



NOVA SCOTIA  
**APPRENTICESHIP**  
AGENCY

# **NOVA SCOTIA**

# **CURRICULUM STANDARD**

# **COMMUNICATIONS**

# **TECHNICIAN**

Based on the 2023 Nova Scotia Occupational Standard

# **Nova Scotia Apprenticeship Curriculum Standard**

## **Communications Technician**

## Preface

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This Nova Scotia Curriculum Standard (NSCS) is intended to assist instructional staff in the design and delivery of technical, in-class training in support of the apprenticeship program.

This NSCS contains all the technical training elements required to complete the apprenticeship program and has been developed based on the 2024 Nova Scotia Occupational Standard (NSOS) for the trade.

Implementation of the NSCS for Apprenticeship training is outlined in the following table.

Level	Implementation Effective
Level 1	TBD
Level 2	TBD

The above implementation schedule was current at time of publication.

Granting of credit or permission to challenge level examinations (if applicable) for pre-apprenticeship training for this trade will be based on the content outlined in this standard. Training providers must contact the Nova Scotia Apprenticeship Agency for more information on the process and requirements for determining eligibility for credit towards an apprenticeship program.

## Acknowledgements

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## User Guide

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Nova Scotia Curriculum Standards (NSCS) are developed based on Red Seal Occupational Standards (RSOS) or Nova Scotia Occupational Standards (NSOS) and industry consultation. This document represents the minimum content to be delivered as part of the apprenticeship program for this trade.

The NSCS documents are purposefully constructed for ease of use and flexibility of structure in order to adapt to all delivery requirements. They detail units of training, unit outcomes and objectives. They do not impose a delivery model or teaching format.

Training providers will select and develop delivery materials and techniques that accommodate a variety of learning styles and delivery patterns. The NSCS does not dictate study materials, textbooks or learning activities to be used in delivery.

This document includes a Level Structure to facilitate mobility for apprentices moving from one jurisdiction to another.

### **Structure**

The content of the NSCS is divided into units. Unit codes are used as a means of identification and are not intended to convey the order of delivery. It is at the discretion of the training provider to deliver the content in the required logical sequence of delivery within the level. Units may be delivered one at a time or concurrently within a level, provided all outcomes are met.

The Learning Outcomes describe what the apprentice should know or be able to do at the end of training. Wording of the Learning Outcomes, “Demonstrate knowledge of...” acknowledges the broad spectrum of ways in which knowledge can be assessed (i.e. practical projects, multiple choice testing, presentations, etc.) by instructional staff within the training.

## User Guide (cont'd)

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The Occupational Standard (OS) to Curriculum Comparison chart maps the OS trade skills/sub-tasks to the curriculum standard.

Each unit of training in the curriculum standard lists both theoretical and practical objectives, which represent the minimum content that must be covered during technical training. Detailed content/bulleted lists for each objective have not been developed. Where detail is required for clarity, content has been provided.

The practical objectives represent the tasks/skills that apprentices must be exposed to during technical training. An individual or group performance of the task/skill is recommended; if not possible, an instructor demonstration is acceptable. Training Providers should use practical, hands-on learning whenever possible, whether identified in the curriculum standard as a practical objective or not.

Each unit also provides suggested hours (a guide only), which can be adjusted for apprentice learning, delivery methods, practical/hands-on learning, examinations, registration, holidays, storm days, etc.

## Glossary of Terms

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These definitions are intended as a guide to how language is used in the document.

<b>ADJUST</b>	To put in good working order; regulate; bring to a proper state or position.
<b>APPLICATION</b>	The use to which something is put and/or the circumstance in which an individual would use it.
<b>CHARACTERISTIC</b>	A feature that helps to identify, tell apart or describe recognizably; a distinguishing mark or trait.
<b>COMPONENT</b>	A part that can be separated from or attached to a system; a segment or unit.
<b>DEFINE</b>	To state the meaning of (a word, phrase, etc.).
<b>DESCRIBE</b>	To give a verbal account of; tell about in detail.
<b>EXPLAIN</b>	To make plain or clear; illustrate; rationalize.
<b>IDENTIFY</b>	To point out or name objectives or types.
<b>INTERPRET</b>	To translate information from observation, charts, tables, graphs and written material.
<b>MAINTAIN</b>	To keep in a condition of good repair or efficiency.
<b>METHOD</b>	A means or manner of doing something that has procedures attached to it.
<b>OPERATE</b>	How an object works; to control or direct the functioning of.
<b>PROCEDURE</b>	A prescribed series of steps taken to accomplish an end.
<b>PURPOSE</b>	The reason for which something exists or is done, made or used.



## Glossary of Terms (cont'd)

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<b>SERVICE</b>	<p>Routine inspection and replacement of worn or deteriorating parts.</p> <p>An act or business function provided to a customer in the course of an individual's profession (e.g., haircut).</p>
<b>TECHNIQUE</b>	<p>Within a procedure, the manner in which technical skills are applied.</p>
<b>TEST</b>	<p>v. To subject to a procedure that ascertains effectiveness, value, proper function or other quality.</p> <p>n. A way of examining something to determine its characteristics or properties, or to determine whether or not it is working correctly.</p>
<b>TROUBLESHOOT</b>	<p>To follow a systematic procedure to identify and locate a problem or malfunction and its cause.</p>

## Essential Skills Profiles/Skills for Success

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Through extensive research, the Government of Canada and other national and international agencies have identified and validated key essential skills for the workplace. These skills are used in nearly every job and at different levels of complexity. They provide the foundation for learning all other skills and enable people to evolve with their jobs and adapt to workplace change. In response to the evolving labour market and changing skill needs, in 2021 the Government of Canada launched a new **Skills for Success** model. Information can be found at:

<https://www.canada.ca/en/services/jobs/training/initiatives/skills-success/new-model.html>

The Employment and Social Development Canada (ESDC) website provides information about the Skills for Success, including:

- a brief description of the skills;
- why the skill is important;
- tools to help you improve on each of the skills, and
- videos to help you improve on each of the skills.

