PLAN OF TRAINING

Powerline Technician

Government of Newfoundland and Labrador
Department of Advanced Education and Skills
Apprenticeship and Trades Certification Division

October 2014

Preface

This Apprenticeship Standard is based on the **2013** edition of the National Occupational Analysis for the Powerline Technician trade.

This document describes the curriculum content for the Powerline Technician apprenticeship training program and outlines each of the technical training units necessary for the completion of apprenticeship.

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A. Profile Chart

COMMON OCCUPATIONAL SKILLS			
OL1631 Safety	OL1681 Tools & Equipment	OL1250 Access Equipment	OL1691 Pole Climbing
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OL1701 Drawings, Schematics and Specifications	OL1170 Job Planning	OL1601 Traffic Control	OL3700 Live Line Work
STRUCTURES			
OL1791 Grounding and Bonding	OL1725 Overhead Distribution Structures	OL1781 Transmission Structures	
CONDUCTOR SYSTEMS			
OL1721 Conductors and Cables	OL1741 Sagging Conductors	OL1150 Transmission Systems	
AUXILIARY EQUIPMENT			
OL1140 Inductance and Capacitance	OL1811 Transformers	OL2532 Transformer Banking	OL4000 Power Transformers
OL4060 Single-Phase Metering	OL4010 Three-Phase Metering	OL4020 Voltage Regulation and Control Devices	OL4030 Line Protection Devices
OL4040 Line Capacitors	OL1821 Street Lighting Systems		

OPERATION, MAINTENANCE AND REPAIR			
OL1751 Tree Trimming	OL1130 Power and Energy	ER1140 DC Theory	ER1151 Series and Parallel DC Circuits
OL1180 AC Theory	OL1190 AC Circuits	OL1240 Series and Parallel Circuits	OL1714 Single-Phase Circuits
OL2521 Three-Phase Circuits	OL1715 Distribution Lines	OL1835 Overhead Distribution Systems	OL2632 Underground Distribution Systems
OL4050 Substations, Switching Stations and Terminals			

B. NOA Comparison Chart

NOA 2012 Tasks		2014 POT
Task 1 – Uses and Maintains Tools and Equipment		
1.01	Maintains hand, power, and powder-actuate tools and equipment	OL1681 – Tools & Equipment ***Included in all courses**
1.02	Maintains electrical measuring and testing equipment	OL1681 – Tools & Equipment
1.03	Uses rigging, hoisting and lifting equipment	OL1851 – Rigging, Hoisting and Lifting
1.04	Uses PPE and safety equipment	OL1631 – Safety OL1601 – Traffic Control ***Included in all courses**
Task 2 – Accesses Work Area		
2.01	Climbs poles and structures	OL1691 – Pole Climbing OL1160 – Steel Structure Climbing
2.02	Uses access equipment	OL1250 – Access Equipment OL1771 – Aerial Devices and Hydraulics
2.03	Uses on and off road equipment	OL1641 – On- and Off-Road Equipment
Task 3 – Organizes Work		
3.01	Interprets codes, regulations and procedures	OL1835 – Overhead Distribution Systems
3.02	Interprets plans, drawings, and specifications	OL1701 – Drawings, Schematics and Specifications
3.03	Prepares worksite	OL1835 – Overhead Distribution Systems OL1601 – Traffic Control
3.04	Plans job tasks and procedures	OL1170 – Job Planning
Task 4 – Establishes Safe Work Environment		
4.01	Controls powerline hazards	OL1835 – Overhead Distribution Systems OL1170 – Job Planning OL1130 – Power and Energy
4.02	Controls environmental hazards	
4.03	Performs lock out and tag our procedures	OL1835 – Overhead Distribution Systems
Task 5 – Uses Live-Line Methods		
5.01	Uses cover up	OL3700 – Live Line Work
5.02	Uses rubber gloves	
5.03	Uses bare hand methods	
5.04	Uses fiberglass reinforced plastic (FRP) tools (sticks)	

Task 6 – Install Poles		
6.01	Frames poles	OL1725 – Overhead Distribution Structures
6.02	Sets poles	
6.03	Installs pole guys and anchors	
Task 7 – Installs Steel Structures		
7.01	Installs footings	**NOT COMMON CORE**
7.02	Assembles steel structures	OL1725 – Overhead Distribution Structures
7.03	Erects steel structures	
7.04	Installs steel structure guy wires and anchors	
Task 8 – Installs Overhead Conductors		
8.01	Strings overhead conductors	OL1725 – Overhead Distribution Structures
8.02	Sags overhead conductors	OL1741 – Sagging Conductors
8.03	Ties-in overhead conductors	OL1725 – Overhead Distribution Structures
8.04	Splices overhead conductors	
Task 9 – Installs Underground and Underwater Cable		
9.01	Installs conduit and cable installations	OL2632 – Underground Distribution Systems OL1721 – Conductors and Cables
9.02	Places underground and underwater cable	
9.03	Splices underground and underwater cable	OL2632 – Underground Distribution Systems
9.04	Terminates underground and underwater cable	
Task 10 – Installs Lighting Systems		
10.01	Installs street lights	OL1821 – Street Lighting Systems
10.02	Maintains street lights	
Task 11 – Installs Voltage Control Equipment		
11.01	Installs transformers	OL1811 – Transformers OL2532 – Transformer Banking OL4000 – Power Transformers
11.02	Installs capacitors	OL4040 – Line Capacitors OL1140 – Inductance and Capacitance
11.03	Installs voltage regulators	OL4020 – Voltage Regulation and Control Devices
11.04	Installs switches	OL4030 – Line Protective Devices
11.05	Installs reactors	**NOT COMMON CORE**

Task 12 – Install Protection Equipment		
12.01	Installs reclosers	OL4030 – Line Protective Devices
12.02	Installs sectionalizers	
12.03	Installs fuses	
12.04	Installs lightning arrestors	OL4030 – Line Protective Devices OL1725 – Overhead Distribution Structures
Task 13 – Installs Metering Equipment		
13.01	Installs primary metering equipment	OL4010 – Three-Phase Metering
13.02	Installs secondary metering equipment	OL4010 – Three-Phase Metering OL4060 – Single-Phase Metering
Task 14 – Installs Communication Equipment		
14.01	Installs cellular antennas	**NOT COMMON CORE**
14.02	Transfers communication lines	OL1721 – Conductors and Cables
Task 15 – Operates Distribution and Transmission Systems		
15.01	Operates overhead and underground transmission systems	OL1835 – Overhead Distribution Systems OL1725 – Overhead Distribution Structures OL2632 – Underground Distribution Systems OL1130 – Power and Energy ER1140 – DC Theory OL1180 – AC Theory OL1190 – AC Circuits OL1240 – Series and Parallel Circuits OL1791 – Grounding and Bonding OL1721 – Conductors and Cables OL1714 – Single-Phase Circuits OL1715 – Distribution Lines OL1140 – Inductance and Capacitance OL2521 – Three-Phase Circuits
15.02	Operates overhead and underground distribution systems	
15.03	Performs stations switching	OL4030 – Line Protective Devices
Task 16 – Maintains Distribution and Transmission Systems		
16.01	Inspects distribution and transmission systems	OL1725 – Overhead Distribution Structures OL1781 – Transmission Structures
16.02	Maintains poles	
16.03	Maintains steel structures	
16.04	Maintains system components	
16.05	Trims trees	OL1170 – Tree Trimming OL1725 – Overhead Distribution Structures

Task 17 – Repairs Distribution Systems		
17.01	Troubleshoots overhead distribution systems	OL1725 – Overhead Distribution Structures OL4050 – Substations, Switching Stations and Terminals
17.02	Troubleshoots underground distribution systems	OL2632 – Underground Distribution Systems
17.03	Repairs overhead distribution systems	OL1725 – Overhead Distribution Structures OL4050 – Substations, Switching Stations and Terminals
17.04	Repairs underground distribution systems	OL2632 – Underground Distribution Systems
Task 18 – Repairs Transmission Systems		
18.01	Troubleshoots overhead transmission systems	OL1150 – Transmission Systems OL1781 – Transmission Structures OL4050 – Substations, Switching Stations and Terminals
18.02	Troubleshoots underground transmission systems	OL2632 – Underground Distribution Systems
18.03	Repairs overhead transmission systems	OL1150 – Transmission Systems OL1781 – Transmission Structures OL4050 – Substations, Switching Stations and Terminals
18.04	Repairs underground transmission systems	OL2632 – Underground Distribution Systems

C. Program Structure

For each and every course, a formal assessment is required for which 70% is the pass mark. A mark of 70% must be attained in both the theory examination and the practical project assignment, where applicable as documented on an official transcript.

The order of course delivery within each block can be determined by the educational agency, as long as pre-requisite conditions are satisfied.

Upon completion of an entry level program, individuals may be required to complete other certifications (employer or job site specific) in order to gain employment.

Block I				
Course No.	**IPG No.**	**Course Name**	**Hours**	**Pre-Requisite(s)**
TS1510	-	Occupational Health and Safety	6	None
TS1520	-	WHMIS	6	None
TS1530	-	Standard First Aid	14	None
OL1631	PLT-100	Safety	14	None
OL1681	PLT-105	Tools and Equipment	40	OL1631
OL1250	PLT-110	Access Equipment	6	OL1631
OL1691	PLT-115	Pole Climbing	30	OL1631
OL1851	PLT-120	Rigging, Hoisting and Lifting	30	OL1631
OL1771	PLT-125	Aerial Devices and Hydraulics	30	OL1631
OL1641	PLT-130	On- and Off-road Equipment	10	OL1631
OL1601	PLT-140	Traffic Control	4	None

Block I				
Course No.	**IPG No.**	**Course Name**	**Hours**	**Pre-Requisite(s)**
OL1130	PLT-145	Power and Energy	6	None
ER1140	PLT-150	DC Theory	30	None
ER1151	PLT-155	Series and Parallel DC Circuits	45	ER1140
OL1180	PLT-160	AC Theory	6	ER1151
OL1190	PLT-205	AC Circuits	24	OL1180
OL1240	PLT-210	Series and Parallel Circuits	10	OL1180
OL1791	PLT-165	Grounding and Bonding	30	OL1631 OL1180
OL1721	PLT-170	Conductors and Cables	30	None
OL1741	PLT-175	Sagging Conductors	10	OL1791 OL1721
OL1714	PLT-180	Single-Phase Circuits	10	OL1180 OL1791
OL1701	PLT-200	Drawings, Schematics and Specifications	15	None
OL1715	PLT-225	Distribution Lines	30	OL1714
OL1725	PLT-185	Overhead Distribution Structures	240	OL1691 OL1851 OL1701 OL1715
OL1835	PLT-230	Overhead Distribution Systems	30	OL1725
OL1140	PLT-215	Inductance and Capacitance	10	OL1180
OL1811	PLT-220	Transformers	30	OL1190

Block I				
Course No.	**IPG No.**	**Course Name**	**Hours**	**Pre-Requisite(s)**
OL1821	PLT-250	Street Lighting Systems	25	OL1190
OL1150	PLT-415	Transmission Systems	5	OL1190 ER1151
OL1781	PLT-420	Transmission Structures	5	OL1150
OL1160	PLT-400	Steel Structure Climbing	6	OL1150
OL1751	PLT-410	Tree Trimming	6	OL1631 OL1681
OL1170	PLT-405	Job Planning	6	OL1701
AP1101	-	Introduction to Apprenticeship	15	None
*AM1100	-	Math Essentials	30	None
AM1270	-	Powerline Technician Math Fundamentals	30	AM1100
CM2160	-	Communication Essentials	45	None
SD1760	-	Workplace Essentials	45	None
MC1060	-	Computer Essentials	15	None
OT1161	-	Workplace Exposure	60	None
		Total Hours	**1039**	

***A student who can meet the mathematics requirement through an ACUPLACER® test may be exempted from AM1100 - Math Essentials. Please check with your training institution**.

