- Structure loading application examples
- Overview of NESC mechanical loading & strength requirements

2:45 p.m. **Break**

3:00 p.m. **Loading & Strength – Part 1** *(continued)*
- Structure loading application examples
- Session 3 examples

3:45 p.m. **Session 3 Kahoot, Quiz & Wrap-Up, Q & A**

4:00 p.m. **Adjourn**

Wednesday, September 11

Session 4: Overhead Line Structure Loading and Strength, Part 2

Noon **Start-up/Q&A, Review Session 3A & 3B Exercises**

12:20 p.m. **Overhead Line Guying & Anchoring** – *continued*
- Functions of guys and guy forces
- Guy types, characteristics, and applications
- Anchor types, characteristics and applications

1:15 p.m. **Break**

:30 p.m. **Overhead Line Guying & Anchoring** – *continued*
- Structure guying application examples
- Guying Issues
- Group Practice Problem (Guying)

2:05 p.m. **Overhead Line Structure Loading & Strength Part 2 (Wood Poles)**
- Wood pole species, characteristics & applications
- Review of NESC requirements for wood poles
- ANSI O5.1 Standard for Wood Poles
- Wood pole preservatives
- Specifications for wood poles
- Embedment of wood poles

2:45 p.m. **Break**

3:00 p.m. **Overhead Line Structure Loading & Strength Part 2 (Manufactured Poles)**
- Types of materials & Characteristics
- Pros and cons of manufactured poles

- NESC requirements for manufactured poles
- Embedment of manufactured poles

3:45 p.m. **Session 4 Kahoot Quiz & Wrap-up/Q&A**

4:00 p.m. **Adjourn for the Day**

Thursday, September 12

Session 5: Overhead Line Electrical Considerations

Noon **Start-up, Q&A, Review Session 4 Quiz**

12:15 p.m. **Overhead Line Grounding**
- Purposes of grounding
- Grounding system components
- NESC grounding requirements

1:15 p.m. **Break**

1:30 p.m. **Overhead Line Grounding** *(continued)*
- Overhead Line Grounding
- Circuit Grounding
- Equipment Grounding

1:55 p.m. **Overhead Line Insulation & Lightning Protection**
- Characteristics of lightning
- Lightning surges & surge impedances
- Pole-top insulation coordination

2:45 p.m. **Break**

3:00 p.m. **Overhead Line Insulation & Lightning Protection** *(continued)*
- System BIL
- Lighting arresters & applications
- Session 5 Application Examples

3:40 p.m. **Session 5 Kahoot Quiz, Q&A, Course Wrap-Up**

4:00 p.m. **Course Adjourns**

Overhead Distribution Principles and Applications

Upon completion of this course, participants will be able to successfully:

1. Explain the business purposes and technical functions of overhead distribution
2. Recognize common overhead distribution line components and equipment and be able to explain their characteristics
3. Outline the legal and regulatory context for overhead lines
4. Describe overhead line design and operating risks as well as the role of design/operating criteria and design/construction standards in managing those risks
5. Explain the basic purpose and organization of the NESC and how it applies to overhead lines
6. Describe the various types of overhead line conductors and cables, their physical and electrical characteristics, and typical applications
7. Describe the mechanical forces that act on overhead line structures and the NESC requirements for conductor design calculations (sag & tension)
8. Describe the basic NESC requirements for overhead line clearances
9. Describe the functions & types of typical overhead distribution line support structures
10. Describe the mechanical forces that act on overhead line structures and the NESC requirements for structure loading and strength calculations
11. Perform basic conductor/cable & structure loading calculations by hand
12. Identify common structure guying schemes and components
13. Perform basic guying calculations by hand
14. Outline the basic characteristics, advantages and disadvantages of wood poles
15. Outline the basic characteristics, advantages and disadvantages, and typical applications of manufactured poles (steel, concrete, fiberglass, ductile iron)
16. Understand and apply basic principles of grounding and be able to identify common components and practices use for the grounding of overhead lines
17. Understand and apply basic principles of insulation coordination and overvoltage protection and be able to identify insulating components and lightning arresters on overhead lines