This information can be found at: <https://www.jobbank.gc.ca/essentialskills>

Skills for Success training tools can be found at:

<https://www.canada.ca/en/services/jobs/training/initiatives/skills-success/tools.html>

The development and improvement of these Skills for Success is inherent throughout the apprenticeship training program as apprentices work towards achieving journey person status.

## Level Structure

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### Level 1, 8 Weeks (240 hrs)

Code	Unit Title	Hrs*	Pg	Practical Objectives*
CMT-100	Safety	6	N/A	
CMT 105	Tools and Equipment	6	N/A	
CMT-110	Access Equipment	6	N/A	
CMT-115	Lifting Equipment	6		1. Tie knots. 2. Perform standard hand signals.
CMT-120	Trade Math	12	N/A	
CMT-125	Introduction to Canadian Electrical Code	6		1. Locate and interpret information in the CEC.
CMT-130	Introduction to Cabling Standards	30	N/A	
CMT-135	Trade Documentation	6	N/A	
CMT-140	Drawings and Specifications	18		1. Interpret information found on drawings and specifications.
CMT-145	Basic Electricity	30	N/A	
CMT-150	Cable Plant Architecture I	42	N/A	
CMT-155	Telephony	30	N/A	
CMT-160	Grounding and Bonding	6	N/A	
CMT-165	Conductors and Cables	6		1. Install, splice and terminate conductors and cables.
CMT-170	Conduit, Tubing and Fittings	6	N/A	
CMT-175	Boxes and Enclosures	6	N/A	
CMT-180	Introduction to Communication Systems	6	N/A	
CMT- 185	Environmental and Hazardous Installations	6	N/A	
MENT-700	Mentoring I	6	N/A	

**Level 2, 8 Weeks (240 hrs)**

Code	Unit Title	Hrs*	Pg	Practical Objectives*
MENT-701	Mentoring II	6	N/A	
CMT-200	Network Fundamentals	24		1. Construct a simple LAN.
CMT-205	Cable Plant Architecture II	42	N/A	
CMT-210	Voice Networks	18		1. Plan out a multi-media meeting room (incorporating projectors, screens, speakers and sight lines).
CMT-215	IP Telephony and Unified Communications	12		1. Implement QoS on an IP telephony VLAN.
CMT-220	Fibre Optics	30		1. Install fibre connectors. 2. Prepare fibre optic cable. 3. Install fibre optic connectors. 4. Inspect and rectify connector loss. 5. Perform fusion splicing.
CMT-225	Wireless Systems	30	N/A	
CMT-230	Commissioning and Decommissioning	12	N/A	
CMT-235	Job Planning	6	N/A	
CMT-240	Security and Surveillance Systems	6	N/A	
CMT-245	VDV, IPTV and CATV Systems	9	N/A	
CMT-250	Public Address, Mass Notification and Intercom Systems	3	N/A	
CMT-255	Nurse Call Systems	3	N/A	
CMT-260	Audio Visual Systems	3	N/A	
CMT-265	Building Automation Systems	6	N/A	
CMT-270	Program Review	30	N/A	

**\*Hours:** The time it should take to cover the unit (a guide only).

**\*Practical Objectives:** The tasks/skills apprentices must be exposed to during the technical training. An individual or group performance of the task/skill is recommended; if not possible, an instructor demonstration is acceptable. Training Providers should use practical, hands-on learning whenever possible, whether identified in the curriculum as a practical objective or not.

## 2023 Occupational Standard Sub-task to Curriculum Unit Comparison

NSOS Sub-task		Unit of Training	
<b>Task A-1 – Performs safety-related functions</b>			
A-1.01	Uses personal protective equipment (PPE) and safety equipment	CMT-100	Safety
A-1.02	Maintains a safe worksite	CMT-100	Safety
A-1.03	Performs lock-out and tag-out procedures	CMT-100	Safety
A-1.04	Performs access and egress procedures	CMT-100	Safety
<b>Task A-2 – Uses tools and equipment</b>			
A-2.01	Uses hand, portable power and specialty tools	CMT-105	Tools and Equipment
A-2.02	Uses access equipment	CMT-110	Access Equipment
A-2.03	Uses lifting equipment	CMT-115	Lifting Equipment
<b>Task A-3 – Organizes work</b>			
A-3.01	Interprets plans, drawings and specifications.	CMT-140	Drawings and Specifications
A-3.02	Organizes materials and supplies	CMT-235	Job Planning
A-3.03	Plans project tasks and procedures	CMT-235	Job Planning
A-3.04	Prepares Worksite	CMT-235	Job Planning
<b>Task A-4 – Installs support components</b>			
A-4.01	Installs brackets, hangers and fasteners	CMT-165	Conductors and Cables
A-4.02	Installs seismic restraint systems	CMT-165	Conductors and Cables
<b>Task A-5 – Commissions and decommissions communication and associated systems</b>			
A-5.01	Performs commissioning of communication and associated systems	CMT-230	Commissioning and Decommissioning
A-5.02	Performs decommissioning of communication and associated systems	CMT-230	Commissioning and Decommissioning

