

ELECTRICAL LINE WORKER 1

COURSE CODES: 6305

COURSE DESCRIPTION: Electrical Line Worker 1 introduces the student to the electric utility industry and the skills, knowledge, safe work practices and physical ability required to perform line work. Students receive classroom and field training in math, electrical circuit analysis, power systems including Ohm's Law, AC and DC theory and analysis, generation, transmission and distribution of electrical energy and transformer theory. Climbing techniques are strongly emphasized. Safety and teamwork are demonstrated and emphasized in all phases of training.

OBJECTIVE: Given the necessary equipment, supplies, and facilities, the student will complete all of the following core standards successfully.

CREDITS: 1 (120 hours), 2 (240 hours) units per course code

PREREQUISITE(S): Algebra 1

RECOMMENDED GRADE LEVEL: 10 - 12

COMPUTER ACCESS REQUIRED: 1 Computer per student with Internet access

RECOMMENDED ENROLLMENT: 12

RECOMMENDED CURRICULUM: [T&D Lineman Training](#)

A. STUDENT ORGANIZATIONS

Proficient professionals know the academic subject matter, including professional development, required for proficiency within their area. They will use this knowledge as needed in their role. The following accountability criteria are considered essential for students in any program of study.

1. Identify the purpose and goals of a Career and Technology Student Organization (CTSO).
2. Explain how CTSOs are integral parts of specific clusters, majors, and/or courses.
3. Explain the benefits and responsibilities of being a member of a CTSO.
4. List leadership opportunities that are available to students through participation in CTSO conferences, competitions, community service, philanthropy, and other activities.
5. Explain how participation in CTSOs can promote lifelong benefits in other professional and civic organizations.

B. TECHNOLOGY KNOWLEDGE

Effective professionals know the academic subject matter, including the ethical use of technology as needed in their role. The following accountability criteria are considered essential for students in any program of study.

1. Demonstrate proficiency and skills associated with the use of technologies that are common to a specific occupation.
2. Identify proper netiquette when using e-mail, social media, and other technologies for communication purposes.
3. Identify potential abuse and unethical uses of laptops, tablets, computers, and/or networks.
4. Explain the consequences of social, illegal, and unethical uses of technology (e.g., piracy; cyberbullying, illegal downloading; licensing infringement; inappropriate uses of software, hardware, and mobile devices in the work environment).
5. Discuss legal issues and the terms of use related to copyright laws, fair use laws, and ethics pertaining to downloading of images, photographs, documents, video, sounds, music, trademarks, Creative Commons, and other elements for personal use.
6. Describe ethical and legal practices of safeguarding the confidentiality of business-related information.
7. Describe possible threats to a laptop, tablet, computer, and/or network and methods of avoiding attacks.

C. PERSONAL QUALITIES AND EMPLOYABILITY SKILLS

Effective professionals know the academic subject matter, including positive work practices and interpersonal skills, as needed in their role. The following accountability criteria are considered essential for students in any program of study.

1. Demonstrate punctuality.
2. Demonstrate self-representation.
3. Demonstrate work ethic.
4. Demonstrate respect.
5. Demonstrate time management.
6. Demonstrate integrity.
7. Demonstrate leadership.
8. Demonstrate teamwork and collaboration.
9. Demonstrate conflict resolution.
10. Demonstrate perseverance.
11. Demonstrate commitment.
12. Demonstrate a healthy view of competition.
13. Demonstrate a global perspective.
14. Demonstrate health and fitness.
15. Demonstrate self-direction.
16. Demonstrate lifelong learning.

D. PROFESSIONAL KNOWLEDGE

Effective professionals know the academic subject matter, including positive work practices and interpersonal skills, as needed in their role. The following accountability criteria are considered essential for students in any program of study.

1. Demonstrate effective speaking and listening skills.
2. Demonstrate effective reading and writing skills.
3. Demonstrate mathematical reasoning.
4. Demonstrate job-specific mathematics skills.
5. Demonstrate critical-thinking and problem-solving skills.
6. Demonstrate creativity and resourcefulness.
7. Demonstrate an understanding of business ethics.
8. Demonstrate confidentiality.
9. Demonstrate an understanding of workplace structures, organizations, systems, and climates.
10. Demonstrate diversity awareness.
11. Demonstrate job acquisition and advancement skills.
12. Demonstrate task management skills.
13. Demonstrate customer-service skills.

E. NCCER® CORE MODULES (RECOMMENDED)

MODULE A: SAFETY

Proficient electrical line workers demonstrate basic safety knowledge as needed in their role. The following accountability criteria are considered essential for students in all the Construction programs of study.

