EET-1910: DIRECTED PRACTICE ELECTRICAL UTILITY TECHNOLOGY I

Cuyahoga Community College

Viewing: EET-1910 : Directed Practice Electrical Utility Technology I

Board of Trustees:
December 2022

Academic Term:
Fall 2023

Subject Code
EET - Electrical/Electronic Engineer

Course Number:
1910

Title:
Directed Practice Electrical Utility Technology I

Catalog Description:
Supervised practical applications of electrical substation worker job duties in a setting under direct supervision of FirstEnergy personnel. Emphasis on safety practices and regulations, using substation vehicles and equipment, and procedures and tasks related to use and maintenance of an electrical substation.

Credit Hour(s):
4

Other Hour(s):
300

Other Hour Details:
Directed Practice: 20 hours per week (300 hours per semester)

Requisites

Prerequisite and Corequisite
EET-1161 Direct Current Circuits, and departmental approval: admission to the Electric Utility Technology program.

Outcomes

Course Outcome(s):
Select and utilize appropriate tools to climb electrical poles, and install rigging for hoisting equipment in order to perform installation, maintenance, and repair of residential electrical services in accordance with electrical industry procedures and OSHA regulations.

Essential Learning Outcome Mapping:
Not Applicable: No Essential Learning Outcomes mapped. This course does not require application-level assignments that demonstrate mastery in any of the Essential Learning Outcomes.

Objective(s):
a. Measure, select and install climbing tools correctly, in accordance with verbal/written instructions.
b. Climb a 65′ pole with fall protection.
c. Climb pole to designated height, install a hand line, return to the ground, send up a crossarm, pull service cable, bare wire and various types of small material without falling off or causing injury to the person sending the material up the pole.
d. Identify a variety of anchors and extensions.
e. Determine anchor installation points and install a power screw anchor.
f. Correctly identify the guy wire by size and its use.
g. Identify and state the use of a preform guy grip dead.
h. End and preform conductor dead-end.
i. Install a guy grip.

j. Rig, tie knots, make up blocks and hand line, and perform other tasks.
k. Install a stringing block on a crossarm and lift a conductor under tension to an insulator with and without a crossarm gin.
l. Give a job briefing, plan the job, and identify any hazards that exist or may develop.
m. Coil a rope for throwing and throw one end of rope over a 3-phase de-energized line.
n. Use a transformer gin to raise a 10 kVA transformer to the mounting position.
o. Make up a set of slack blocks.
p. Identify, inspect, rate and rig chains, webbing slings, rigging fitting, wire rope slings, chain hoist, and snatch blocks.
q. Identify five come-along pulling grips and explain their purpose.
r. Winch line pull and rope strength.
s. Identify, inspect, and operate a strap hoist or chain hoist.
t. Pull a ¼" anchor guy and make it up using a guy wire grip (preform).
u. Properly install material, pull and dead-end a ¼" overhead guy.
v. Prepare and install the stringing blocks for use on the given type of construction.
w. Follow electrical company Accident Prevention Handbook practices.
x. Tie conductor to insulator on straight-line construction using a top tie to an angled construction using a side tie, to an insulator using a hot stick tie, and to a secondary spool insulator using a spool tie.
y. Use a factory preformed tie to tie a top tie, a spool tie, double support tie, and a side tie.
z. Pull off and cut a pre-determined amount of cable or wire using the measuring methods learned.
aa. Properly roll wire and place on truck for transporting.
bb. Identify various wires and sleeves.
cc. Explain methods of butt testing, the Osmose Inspection Program, and butt test a pole to determine if it is safe to climb.
dd. Climb a 40' pole, install safety strap, maneuver around the pole 360° in both directions, remove safety strap, and climb down the opposite side of pole.
ee. Climb around conduit fastened on to the pole.
ff. Install 10' crossarm on top of a 40' pole.
gg. Climb up, over, and down, over two sets of buck arms at the 25' level.

Course Outcome(s):

Operate and inspect line trucks, digger derricks, and other equipment/vehicles in accordance with electric company and OSHA regulations in order to perform installation, maintenance, and repair of residential electrical services.

Essential Learning Outcome Mapping:

Not Applicable: No Essential Learning Outcomes mapped. This course does not require application-level assignments that demonstrate mastery in any of the Essential Learning Outcomes.