NSOS Sub-task		Unit of Training	
<b>Task A-6 – Performs labelling, testing and documentation</b>			
A-6.01	Labels communication and associated systems	CMT-135	Trade Documentation.
A-6.02	Tests communication and associated systems	CMT-155	Telephony
		CMT-205	Cable Plant Architecture II
		CMT-215	IP Telephony and Unified Communications
		CMT-220	Fibre Optics
		CMT-240	Security and Surveillance Systems
		CMT-245	VDV, IPTV and CATV Systems
		CMT-250	Public Address, Mass Notification and Intercom Systems
		CMT-255	Nurse Call Systems
		CMT-260	Audio Visual Systems
A-6.03	Performs final inspection of communication and associated systems	CMT-235	Job Planning
A-6.04	Completes documentation	CMT-135	Trade Documentation
<b>Task A-7 – Uses communication and mentoring techniques</b>			
A-7.01	Uses communication techniques	MENT-700	Mentoring I
		MENT-701	Mentoring II
A-7.02	Uses mentoring techniques	MENT-700	Mentoring I
		MENT-701	Mentoring II
<b>Task B-8 – Lays out and creates cable pathways (inside plant)</b>			
B-8.01	Lays out and installs cable management and support systems inside plant	CMT-150	Cable Plant Architecture I
		CMT-165	Conductors and Cables
B-8.02	Creates openings inside plant	CMT-150	Cable Plant Architecture I

NSOS Sub-task		Unit of Training	
<b>Task B-9 – Lays out and creates cable pathways (outside plant)</b>			
B-9.01	Lays out and installs cable management and support systems outside plant	CMT-150	Cable Plant Architecture I
		CMT-165	Conductors and Cables
B-9.02	Creates openings outside plant	CMT-150	Cable Plant Architecture I
<b>Task B-10 – Selects and prepares cable for installation (inside and outside plant)</b>			
B-10.01	Determines media type	CMT-165	Conductors and Cables
B-10.02	Conducts acceptance testing	CMT-165	Conductors and Cables
		CMT-205	Cable Plant Architecture II
B-10.03	Installs pulling medium in cable pathway	CMT-165	Conductors and Cables
<b>Task B-11 – Installs cable (inside and outside plant)</b>			
B-11.01	Installs cable into support infrastructure	CMT-150	Cable Plant Architecture I
		CMT-165	Conductors and Cables
		CMT-205	Cable Plant Architecture II
B-11.02	Terminates cable	CMT-165	Conductors and Cables
		CMT-205	Cable Plant Architecture II
B-11.03	Installs firestop	CMT-205	Cable Plant Architecture II
<b>Task B-12 – Services cable plant infrastructure</b>			
B-12.01	Performs cable plant audit	CMT-165	Conductors and Cables
		CMT-205	Cable Plant Architecture II
B-12.02	Services cable plant fault	CMT-150	Cable Plant Architecture I
		CMT-165	Conductors and Cables
		CMT-205	Cable Plant Architecture II

NSOS Sub-task		Unit of Training	
<b>Task C-13 – Installs and services security and surveillance systems</b>			
A-13.01	Installs security and surveillance systems	CMT-180	Introduction to Communication Systems
		CMT-240	Security and Surveillance Systems
A-13.02	Performs servicing of security and surveillance systems	CMT-240	Security and Surveillance Systems
<b>Task C-14 – Installs and services communication systems</b>			
A-14.01	Installs communications systems	CMT-180	Introduction to Communication Systems
		CMT-210	Voice Networks
		CMT-215	IP Telephony and Unified Communications
		CMT-245	VDV, IPTV and CATV Systems
		CMT-250	Public Address, Mass Notification and Intercom Systems
		CMT-255	Nurse Call Systems
		CMT-260	Audio Visual Systems
A-14.02	Performs servicing of communication systems	CMT-215	IP Telephony and Unified Communications
		CMT-245	VDV, IPTV and CATV Systems
		CMT-250	Public Address, Mass Notification and Intercom Systems
		CMT-255	Nurse Call Systems
		CMT-260	Audio Visual Systems
<b>Task C-15 – Installs and services building automation systems</b>			
A-15.01	Installs building automation systems	CMT-180	Introduction to Communication Systems
		CMT-265	Building Automation Systems
A-15.02	Performs servicing of building automation systems	CMT-265	Building Automation Systems



# **Level 1**

## **8 Weeks (240 hours)**

## CMT-100 Safety

### Learning Outcomes:

- Demonstrate knowledge of personal protective equipment (PPE) and safety equipment, their applications, maintenance and procedures for use.
- Demonstrate knowledge of safe work practices.
- Demonstrate knowledge of regulatory requirements associated with safety, PPE and safety equipment.
- Demonstrate knowledge of procedures to lock-out and tag-out equipment.
- Demonstrate knowledge of access and egress procedures.

### Occupational Standard Reference:

- 1.01 Uses personal protective equipment (PPE) and safety equipment.
- 1.02 Maintains a safe work site.
- 1.03 Performs lock-out and tag-out procedures.
- 1.04 Performs access and egress procedures.