1. Identify the responsibilities and personal characteristics of a professional craftsman.
2. Describe the safe work requirements for elevated work.
3. Identify and explain how to avoid struck-by and caught-in-between hazards.
4. Explain the appropriate safety precautions around common job-site hazards.
5. Demonstrate the use and care of appropriate personal protective equipment (PPE).
6. Identify and describe other specific job-site safety hazards.
7. Follow safe procedures for lifting heavy objects.
8. Describe safe behavior on and around ladders and scaffolds.
9. Explain the importance of the Hazard Communication Standard (HazCom) requirement and Safety Data Sheets (SDS)
10. Describe fire prevention and firefighting techniques.
11. Define safe work procedures around electrical hazards.
12. Complete 10-hour OSHA course/assessment and receive card. (SDE Requirement)

MODULE B: CONSTRUCTION MATH

Proficient electrical line workers demonstrate basic math skills as needed in their role. The following accountability criteria are considered essential for students in all the Construction programs of study.

1. Add, subtract, multiply, and divide whole numbers, with and without a calculator.
2. Use a standard ruler and a metric ruler to measure.
3. Add, subtract, multiply, and divide fractions.
4. Add, subtract, multiply, and divide decimals, with and without a calculator.
5. Convert decimals to percent and percent to decimals.
6. Convert fractions to decimals and decimals to fractions.
7. Explain what the metric system is and how it is important in the construction trade.
8. Recognize and use metric units of length, weight, volume, and temperature.
9. Recognize some of the basic shapes used in the construction industry and apply basic geometry to measure them.

MODULE C: INTRODUCTION TO HAND TOOLS

Proficient electrical line workers demonstrate how to safely use various hand tools as needed in their role. The following accountability criteria are considered essential for students in all the Construction programs of study.

1. Recognize and identify various types of basic hand tools used in the construction trade.
2. Identify and describe how to use various types of measurement and layout tools.
3. Identify and explain how to use various types of cutting and shaping tools.
4. Use these tools safely.
5. Describe the basic procedures for taking care of these tools.

MODULE D: INTRODUCTION TO POWER TOOLS

Proficient electrical line workers demonstrate how to safely use power tools as needed in their role. The following accountability criteria are considered essential for students in all the Construction programs of study.

1. Identify and explain how to use various types of power drills and impact wrenches used in the construction trade.
2. Identify and explain how to use various types of power saws.
3. Identify and explain how to use various grinders and grinder attachments.
4. Identify and explain how to use miscellaneous power tools.

5. Use power tools safely.
6. Explain how to maintain power tools properly.
7. Complete Performance Tasks.

MODULE E: INTRODUCTION TO CONSTRUCTION DRAWINGS/RECOMMEND BLUEPRINT READING

Proficient electrical line workers demonstrate knowledge and the use of blueprints/construction drawings as needed in their role. The following accountability criteria are considered essential for students in all of the Construction programs of study.

1. Identify and describe various types of construction drawings, including their fundamental components and features.
2. Recognize and identify basic blueprint terms, components, and symbols.
3. Relate information on blueprints to actual locations on the print.
4. Recognize different classifications of drawings.
5. Interpret and use drawing dimensions.
6. Complete Performance Tasks.

MODULE F: BASIC RIGGING

Proficient electrical line workers demonstrate how to use basic rigging as needed in their role. The following accountability criteria are considered essential for students in all of the Construction programs of study.

1. Explain how ropes, chains, hoists, loaders, and cranes are used to move material and equipment from one location to another on a job site.
2. Describe inspection techniques and load-handling safety practices.
3. Explain the American National Standards Institute (ANSI) hand signals.
4. Complete Performance Tasks.

MODULE G: BASIC COMMUNICATION SKILLS (SDE Requirement)

Proficient electrical line workers demonstrate appropriate communication skills as needed in their role. The following accountability criteria are considered essential for students in all of the Construction programs of study.

1. Describe the communication, listening and speaking processes and their relationship to job performance.
2. Describe good reading and writing skills and their relationship to job performance.
3. Demonstrate telephone and e-communication skills necessary in the workplace.
4. Complete Performance Tasks.

MODULE H: BASIC EMPLOYABILITY SKILLS (SDE Requirement)

Proficient electrical line workers demonstrate appropriate workplace behavior as needed in their role. The following accountability criteria are considered essential for students in all of the Electricity program of study.

1. Describe the opportunities in the construction business and how an individual enters the construction workforce.
2. Explain the importance of critical thinking and how to solve problems in the workplace.
3. Explain the importance of social skills and identify ways good social skills are applied in the construction trade.
4. Describe computer systems and their industry applications.
5. Explain interpersonal relationship skills, self-presentation, and key workplace issues such as sexual harassment, stress, and substance abuse.

MODULE I: MATERIALS HANDLING

Proficient electrical line workers demonstrate appropriate skills handling materials as needed in their role. The following accountability criteria are considered essential for students in all of the Construction programs of study.

1. Describe the hazards associated with handling materials and provides techniques to avoid both injury and property damage.

F. INTRODUCTION TO ELECTRICAL LINEWORKER

Proficient electrical line workers demonstrate knowledge of the industry and relevant professional development as needed in their role. The following accountability criteria are considered essential for students in the Electrical Line Worker program of study.

