ELECTRICAL LINE WORKER 2
COURSE CODE: 6306

COURSE DESCRIPTION: The Electrical Line Worker 2 course further prepares the student to enter the electric utility and to 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):	Electrical Line Worker 1 with passing grade "C"
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.

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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 craftsperson.
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)

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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.

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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.

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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. ALTERNATING CURRENT

Proficient electrical line workers demonstrate appropriate knowledge and skills in working with AC currents as well as making power calculations as needed in their role. The following accountability criteria are considered essential for students in the Electrical Line Worker program of study.

1. Define the terminology of sine waves.
2. Define AC phase relationships.
3. Find unknown values in purely resistive AC circuits.
4. Find unknown values in inductive AC circuits.
5. Find unknown values in capacitive AC circuits.
6. Find unknown values in combination circuits.
7. Make power calculations in AC circuits.
8. Calculate true, apparent, and reactive power.
9. Use the power triangle to determine unknown values.
10. Identify the basic components in a transformer.
11. Identify transformer operating characteristics.
12. Calculate turns and voltage ratios.
13. Identify various types of transformers and their applications.

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G. ELECTRICAL TEST EQUIPMENT

Proficient electrical line workers demonstrate appropriate knowledge and skills for utilizing 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 electrical test equipment.
2. Demonstrate proper use of electrical test equipment.

H. ELECTRIC LIGHTING

Proficient electrical line workers demonstrate appropriate knowledge and skills for installing electric lighting 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 install lamps.
2. Identify lighting fixtures and their applications.
3. Install lighting fixtures.
4. Select photosensors.

I. PULL AND JUNCTION BOXES

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

1. Select pull and junction boxes.
2. Select and install fittings.
3. Size pull and junction boxes for systems over and under 1,000V.
4. Identify conduit bodies and other cast enclosures.
5. Select and install handholes.

J. CONDUCTOR INSTALLATIONS

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

1. Plan the installation.
2. Identify a pulling location and set up the cable reels.
3. Prepare raceways for conductors.
4. Install a pull line.
5. Prepare the cable ends for pulling.
6. Select cable-pulling equipment.

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7. Set up the feeding end.
8. Support conductors.
9. Pull cable in cable trays.
10. Identify cable limitations when pulling.
11. Calculate the allowable tension on pulling devices and conductors.
12. Calculate the sidewall loading.

K. CONDUCTOR TERMINATIONS AND SPLICES

Proficient electrical line workers demonstrate appropriate knowledge and skills for preparing cable ends for terminations and splices 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 significance of American Wire Gauge System (AWG).
2. Strip and train small and large conductors.
3. Bend cable and train conductors.
4. Make wire connections.
5. Install various types of connectors.
6. Make aluminum connections.
7. Reinsulate electrical connections.
8. Tape electrical connections.
9. Install heat-shrink insulators.

L. GROUNDING AND BONDING

Proficient electrical line workers demonstrate appropriate knowledge and skills for appropriate grounding and bonding as required by NEC Article 250 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 purpose of grounding and bonding.
2. Identify the grounding requirements for various systems.
3. Identify service grounding methods.
4. Size and install a grounding electrode conductor.

M. CIRCUIT BREAKERS AND FUSES

Proficient electrical line workers demonstrate appropriate knowledge and skills for installing circuit breakers, fuses, and overcurrent devices 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 function of overcurrent protective devices.
2. Identify types of overcurrent conditions.
3. Identify NESC® requirements for overcurrent protective devices.

4. Size and select circuit breakers.
5. Identify circuit breaker components.
6. Identify circuit breaker types and ratings.
7. Size and select fuses.
8. Identify fuse types and markings.
9. Size fuses.
10. Coordinate the operation of overcurrent protective devices.

N. 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 and demonstrate appropriate employability skills necessary in the field of electrical lineman.
2. Develop a personal resume' for a position in the electrical lineman field.

Additional Course Materials and Resources

Academic Standards and Resources

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