Required Work Experience

Block II				
Course No.	**IPG No.**	**Course Name**	**Hours**	**Pre-Requisite(s)**
OL2632	PLT-235	Underground Distribution Systems	120	Block I
OL2521	PLT-310	Three-Phase Circuits	60	Block I
OL2532	PLT-300	Transformer Banking	60	OL2521
		Total Hours	**240**	

Required Work Experience

Block III				
Course No.	**IPG No.**	**Course Name**	**Hours**	**Pre-Requisite(s)**
OL3700	PLT-240	Live Line Work	240	Block II
		Total Hours	**240**	

Required Work Experience

Block IV				
Course No.	**IPG No.**	**Course Name**	**Hours**	**Pre-Requisite(s)**
OL4000	PLT-305	Power Transformers	25	Block III
OL4010	PLT-315	Three-Phase Metering	30	Block III
OL4020	PLT-320	Voltage Regulation and Control Devices	30	Block III
OL4030	PLT-325	Line Protective Devices	60	Block III
OL4040	PLT-330	Line Capacitors	20	Block III
OL4050	PLT-425	Substations, Switching Stations and Terminals	60	Block III
OL4060	PLT-245	Single-Phase Metering	15	Block III

Total Hours	**240**

Total Course Credit Hours	**1759**

* **All entrants must have a valid Class 05 license prior to entry into the Powerline Technician program.**

BLOCK I

TS1510 Occupational Health and Safety

Learning Outcomes:

- Demonstrate knowledge of identifying how to prevent accidents and illnesses.
- Demonstrate knowledge of improving health and safety conditions in the workplace.

Duration: 6 Hours

Pre-Requisite(s): None

Objectives and Content:

1. Interpret the Occupational Health and Safety Act laws and regulations.
   i. explain the scope of the act
      - application of the act
      - Federal/Provincial jurisdictions
      - Canada Labour Code
      - rules and regulations
      - private home application
      - conformity of the Crown by the Act

2. Explain responsibilities under the Act & Regulations.
   i. duties of employer, owner, contractors, sub-contractors, employees, and suppliers

3. Explain the purpose of joint health and safety committees.
   i. formation of committee
   ii. functions of committee
   iii. legislated rights
   iv. health and safety representation
   v. reporting endangerment to health
   vi. appropriate remedial action
   vii. investigation of endangerment
   viii. committee recommendation
   ix. employer's responsibility in taking remedial action

4. Examine right to refuse dangerous work.
   i. reasonable grounds for refusal
   ii. reporting endangerment to health
   iii. appropriate remedial action
   iv. investigation of endangerment
   v. committee recommendation
   vi. employer's responsibility to take appropriate remedial action
   vii. action taken when employee does not have reasonable grounds for refusing dangerous work
   viii. employee's rights
   ix. assigning another employee to perform duties
   x. temporary reassignment of employee to perform other duties
   xi. collective agreement influences
   xii. wages and benefits

5. State examples of work situations where one might refuse work.

6. Describe discriminatory action.
   i. definition
   ii. filing a complaint procedure
   iii. allocated period of time a complaint can be filed with the Commission
   iv. duties of an arbitrator under the Labour Relations Act
   v. order in writing inclusion
   vi. report to commission Allocated period of time to request Arbitrator to deal with the matter of the request
   vii. notice of application
   viii. failure to comply with the terms of an order
   ix. order filed in the court

7. Explain duties of commission officers.
   i. powers and duties of officers
   ii. procedure for examinations and inspections
   iii. orders given by officers orally or in writing
   iv. specifications of an order given by an officer to owner of the place of employment, employer, contractor, sub-contractor, employee, or supplier
   v. service of an order
   vi. prohibition of persons towards an officer in the exercise of his/her power or duties
   vii. rescinding of an order
   viii. posting a copy of the order
   ix. illegal removal of an order

8. Interpret appeals of others.
   i. allocated period of time for appeal of an order
   ii. person who may appeal order
   iii. action taken by Commission when person involved does not comply with the order
   iv. enforcement of the order
   v. notice of application
   vi. rules of court

9. Explain the process for reporting of accidents.
    i. application of act
    ii. report procedure
    iii. reporting notification of injury
    iv. reporting accidental explosion or exposure
    v. posting of act and regulations

Practical Requirements:

1. Conduct an interview with someone in your occupation on two or more aspects of the act and report results.

2. Conduct a safety inspection of shop area.

TS1520 Workplace Hazardous Materials Information System (WHMIS)

Learning Outcomes:

- Demonstrate knowledge of interpreting and applying the Workplace Hazardous Materials Information System (WHMIS) Regulation under the Occupational Health and Safety Act.

Duration: 6 Hours

Pre-Requisite(s): None

Objectives and Content:

1. Define WHMIS safety.
   - i. rational and key elements
   - ii. history and development of WHMIS
   - iii. WHMIS legislation
   - iv. WHMIS implementation program
   - v. definitions of legal and technical terms

2. Examine hazard identification and ingredient disclosure.
   - i. prohibited, restricted and controlled products
   - ii. classification and the application of WHMIS information requirements
   - iii. responsibilities for classification
     - the supplier
     - the employer
     - the worker - Classification: rules and criteria
     - information on classification
     - classes, divisions and subdivision in WHMIS
     - general rules for classification
     - class A - compressed gases
     - class B - flammable and combustible materials
     - class C - oxidizing material
     - class D - poisonous and infectious material
     - class E - corrosive material
     - class F - dangerously reactive material

iv. products excluded from the application of WHMIS legislation
- consumer products
- explosives
- cosmetics, drugs, foods and devices
- pest control products
- radioactive prescribed substances
- wood or products made of wood
- manufactured articles
- tobacco or products of tobacco
- hazardous wastes
- products handled or transported pursuant to the Transportation of Dangerous Goods (TDG) Act

v. comparison of classification systems - WHMIS and TDG
vi. general comparison of classification categories
vii. detailed comparison of classified criteria

3. Explain labeling and other forms of warning.
i. definition of a WHMIS label
- supplier label
- workplace label
- other means of identification

ii. responsibility for labels
- supplier responsibility
- employer responsibility
- worker responsibility

iii. introduce label content, design and location
- supplier labels
- workplace labels
- other means of identification

4. Introduce material safety data sheets (MSDS).
i. definition of a material safety data sheet
ii. purpose of the data sheet
iii. responsibility for the production and availability of data sheets
- supplier responsibility
- employer responsibility
- workers responsibility

Practical Requirements:

1. Locate WHMIS label and interpret the information displayed.

2. Locate a MSDS sheet for a product used in the workplace and determine what personal protective equipment and other precautions are required when handling this product.

TS1530 Standard First Aid

Learning Outcomes:

- Demonstrate knowledge of recognizing situations requiring emergency action.
- Demonstrate knowledge of making appropriate decisions concerning first aid.

Duration: 14 Hours

Pre-Requisite(s): None

Practical Requirements:

1. Complete a **St. John Ambulance or Canadian Red Cross** Standard First Aid Certificate course.

OL1631 Safety

Learning Outcomes:

- Demonstrate knowledge of safety equipment, their applications, maintenance and procedures for use.
- Demonstrate knowledge of safe work practices.
- Demonstrate knowledge of regulatory requirements pertaining to safety.

Duration: 14 Hours

Pre-Requisite(s): None

Objectives and Content:

1. Identify types of personal protective equipment (PPE) and clothing and describe their applications and limitations.

2. Describe the procedures used to care for and maintain PPE.

3. Identify hazards and describe safe work practices.
   i. personal
   ii. workplace
      - biohazards (used needles)
      - energy state awareness (electrical and mechanical)
        - arc flash awareness
        - isolation and de-energizing procedures
        - equi-potential grounding and bonding
        - lockout / tag out
        - confined space awareness
        - rescue procedures
      - fire
      - heights
        - fall prevention and arrest
          - OH&S Regulations Part X – Section 139
        - rescue procedures
      - chemical / gas / radiation
      - asbestos

iii. environmental
- discharge/spills

4. Identify and describe workplace safety and health regulations.
   i. federal
      - Material Safety Data Sheets (MSDS)
      - Workplace Hazardous Material Information System (WHMIS)
      - Transportation of Dangerous Goods (TDG)
   ii. provincial/territorial
      - Occupational Health and Safety (OH&S)
   iii. municipal

Practical Requirements:

1. Inspect and perform air test on rubber gloves.

OL1681 Tools and Equipment

Learning Outcomes:

- Demonstrate knowledge of tools and equipment, their applications, maintenance and procedures for use.

Duration: 40 Hours

Pre-Requisite(s): OL1631

Objectives and Content:

1. Identify types of hand tools and describe their applications and procedures for use.

2. Describe the procedures used to inspect and maintain hand tools.

3. Identify types of power tools and describe their applications and procedures for use.
   i. electric (corded/cordless)
   ii. hydraulic
   iii. pneumatic
   iv. gas powered
   v. powder actuated

4. Describe the procedures used to inspect and maintain power tools.

5. Identify types of basic electrical measuring and test equipment and describe their general applications.

6. Describe the procedures used to inspect and maintain electrical measuring and test equipment.

7. Identify types of specialty live line tools (FRP) and cover up equipment (rubber and rigid).

Practical Requirements:

1. Safely use basic hand tools.

2. Safely use basic power tools.

3. Safely use electrical measuring and test equipment.

4. Inspect and perform basic maintenance and care of specialty live line tools (FRP) and cover up equipment (rubber and rigid).

5. Perform basic cuts with a chainsaw.

OL1250 Access Equipment

Learning Outcomes:

- Demonstrate knowledge of ladders, their applications, limitations and procedures for use.

Duration: 6 Hours

Pre-Requisite(s): OL1631

Objectives and Content:

1. Define terminology associated with ladders.

2. Identify hazards and describe safe work practices pertaining to ladders.
   i. fall prevention and arrest (set up, secure and stability of ladder)
   ii. fiberglass versus steel ladders around energized conductors

3. Identify codes and regulations pertaining to ladders.

4. Identify types of ladders and describe their characteristics and applications.
   i. extension
   ii. step

5. Describe the procedures used to erect and remove ladders.

6. Describe the procedures used to inspect, maintain, transport and store ladders.

Practical Requirements:

1. Safely set up and climb ladders.

OL1691 Pole Climbing

Learning Outcomes:

- Demonstrate knowledge of pole climbing, its applications, limitations and procedures for use.
- Demonstrate knowledge of pole climbing equipment, its applications, limitations and procedures for use.

Duration: 30 Hours

Pre-Requisite(s): OL1631

Objectives and Content:

1. Define terminology associated with pole climbing and equipment.

2. Identify hazards and describe safe work practices pertaining to pole climbing and equipment.
   i. fall prevention and arrest

3. Describe the procedures used to perform pole top rescues.

4. Identify codes and regulations pertaining to pole climbing equipment.
   i. training and certification requirements

5. Identify types of pole climbing equipment and describe their characteristics and applications.

6. Identify pole climbing equipment components and describe their characteristics and applications.
   i. spurs
   ii. belts
   iii. pole straps

7. Describe the procedures used to climb using climbing equipment.

8. Describe the procedures used to inspect, maintain and store climbing equipment and components.

Practical Requirements:

1. Climb poles using safe climbing practices.

2. Perform pole cut out test.

3. Perform pole top rescue.

OL1851 Rigging, Hoisting and Lifting

Learning Outcomes:

- Demonstrate knowledge of rigging, hoisting and lifting equipment, their applications, limitations and procedures for use.
- Demonstrate knowledge of basic rigging, hoisting and lifting techniques.

Duration: 30 Hours

Pre-Requisite(s): OL1631

Objectives and Content:

1. Define terminology associated with rigging, hoisting and lifting.

2. Identify hazards and describe safe work practices pertaining to rigging, hoisting and lifting.

3. Identify codes and regulations pertaining to rigging, hoisting and lifting.
   i. training and certification requirements

4. Interpret information pertaining to rigging, hoisting and lifting found on drawings and specifications.

5. Identify types of rigging, hoisting and lifting equipment and accessories and describe their applications and procedures for use.
   i. slings
   ii. wire/conductor grips
   iii. shackles
   iv. ropes
   v. cables
   vi. levers
   vii. pullers
   viii. block and tackles
   ix. chain jack, cable jack
   x. winches

6. Identify types of knots, hitches, splices and bends and describe their applications and the procedures used to tie them.