### Suggested Hours:

6 Hours

### Theoretical Objectives:

1. Identify workplace hazards and describe safe work practices.
  - poor housekeeping
  - improper use of PPE
  - lack of monitoring devices
  - improper hardware selection
  - poor air quality
  - poor ventilation
2. Interpret workplace health and safety regulations associated with safety, PPE and safety equipment.
  - occupational health and safety (OHS)
  - fall protection
  - confined spaces
  - transportation of dangerous goods (TDG)
  - globally harmonized system of classification and labelling of chemicals (GHS)
  - workplace hazardous materials information system (WHMIS)
  - hazardous products regulations

3. Identify certification and training requirements for PPE and safety equipment.
4. Identify types of PPE and safety equipment and describe their applications, limitations and procedures for use.
  - PPE
    - safety glasses (face shield)
    - respirators
    - hard hats
    - footwear
    - gloves
    - coveralls
    - hearing protection
    - respirators
    - coveralls
    - personal monitors
    - fall protection
    - hearing protection
    - high-visibility clothing
  - safety equipment
    - lockout devices
    - fire extinguishers
    - gas detectors
    - first aid kit
    - fall protection equipment and devices
5. Describe the importance of locating PPE and safety equipment.
6. Describe the importance of expiry dates on PPE and safety equipment.
7. Describe workers' rights and responsibilities.
8. Describe the procedures used in emergency situations.
9. Describe the procedures used to inspect, maintain and store PPE and safety equipment.
10. Describe good housekeeping practices.
  - sweeping
  - removing debris
  - storing materials and tools and equipment
11. Describe the procedures used to lock-out and tag-out equipment and confirm zero energy state.
12. Describe the procedures used to determine testing equipment is matched to the voltage and energy rating of the equipment being locked out.

13. Describe safe access and egress considerations and procedures.

**Practical Objectives:**

N/A

## CMT-105 Tools and Equipment

### Learning Outcomes:

- Demonstrate knowledge of hand tools, their applications, maintenance and procedures for use.
- Demonstrate knowledge of portable power tools, their applications, maintenance and procedures for use.
- Demonstrate knowledge of specialty tools and their applications.

### Occupational Standard Reference:

2.01 Uses hand, portable power and specialty tools.

### Suggested Hours:

6 Hours

### Theoretical Objectives:

1. Define terminology associated with tools and equipment.
2. Identify hazards and describe safe work practices associated with the use of tools and equipment.
3. Identify types of hand tools and describe their applications and procedures for use.
  - wrenches
  - screwdrivers
  - measuring tools
  - hammers
  - hand saws
  - hydraulic tools
  - crimp tools
  - testing equipment
  - cable prep tools
4. Identify types of portable power tools and describe their applications and procedures for use.
  - grinders
  - power metal saws
  - drilling machines
  - powder-actuated devices

5. Identify training and certification requirements and manufacturers specifications for powder-actuated tools.
6. Identify types of specialty tools and describe their applications.
  - fusion splicer
  - cable test equipment
  - optical time-domain reflectometers
  - optical loss test sets
  - scopes for fibre optic cable testing
7. Describe the procedures used to inspect, store and maintain hand tools.
8. Describe the procedures used to inspect, store and maintain portable power tools.

**Practical Objectives:**

N/A

## CMT-110 Access Equipment

### Learning Outcomes:

- Demonstrate knowledge of access equipment, their applications, maintenance and procedures for use.
- Demonstrate knowledge of regulatory requirements associated with access equipment.

### Occupational Standard Reference:

2.02 Uses access equipment.

### Suggested Hours:

6 Hours

### Theoretical Objectives:

1. Define terminology associated with access equipment.
2. Identify hazards and describe safe work practices associated with access equipment.
3. Interpret regulations and standards associated with access equipment and fall protection.
4. Identify tools and equipment associated with access equipment and describe their applications and procedures for use.
  - fall arrest system
5. Identify types of access equipment and describe their characteristics and applications for use.
  - ladders
  - scaffolding
  - powered mobile equipment (PME)
  - lifts
6. Identify factors to consider when selecting access equipment.
  - safety
  - load characteristics
  - environment
  - application
7. Describe the procedures used to erect and dismantle ladders and scaffolding.
8. Describe the procedures used to inspect, maintain and store access equipment.

**Practical Objectives:**

N/A



## CMT-115 Lifting Equipment

### Learning Outcomes:

- Demonstrate knowledge of lifting equipment, their applications, maintenance and procedures for use.
- Demonstrate knowledge of communication methods used during lifting operations.
- Demonstrate knowledge of regulatory requirements associated with lifting.
- Demonstrate knowledge of procedures to perform a basic lift.

### Occupational Standard Reference:

2.03 Uses lifting equipment.

### Suggested Hours:

6 hours

### Theoretical Objectives:

1. Define terminology associated with lifting equipment.
2. Identify hazards and describe safe work practices associated with the use of lifting equipment.
  - overhead hazards (powerlines)
  - uneven surfaces
  - excessive loads
  - centre of gravity
  - weather
  - equipment damage
  - slippery surfaces
  - dropped loads
  - congested worksites
  - confined spaces
  - trenches
3. Interpret regulations and standards associated with lifting equipment.
4. Explain the fundamental principles of lifting.
  - mechanical advantage
  - balance point
5. Describe loads which should be lifted mechanically.

6. Identify types of lifting equipment and attachments and describe their applications, limitations and procedures for use.
  - cranes
  - boom trucks
7. Identify types of knots, hitches and bends and describe their applications and associated procedures.
  - half hitch
  - clove hitch
  - bowline
  - figure-eight
8. Identify types of ropes and describe their characteristics and applications.
  - fibre
  - wire
9. Identify factors to consider when selecting lifting equipment.
  - load characteristics
    - dimensions
    - shape
    - weight
  - environment
  - application
10. Identify types of barriers used to protect public and workers.
  - signs
  - barricades
  - danger/caution tape
11. Describe communications methods used during lifting operations.
  - electronic communications
  - audible/visual
12. Describe loading and unloading procedures.
13. Describe the procedures used to perform a basic lift.
14. Describe the procedures used to inspect, maintain and store lifting equipment.