1. Identify various career paths and opportunities in the electrical line worker trade.
2. Identify the skills, responsibilities, and characteristics needed to be a successful electrical line worker.
3. Describe various types of training in the field.
4. List department of labor (DOL) requirements for apprenticeship.

G. ELECTRICAL SAFETY

Proficient electrical line workers demonstrate appropriate knowledge and skills in electrical safety as needed in their role. The following accountability criteria are considered essential for students in the Electrical Line Worker program of study.

1. Analyze the effects of electrical shock on the human body.
2. Verify that circuits are de-energized.
3. Use PPE to reduce the risk of injury.

4. Identify OSHA requirements for protective equipment.
5. Apply OSHA requirements in the workplace.
6. Select and use protective equipment.
7. Discuss the purpose of NFPA 70E®.
8. Identify the safety hazards associated with ladders, scaffolds, and lift equipment.
9. Avoid back injuries by practicing proper lifting techniques.
10. Demonstrate basic tool safety.
11. Identify confined-space entry procedures.
12. Work safely with dangerous materials.
13. Select and use appropriate fall protection.

H. INTRODUCTION TO ELECTRICAL CIRCUITS

Proficient electrical line workers demonstrate appropriate knowledge of electrical circuits as needed in their role. The following accountability criteria are considered essential for students in the Electrical Line Worker program of study.

1. Identify and describe hand tools commonly used by electrical workers.
2. Identify the components of an atom.
3. Compare the atomic structures of conductors and insulators.
4. Identify the role of magnetism in electrical devices.
5. Identify the basic components in a power distribution system.
6. Define terms related to electricity, e.g., current, voltage, resistance.
7. Use Ohm's law to solve for unknown circuit values.
8. Identify the symbol for a resistor and determine its value based on color codes.
9. Distinguish between series and parallel circuits.
10. Identify the instruments used to measure circuit values.
11. Calculate electrical power.

I. ELECTRICAL THEORY

Proficient electrical line workers understand electrical theory as needed in their role. The following accountability criteria are considered essential for students in the Electrical Line Worker program of study.

1. Identify resistances in series and parallel.
2. Simplify series-parallel circuits.
3. Apply Ohm's law to various types of circuits.
4. Apply Kirchhoff's laws to various types of circuits.
5. Use Kirchhoff's current law.
6. Use Kirchhoff's voltage law.

J. LINEMAN SAFETY

Proficient electrical line workers understand the risks, awareness, and essentials needed to perform safely as needed in their role. The following accountability criteria are considered essential for students in the Electrical Line Worker program of study.

1. Identify and prevent work risks.
2. Identify most common dangers associated with electrical lineman duties.
3. Identify best practices when working with electrical equipment.
4. Develop and implement procedures to communicate job briefings.
5. Develop best practices for making risk assessments.

K. DEVICE BOXES

Proficient electrical line workers demonstrate knowledge and installation of device boxes as needed in their role. The following accountability criteria are considered essential for students in the Electrical Line Worker program of study.

1. Identify, size, and install boxes and their applications.
2. Size and install pull and junction boxes.

L. PERSONAL PROTECTIVE EQUIPMENT

Proficient electrical line workers use personal protective equipment as needed in their role. The following accountability criteria are considered essential for students in the Electrical Line Worker program of study.

1. Identify the proper use of personal protective equipment.

M. CONDUCTORS AND CABLES

Proficient electrical line workers demonstrate appropriate knowledge and skills for installing conductors and cables as needed in their role. The following accountability criteria are considered essential for students in the Electrical Line Worker program of study.

1. Identify wire sizes.
2. Determine conductor ampacities.
3. Install conductors using pulling equipment.

N. BASIC ELECTRICAL CONSTRUCTION DRAWINGS

Proficient electrical line workers demonstrate appropriate knowledge and skills for interpreting electrical drawings, equipment schedules, and specifications as needed in their role. The following accountability criteria are considered essential for students in the Electrical Line Worker program of study.

1. Read and interpret information found elevation and sectional drawings.
2. Interpret electrical symbols and abbreviations.
3. Analyze a set of electrical drawings.
4. Read block and schematic diagrams.
5. Interpret written specifications.

O. ELECTRICAL TEST EQUIPMENT

Proficient electrical line workers demonstrate appropriate knowledge and skills for using electrical test equipment as needed in their role. The following accountability criteria are considered essential for students in the Electrical Line Worker program of study.

1. Identify the applications of a voltmeter, ohmmeter, ammeter, a multimeter, and other meters.
2. Select a meter with the correct category rating for an application.
3. Identify electrical test equipment safety hazards.

P. CAREER DEVELOPMENT

Proficient electrical line workers demonstrate appropriate knowledge and skills for working in the line worker industry as needed in their role. The following accountability criteria are considered essential for students in the Electrical Line Worker program of study.

1. Research careers, requirements, certifications, and employability skills in electrical line worker industry.

Additional Course Materials and Resources

Academic Standards and Indicators