Objective(s):

a. Direct a driver with a utility vehicle into a parking space using hand signals so that the vehicle does not strike any object while moving and is in alignment with parking stripes.
b. Use hand signals to direct the crane operator through lifting, moving, and lowering of a load.
c. Set up the work area protection needed to comply with state and federal laws to prevent accidents.
d. Tie seven basic knots (bowline, bowline on a bight, clove hitch, timber hitch, two half-hitches, overhand knot, square knot, and make an eye splice).
e. Correctly name line-related materials items and identify each orally.
f. Identify tools and state their proper use.
g. Identify line-related tools and state their proper use.
h. Identify types of cutters, select, and explain the use of each with 100% accuracy.
i. Explain defensive driving principles.
j. Perform a pre and post-trip vehicle inspection. List all conditions found properly through a post-trip driver's inspection report in accordance with company policy and the Federal Commercial Motor Vehicle Safety Act of 1986.
k. Load pole on a pole trailer and secure the load in accordance with the Accident Prevention Handbook, established work practices, and without damage to poles, property, or equipment.
l. Operate a line truck and perform all necessary operations needed to set and remove a wood pole.
m. Operate a digger derrick and perform all necessary operations needed to set a wood pole.
n. Dig a pole hole by hand, suitable for a 45', Class 3 pine pole to the proper circumference and depth.
o. Assemble a 3-phase 10' crossarm with steel pins, insulators, aluminum tie wires, and wood braces.
p. Assemble a 3-phase 8' alley arm with pins, insulators, aluminum tie wires, and alley arm brace.
q. Assemble a set of 1 ½ " x 4 ½ " x 10' dead-end crossarms.

r. Frame a 3-phase bare wire common neutral unguyed structure 15 kV and below.
s. Proper operation of gasoline chainsaw.
t. Utilize the T&D Construction Standards Manual to find information on a variety of subjects and locate standards by number.

Course Outcome(s):

Inspect and utilize appropriate protective equipment in accordance with electrical industry procedures and OSHA regulations when working as an electrical utility lineman.

Essential Learning Outcome Mapping:

Not Applicable: No Essential Learning Outcomes mapped. This course does not require application-level assignments that demonstrate mastery in any of the Essential Learning Outcomes.

Objective(s):

a. Perform a visual inspection (inside and out) on the gloves, sleeves, and leather protectors and perform a mechanical air test and a physical air test of the rubber gloves.
b. Explain the care and use of rubber gloves.
c. Inspect and determine if protective equipment provided with a utility truck (blankets, line hose, hoods and line guards) is ready for use or properly rejected and taken out of use.
d. Read a sag chart, figure ambient temperature and sag the conductor using the sight method and/or the dynamometer method.
e. Transfer open wire secondary from existing pole to new pole and back to the existing pole.
f. Visually inspect protective equipment, apply cover to secondaries, and remove protective equipment on dead-ends, straight-line secondaries, and URD transformers.
g. Climb a pole, install the proper protective equipment, remove protective equipment and descend to the ground.

Methods of Evaluation:

a. Written Exams
b. Presentations
c. Evaluation by faculty based upon site visitations and written and oral feedback provided by directed practice site supervisors.

Course Content Outline:

a. Wood Pole Climbing
    i. Select proper climbing tools
    ii. Butt test a wood pole
    iii. Sharpen hooks
    iv. Learn to climb a pole
b. Tool and Material Identification/Familiarization
    i. Use of a hand-line
    ii. Tie seven basic knots and make splice
    iii. Identify cutters (bolt and cable)
    iv. Operate chain saw
    v. Identify anchors and extension
    vi. Identify guy wire and where it is used
    vii. Identify and use preform material
c. Setting & Framing Poles
    i. Hand signals to direct vehicle
    ii. Mobile crane hand signals
    iii. Install work area protection (safety)
    iv. Load and unload poles
    v. Operation of line truck and setting of poles in non-energized area
    vi. Operation of a digger derrick and setting of poles in non-energized area
    vii. Use of hand digging set
    viii. Assemble hardware for poles
    ix. Assemble ten foot dead-end crossarms
    x. Frame poles on the ground

xi. Use of T&D Construction Standards Book
xii. Calculate anchor installation point and install

d. Rigging
i. Snatch blocks
ii. Slack blocks
iii. Come along and pulling grips
iv. Use of lifting hoist and chains
v. Pull down guys
vi. Pull overhead guys
vii. Prepare string blocks for use (rollers)

e. Wire
i. Use of tie wires
ii. Pull out and cut wire
iii. Roll up wire by hand
iv. Identify wire and sleeve sizes
v. Driver's training
vi. Seven defensive driving principles
vii. Pre-trip inspection

f. Safety
i. Accident Prevention Handbook practices
ii. Pre-job briefing
iii. Rigging safety awareness
iv. Fall protection
v. Flame retardant personal protective equipment
vi. Medic first-aid
vii. Bloodborne pathogens
viii. Good housekeeping

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Resources

Herman, Stephen L. *Delmar's Standard Textbook of Electricity*. 7th ed. Clifton Park, NY: Delmar Cengage Learning, 2020.

Herman, Stephen L. *Electrical Transformers and Rotating Machines*. 4th ed. Clifton Park, NY: Delmar Cengage Learning, 2017.

National Fire Protection Association. *NFPA 70 National Electrical Code*. 2020. Quincy, MA: National Fire Protection Association, 2020.

Resources Other

a. Company training materials.

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