7. Describe the considerations when rigging, hoisting and lifting material/equipment.
   i. load characteristics
   ii. equipment and accessories
      - mechanical advantage
   iii. anchor points
   iv. sling angles

8. Describe the procedures used when rigging, hoisting and lifting material/equipment.

Practical Requirements:

1. Calculate the mechanical advantage of various blocks, sheaves and ropes.

2. Tie various knots, splices and hitches used in rigging.

OL1771 Aerial Devices and Hydraulics

Learning Outcomes:

- Demonstrate knowledge of aerial devices, their applications and operation.
- Demonstrate knowledge of basic hydraulic principles.
- Demonstrate knowledge of hydraulic equipment components, their applications and operation.

Duration: 30 Hours

Pre-Requisite(s): OL1631

Objectives and Content:

1. Define terminology associated with aerial devices.

2. Identify types of aerial devices and describe their applications.
   i. material handling
   ii. personnel lift
   iii. radial boom derricks

3. Identify hazards and describe safe work practices pertaining to aerial devices.
   i. working load limits (WLL) and safe working loads (SWL)
   ii. use of outriggers

4. Describe the procedures used to perform bucket evacuations and rescues.

5. Interpret codes, standards and regulations pertaining to aerial devices.
   i. training, certification and licensing requirements

6. Interpret information pertaining to aerial devices and hydraulic equipment found on drawings and specifications.

7. Identify tools and equipment relating to aerial devices and describe their applications and procedures for use.

8. Identify aerial device components and describe their functions.

9. Explain basic hydraulic principles and their applications relating to aerial devices.

10. Identify hydraulic equipment components and describe their purpose and operation.
    i. hydraulic cylinders
    ii. hydraulic valves
    iii. hydraulic hoses
    iv. hydraulic reservoirs

11. Describe the procedures used to ensure the work area is safe for operating aerial devices.
    i. supervision
    ii. securing work area
    iii. communication
        - hand signals (awareness of)
        - electronic communications
        - audible/visual

12. Describe the procedures used to operate aerial devices.

Practical Requirements:

1. Set up and operate various types of aerial devices.

2. Perform daily operational checks on hydraulic aerial devices and radial boom derrick vehicles.

OL1641 On- and Off-road Equipment

Learning Outcomes:

- Demonstrate knowledge of on- and off-road equipment, their applications, maintenance and operating procedures.

Duration: 10 Hours

Pre-Requisite(s): OL1631

Objectives and Content:

1. Define terminology associated with on- and off-road equipment.

2. Identify types of on- and off-road equipment and describe their characteristics and applications.
   - i. bucket trucks
     - material handling
     - personnel lift
   - ii. radial boom derricks
   - iii. off-road track machines
   - iv. hydro-vacuum excavators
   - v. all-terrain vehicles

3. Identify hazards and describe safe work practices pertaining to on- and off-road equipment.

4. Interpret codes, standards and regulations pertaining to on- and off-road equipment.
   - i. training, certification and licensing requirements
     - Air Brake Endorsement 9

5. Interpret information pertaining to on- and off-road equipment found in specifications.
   - i. load charts
   - ii. working load limits (WLL)/ safe working loads (SWL)

6. Identify tools and equipment relating to on- and off-road equipment and describe their applications and procedures for use.

7. Identify on- and off-road equipment components and accessories and describe their characteristics and applications.

8. Describe the procedures used to inspect and maintain on- and off-road equipment.

9. Describe the procedures used to operate on- and off-road equipment.

Practical Requirements:

None.

OL1601 Traffic Control

Learning Outcomes:

- Demonstrate knowledge of traffic control equipment, their applications, maintenance and procedures for use.
- Demonstrate knowledge of traffic control techniques and procedures.

Duration: 4 Hours

Pre-Requisite(s): None

Objectives and Content:

1. Define terminology associated with traffic control.

2. Identify hazards and describe safe work practices pertaining to traffic control.

3. Interpret codes, standards and regulations pertaining to traffic control.
   i. highway safety legislation

4. Identify tools and equipment relating to traffic control and describe their applications and procedures for use.

5. Identify the techniques used to control traffic.

6. Describe the procedures used to control traffic.

Practical Requirements:

None.

OL1130 Power and Energy

Learning Outcomes:

- Demonstrate knowledge of power and energy, their characteristics and associated principles.
- Demonstrate knowledge of units of measure and symbols relating power and energy.
- Demonstrate knowledge of the instruments and procedures used to measure power and energy.

Duration: 6 Hours

Pre-Requisite(s): None

Objectives and Content:

1. Define terminology associated with power and energy.

2. Explain mechanical power and energy.
   i. force
   ii. work
   iii. power
   iv. horsepower
   v. energy

3. Explain electrical power and energy.
   i. watt
   ii. kilowatt
   iii. kilowatt hour

4. Explain principles of efficiency.

5. Identify units of measure and symbols pertaining to power and energy.

6. Identify instruments used for measuring power and energy and describe their applications and procedures for use.

Practical Requirements:

1. Perform calculations to determine power and energy related values.

2. Use test instruments to verify calculations.

ER1140 DC Theory

Learning Outcomes:

- Demonstrate knowledge of direct current (DC) electricity, its characteristics and associated principles.
- Demonstrate knowledge of Ohm's law.
- Demonstrate knowledge of units of measure and symbols relating to DC electricity.
- Demonstrate knowledge of the instruments and procedures used to measure electricity.

Duration: 30 Hours

Pre-Requisite(s): None

Objectives and Content:

1. Identify hazards and describe safe work practices pertaining to DC electricity.

2. Describe the atomic structure of matter.
   - i. electron theory
     - matter
     - atoms
     - electric charge
     - protons, electrons, neutron
   - ii. static electricity and electrostatics
     - positive and negative charge
     - electrostatic field
     - transferring static electricity
       - conduction
       - induction
   - iii. discharging static charges
     - electrons in motion
     - causes of current
     - conductors, semi-conductors, insulators
     - electron current flow
     - conventional current flow

3. Identify electrical units of measure and symbols.
   i. absolute electrical units
      - current
      - voltage
      - resistance
   ii. prefixes for absolute units

4. Identify different forms of energy and describe the effects of dynamic electricity.
   i. different forms of energy to produce electricity
      - chemical action
      - piezoelectric effect
      - magnetism
      - heat
      - light and solar energy
      - friction
   ii. effects of dynamic electricity
      - heating effects
      - chemical effects
      - magnetic effects
      - psychological and physiological effects

5. Identify and analyze the components necessary for the assembly of an electric circuit.
   i. the electron path (conductors)
   ii. the load
   iii. the source
   iv. the control
   v. closed circuit
   vi. open circuit
   vii. short circuit

6. Identify and describe the three basic electrical properties.
   i. voltage
   ii. current
   iii. resistance

7. Explain Ohm's Law.

8. Describe the following in relation to electricity.
   i. work
   ii. power
   iii. joules and coulombs
   iv. electrical power (watt)
   v. combination of the Power formulas and Ohm's Law
   vi. watts and horsepower
   vii. BTU
   viii. kilowatt hours
      - meter reading and cost

9. Identify measuring instruments and describe their applications and procedures for use.
   i. ammeter
   ii. voltmeter
   iii. ohmmeter
   iv. multimeter
   v. circuit tester
   vi. continuity tester
   vii. megger

Practical Requirements:

1. Compute values of electrical energy and power.

2. Use electrical measuring instruments.

3. Use instruments to troubleshoot DC components
   i. closed circuit
   ii. open circuit
   iii. short circuit

4. Ensure calibration of measuring instruments in accordance with manufacturing specifications.

5. Conduct megger test.

ER1151 Series and Parallel DC Circuits

Learning Outcomes:

- Demonstrate knowledge of series, parallel and complex DC circuits, their characteristics and operation.
- Demonstrate knowledge of the procedures used to troubleshoot DC circuits.
- Demonstrate knowledge of the procedures used to analyze and measure DC circuit values.

Duration: 45 Hours

Pre-Requisite(s): ER1140

Objectives and Content:

1. Describe the characteristics of a series circuit and calculate values.
   i. Resistance
   ii. current
   iii. voltage
   iv. power
   v. open resistor
   vi. shorted resistor

2. Describe the characteristics of a parallel circuit and calculate values.
   i. resistance
   ii. current
   iii. voltage
   iv. power
   v. open resistor
   vi. shorted resistor

3. Identify hazards and describe safe practices pertaining to DC electricity.

4. Interpret information pertaining to DC circuits found on drawings and specifications.

5. Explain Kirchhoff's Laws.
   i. current law
   ii. voltage law

6. Describe the characteristics of a combination circuit and calculate values.

7. Describe the procedures used to troubleshoot series, parallel and complex DC circuits.

Practical Requirements:

1. Analyze and measure amperage and voltage in series DC circuits.

2. Analyze and measure amperage and voltage in parallel DC circuits.

3. Analyze and measure amperage and voltage in combination DC circuits.

4. Analyze and measure resistance and/or continuity in basic DC circuits.

5. Analyze and measure power consumption in basic DC circuits.

OL1180 AC Theory

Learning Outcomes:

- Demonstrate knowledge of alternating current (AC) electricity, its characteristics and associated principles.
- Demonstrate knowledge of units of measure and symbols relating to AC electricity.
- Demonstrate knowledge of the instruments and procedures used to measure electricity.

Duration: 6 Hours

Pre-Requisite(s): ER1151

Objectives and Content:

1. Define terminology associated with AC electricity.

2. Explain alternating current (AC).

3. Identify types of components found in AC circuits and describe their characteristics and applications.
   i. resistors
   ii. inductors
   iii. capacitors

4. Identify units of measure and symbols pertaining to AC electricity.

5. Identify electrical properties and describe their relationship.
   i. magnetism
   ii. electromagnetism

6. Identify instruments used for measuring electricity and describe their applications and procedures for use.

7. Explain the generation of alternating current.

Practical Requirements:

None.

OL1190 AC Circuits

Learning Outcomes:

- Demonstrate knowledge of AC circuits, their characteristics and operation.
- Demonstrate knowledge of the procedures used to troubleshoot AC circuits.
- Demonstrate knowledge of the procedures used to analyze and measure AC circuit values.

Duration: 24 Hours

Pre-Requisite(s): OL1180

Objectives and Content:

1. Define terminology associated with AC circuits.

2. Explain the characteristics and operation of AC circuits.

3. Identify hazards and describe safe work practices pertaining to AC electricity.

4. Identify types of AC circuits and describe their characteristics and operation.
   i. series-parallel
   ii. combination

5. Interpret information pertaining to AC circuits found on drawings and specifications.

6. Perform calculations to analyze and measure AC circuit related values.
   i. voltage
   ii. current
   iii. impedance

7. Explain vector representation as it applies to analyzing AC circuits.

8. Describe the procedures used to troubleshoot AC circuits.

9. Use instruments to troubleshoot AC circuits.

Practical Requirements:

1. Perform calculations to determine electricity and power related values.

2. Use electrical instruments to troubleshoot series and parallel AC circuits.

OL1240 Series and Parallel Circuits

Learning Outcomes:

- Demonstrate knowledge of series, parallel and combination circuits, their characteristics and operation.

Duration: 10 Hours

Pre-Requisite(s): OL1180

Objectives and Content:

1. Define terminology associated with series and parallel circuits.

2. Identify hazards and describe safe work practices pertaining to series and parallel circuits.

3. Explain the characteristics and operation of series circuits.

4. Explain the characteristics and operation of parallel circuits.

5. Explain the characteristics and operation of combination circuits.

6. Describe the procedures used to troubleshoot series, parallel and combination circuits.

Practical Requirements:

1. Perform calculations to determine series, parallel and combination circuit related values.

OL1791 Grounding and Bonding

Learning Outcomes:

- Demonstrate knowledge of grounding and bonding methods and equipment.
- Demonstrate knowledge of the procedures used to install, inspect and maintain grounding and bonding systems.

Duration: 30 Hours

Pre-Requisite(s): OL1631, OL1180

Objectives and Content:

1. Define terminology associated with grounding and bonding.

2. Identify hazards and describe safe work practices pertaining to grounding and bonding.

3. Interpret codes, standards and regulations pertaining to grounding and bonding.

4. Interpret information pertaining to grounding and bonding found on drawings and specifications.

5. Identify tools and equipment relating to grounding and bonding and describe their applications and procedures for use.