**Practical Objectives:**

1. Tie knots.
2. Perform standard hand signals.

## CMT-120 Trade Math

### Learning Outcomes:

- Demonstrate knowledge of basic mathematical calculations and formulas used in the trade.

### Occupational Standard Reference:

Integrated throughout document.

### Suggested Hours:

12 Hours

### Theoretical Objectives:

1. Describe metric and imperial systems of measurement.
2. Perform basic mathematical calculations.
  - whole numbers
  - decimals
  - fractions
  - ratios
3. Perform conversions.
  - metric to imperial
  - imperial to metric
  - fractions to decimals
  - decimals to fractions
4. Solve problems using basic trade formulas.

### Practical Objectives:

N/A

## CMT-125 Introduction to Canadian Electrical Code

### Learning Outcomes:

- Demonstrate knowledge of the layout of the Canadian Electrical Code (CEC).
- Demonstrate knowledge of the procedures to locate and interpret information in the CEC.

### Occupational Standard Reference:

Integrated throughout document.

### Suggested Hours:

6 Hours

### Learning Objectives:

1. Define terminology associated with the CEC.
2. Explain the layout of the CEC.
  - sections
  - appendices
  - tables
  - indexes
3. Explain the methods used to locate information in the CEC and describe their associated procedures.
  - by keyword in index
  - by subject area
4. Identify sections of the CEC relevant to the Communications Technician trade.
  - grounding and bonding
  - class 1 and class 2 circuits
  - optical fibre cables
  - communication systems
  - conduits and cable trays/raceways

### Practical Objectives:

1. Locate and interpret information in the CEC.

## CMT-130 Introduction to Cabling Standards

### Learning Outcomes:

- Demonstrate knowledge of cabling installation standards.

### Occupational Standard Reference:

Integrated throughout document.

### Suggested Hours:

30 Hours

### Learning Objectives:

1. Define terminology associated with cabling standards.
2. Identify standards required to plan installations.
  - CSA
  - TIA/EIA
  - BICSI
  - AVIXA
3. Interpret applicable sections of building codes required to plan installations.
  - firestop systems
  - plenum spaces
4. Describe the function of firestop systems in cabling installations.
5. Explain fire rating requirements for telecommunication cables.
  - NBC/NSBC
  - NS electrical bulletin
  - CEC/NSEC
  - TIA/EA
  - NFC
  - CAN/CSA
6. Identify limitations of cabling distances for specific applications.
  - UTP
  - ScTP
  - STP
  - optical fibre

- coaxial
7. Describe cable installation requirements for raised floor applications.
  8. Describe layout requirements for equipment room installations.
    - lighting
    - power requirements
    - room size
    - HVAC
    - sleeves
    - ceilings
    - walls
    - doors
    - grounding
  9. Describe requirements for aerial, direct buried and underground outside plant installations.
  10. Describe requirements for raceway installations in telecommunication systems.
  11. Describe requirements for closed and open ceiling space installations.
  12. Explain bandwidth limits for cable types.
  13. Describe restrictions and distance considerations when installing cables near sources of electromagnetic interference (EMI) and radio-frequency interference (RFI).
  14. Differentiate between permanent, temporary, water-tight and fire-rated sleeves.
  15. Perform calculations related to cable raceway installations.
    - raceway fill ratios
    - sizing requirements for pull boxes
  16. Describe cable support requirements in inside plant environments.
    - d-rings
    - conduits
    - wireways
    - threaded rods
    - ceiling hanger brackets
    - wall brackets
    - conduit hangers
  17. Describe protection measures required to prevent spikes and surges in telecommunication systems.

**Practical Objectives:**

N/A

## CMT-135 Trade Documentation

### Learning Outcomes:

- Demonstrate knowledge of trade-related documentation, its purpose and use.
- Demonstrate knowledge of procedures to complete and interpret documentation.
- Demonstrate knowledge of labelling requirements and procedures.

### Occupational Standard Reference:

- 6.01 Labels communication and associated systems.
- 6.04 Completes documentation.

### Suggested Hours:

6 hours

### Theoretical Objectives:

1. Define terminology associated with trade documentation.
2. Identify regulations and standards associated with safety-related documentation.
  - site-specific requirements
  - Occupational Health and Safety (OH&S)
3. Identify types of work-related documentation and describe their applications.
  - cable records
  - test document
  - as-built information
  - work orders
  - change orders
  - time sheets
  - estimates
  - company specific documents
  - labels
4. Identify types of safety-related documentation and describe their applications.
  - job hazard assessments
  - toolbox meeting records
  - first aid logs
  - safety manuals
  - occupational health and safety (OH&S) requirements

- WHMIS symbols
  - safety data sheets
    - equipment inspection logs
    - firestop records
    - inspection data
5. Identify types of reference materials and sources of information and describe their applications.
    - manuals
    - manufacturers' specifications
    - standards and regulations
    - client and site specifications
    - company documentation
    - drawings and specifications
    - catalogues
    - warranties
    - permits
    - master specification format
  6. Explain responsibilities associated with completing and signing work-related and safety-related documentation.
  7. Describe the procedures used to access, interpret and apply information found in trade documentation and reference material.
  8. Describe the procedures used to complete trade documentation.
    - time sheets
  9. Identify label types and colour coding and describe their applications.
    - adhesive (UL 969 and TIA 606)
    - insert
    - tie-on
  10. Describe requirements and procedures for labelling system components.
    - mounting equipment
    - station and distribution cable ends
    - termination hardware
    - inter-connect cables
    - raceway and pathways
    - patch cords
    - equipment cords



**Practical Objectives:**

N/A

## CMT-140 Drawings and Specifications

### Learning Outcomes:

- Demonstrate knowledge of drawings and specifications and their applications.
- Demonstrate knowledge of procedures to interpret and extract information from drawings and specifications.

