INSTRUMENT ELECTRICAL MECHANIC

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. Tool and Supply Room	**40**
1. Learn size of wire condulets and conduits, simple meters, bending of conduit, use of tools and how to determine the size of the load.	
2. Safety.	
B. Lighting	**40**
1. Replacement of incandescent lamps and hot cathode fluorescent bulbs and starters.	
2. Repair of fluorescent fixtures, replacing ballast, socket and wiring.	
3. Code requirements.	
4. Safety.	
C. Installation AC Wiring	**360**
1. Learn installation wiring of machines, wiring contactors, push buttons, principle of overload devices and proper selection.	
2. Selection and use of proper fittings for rigid, thin wall and flexible condulets.	
3. Bending and installing conduit.	
4. Code requirements.	
5. Safety.	
D. Troubleshooting AC Wiring	**200**
1. Learn to locate and repair contactor troubles, replacing contacts and contactor coils.	
2. Locate and replace blown fuses.	

3. Check and repair limit switches, push buttons, etc.
4. Safety.

E. Minor AC Motor Repair **100**

1. Learn to disassemble and assemble motors, replacing bearings, cleaning, checking and painting windings.
2. Use of megger.

F. Three-Phase Motor Repair **100**

1. Learn to locate and repair grounds, repair and cutting of bad coils.
2. Tapping and reconnecting windings for voltage changes.
3. Safety.

G. Special Circuits AC **400**

1. Learning to read wiring diagrams.
2. Operation of special control circuits, time delays switches, electric breaking.
3. Safety.

H. Direct Current Machinery **560**

1. Learn to locate and repair direct current motor and generator troubles in fields, armatures, bearnings, brush holders, and commutators.
2. Knowledge of variable speed DC drives, reliance contactors and field control.
3. Truck and battery maintenance, battery chargers, rectifier and motor generator type.

I. General Wiring **400**

1. Learn proper handling and installation or power feeding, wiring, fuse panels, breakers, etc.
2. Estimate load requirements, laying out conduit runs. Code requirements.
3. Install general wiring, wiring fixtures, receptacles, etc. Connecting transformers, three-phase, star and delta connections, transformer polarity, knowledge of generally used wiring systems and current relationship.
4. Three-phase and two-phase, single-phase two and three wire, and three-phase four wire.
5. Safety.

J. Instruments **160**

1. Learn proper use and care of volt meter, ammeter, watt meter, power factor meter and recording meters, etc.

K. Power Factor Correction **160**

1. Learn use of condensers for P.F. correction, use of synchronous motors for P.F. correction.
2. Estimating amount K.V.A.R/ required for proper correction and its effect on power system capacity and power rates.
3. Safety.

L. Industrial Electronics **400**

1. Learn installation, operation and repair of electronic electrifiers.
2. Thymatrol speed control units and public address system.
3. Safety.

M. Types of Instruments or Equipment **960**

1. Recording
   a. Temperature
   b. Controllers
   c. Atmosphere
2. Testing
   a. Sonic
   b. Thickness Gauges
3. Control
   a. Timers
   b. Temperature
   c. Valve Control Motors
4. Output
   a. Amplifiers
   b. High Frequency Generators
5. Miscellaneous
   a. Thermocouples
   b. Potentiometers
   c. Thermometers

N. Installation Procedures **1160**

1. Planning
    a. Check specifications, blueprints, diagrams, drawing or instructions for job.
    b. Determine what equipment, material, etc., is necessary for the job.
    c. Prepare requisitions accordingly.
2. Preparation for Installation
    a. Determine from blueprints the local of installation
    b. Make a safety check.
    c. Prepare layout.
    d. Check availability of utilities needed, etc.
    e. Calibrate and adjust equipment.
3. Installation
    a. Install fasteners
    b. Set equipment
    c. Wire or connect, adjust in accordance with instructions or directions.
    d. Check and test operation.

O. Repair of Instruments **960**

1. Check instrument to determine source of trouble.
    a. Checking circuiting.
    b. Test tubes, condensers, resistors, etc.
    c. Check mechanical parts.
2. Remove defective parts, wiring, etc., and replace or repair.
3. Calibrate or otherwise adjust equipment.
4. Check operations.
    a. Test output, etc.

P. Maintenance of Instruments **700**

1. Cleaning and lubrication.
2. Checking standard cells.
3. Installation of charts, changing charts, etc.
4. Inking pens, cams, etc.
5. Checking humidistats

Q. Checking, Testing and Troubleshooting Procedures **300**

1. Check power input
2. Check tube
3. Check condenser and transformer
4. Check wiring
5. Check resistor valve

R. Construction, Maintenance or Repair of Power Transmission Lines **500**

1. Care and use of tools and equipment:
    a. pipe cutters
    b. wrenches
    c. ladders
    d. scaffolding
    e. channel locks
    f. pipe dies
    g. pipe benders
    h. ratchet chain pulls
2. Types of lines
    a. conduit
    b. duct
    c. open
3. Methods and procedures for construction of power transmission lines
    a. Locate power transmission lines in accordance with prints or plans
    b. Fastening, cutting and bending of conduit
    c. Fastening and cutting of duct
    d. Fastening and installation of open wiring
    e. Pulling wires through conduit or duct
4. Methods and procedures for construction of other electrical equipment
    a. Determine from prints or plans location for installation of electrical equipment
    b. Prepare bases of facilities for fastening
    c. Install equipment
    d. Connect power transmission lines

5. Safety Precautions

Approximate Total Hours 7500

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

INSTRUMENT ELECTRICAL MECHANIC

APPENDIX B

RELATED INSTRUCTION

Safety

1. Fundamentals (4 hours)
2. Trade Safety (12 hours)
3. First Aid (6.5 hours every 3 years)
4. Sexual Harassment Prevention Training – must comply with section 201-g of the Labor Law

Blueprint Reading, Sketching and Drawing

1. Elementary Blueprint Reading and Sketching
2. Blueprint Reading for Electricians
3. Electrical Circuit Diagrams

Mathematics

1. Fundamentals of Mathematics
2. Mathematics of Electricians

Trade Theory

1. AC Fundamentals
2. DC Fundamentals
3. Electrical Measurement
4. Circuit Theory
5. Industrial Electronics
6. National Electric Code (NEC) Requirements
7. Local and State Electric Codes

Other Courses as necessary

A minimum of 144 hours of Related Instruction is required for each Apprentice for each year.

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