6. Identify methods of grounding and bonding.

7. Describe the theory for equi-potential grounding and bonding.

8. Identify grounding and bonding conductors (jumpers), equipment and components and describe their characteristics and applications.

9. Identify the considerations and requirements for selecting grounding and bonding conductors (jumpers), methods, equipment and components.

10. Describe the procedures used to install grounding and bonding systems.

11. Describe the procedures used to inspect and maintain grounding and bonding systems.

Practical Requirements:

1. Install system grounds.

2. Install safety grounding “EPZ” for working on various structures.

3. Install vehicle grounding.

OL1721 Conductors and Cables

Learning Outcomes:

- Demonstrate knowledge of conductors and cables and their associated components.
- Demonstrate knowledge of methods of cable protection and their applications.
- Demonstrate knowledge of the procedures used to mechanically protect and support cables.

Duration: 30 Hours

Pre-Requisite(s): None

Objectives and Content:

1. Define terminology associated with conductors and cables.

2. Identify hazards and describe safe work practices pertaining to conductors and cables.

3. Interpret utility standards pertaining to conductors and cables.

4. Interpret information pertaining to conductors and cables found on drawings and specifications.

5. Identify tools and equipment relating to conductors and cables and describe their applications and procedures for use.

6. Identify types of conductors and cables and describe their characteristics and applications.
   i. overhead
   ii. underground
   iii. marine
   iv. transmission

7. Identify conductor and cable components and accessories and describe their characteristics and applications.
   i. conductor connections
      - factors concerning conductor connections
      - contact resistance
      - creep
      - surface oxide
      - corrosion
      - thermal effects
   ii. splices
      - importance
      - types of splices
      - full tension splices
      - jumper splices (non-tension)
      - repair splices (non-tension)
      - service lead splices
      - types of sleeves
      - automatic tension splice
      - one piece sleeve
      - two piece sleeve
   iii. types of conductor vibration control equipment
      - aerolian
      - galloping

8. Identify methods of cable protection and describe their characteristics and applications.
   i. mechanical
   ii. electrical

9. Describe the procedures used to provide mechanical protection and support for cables.

10. Identify the considerations and requirements for selecting conductors and cables and their associated components and accessories.

Practical Requirements:

1. Select and use compression tools to complete a splice and connections.

2. Select and use explosive actuated tools to complete a splice and connections.

OL1741 Sagging Conductors

Learning Outcomes:

- Demonstrate knowledge of the effects of sagging on conductors.
- Demonstrate knowledge of the procedures used to sag conductors.

Duration: 10 Hours

Pre-Requisite(s): OL1791, OL1721

Objectives and Content:

1. Define terminology associated with sagging conductors.

2. Identify hazards and describe safe work practices pertaining to sagging conductors.

3. Interpret codes, standards and regulations pertaining to sagging conductors.

4. Interpret information and perform calculations pertaining to sagging conductors found on drawings and specifications.
   i. sag charts
   ii. weights and tensions

5. Identify tools and equipment relating to sagging conductors and describe their applications and procedures for use.

6. Explain the effects of sagging on conductors.

7. Identify types and sizes of conductors and describe their characteristics and applications.

8. Identify the considerations and requirements for selecting dead-ends for conductors.

9. Describe the procedures used to sag conductors.

Practical Requirements:

1. String, sag and tension primary conductors.

OL1714 Single-Phase Circuits

Learning Outcomes:

- Demonstrate knowledge of single-phase circuits, their characteristics and operation.
- Demonstrate knowledge of electromagnetic induction, its characteristics and applications.

Duration: 10 Hours

Pre-Requisite(s): OL1180, OL1791

Objectives and Content:

1. Define terminology associated with single-phase circuits.

2. Identify hazards and describe safe work practices pertaining to single-phase circuits.

3. Identify units of measure and symbols pertaining to single-phase circuits.

4. Identify the components of single-phase circuits and describe their applications and operation.

5. Explain electromagnetic induction and its effect on a circuit.
   i. self -induction
   ii. mutual induction

Practical Requirements:

1. Perform calculations pertaining to single-phase circuits.

OL1701 Drawings, Schematics and Specifications

Learning Outcomes:

- Demonstrate knowledge of drawings, schematics and specifications and their applications.
- Demonstrate knowledge of interpreting and extracting information from drawings, basic schematics and specifications.

Duration: 15 Hours

Pre-Requisite(s): None

Objectives and Content:

1. Define terminology associated with drawings, schematics and specifications.

2. Identify types of drawings and describe their applications.
   i. electrical
   ii. construction standards

3. Interpret and extract information from drawings.
   i. symbols and abbreviations

4. Interpret and extract information from basic schematics and specifications.

Practical Requirements:

None.

OL1715 Distribution Lines

Learning Outcomes:

- Demonstrate knowledge of primary and secondary distribution lines, their applications and operation.
- Demonstrate knowledge of primary and secondary distribution line components, their applications and operation.
- Demonstrate knowledge of the procedures used to install, inspect, maintain, repair, troubleshoot and test distribution lines.

Duration: 30 Hours

Pre-Requisite(s): OL1714

Objectives and Content:

1. Define terminology associated with distribution lines.

2. Identify hazards and describe safe work practices pertaining to distribution lines.

3. Interpret codes, standards and regulations pertaining to distribution lines.

4. Interpret information pertaining to distribution lines found on drawings and specifications.

5. Identify tools and equipment relating to distribution lines and describe their applications and procedures for use.

6. Explain the principles of electrical distribution.

7. Identify types of electrical distribution systems and describe their characteristics and applications.

8. Identify distribution line components and describe their purpose and operation.

9. Describe the procedures used to install primary and secondary lines and their components.
   i. conventional stringing (slack)
   ii. non-conventional stringing (tension)

10. Describe the procedures used to inspect and maintain primary and secondary distribution lines and their components.

11. Describe the procedures used to troubleshoot primary and secondary distribution lines.

12. Describe the procedures used to repair and test primary and secondary distribution lines and their components.

13. Describe basic distribution line design theory.

14. Identify basic electrical design requirements of primary and secondary distribution lines.

Practical Requirements:

None.

OL1725 Overhead Distribution Structures

Learning Outcomes:

- Demonstrate knowledge of distribution structures, their components and applications.
- Demonstrate knowledge of electrical distribution principles.
- Demonstrate knowledge of the procedures used to install and remove distribution structures, their components and accessories.
- Demonstrate knowledge of the procedures used to inspect, maintain, repair and test distribution structures.

Duration: 240 Hours

Pre-Requisite(s): OL1691, OL1851, OL1701, OL1715

Objectives and Content:

1. Define terminology associated with distribution structures.

2. Identify hazards and describe safe work practices pertaining to distribution structures.

3. Interpret codes, standards and regulations pertaining to distribution structures.

4. Interpret information pertaining to distribution structures found on drawings and specifications.

5. Identify tools and equipment relating to distribution structures and describe their applications and procedures for use.

6. Identify types of distribution structures and describe their characteristics and applications.
   i. single pole (with conductors only)
   ii. tangent
   iii. angle
   iv. dead-end
   v. take-off (or tap)
   vi. joint use construction
   vii. self-supporting poles
      - wood
      - steel
      - fiberglass
      - concrete
      - laminate

7. Identify distribution structure components and accessories and describe their characteristics and applications.

8. Identify types of distribution system components.
   i. pole mounted transformers
   ii. single-phase and three-phase switching points
   iii. capacitor banks
   iv. regulator banks
   v. reclosers
   vi. sectionalizers

9. Describe the procedures used to install and remove distribution structures, their components and accessories.

10. Describe the procedures used to repair and test distribution structures, their components and accessories.

11. Describe the procedures used to inspect and maintain distribution structures, their components and accessories.

Practical Requirements:

1. Install poles, anchors and guys.

2. Frame poles as per common utility standards.

3. String and sag primary conductors.

4. Install transformers and secondary conductors.

5. Install customer services.

6. Troubleshoot overhead distribution systems.

OL1835 Overhead Distribution Systems

Learning Outcomes:

- Demonstrate knowledge of overhead systems, their characteristics and applications.
- Demonstrate knowledge of overhead system construction principles.
- Demonstrate knowledge of the procedures used to install, connect, inspect, maintain, repair, troubleshoot and test overhead system components and accessories.

Duration: 30 Hours

Pre-Requisite(s): OL1725

Objectives and Content:

1. Define terminology associated with overhead systems.

2. Identify hazards and describe safe work practices pertaining to overhead systems.

3. Interpret codes, standards and regulations pertaining to overhead systems.

4. Interpret information pertaining to overhead systems found on drawings and specifications.

5. Identify tools and equipment relating to overhead systems and describe their applications and procedures for use.

6. Identify types of overhead systems and describe their applications.

7. Identify components and accessories used in overhead systems and describe their characteristics and applications.
   i. transformers
   ii. reclosers
   iii. capacitors
   iv. conductors
   v. system grounds
   vi. voltage regulators

8. Explain the principles of overhead system construction.

9. Describe the operating procedures for overhead systems.

10. Describe the procedures used to install and connect overhead systems, their components and accessories.

11. Describe the procedures used to troubleshoot overhead systems, their components and accessories.

12. Describe the procedures used to inspect and maintain overhead systems, their components and accessories.

13. Describe the procedures used to repair and test overhead systems, their components and accessories.

Practical Requirements:

None.

OL1140 Inductance and Capacitance

Learning Outcomes:

- Demonstrate knowledge of inductance and capacitance, their characteristics and associated principles.
- Demonstrate knowledge of how inductance and capacitance are encountered on the job.

Duration: 10 Hours

Pre-Requisite(s): OL1180

Objectives and Content:

1. Define terminology associated with inductance and capacitance.

2. Identify hazards and describe safe work practices pertaining to inductance and capacitance.

3. Explain the principles of inductance and capacitance.

4. Describe the importance of inductance and capacitance in AC circuits.
   i. series circuits
   ii. parallel circuits
   iii. combination circuits

5. Identify the effects of inductance and capacitance on transmission and distribution lines.
   i. skin effect
   ii. mutual induction
   iii. capacitive reactance
   iv. conductor impedance
   v. inductive reactance

6. Explain the effects of resonance as it pertains to inductance and capacitance.

Practical Requirements:

None.

OL1811 Transformers

Learning Outcomes:

- Demonstrate knowledge of transformer operating principles.
- Demonstrate knowledge of transformer components, their applications and operation.
- Demonstrate knowledge of the procedures used to install and maintain transformers.
- Demonstrate knowledge of managing hazardous materials associated with transformers.

Duration: 30 Hours

Pre-Requisite(s): OL1190

Objectives and Content:

1. Define terminology associated with transformers.

2. Identify hazards and describe safe work practices pertaining to transformers.

3. Interpret codes, standards and regulations pertaining to transformers.

4. Interpret information pertaining to transformers found on nameplates, drawings and specifications.

5. Identify tools and equipment relating to transformers and describe their applications and procedures for use.

6. Identify types of transformers and describe their applications.

7. Identify transformer components and describe their purpose and operation.
   i. core
   ii. windings
   iii. oil
   iv. bushings
   v. gaskets
   vi. tank
   vii. cover
   viii. taps and tap changer
   ix. mounting brackets
   x. switches

8. Explain transformer operating principles and their applications.

9. Describe the procedures used for paralleling single-phase transformers.

10. Explain transformer fusing principles and their applications relating to single-phase transformation.

11. Describe the procedures used to install and maintain transformers.

12. Describe the procedures used to manage oils and other petroleum products pertaining to transformers.

Practical Requirements:

1. Perform transformer load calculations.

OL1821 Street Lighting Systems

Learning Outcomes:

- Demonstrate knowledge of street lighting systems, their characteristics and applications.
- Demonstrate knowledge of the procedures used to install, connect, troubleshoot, inspect, maintain, repair and test street lighting systems.
- Demonstrate knowledge of the procedures used to store and dispose of ballasts, capacitors and lamps.