### Occupational Standard Reference:

3.01 Interprets plans, drawings and specifications.

### Suggested Hours:

18 Hours

### Theoretical Objectives:

1. Define terminology associated with drawings and specifications.
2. Identify and interpret information found on drawings.
  - lines
  - legend
  - symbols and abbreviations
  - notes and specifications
  - schedules
  - units of measurements (metric/imperial)
  - master specification format
3. Identify types of specification documents and describe their applications.
  - manufacturer
  - engineer
  - contractor
  - client
  - manuals
  - standard operating procedures (SOP)
4. Identify types of drawings and describe their purpose and applications.
  - civil/site
  - mechanical
  - structural

- riser diagrams
  - shop
    - architectural
    - sketches
    - as-builts
5. Describe the components and views of drawings.
  6. Describe the use of drawings and measurement scales.
  7. Describe the procedures used to interpret and extract information from drawings.
    - elevations
    - scales
    - legends
    - symbols and abbreviations
    - notes and specifications
    - addendums
  8. Describe the procedures used to perform a basic material take-off from a drawing.

**Practical Objectives:**

1. Interpret information found on drawings and specifications.

## CMT-145 Basic Electricity

### Learning Outcomes:

- Demonstrate knowledge of basic electrical theory, including the principles of direct and alternating current circuits.
- Demonstrate knowledge of mathematical and electrical calculations related to electricity.
- Demonstrate knowledge of tools and techniques to measure voltage, current, and resistance.
- Demonstrate knowledge of safety and regulatory standards associated with electrical installations in the communications technician trade.

### Occupational Standard Reference:

Integrated throughout the document.

### Suggested Hours:

30 Hours

### Learning Objectives:

1. Define terminology associated with electricity.
  - alternating current
  - direct current
  - voltage, amperage, and resistance
  - inductance, capacitance and impedance
  - sine wave, magnetic field and magnetic flux
2. Identify hazards and describe safe work practices associated with electricity in the communications technician trade.
3. Interpret codes, regulations and standards associated with electrical installations.
4. Interpret information and symbols associated with electrical installations found on drawings and specifications.
5. Identify tools and equipment used to measure and test electricity and describe their applications and procedures for use.
  - analogue multimeter
  - digital multimeter
6. Explain the fundamental principles of electricity, emphasizing on atomic structure of matter, free electrons, sources and nature of electricity, and static electricity.

7. Identify units of measure and symbols used in electrical calculations and explain their application.
  - coulomb (unit of charge)
  - volt (unit of potential difference)
  - ampere (unit of current)
  - Ohm (unit of resistance)
8. Explain the basic electrical properties and their relationships.
  - voltage
  - current
  - resistance
  - power
9. Discuss the direction of current in a circuit, differentiating between electron flow and conventional current flow.
10. Describe the characteristics and operation of electrical circuits.
  - series circuits
  - parallel circuits
  - series/parallel circuits
  - Kirchhoff's laws
  - power and heat loss in circuits
11. Explain the principles and operation of direct current (DC) and alternating current (AC) electrical circuits.
12. Identify basic components found in DC and small signal AC circuits and describe their purpose and operation.
  - resistors
  - inductors
  - capacitors
13. Perform basic electrical calculations and describe the processes and significance of these calculations in the communications technician trade.
14. Describe the procedures used to measure voltage, current and resistance, explaining how these measurements are made and interpreted.
15. Identify types of conductors and insulators used in communication systems and describe their characteristics.
16. Describe the procedures used to operate DC circuits and battery components.

**Practical Objectives:**

N/A

## CMT-150 Cable Plant Architecture I

### Learning Outcomes:

- Demonstrate knowledge of equipment components and structures of cable plant architecture.
- Demonstrate knowledge of cables, their characteristics and applications.
- Demonstrate knowledge of procedures to install, service and maintain cables plant architecture.

### Occupational Standard Reference:

- 8.01 Lays out and installs cable management and support systems inside plant.
- 8.02 Creates opening inside plant.
- 9.01 Lays out and installs cable management and support systems outside plant.
- 9.02 Creates openings outside plant.
- 11.01 Installs cable into support infrastructures.
- 12.02 Services cable plant fault.

