ELECTRICIAN

APPENDIX A

O*NET CODE 47-2111.00

This training outline is a minimum standard for Work Processes and Related Instruction. Changes in technology and regulations may result in the need for additional on-the-job or classroom training.

WORK PROCESSES

	Approximate Hours
A. Project Layout and Planning	**200**
1. Reading and interpreting blueprints and specifications.	
2. Coordination between crafts, engineers, and architects.	
3. Laying out feeders, risers, and branch circuits.	
B. Underground Installations	**300**
1. Trenching and ditch digging (if in keeping with prevailing area practice).	
2. Direct burial.	
3. Installing PVC/rigid conduit (including bender usage).	
4. Installing grounding electrode systems.	
C. Thinwall Conduit Raceway Systems	**1,000**
1. Selecting and installing fastening and support devices.	
2. Conduit fabrication.	
3. Installation of conduit, fittings, and boxes.	
D. Rigid Conduit Raceway Systems	**750**
1. Selecting and installing fastening and supporting devices.	
2. Bender machine setup and operation.	
3. Conduit fabrication.	
4. Installation of conduit, fittings, and boxes.	
E. Installing Services, Switchboards and Panels	**500**
1. Mounting devices.	
2. Breaker installation.	
3. Terminations.	

F. Floor Duct Installation **200**

1. Shooting transit/grade establishment (if in keeping with prevailing area practice).
2. Installing duct and fittings.
3. Core drilling and outlet installation.

G. Motor Control Center Installation **100**

1. Rigging and mounting (if in keeping with prevailing area practice).
2. Terminating feeders, branch circuits and control wiring.

H. Installing, Splicing and Terminating Wires and Cables **1,200**

1. Establishing temporary power.
2. Installing feeders and branch circuits.
3. Installing control wiring.
4. Performing splices, taps and terminations.

I. Cable Tray Installation **150**

1. Fabrication.
2. Installing support devices.
3. Installing cable tray and covers.

J. Lighting System Installation **1,050**

1. Installing outlet boxes and conductors.
2. Installing fixtures and lamps.
3. Installing lighting control devices.

K. Testing and Troubleshooting Feeders, Motors, and Branch Circuits **150**

1. Checking circuit continuity.
2. Identifying fault current to ground.
3. Meggering and Hi Potting.
4. Certifying system operation.
5. Repair and maintenance.
6. Ground verification.

L. Fire Alarm and Security System Installation (optional*) **400**

The employer(s) for whom the apprentice or journeyperson is working must possess a valid Alarm Installer license, issued by the New York State Department of State. In addition, the apprentice/journeyperson performing such work must be fingerprinted, as required by the Department of State.

1. Fire Alarms (300 hrs.)
    a. Interpreting blueprints and specifications.
    b. Layout and circuit installation.
    c. Control panel and device installation.
    d. Programming and testing.
2. Security Systems (100 hrs.)
    a. Interpreting blueprints and specifications.
    b. Layout.
    c. Box and circuit installation.
    d. Terminations.
    e. Testing.

M. Motor Installation **400**

1. Rigging and setting (if in keeping with prevailing area practice).
2. Alignment (if in keeping with prevailing area practice).
3. Installing circuiting and terminations.
4. Testing.

N. Control System Installation **200**

1. Blueprint and specification interpretation.
2. Layout and circuit installation.
3. Installing and certifying distributed control system.

O. Installing and Programming Programmable Logic Controllers **100**

1. Module installation.
2. Installing control wiring and devices.
3. Programming (if in keeping with prevailing area practice).

P. Installing Instrumentation and Process Control Systems **200**

(If in keeping with prevailing area practice).

1. Blueprint and specification interpretation.

2. Layout and installation.
3. Calibration.

Q. Installing Sound and Communication Systems **150**

1. Blueprint and specification interpretation.
2. Layout.
3. Conduit and box installation.
4. Installing panels and network devices.
5. Circuit installation.
6. Terminating and testing circuits.

R. Installing and Terminating Transformers **100**

1. Rigging and mounting (if in keeping with prevailing area practice).
2. Terminating primary and secondary cables.
3. Testing and troubleshooting.

S. Installing Fiber Optic and Tele/Data Cable **100**

1. Equipment layout.
2. Installing cable.
3. Polishing and terminating.
4. Testing and verifying.

T. Welding/Exothermic Welding and Brazing, Mechanical Fastening **100**

1. Machine setup.
2. Fabrication.
3. Welding/exothermic welding, grinding, and finishing.
4. Installing fixings, fasteners and supports.

U. Service and Troubleshooting **200**

Testing, analysis, and repair of electrical/electronic components of: motors, transformers, electrical devices, electronic devices, magnetic devices, lighting and power circuits, equipment and machinery, control circuits and devices.

V. Material Handling and Pre-Fabrication **150**

1. Awareness of materials and equipment of the trade.
2. Handling materials of the trade (if in keeping with prevailing area practice).