Duration: 25 Hours

Pre-Requisite(s): OL1190

Objectives and Content:

1. Define terminology associated with street lighting systems.

2. Identify hazards and describe safe work practices pertaining to street lighting systems.

3. Interpret codes, standards and regulations pertaining to street lighting systems.

4. Interpret information pertaining to street lighting systems found on drawings and specifications.

5. Identify tools and equipment relating to street lighting systems and describe their applications and procedures for use.

6. Identify types of street lighting systems and describe their characteristics and applications.

7. Identify street lighting system components and accessories and describe their characteristics and applications.

8. Identify considerations and requirements for selecting street lighting system components and accessories.

9. Describe the procedures used to install and connect street lighting systems, their components and accessories.

10. Describe the procedures used to troubleshoot street lighting systems, their components and accessories.

11. Describe the procedures used to inspect and maintain street lighting systems, their components and accessories.

12. Describe the procedures used to repair and test street lighting systems, their components and accessories.

13. Identify the hazards associated with the storage and disposal of ballasts, capacitors and lamps.

14. Describe the procedures used to store and dispose of ballasts, capacitors and lamps.

Practical Requirements:

1. Install and connect streetlights.

OL1150 Transmission Systems

Learning Outcomes:

- Demonstrate knowledge of transmission systems, their applications and operation.
- Demonstrate knowledge of electrical transmission principles.
- Demonstrate knowledge of procedures used in the grounding and bonding of transmission systems.

Duration: 5 Hours

Pre-Requisite(s): OL1190, ER1151

Objectives and Content:

1. Define terminology associated with transmission systems.

2. Identify hazards and describe safe work practices pertaining to transmission systems.

3. Interpret codes, standards and regulations pertaining to transmission systems.

4. Interpret information pertaining to transmission systems found on drawings and specifications.

5. Identify tools and equipment relating to transmission systems and describe their applications and procedures for use.

6. Identify types of transmission systems and describe their characteristics and applications.

7. Explain the principles of electrical transmission.

8. Identify transmission system components and describe their applications and operation.

9. Describe the procedures used to install transmission systems.
   i. tension stringing

10. Identify grounding and bonding requirements relating to transmission systems.

11. Describe the procedures used for temporary grounding and bonding of transmission systems.

12. Explain troubleshooting and repair procedures related to transmission systems.

Practical Requirements:

None.

OL1781 Transmission Structures

Learning Outcomes:

- Demonstrate knowledge of transmission structures, their components and applications.
- Demonstrate knowledge of the procedures used to inspect and maintain transmission structures.

Duration: 5 Hours

Pre-Requisite(s): OL1150

Objectives and Content:

1. Define terminology associated with transmission structures.

2. Identify hazards and describe safe work practices pertaining to transmission structures.

3. Interpret codes, standards and regulations pertaining to transmission structures.

4. Interpret information pertaining to transmission structures found on drawings and specifications.

5. Identify tools and equipment relating to transmission structures and describe their applications and procedures for use.

6. Identify types of transmission structures and describe their characteristics and applications.
   i. single pole
   ii. "H" – Frame
   iii. "H" – Frame with overhead ground wire
   iv. steel tower

7. Identify transmission structure components and accessories and describe their applications and operation.

8. Describe the procedures used to inspect and maintain transmission structures, their components and accessories.

Practical Requirements:

None.

OL1160 Steel Structure Climbing

Learning Outcomes:

- Demonstrate knowledge of steel structure climbing, steel structure climbing equipment, its applications, limitations and procedures for use.

Duration: 6 Hours

Pre-Requisite(s): OL1150

Objectives and Content:

1. Define terminology associated with steel structure climbing and equipment.

2. Identify hazards and describe safe work practices pertaining to steel structure climbing and equipment.
   i. fall prevention and arrest

3. Describe the procedures used to perform rescues on steel structures.

4. Identify codes and regulations pertaining to steel structure climbing equipment.
   i. training and certification requirements

5. Identify types of steel structure climbing equipment and describe their characteristics and applications.

6. Identify steel structure climbing equipment components and describe their characteristics and applications.
   i. tower harnesses
   ii. lanyards

7. Describe the procedures used to climb using climbing equipment.

8. Describe the procedures used to inspect, maintain and store climbing equipment and components.

Practical Requirements:

None.

OL1751 Tree Trimming

Learning Outcomes:

- Demonstrate knowledge of tree trimming equipment, their applications, maintenance and procedures for use.
- Demonstrate knowledge of the techniques and procedures used to trim trees.

Duration: 6 Hours

Pre-Requisite(s): OL1631, OL1681

Objectives and Content:

1. Define terminology associated with tree trimming.

2. Identify hazards and describe safe work practices pertaining to tree trimming.

3. Interpret guidelines, codes and regulations pertaining to tree trimming.

4. Identify tools and equipment relating to tree trimming and describe their applications and procedures for use.
   i. gas powered chain saws
   ii. hand saws
   iii. hydraulic saws
   iv. mechanical pruning equipment
   v. rigging

5. Identify the techniques used to trim trees.

6. Describe the procedures used to trim trees.

Practical Requirements:

None.

OL1170 Job Planning

Learning Outcomes:

- Demonstrate knowledge of the procedures used to plan and organize job tasks.

Duration: 6 Hours

Pre-Requisite(s): OL1701

Objectives and Content:

1. Identify sources of information relevant to planning job tasks.
   - i. Documentation
     - standard operating procedures (SOPs)
   - ii. drawings
   - iii. related professionals
   - iv. clients

2. Identify codes and regulations pertaining to job planning.

3. Describe the considerations to plan and organize job tasks.
   - i. permits
   - ii. risk assessments (tailboard)
   - iii. personnel
   - iv. tools and equipment
   - v. materials and supplies
   - vi. scheduling/sequencing
   - vii. environmental

Practical Requirements:

None.

AP1101 Introduction to Apprenticeship

Learning Outcomes:

- Demonstrate knowledge of how to become a registered apprentice.
- Demonstrate knowledge of the steps to complete an apprenticeship program.
- Demonstrate knowledge of various stakeholders in the apprenticeship process.
- Demonstrate knowledge of the Red Seal Program.

Duration: 15 Hours

Pre-Requisite(s): None

Objectives and Content:

1. Define the following terms:
   i. apprenticeship
   ii. apprentice vs. registered apprentice
   iii. Journeyperson vs. Certified Journeyperson
   iv. Certificate of Apprenticeship
   v. Certificate of Qualification
   vi. Recognition of Prior Learning
   vii. dual certification

2. Explain the apprenticeship system in Newfoundland and Labrador and the roles and responsibilities of those involved.
   i. registered apprentice
   ii. training institution
   iii. employer
   iv. Journeyperson
   v. Department of Advanced Education and Skills
      - Industrial Training Section
      - Standards and Curriculum Section
   vi. Provincial Trade Advisory Committees
   vii. Provincial Apprenticeship and Certification Board

3. Identify the Conditions Governing Apprenticeship.

4. Describe the training and educational requirements.
   i. pre-employment (entry level) training
   ii. block release
   iii. on-the-job

5. Explain the steps in the registered apprenticeship process.
   i. criteria for eligibility
      - entrance requirements as per Conditions of Apprenticeship
      - employment
   ii. registration process
      - application requirements
   iii. Memorandum of Understanding
      - probation period
      - cancellation
   iv. Record of Occupational Progress (Logbook)
      - signing off skills
      - recording hours
      - updating PDO on progress
   v. class calls
      - schedule
      - EI Eligibility
      - Direct Entry
      - advanced level
   vi. Block Exams
   vii. progression
      - schedule
      - wage rates
   viii. cancellation of apprenticeship
   ix. Practical Examinations
   x. Provincial and Interprovincial examinations
   xi. certification
      - Certification of Apprenticeship
      - Certification of Qualification
      - Provincial certification
      - Interprovincial Red Seal endorsement

6. Explain the Interprovincial Standards Red Seal Program.
   i. designated Red Seal trade
   ii. the National Occupational Analysis (NOA)
   iii. Interprovincial (IP) Red Seal Endorsement Examination
   iv. relationship of NOA to IP Examination
   v. qualification recognition and mobility

7. Identify the current financial incentives available to apprentices.

8. Explain the NL apprenticeship and trades certification division's out-of- province apprenticeship policy.

Practical Requirements:

1. Use the Provincial Apprenticeship and Trades Certification web site at www.gov.nl.ca/app to:
   i. locate, download, and complete the Application for Apprenticeship and Memorandum of Understanding (MOU)
   ii. locate, download, and complete the Out of Province registration forms
      - Application for Apprenticeship (out of province)
      - Letter of Understanding (LOU)
      - Acceptance of Conditions Letter
   iii. locate, download, and complete the Work Experience Credits form
   iv. identify the locations of all Industrial Training offices
   v. locate and review the following learning resources relevant to the trade:
      - Study Guide
      - Exam Preparation Guide
      - Plan of Training

2. Use a logbook for this trade to:
   i. identify the hours for the trade (in-school and on-the-job)
   ii. identify the number of blocks
   iii. identify the courses in each block
   iv. identify the workplace skills to be completed and verified

3. Use the Red Seal Web site, http://www.red-seal.ca to retrieve the National Occupational Analyses (NOA) for this trade.
   i. identify the following components of the NOA:
      - Trends
      - Scope
      - Key Competencies
      - Blocks
      - Tasks
      - Subtasks
      - Pie Charts
      - Table of Specifications

AM1100 Math Essentials

Note: It is recommended that AM1100 be delivered in the first semester of the Entry Level training program.

Learning Outcomes:

- Demonstrate knowledge of the numeracy skills required to begin the 2nd level math course.
- Demonstrate knowledge of mathematics as a critical element of the trade environment.
- Demonstrate knowledge of mathematical principles in trade problem solving situations.
- Demonstrate the ability to solve simple mathematical word problems.

Duration: 30 Hours

Pre-Requisite(s): None

Objectives and Content:

Wherever possible, the instructor should use trade specific examples to reinforce the course objectives

1. Use multiplication tables from memory.

2. Perform whole number operations.
   i. read, write, count, round off, add, subtract, multiply and divide whole numbers

3. Apply the order of operations in math problems.

4. Perform fraction and mixed number operations.
   i. read, write, add, subtract, multiply and divide fractions

5. Perform decimal operations.
   i. read, write, round off, add, subtract, multiply and divide decimals

6. Perform percent/decimal/fraction conversion and comparison.
   i. convert between fractions, decimals and percents

7. Perform percentage operations.
   i. read and write percentages
   ii. calculate base, rates and percentages

8. Perform ratio and proportion operations.
   i. use a ratio comparing two quantities with the same units
   ii. use a proportion comparing two ratios

9. Use the imperial measurement system in math problems.
   i. identify units of measurement for:
      - length
      - mass
      - area
      - volume
      - capacity

10. Use the metric measurement system in math problems.
    i. identify units of measurement for:
       - length
       - mass
       - area
       - volume
       - capacity

Practical Requirements:

1. To emphasize or further develop specific knowledge objectives, students will be asked to complete practical demonstrations which confirm proper application of mathematical theory to job skills.

AM1270 Powerline Technician Math Fundamentals

Learning Outcomes:

- Demonstrate knowledge of mathematical concepts in the performance of trade practices.
- Demonstrate knowledge of mathematics as a critical element of the trade environment.
- Demonstrate knowledge of solving mathematical word problems.
- Demonstrate knowledge of mathematical principles for the purposes of problem solving, job and materials estimation, measurement, calculation, system conversion, diagram interpretation and scale conversions, formulae calculations, and geometric applications.

Duration: 30 Hours

Pre-Requisite(s): AM1100

Objectives and Content:

The instructor is required to use trade specific examples to reinforce the course objectives.

1. Employ percent/decimal/fraction conversion and comparison in trade specific situations.

2. Apply ratios and proportions to trade specific problems.

3. Use the Imperial Measurement system in trade specific applications.

4. Use the Metric Measurement system in trade specific applications.

5. Complete Imperial/Metric conversions in trade specific situations.
   i. convert between imperial and metric measurements
   ii. convert to another unit within the same measurement system

6. Manipulate formulas using cross multiplication, dividing throughout, elimination, and substitution to solve trade specific problems, such as:
   i. right angle triangles
   ii. area
   iii. volume
   iv. perimeter

7. Perform calculations involving geometry that are relevant to the trade, such as:
   i. angle calculations
   ii. circle calculations

8. Use practical math skills to complete administrative trade tasks.
   i. material estimation
   ii. material costing
   iii. time & labour estimates
   iv. taxes & surcharges
   v. markup & projecting revenue

Practical Requirements:

1. To emphasize or further develop specific knowledge objectives, students will be asked to complete practical demonstrations which confirm proper application of mathematical theory to job skills.