### Suggested Hours:

42 Hours

### Theoretical Objectives:

1. Define terminology associated with cable plant architecture.
2. Identify hazards and describe safe work practices associated with cabling.
3. Identify codes, regulations and standards associated with cabling.
  - International Organization for Standardization (ISO)
  - American National Standards Institute (ANSI)
  - Institute of Electrical and Electronics Engineers (IEEE)
  - Electronic Industries Alliance (EIA)
  - Telecommunications Industry Association (TIA)
  - CSA Group (CSA)
  - Building Industry Consulting Service International (BICSI)
  - ASIS International
  - Audio visual and Integrated Experience Association (AVIXA)
4. Interpret information associated with cabling found on drawings and specifications.
5. Identify types of cable management and support systems.
  - J-hooks

- cable trays
  - sleeving
  - seismic bracing
  - duct
  - support strands
  - poles
  - guy wires
6. Identify tools and equipment used to install, service and maintain cable plant architecture
  7. Describe procedures to install, service and maintain cables plant architecture.
  8. Describe equipment components and structures of outside plant architecture.
    - serving area concept (SAC)
  9. Describe underground, direct buried and aerial components.
    - outside plant (OSP) infrastructure
    - OSP cable structure and cable types
    - OSP cable enclosures
    - OSP colour codes
    - OSP splicing techniques
  10. Describe equipment components and structures of inside plant architecture.
    - structured cabling systems (SCS)
      - SCS infrastructure
      - patch panels
      - cross connects (X-Conn)
      - telecommunication outlets
      - multi-user telecommunication outlets
      - SCS cable structure
      - SCS cable types
      - SCS colour codes
      - SCS termination techniques
  11. Identify and describe building entrances and demarcation points.
  12. Identify and describe the function of network interface device (NID)/network interface box (NIB) component parts.
  13. Identify protective devices and describe their characteristics and applications.
  14. Identify and describe vertical risers.
    - backbone
    - pathways
    - spaces and access panels
    - cable types



- fire ratings

**Practical Objectives:**

N/A

## CMT-155 Telephony

### Learning Outcomes:

- Demonstrate knowledge of telephone systems, their applications, components and operation.
- Demonstrate knowledge of procedures to test telephony.

### Occupational Standard Reference:

6.02 Tests communication and associated systems.

### Suggested Hours:

30 Hours

### Theoretical Objectives:

1. Define terminology associated with telephony.
2. Identify hazards and describe safe work practices associated with telephony.
3. Interpret codes, standards and protocols relevant to telephony.
  - public switched telephone network (PSTN)
  - integrated services digital network (ISDN)
  - Voice over Internet Protocol (VoIP)
4. Identify tools and equipment used to test and troubleshoot telephony and describe their applications and procedures for use.
5. Identify types of telephone, communication and associated systems.
  - wireless
  - data
  - security and surveillance systems
  - PA and intercom systems
  - nurse call systems
  - patient wandering systems
  - VDV and CATV systems
  - distributed antenna systems (DAS)
  - ethernet and industrial data communication systems
6. Describe the fundamental operation of telephony.
  - signal

- transmission
  - switching
  - reception
7. Identify the main components of a telephone system and describe their purpose and operation.
    - handsets
    - exchange systems
    - telephone lines
  8. Interpret information found on drawings and specifications associated with the sending and receiving of IP telephony calls.
  9. Identify emerging trends with IP telephony.
  10. Identify voice quality issues and describe their causes, prevention and potential solutions.
  11. Describe the procedures used to test and analyze telephony operations.
    - measure voltage and current on the subscriber loop
    - measure frequency response on cables
    - perform decibel (dB) loss measurements
    - perform noise measurements

**Practical Objectives:**

N/A

## CMT-160 Grounding and Bonding

### Learning Outcomes:

- Demonstrate knowledge of grounding and bonding equipment and requirements.

### Occupational Standard Reference:

Integrated throughout document.

### Suggested Hours:

6 Hours

### Theoretical Objectives:

1. Define terminology associated with grounding and bonding.
2. Identify hazards and describe safe work practices associated with grounding and bonding.
3. Interpret codes, regulations and standards associated with grounding and bonding of communications facilities.
  - CEC
  - TIA 607
  - TBB/BBC (conductor size versus length)
4. Interpret information associated with grounding and bonding found on drawings and specifications.
5. Identify tools and equipment used in grounding and bonding and describe their applications and procedures for use.
6. Explain the purpose of grounding and bonding.
  - effects of lightning on communication systems
  - effects of precipitation on communication systems
7. Describe bonding and grounding requirements for communications equipment.
8. Describe new developments in anti-static protection.
9. Identify how bonding can help mitigate signal interference.

### Practical Objectives:

N/A

## CMT-165 Conductors and Cables

### Learning Outcomes:

- Demonstrate knowledge of conductors and cables related to communications systems and their associated components.
- Demonstrate knowledge of the procedures used to remove and/or install conductors and cables.
- Demonstrate knowledge of the procedures used to install brackets, hangers and fasteners.
- Demonstrate knowledge of the procedures to test, service and maintain conductors and cables.

### Occupational Standard Reference:

- 4.01 Installs brackets, hangers and fasteners.
- 4.02 Installs seismic restraint systems.
- 8.01 Lays out and installs cable management and support systems.
- 9.01 Lays out and installs cable management and support systems.
- 10.01 Determines media type.
- 10.02 Conducts acceptance testing.
- 10.03 Installs pulling medium in cable pathway.
- 11.01 Installs cable into support infrastructures.
- 11.02 Terminates cable.
- 12.01 Performs cable plant audit.
- 12.02 Services cable plant faults.