3. Fabrication for field installation.
4. Cleanup and recycling.

W. Safety Awareness, Processing Required Paperwork and Other Specialized Areas **200**

X. Green Skills (optional*) **300**

1. Energy Efficiency (100 hrs.)
    a. Replacing incandescent light bulbs with compact fluorescent lamps (CFL's), while maintaining or improving lighting levels.
    b. Properly installing smoke detectors.
    c. Properly installing carbon monoxide (CO) detectors.
    d. Checking electrical appliances for obstruction, dilapidation, or other contributing factors to energy waste.
    e Building automation:
        i. Correctly interpreting blueprints and specifications.
        ii. Layout and circuit installation.
        iii. Selecting and installing fastening and support devices.
        iv. Installing all electrical components and control devices.
        v. Applying system integration with open protocols.
        vi. Bonding and grounding of all electrical components.
2. Alternative Energy Sources-solar, wind, fuel cell, etc. (200 hrs.)
    a. Working safely with alternate energy systems.
    b. Conducting a site assessment including possible barriers such as: wind, property location, height, sunlight (if applicable).
    c. Accurately reading blueprints, specifications, drawings, schematics, work orders, and/or recommended procedures.
    d. Selecting appropriate materials and amounts based on requirements of job.
    e. Adapting, planning, layout, design, and circuit installation.
    f. Selecting and installing fasteners and supportive devices (if applicable).

g. Installing racking systems (if applicable).

h. Installing modules, inverters (if applicable).

i. Assembling, installing, weather sealing photovoltaic systems and support structures (if applicable).

j. Installing fuel cells (if applicable).

k. Installing wind turbines (if applicable).

l. Bonding and grounding.

m. Inspecting, testing, verifying, maintaining, troubleshooting, repairing systems.

Approximate Total Hours (Over a five-year period) **8,200**

*It is expected that the apprentice will complete some, but not all, of the optional work processes.

Apprenticeship work processes are applicable only to training curricula for apprentices in approved programs. Apprenticeship work processes have no impact on classification determinations under Article 8 or 9 of the Labor Law. For guidance regarding classification for purposes of Article 8 or 9 of the Labor Law, please refer to https://dol.ny.gov/public-work-and-prevailing-wage .

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APPENDIX B

RELATED INSTRUCTION

Safety

1. Safety and Health Awareness (safeguarding both worker and the public)
2. OSHA/Safety Awareness (including fall-protection and confined space training)
3. OSHA 10-Hour Construction Course – if required for Public Work
4. Asbestos Awareness – minimum 4 hours (see attachment)
5. First Aid/CPR – minimum 6.5 hours every 3 years
6. Sexual Harassment Prevention Training – must comply with section 201-g of the Labor Law
7. Proper Use of Personal Protective Equipment (PPE)
8. Right-to-Know/Material Safety Data Sheets (MSDS)

Blueprints

1. Blueprint Reading and Sketching
2. CAD (optional)

Mathematics

1. Algebra
2. Geometry
3. Trigonometry
4. Trade Math
5. Estimating (optional)

Trade Theory

1. Electrical Theory

Trade Science

1. Tools and Equipment: Safety, Proper Use, Care and Maintenance
2. National Electrical Code
3. State and Local Electrical Codes

4. Conduit Fabrication
5. Transformers
6. Electrical Grounding
7. Electronics
8. Motors
9. Digital Electronics
10. Fiber Optics
11. Motor Control
12. Distributed Control
13. Intelligent Wiring Systems
14. Local Area Network Systems
15. Low Voltage Systems
16. Programmable Logic Controllers
17. Telecommunications
18. Fire Alarm and Security Systems (if Work Process “L” is selected)
    a. Installations: Standards, Codes and Techniques,
    b. Control Panels and Alarm Transmissions,
    c. Security Systems and Fire Technology
19. Welding for the Trade
20. Systems Analysis, Repair and Certification
21. Air Conditioning
22. Instrumentation
23. Process Control
24. Service and Troubleshooting
25. Building Automation (if Work Process “X” is selected)
26. Alternate Energy Sources (Solar, Wind, Fuel Cell, etc.): Installation and Repair (if Work Process “X” is selected)
27. Lighting Controls
28. Energy Efficiency (if Work Process “X” is selected)
29. Demand Limiting
30. Customer Service
31. Workmanship

A minimum of 180 hours of Related Instruction is required for each apprentice for each of the five years. This results in a total of at least 900 hours.

Appendix B topics are approved by New York State Education Department.

ATTACHMENT TO APPENDIX B

Asbestos Awareness

This course must be delivered by one of the following:

1. A provider currently approved by the New York State Department of Health to deliver asbestos safety training.
2. A person holding a current Asbestos Handler certificate from the New York State Department of Labor in the title of: Inspector, Supervisor, Project Monitor, Management Planner, or Project Designer.
3. Anyone otherwise approved by the New York State Education Department.

Minimum course contents must include the following:

1. Definition of asbestos
2. Types and physical characteristics
3. Uses and applications
4. Health effects:
    a. Asbestos-related diseases
    b. Risks to families
    c. Cigarette smoking
    d. Lack of safe exposure level
5. Employer-specific procedures to follow in case of potential exposure, including making a supervisor or building owner immediately aware of any suspected incidental asbestos disturbance so that proper containment and abatement procedures can be initiated promptly.

Notwithstanding the above course requirement, employers are advised that they must also be in compliance with New York State Department of Labor Industrial Code Rule 56 at all times.

Employers are further advised, and must advise all apprentices, that completion of the above course requirement does not authorize any person to remove, encapsulate, enclose, repair, disturb, or abate in any manner, any friable or non-friable asbestos, asbestos containing material, presumed asbestos containing material, or suspect miscellaneous asbestos containing material.