Note:

This course has been designated as NON-TRANSFERABLE to other trades programs, and NOT ELIGIBLE FOR PRIOR LEARNING ASSESSMENT. Students completing training in this trade program are required to complete this math course.

CM2160 Communication Essentials

Learning Outcomes:

- Demonstrate knowledge of the importance of well-developed writing skills in the workplace and in career development.
- Demonstrate knowledge of the purpose of various types of workplace correspondence.
- Demonstrate knowledge of the principles of effective workplace writing.
- Demonstrate knowledge of standard formats for letters and memos.
- Demonstrate knowledge of principles related to writing effective letters and memos.
- Demonstrate the ability to prepare and deliver an oral presentation.
- Demonstrate knowledge of the importance of effective interpersonal skills in the workplace.

Duration: 45 Hours

Pre-Requisite(s): None

Objectives and Content:

Wherever possible, the instructor is expected to use trade specific examples to reinforce the course objectives.

1. Identify the principles for writing clear, concise, complete sentences and paragraphs which adhere to the conventions of grammar, punctuation, and mechanics.

2. Identify the principles of effective workplace writing.
   i. describe the value of well-developed writing skills to career success
   ii. discuss the importance of tone, and language or word choice in workplace communication, regardless of the circumstances
   iii. demonstrate an awareness of cultural differences when preparing workplace correspondence

iv. describe the writing process as it applies to workplace communication
- planning
- writing
- editing/revising

v. identify the parts of a business letter and memo, and when each should be used in the workplace

vi. identify the standard formats for business letters and memos

vii. identify guidelines for writing sample letters and memos which convey:
- acknowledgment
- routine request
- routine response
- complaint
- refusal
- persuasive request
- letters of appeal

3. Identify types of informal workplace documents.

i. identify types & purposes of reports
- incident
- process
- progress

ii. identify common trade specific forms

iii. describe primary and secondary methods used to gather information

iv. discuss the importance of accuracy and completeness in reports and forms

4. Identify the elements of presentations used in the workplace.

i. identify presentation types
- impromptu
- informative
- demonstration
- persuasive

ii. identify the components of an effective presentation
- eye contact
- body language
- vocal qualities
- audience analysis
- multimedia tools
- keeping on topic

5. Demonstrate an understanding of interpersonal communications in the workplace.
   i. identify listening techniques
   ii. demonstrate an understanding of group dynamics
   iii. describe the importance of contributing information and expertise in the workplace
   iv. describe the importance of respectful and open communication in the workplace
   v. identify methods to accept and provide feedback in a constructive and considerate manner
   vi. explain the role of conflict in a group to reach solutions

6. Identify acceptable workplace uses of communication technologies.
   i. cell / Smart Phone etiquette
   ii. voice mail
   iii. e-mail
   iv. teleconferencing / videoconferencing for meetings and interviews
   v. social networking
   vi. other emerging technologies

Practical Requirements:

1. Write well-developed, coherent, unified paragraphs.

2. Write sample letters and memos.

3. Write one short informal report.

4. Complete a selection of at least 3 trade-related forms.

5. Deliver an effective oral presentation.

SD1760 Workplace Essentials

Note: It is recommended that SD1760 be delivered in the second half of the Entry Level training program.

Learning Outcomes:

- Demonstrate knowledge of workplace essentials in the areas of meetings, unions, workers compensation, workers' rights, and human rights.
- Demonstrate knowledge of good customer service practices.
- Demonstrate knowledge of effective job search techniques.

Duration: 45 Hours

Pre-Requisite(s): None

Objectives and Content:

Wherever possible, the instructor is expected to use trade specific examples to reinforce the course objectives.

1. Identify common practices related to workplace meetings.
   i. identify and discuss meeting format and preparation required for a meeting
   ii. explain the purpose of an agenda
   iii. explain the expected roles, responsibilities, and etiquette of meeting participants

2. Define unions and identify their role in the workplace.
   i. identify the purpose of unions
   ii. identify a common union structure
   iii. identify the function of unions in this trade

3. Demonstrate an understanding of the Workers Compensation process.
   i. describe the aims, objectives, regulations and benefits of the Workplace Health, Safety and Compensation Commission
   ii. explain the role of the Workers Advisor
   iii. explain the internal review process

4. Demonstrate an understanding of workers' rights.
   i. define labour standards
   ii. identify regulations, including:
      - hours of work & overtime
      - termination of employment
      - minimum wages & allowable deductions
      - statutory holidays, vacation time, and vacation pay

5. Demonstrate an understanding of Human Rights issues.
   i. examine the Human Rights Code and explain the role of the Human Rights Commission
   ii. define harassment in various forms and identify strategies for prevention
      - direct
      - systemic
      - adverse effect
   iii. identify gender and stereotyping issues in the workplace
   iv. define basic concepts and terms related to workplace diversity including age, race, culture, religion, socio-economic status, and sexual orientation

6. Demonstrate an understanding of quality customer service.
   i. explain why quality service is important
   ii. identify barriers to quality customer service
   iii. identify customer needs & common methods for meeting them
   iv. identify and discuss the characteristics & importance of a positive attitude
   v. identify the importance of demonstrating good communication skills including body language, listening, questioning, and when using electronic communication devices
   vi. identify techniques for interacting with challenging customers to address complaints and resolve conflict

7. Demonstrate an understanding of effective job search techniques.
   i. identify and explain employment trends, opportunities, and sources of employment
   ii. identify and discuss essential skills for the trades as outlined by Human Resources and Skills Development Canada
   iii. review job ads and identify the importance of fitting qualifications to job requirements
   iv. identify the characteristics of effective resumes, the types of resumes, and principles of resume formatting
   v. identify the characteristics of an effective cover letter
   vi. identify the components of a portfolio, and discuss the value of establishing and maintaining a personal portfolio
   vii. identify the common characteristics of the job interview process:
      - pre-interview preparation
      - interview conduct
      - post-interview follow up

Practical Requirements:

1. Create a resume.

2. Create a cover letter.

3. Participate in a mock job interview.

MC1060 Computer Essentials

Learning Outcomes:

- Demonstrate knowledge of computer systems and their operation.
- Demonstrate knowledge of popular software packages and their applications.
- Demonstrate knowledge of security issues related to computers.

Duration: 15 Hours

Pre-Requisite(s): None

Objectives and Content:

Wherever possible, the instructor is expected to use trade specific examples to reinforce the course objectives.

1. Identify the major external components of a microcomputer system.
   i. input devices
   ii. output devices
   iii. central control unit

2. Use operating system software.
   i. start and quit a program
   ii. use the help function
   iii. use the find function
   iv. maximize and minimize a window
   v. use the task bar
   vi. adjust desktop settings such as screen savers, screen resolution, and backgrounds
   vii. shut down a computer

3. Perform file management commands.
   i. create folders
   ii. copy files and folders
   iii. move files and folders
   iv. rename files and folders
   v. delete files and folders

4. Use word processing software to create documents.
   i. enter text
   ii. indent and tab text
   iii. change text attributes (bold, underline, font, etc.)
   iv. change layout format (margins, alignment, line spacing)
   v. spell check and proofread
   vi. edit text
   vii. save document
   viii. print document
   ix. close document
   x. retrieve documents

5. Use spreadsheet software to create spreadsheets.
   i. enter data in cells
   ii. create formulas to add, subtract, multiply and divide
   iii. save spreadsheet
   iv. print spreadsheet
   v. close spreadsheet
   vi. retrieve spreadsheet

6. Access the Internet.
   i. access websites using the world wide web(www)
   ii. identify examples of web browsers
   iii. use search engines with common searching techniques
   iv. describe security issues

7. Use electronic mail.
   - i. describe e-mail etiquette
     - grammar and punctuation
     - privacy and legal issues when sharing and forwarding e-mail
     - work appropriate content
     - awareness of employer policies
   - ii. manage e-mail using the inbox, sent, and deleted folders
   - iii. send an e-mail message with attachment(s)
   - iv. print e-mail

Practical Requirements:

None.

OT1161 Workplace Exposure

Learning Outcomes:

- Demonstrate knowledge of theory and practical applications of trade skills, safe work practices, appropriate workplace behaviour, and time management through exposure to the trade in an authentic work environment.

NOTE: The pre-apprentice must be supervised at the workplace. Supervision staff must be appropriately qualified to undertake that role – preferably a certified Journeyperson for the trade.

Duration: 60 Hours

Pre-Requisite(s): None.

BLOCK II

OL2632 Underground Distribution Systems

Learning Outcomes:

- Demonstrate knowledge of underground systems, their characteristics and applications.
- Demonstrate knowledge of underground system construction principles.
- Demonstrate knowledge of the procedures used to install, splice and terminate conductors and cables.
- Demonstrate knowledge of the procedures used to install, connect, inspect maintain, troubleshoot, repair and test underground system components and accessories.

Duration: 120 Hours

Pre-Requisite(s): Block I

Objectives and Content:

1. Define terminology associated with underground systems.

2. Identify hazards and describe safe work practices pertaining to underground systems.

3. Interpret codes, standards and regulations pertaining to underground systems.

4. Interpret information pertaining to underground systems found on drawings and specifications.

5. Identify tools and equipment relating to underground systems and describe their applications and procedures for use.

6. Identify types of underground systems and describe their applications.
   i. radial
   ii. loop
   iii. network

7. Identify components and accessories used in underground systems and describe their characteristics and applications.
   i. cables
      - concentric neutral
      - non-shielded
      - shielded
   ii. cable protection
   iii. handling cable
   iv. system grounds
   v. duct systems
   vi. direct-buried systems
   vii. pad-mounted transformers

8. Explain the principles of underground system construction.

9. Describe the operating procedures for underground systems.

10. Describe the procedures used to install and connect underground systems, their components and accessories.

11. Describe the procedures used to troubleshoot underground systems, their components and accessories.

12. Describe the procedures used to inspect and maintain underground systems, their components and accessories.

13. Describe the procedures used to repair and test underground systems, their components and accessories.

14. Describe the procedures used to fish and install conductors and cables and their associated components and accessories.

15. Describe the procedures used to splice conductors and cables.

16. Describe the procedures used to cut, strip and terminate conductors and cables.

Practical Requirements:

1. Install duct systems.

2. Install primary and secondary underground cables and conductors.

3. Perform splices and terminations on underground cables and conductors.

4. Install underground residential distribution systems.

5. Operate and maintain residential distribution systems.

6. Perform operating procedures for switching in an underground system.

7. Use cable locating equipment.

8. Use fault locating equipment.

9. Operate and replace bay-o-net fuses.

OL2521 Three-Phase Circuits

Learning Outcomes:

- Demonstrate knowledge of three-phase circuits, their characteristics and applications.
- Demonstrate knowledge of three-phase connections.
- Demonstrate knowledge of three-phase electricity calculations.

Duration: 60 Hours

Pre-Requisite(s): Block I

Objectives and Content:

1. Define terminology associated with three-phase circuits.

2. Identify hazards and describe safe work practices pertaining to three-phase circuits.

3. Identify units of measure and symbols pertaining to three-phase power.

4. Explain three-phase power generation.

5. Identify the components of three-phase circuits and describe their applications and operation.

6. Identify types of three-phase connections and describe their applications and operation.
   i. delta
   ii. wye

7. Explain the relationship between voltage and current in three-phase connections.

8. Describe the procedures used to measure three-phase power.

9. Perform calculations for balanced and unbalanced loads.

10. Perform calculations pertaining to three-phase power.
    i. true power
    ii. apparent power
    iii. reactive power
    iv. power factor

Practical Requirements:

1. Use electrical test instruments to measure volts, amps and watts.

2. Use line test instruments to measure voltage and current on primary systems.

OL2532 Transformer Banking

Learning Outcomes:

- Demonstrate knowledge of transformer connection types, their applications and implications.
- Demonstrate knowledge of transformer fusing principles.
- Demonstrate knowledge of the procedures used to install, parallel and test transformer banks.

Duration: 60 Hours

Pre-Requisite(s): OL2521

Objectives and Content:

1. Define terminology associated with transformer banking.

2. Identify hazards and describe safe work practices pertaining to transformer banking.
   i. single phase circuits
   ii. operating single phase transformers in parallel
   iii. three-phase circuits
   iv. transformer bank with a delta primary
   v. transformer bank with an open-delta primary
   vi. transformers paralleled for single-phase service
   vii. single-phase transformers on a delta system
   viii. transformers connected wye-delta, isolated neutral
   ix. transformers connected open wye – open delta
   x. transformers connected wye-wye
   xi. single-phase transformers on a wye primary
   xii. accidental energization (back feed)
   xiii. electromagnetic coupling
   xiv. electrostatic charge

3. Interpret codes, standards and regulations pertaining to transformer banking.

4. Interpret information pertaining to transformer banking found on nameplates, drawings and specifications.

5. Identify tools and equipment relating to transformer banking and describe their applications and procedures for use.

6. Identify the considerations for selecting transformers to satisfy clients' needs.

7. Identify types of transformer connections and describe their applications.
   i. delta-delta
   ii. wye-wye
   iii. delta-wye
   iv. wye-delta
   v. open wye-open delta
      - transformer capacity

8. Explain transformer fusing principles and their applications relating to transformer banking.

9. Describe the procedures used for paralleling three-phase transformer banks.

10. Describe the procedures used to install transformer banks.

11. Identify types of tests pertaining to transformer banking.
   i. phase rotation

12. Describe the procedures used to perform tests on transformer banks.

Practical Requirements:

1. Connect and test various transformer connections.

2. Install and connect various transformer banks.

3. Use various measuring instrument.

4. Select proper transformer fusing.

5. Troubleshoot various transformer connections.

BLOCK III

OL3700 Live Line Work

Learning Outcomes:

- Demonstrate knowledge of the principles of live line work.
- Demonstrate knowledge of the procedures used to perform live line work.

Duration: 240 Hours

Pre-Requisite(s): Block II

Objectives and Content:

1. Define terminology associated with live line work.

2. Identify hazards and describe safe work practices pertaining to live line work.

3. Interpret codes, standards and regulations pertaining to live line work.

4. Interpret information pertaining to live line work found on drawings and specifications.

5. Identify tools and equipment used for live line work and describe their applications and procedures for use.
   i. rigging
   ii. tension stringing equipment

6. Interpret information and perform calculations pertaining to live line rigging.
   i. weights and tensions
   ii. working load limits (WLL)/ safe working loads (SWL)

7. Identify types of live line work and describe their applications.
   i. hot stick
   ii. rubber glove
   iii. bare hand

8. Identify line protection requirements relating to live line work.

9. Describe principles of live line work.

10. Describe the procedures used to perform live line work.
    i. cover-up
    ii. hot stick
    iii. rubber glove
    iv. bare hand

Practical Requirements:

1. Perform a Tailboard Conference.

2. Perform vehicle and equipment checks.

3. Perform insulator changes on various structure types using proper hot stick live line procedures.

4. Perform cross-arm changes on various structure types using proper hot stick live line procedures.

5. Set- up and use rigging and hoisting equipment specific to hot stick live line procedures.

6. Perform dielectric boom leakage test on aerial device for using rubber glove live line procedures.

7. Layout and set up proper rubber protective equipment, rigid cover-up as required, hot line tools, and proper rubber gloves.

8. Perform insulator changes on various structure types using proper rubber glove live line procedures.

9. Perform cross-arm changes on various structure types using proper rubber glove live line procedures.

BLOCK IV

OL4000 Power Transformers

Learning Outcomes:

- Demonstrate knowledge of power transformer operating principles.
- Demonstrate knowledge of power transformer components, their applications and operation.
- Demonstrate knowledge of the procedures used to install, inspect and maintain power transformers.

Duration: 25 Hours

Pre-Requisite(s): Block III

Objectives and Content:

1. Define terminology associated with power transformers.

2. Identify hazards and describe safe work practices pertaining to power transformers.

3. Interpret codes, standards and regulations pertaining to power transformers.

4. Interpret information pertaining to power transformers found on nameplates, drawings and specifications.

5. Identify tools and equipment relating to power transformers and describe their applications and procedures for use.

6. Identify types of power transformers and describe their applications.
   i. stationary
   ii. mobile

7. Identify power transformer components and describe their functions.

8. Identify types of power transformer connections and describe their applications.
   i. two-winding
   ii. autotransformer
   iii. tertiary

9. Explain power transformer operating principles and their applications.

10. Describe the procedures used to install power transformers.

11. Describe the procedures used to inspect and maintain power transformers.

Practical Requirements:

None.

OL4010 Three-Phase Metering

Learning Outcomes:

- Demonstrate knowledge of three-phase meters, their components and applications.
- Demonstrate knowledge of metering procedures.
- Demonstrate knowledge of the procedures used to remove and install three-phase meters.

Duration: 30 Hours

Pre-Requisite(s): Block III

Objectives and Content:

1. Define terminology associated with three-phase meters.

2. Identify hazards and describe safe work practices pertaining to three-phase meters.

3. Interpret codes, standards and regulations pertaining to three-phase meters.

4. Interpret information pertaining to three-phase meters found on drawings and specifications.

5. Identify tools and equipment relating to three-phase meters and describe their applications and procedures for use.

6. Identify types of three-phase meters and describe their applications.
   i. primary
   ii. secondary
   iii. self-contained
   iv. transformer rated
      - current transformers (CT)
      - potential transformers (PT)
      - test switches

7. Identify three-phase meter components and describe their functions.

8. Explain three-phase metering procedures.

9. Describe the procedures used to remove and install three-phase meters.

10. Describe the procedures to parallel three-phase systems.

Practical Requirements:

1. Perform various measurement tests at a meter test switch.

2. Perform various paralleling system procedures.

OL4020 Voltage Regulation and Control Devices

Learning Outcomes:

- Demonstrate knowledge of voltage regulation and control devices, their characteristics and applications.
- Demonstrate knowledge of the procedures used to install and operate voltage regulation and control devices.

Duration: 30 Hours

Pre-Requisite(s): Block III

Objectives and Content:

1. Define terminology associated with voltage regulation and control devices.

2. Identify hazards and describe safe work practices pertaining to voltage regulation and control devices.

3. Interpret codes, standards and regulations pertaining to voltage regulation and control devices.

4. Interpret information pertaining to voltage regulation and control devices found on drawings and specifications.

5. Identify tools and equipment relating to voltage regulation and control devices and describe their applications and procedures for use.

6. Identify voltage regulation and control devices and accessories and describe their characteristics and applications.
   i. shunt capacitors
   ii. series capacitors
   iii. tap changers
      - on-load
      - off-load
   iv. voltage regulators
      - induction
      - step
   v. auto boosters

7. Identify the considerations and requirements for selecting voltage regulation devices and accessories.

8. Describe the procedures used to install and operate voltage regulation and control devices, their components and accessories.

Practical Requirements:

1. Operate a regulator control panel.

2. Perform switching procedures to place a regulator 'in' service.

3. Perform switching procedures to remove a regulator 'from' service.

4. Perform voltage checks at a regulator control panel to determine proper operation.

OL4030 Line Protective Devices

Learning Outcomes:

- Demonstrate knowledge of protective devices, their characteristics and applications.
- Demonstrate knowledge of operating principles of protective devices.
- Demonstrate knowledge of the procedures used to install, operate, troubleshoot and inspect protective devices.

Duration: 60 Hours

Pre-Requisite(s): Block III

Objectives and Content:

1. Define terminology associated with protective devices.

2. Identify hazards and describe safe work practices pertaining to protective devices and those contained in substations.

3. Interpret codes, standards and regulations pertaining to protective devices.

4. Interpret information pertaining to protective devices found on drawings and specifications.

5. Identify tools and equipment relating to protective devices and describe their applications and procedures for use.

6. Identify types of protective devices and describe their characteristics and applications.
   i. air break devices (load breaking and non-load breaking)
      - fuses
      - sectionalizers
      - power fuses
   ii. oil devices
      - electronic reclosers
      - sectionalizers

iii. vacuum devices
iv. de-ionizing gas devices (SF6, circuit breaker)
v. lightning arrestors
vi. current limiting fuses

7. Identify protective device components and accessories and describe their characteristics and applications.

8. Explain the operating principles of protective devices.

9. Explain protective principles and their applications relating to line protection.

10. Explain the principles relating to protective device coordination.

11. Identify the considerations and requirements for selecting protective devices and accessories.

12. Describe the procedures used to install and operate protective devices, their components and accessories.

13. Describe the procedures used to troubleshoot protective devices, their components and accessories.

14. Describe the procedures used to inspect protective devices, their components and accessories.

Practical Requirements:

1. Perform a Tailboard Conference.

2. Operate various switches and protective devices as per manufacturer procedures.

3. Perform operations to remove switches and protective devices from service.

4. Perform proper operating procedures necessary to:
   i. place an EOR “in” service
   ii. remove an EOR “from” service
   iii. pick up “cold load” with an EOR

5. Close an EOR manually with the manual closing tool.

6. Place an EOR in “non-reclose” for a “hold-off” using both electronic and manual procedures.

OL4040 Line Capacitors

Learning Outcomes:

- Demonstrate knowledge of line capacitors, their characteristics and applications.
- Demonstrate knowledge of the procedures used to install, operate, protect, inspect and test line capacitors.
- Demonstrate knowledge of operating principles of line capacitors.

Duration: 20 Hours

Pre-Requisite(s): Block III

Objectives and Content:

1. Define terminology associated with line capacitors.

2. Identify hazards and describe safe work practices pertaining to line capacitors.

3. Interpret codes, standards and regulations pertaining to line capacitors.

4. Interpret information pertaining to line capacitors found on drawings and specifications.

5. Identify tools and equipment relating to line capacitors and describe their applications and procedures for use.

6. Identify types of line capacitors and describe their characteristics and applications.
   i. shunt connection
   ii. series connection

7. Identify line capacitor components and accessories and describe their characteristics and applications.

8. Describe the operating principles of line capacitors.

9. Identify the considerations and requirements for selecting line capacitors and accessories.

10. Describe the procedures used to install and operate line capacitors, their components and accessories.

11. Describe the procedures used to protect line capacitors, their components and accessories.

12. Describe the procedures used to inspect line capacitors, their components and accessories.

13. Describe the procedures used to test line capacitors, their components and accessories.

Practical Requirements:

1. Install capacitors in parallel and series connection.

2. Use proper procedures to remove capacitors from service.

OL4050 Substations, Switching Stations and Terminals

Learning Outcomes:

- Demonstrate knowledge of substations, switching stations and terminals, their characteristics and applications.
- Demonstrate knowledge of the procedures used to inspect and maintain substations, switching stations and terminals.

Duration: 60 Hours

Pre-Requisite(s): Block III

Objectives and Content:

1. Define terminology associated with substations, switching stations and terminals.

2. Identify hazards and describe safe work practices pertaining to substations, switching stations and terminals.

3. Interpret codes, standards and regulations pertaining to substations, switching stations and terminals.

4. Interpret information pertaining to substations, switching stations and terminals found on drawings and specifications.

5. Identify tools and equipment relating to substations, switching stations and terminals and describe their applications and procedures for use.

6. Identify types of substations, switching stations and terminals and describe their characteristics and applications.

7. Identify substation, switching station and terminal components and accessories and describe their operation.

8. Describe the procedures used to inspect and maintain substations, their components and accessories.

9. Describe the procedures used to inspect and maintain switching stations, their components and accessories.

10. Describe the procedures used to inspect and maintain terminals, their components and accessories.

11. Describe the procedures used to provide personnel protection while performing switching duties.

Practical Requirements:

1. Perform switching procedures, create switching orders and apply lock out / tag out procedures as required.

OL4060 Single-Phase Metering

Learning Outcomes:

- Demonstrate knowledge of single-phase meters, their components and applications.
- Demonstrate knowledge of metering procedures.
- Demonstrate knowledge of the procedures used to remove and install single-phase meters.

Duration: 15 Hours

Pre-Requisite(s): Block III

Objectives and Content:

1. Define terminology associated with single-phase meters.

2. Identify hazards and describe safe work practices pertaining to single-phase meters.

3. Interpret codes, standards and regulations pertaining to single-phase meters.

4. Interpret information pertaining to single-phase meters found on drawings and specifications.

5. Identify tools and equipment relating to single-phase meters and describe their applications and procedures for use.

6. Identify types of single-phase meters and describe their applications.
   i. primary
   ii. secondary
   iii. self-contained
   iv. transformer rated

7. Identify single-phase meter components and describe their functions.

8. Explain single-phase metering procedures.

9. Describe the procedures used to remove and install single-phase meters.

Practical Requirements:

1. Perform voltage checks.

2. Install, read, disconnect and reconnect meters.

D. Conditions Governing Apprenticeship Training

1.0 General

The following general conditions apply to all apprenticeship training programs approved by the Provincial Apprenticeship and Certification Board (PACB) in accordance with the *Apprenticeship Training and Certification Act (1999)*. If an occupation requires additional conditions, these will be noted in the specific Plan of Training for the occupation. In no case should there be a conflict between these conditions and the additional requirements specified in a certain Plan of Training. All references to Memorandum of Understanding will also apply to Letter of Understanding (LOU) agreements.

2.0 Entrance Requirements

2.1 Entry into the occupation as an apprentice requires:

Indenturing into the occupation by an employer who agrees to provide the appropriate training and work experiences as outlined in the Plan of Training.

2.2 Notwithstanding the above, each candidate must have successfully completed a high school program or equivalent, and in addition may be required to have completed certain academic subjects as specified in a particular Plan of Training. Mature students, at the discretion of the Director of Apprenticeship and Trades Certification, may be registered. A mature student is defined as one who has reached the age of 19 and who can demonstrate the ability and the interest to complete the requirements for certification.

2.3 At the discretion of the Director of Apprenticeship and Trades Certification, credit toward the apprenticeship program may be awarded to an apprentice for previous work experience and/or training as validated through prior learning assessment.

2.4 An Application for Apprenticeship form must be duly completed along with a Memorandum of Understanding as applicable to be indentured into an Apprenticeship. The Memorandum of Understanding must contain signatures of an authorized employer representative, the apprentice and an official representing the Provincial Apprenticeship and Certification Board to be valid.

2.5 A new Memorandum of Understanding must be completed for each change in an employer during the apprenticeship term.

3.0 Probationary Period

The probationary period for each Memorandum of Understanding will be six months or 900 employment credit hours. Within that period the memorandum may be terminated by either party upon giving the other party and the PACB one week notice in writing.

4.0 Termination of a Memorandum of Understanding

After the probationary period referred to in Section 3.0, the Memorandum of Understanding may be terminated by the PACB by mutual consent of the parties involved, or cancelled by the PACB for proper and sufficient cause in the opinion of the PACB, such as that stated in Section14.

5.0 Apprenticeship Progression Schedule, Wage Rates and Advanced Training Criteria

Progression Schedule

Powerline Technician (Operating) - 7200 Hours			
APPRENTICESHIP LEVEL AND WAGES			
Year	Wage Rate At This Level	Requirements for progression to next level of apprenticeship	When requirements are met, the apprentice will progress to…
1st	60 %	▪ Completion of Block 1 training ▪ Pass Block 1 exam ▪ Minimum 1800 hours of combined relevant work experience and training	2nd Year
2nd	70%	▪ Completion of Block 2 training ▪ Pass Block 2 exam ▪ Minimum 3600 hours of combined relevant work experience and training	3rd Year
3rd	80%	▪ Completion of Block 3 training ▪ Pass Block 3 exam ▪ Minimum 5400 hours of combined relevant work experience and training	4th Year
4th	90%	▪ Completion of Block 4 training ▪ Minimum 7200 hours of combined relevant work experience and training ▪ Sign-off of all workplace skills in apprentice logbook ▪ Pass certification exam	Journeyperson Certification

Wage Rates

- Rates are percentages of the prevailing journeyperson's wage rate in the place of employment of the apprentice.
- Rates must not be less than the wage rate established by the Labour Standards Act (1990), as now in force or as hereafter amended, or by other order, as amended from time to time replacing the first mentioned order.
- Rates must not be less than the wage rate established by any collective agreement which may be in force at the apprentice's workplace.
- Employers are free to pay wage rates above the minimums specified.

Block Exams

- This program may **not** currently contain Block Exams, in which case this requirement will be waived until such time as Block Exams are available.

Powerline Technician (Operating) - 7200 Hours		
CLASS CALLS		
Call Level	Requirements for Class Call	Hours awarded for In-School Training
Direct Entry Apprentice: PLA & / or Block 1	▪ Minimum of 1000 hours of relevant work experience ▪ Prior Learning Assessment (PLA) at designated college (if applicable)	To be determined by the number of courses completed after each class call
Block 2	▪ Minimum of 3000 hours of relevant work experience and training	240
Block 3	▪ Minimum of 5200 hours of relevant work experience and training	240
Block 4	▪ Minimum of 7000 hours of relevant work experience and training	240

Direct Entry Apprentice

- Must complete Block 1 courses through PLA and / or in-school training.
- Block 1 training is to be completed via class calls; up to 16 weeks of training per calendar year.
- Must attend in-school training until Block 1 is complete before attending Blocks 2 or higher

Class Calls at Minimum Hours

- Class calls may not always occur at the minimum hours indicated. Some variation is permitted to allow for the availability of training resources and apprentices.

6.0 Tools

Apprentices shall be required to obtain their own hand tools applicable for the designated occupation of registration or tools as specified by the PACB.

7.0 Periodic Examinations and Evaluation

7.1 Every apprentice shall submit to such occupational tests and examinations as the PACB shall direct. If after such occupational tests and examinations the apprentice is found to be making unsatisfactory progress, his/her apprenticeship level and rate of wage shall not be advanced as provided in Section 5 until his/her progress is satisfactory to the Director of Apprenticeship and Trades Certification and his/her date of completion shall be deferred accordingly. Persistent failure to pass required tests shall be a cause for revocation of his/her Memorandum of Understanding.

7.2 Upon receipt of reports of accelerated progress of the apprentice, the PACB may shorten the term of apprenticeship and advance the date of completion accordingly.

7.3 For each and every course, a formal assessment is required for which 70% is the pass mark. A mark of 70% must be attained in both the theory examination and the practical project assignment, where applicable as documented on an official transcript.

7.4 Course credits may be granted through the use of a PACB approved matrix which identifies course equivalencies between designated trades and between current and historical Plans of Training for the same trade.

8.0 Granting of Certificates of Apprenticeship

Upon the successful completion of apprenticeship, the PACB shall issue a Certificate of Apprenticeship.

9.0 Hours of Work

Any hours employed in the performance of duties related to the designated occupation will be credited towards the completion of the term of apprenticeship. Appropriate documentation of these hours must be provided.

10.0 Copies of the Registration for Apprenticeship

The Director of Apprenticeship and Trades Certification shall provide copies of the Registration for Apprenticeship form to all signatories to the document.

11.0 Ratio of Apprentices to Journeypersons

Under normal practice, the ratio of apprentices to journeypersons shall not exceed two apprentices to every one journeyperson employed. Other ratio arrangements would be determined and approved by the PACB.

12.0 Relationship to a Collective Bargaining Agreement

Where applicable in Section 5 of these conditions, Collective Agreements take precedence.

13.0 Amendments to a Plan of Apprenticeship Training

A Plan of Training may be amended at any time by the PACB.

14.0 Employment, Re-Employment and Training Requirements

14.1 The Plan of Training requires apprentices to regularly attend their place of employment.

14.2 The Plan of Training requires apprentices to attend training for that occupation as prescribed by the PACB.

14.3 Failure to comply with Sections 14.1 and/or 14.2 will result in cancellation of the Memorandum of Understanding. Apprentices may have their MOUs reinstated by the PACB but would be subject to a commitment to complete the entire program as outlined in the General Conditions of Apprenticeship. Permanent cancellation in the said occupation is the result of non-compliance.

14.4 Cancellation of the Memorandum of Understanding to challenge journeyperson examinations, if unsuccessful, would require an apprentice to serve a time penalty of two (2) years before reinstatement as an apprentice or qualifying to receive a class call to training as a registered Trade Qualifier. Cancellation must be mutually agreed upon by the employer and the apprentice.

14.5 An employer shall ensure that each apprentice is under the direct supervision of an approved journeyperson supervisor who is located at the same worksite as the apprentice, and that the apprentice is able to communicate with the journeyperson with respect to the task, activity or function that is being supervised.

14.6 Under the Plan of Training the employer is required to keep each apprentice employed as long as work is available, and if the apprentice is laid off due to lack of work, to give first opportunity to be hired before another is hired.

14.7 The employer will permit each apprentice to attend training programs as prescribed by the PACB.

14.8 Apprentices who cannot acquire all the workplace skills at their place of employment will have to be evaluated in a simulated work environment at a PACB authorized training institution and have sign-off done by instructors to meet the requirements for certification.

15.0 Appeals to Decisions Based on Conditions Governing Apprenticeship Training

Persons wishing to appeal any decisions based on the above conditions must do so in writing to the Minister of Advanced Education and Skills within 30 days of the decision.

E. Requirements for Red Seal Endorsement

1. Evidence the required work experiences outlined in this Plan of Training have been obtained. This evidence must be in a format clearly outlining the experiences and must be signed by an appropriate person or persons attesting that these experiences have been obtained to the level required.

2. Successful completion of all required courses in the program.

3. A combination of training from an approved training program and suitable work experience totaling 7200 hours.

   Or

   A total of 9000 hours of suitable work experience.

4. Completion of a National Red Seal examination, to be set at a place and time determined by the Apprenticeship and Trades Certification Division.

F. Roles and Responsibilities of Stakeholders in the Apprenticeship Process

The apprenticeship process involves a number of stakeholders playing significant roles in the training of apprentices. This section outlines these roles and the responsibilities resulting from them.

The Apprentice:

- completes all required technical training courses as approved by the PACB.
- finds appropriate employment.
- completes all required work experiences in combination with the required hours.
- ensures work experiences are well documented.
- approaches apprenticeship training with an attitude and commitment that fosters the qualities necessary for a successful career as a qualified journeyperson.
- obtains the required hand tools as specified by the PACB for each period of training of the apprenticeship program.

The Employer:

- provides high quality work experiences in an environment conducive to learning.

- remunerates apprentices as set out in the Plan of Training or Collective Agreements.

- provides feedback to training institutions, Apprenticeship and Trades Certification Division and apprentices in an effort to establish a process of continuous quality improvement.

- where appropriate, releases apprentices for the purpose of returning to a training institution to complete the necessary technical courses.

- ensures work experiences of the apprentice are documented.

- ensures a certified journeyperson is currently on staff in the same trade area as the apprentice and whose certification is recognized by the NL Department of Advanced Education and Skills.

The Training Institution:

- provides a high quality learning environment.

- provides the necessary student support services that will enhance an apprentice's ability to be successful.

- participates with other stakeholders in the continual updating of programs.

The Apprenticeship and Trades Certification Division:

- establishes and maintains program advisory committees under the direction of the PACB.
- promotes apprenticeship training as a viable career option to prospective apprentices and other appropriate persons involved, such as career guidance counsellors, teachers, parents, etc.
- establishes and maintains a protocol with training institutions, employers and other appropriate stakeholders to ensure the quality of apprenticeship training programs.
- ensures all apprentices are appropriately registered and records are maintained as required.
- schedules all necessary technical training periods for apprentices to complete requirements for certification.
- administers block, provincial and interprovincial examinations.

The Provincial Apprenticeship and Certification Board:

- sets policies to ensure the provisions of the *Apprenticeship and Certification Act (1999)* are implemented.
- ensures advisory and examination committees are established and maintained.
- accredits institutions to deliver apprenticeship training programs.
- designates occupations for apprenticeship training and/or certification.