### Suggested Hours:

6 Hours

### Theoretical Objectives:

1. Define terminology associated with conductors and cables.
2. Identify hazards and describe safe work practices associated with conductors and cables.
3. Interpret codes, regulations and standards associated with conductors and cables.
4. Interpret information associated with conductors and cables found on drawings and specifications.
5. Identify types of conductors and cable management systems and describe their characteristics and applications.
  - J-hooks

- cable trays
  - sleeving
  - seismic bracing
  - duct
  - support strands
  - poles
  - guy wires
6. Identify conductor and cable components and describe their characteristics and applications.
- mechanical fittings
  - compression fittings
  - straps
  - connectors
  - hangers
    - trapezes
    - pipe clamps
    - beam clamps
    - J-hooks
  - brackets
    - angle brackets
    - T brackets
    - L brackets
    - floor brackets
    - ceiling brackets
  - seismic restraint systems
    - chains
    - cables
    - rods
    - aircraft wires
7. Identify tools and equipment used to install, service and maintain conductors and cables and their associated components.
8. Identify the considerations and requirements for removal of conductors and cables and their associated components.
9. Identify the considerations and requirements for selecting conductors and cables and their associated components and accessories.
10. Identify the considerations and requirements for installing conductors and cables and their associated components and accessories.
- conduit fill
  - methods of pulling conductors/cables

- de-rating factors
  - routing
  - location
  - bend radius
11. Describe the procedures used to remove conductors and cables and their associated components.
  12. Describe the products and procedures used to install conductors and cables and their associated components.
    - proper lubricants
  13. Describe the procedures used to prepare conductors and cables and their associated components and accessories.
  14. Describe the procedures used to splice conductors and cables.
  15. Describe the procedures used to terminate conductors and cables.
  16. Describe the procedures used to service cables.
  17. Identify considerations when maintaining cables.
    - changes from the original installation
    - heat points
    - physical damage
    - information from end user
    - integrity of the insulation
    - tightness of the terminations
    - odours
    - colour
    - physical protection
    - supports
    - movement due to temperature or vibration
  18. Describe the procedures used to maintain cables.
  19. Identify types of testing equipment used to verify performance and functionality.

**Practical Objectives:**

1. Install, splice and terminate conductors and cables.

## CMT-170 Conduit, Tubing and Fittings

### Learning Outcomes:

- Demonstrate knowledge conduit, tubing and fittings, their applications, components and applications.
- Demonstrate knowledge of procedures to install and maintain conduit, tubing and fittings.

### Occupational Standard Reference:

Integrated throughout document.

### Suggested Hours:

6 Hours

### Theoretical Objectives:

1. Define terminology associated with conduit, tubing and fittings.
2. Identify hazards and describe safe work practices associated with conduit, tubing and fittings.
3. Interpret codes, regulations and standards associated with conduit, tubing and fittings.
4. NS electrical bulletin
5. Interpret information associated with conduit, tubing and fittings found on drawings and specifications.
6. Identify tools and equipment to install, service and maintain conduit, tubing and fittings and describe their applications and procedures for use.
7. Identify types of conduit, tubing and fittings and describe their characteristics, applications and limitations.
  - Electrical metallic tubing (EMT)
  - rigid polyvinyl chloride (PVC)
  - flexible conduit
  - rigid steel
  - electrical non-metallic tubing (ENT)
  - DB2
8. Perform calculations to determine conduit size.
9. Identify conduit, tubing and fitting components and describe their characteristics and applications.



10. Identify the considerations and requirements for selecting conduit, tubing and fittings and their associated components.
11. Describe the procedures used to install and deburr conduit, tubing and fittings.
12. Identify environmental conditions, hazards, incidents, situations and inside/outside conditions that can cause damage in specific types of conduit, tubing and fittings.
13. Describe the procedures used to service and maintain conduit, tubing and fittings.
  - tighten and adjust
  - clean

### **Practical Objectives**

N/A

## CMT-175 Boxes and Enclosures

### Learning Outcomes:

- Demonstrate knowledge of boxes and enclosures, their applications, characteristics and applications.
- Demonstrate knowledge of procedures to install low-voltage rated boxes and rings for telecommunication systems.

### Occupational Standard Reference:

Integrated throughout document.

### Suggested Hours:

6 Hours

### Theoretical Objectives:

1. Define terminology associated with boxes and enclosures.
2. Identify hazards and describe safe work practices associated with boxes and enclosures.
3. Interpret codes, regulations and standards associated with boxes and enclosures.
4. Interpret information associated with boxes and enclosures found on drawings and specifications.
5. Identify types of boxes and enclosures and describe their characteristics and applications.
  - device
  - utility
  - cast-device boxes (FS/FD)
  - masonry
  - square
  - octagon
  - pancake
  - power and communication
  - pull
6. Identify tools and equipment used to install, service and maintain low-voltage rated boxes and rings and describe their applications and procedures for use.
7. Describe the procedures used to install low-voltage rated boxes and rings for telecommunication systems.

**Practical Objectives:**

N/A

## CMT-180 Introduction to Communications Systems

### Learning Outcomes:

- Demonstrate knowledge of signaling, communication and associated systems, their applications and operation.

### Occupational Standard Reference:

13.01 Installs security and surveillance systems.

14.01 Installs communication systems.

15.01 Installs building automation systems.

### Suggested Hours:

6 Hours

### Theoretical Objectives:

1. Define terminology associated with signaling, communication and associated systems.
2. Interpret codes, regulations and standards associated with signaling, communication and associated systems.
  - minimum distances and separation requirements
3. Interpret information associated with signaling, communication and associated systems found on drawings and specifications.
4. Identify types of communication and associated systems and describe their applications, components and basic operating principles.
  - voice/data/video (VDV)
  - community antenna television (CATV)
  - internet protocol television (IPTV)
  - public address
  - mass notification
  - intercom
  - nurse call
  - audio visual (AV)
  - building automation systems
  - security and surveillance systems
    - cameras
    - video recorders
    - electronic locks

5. Identify basic communication system components and describe their purpose and applications.

**Practical Objectives:**

N/A

## CMT-185 Environmental and Hazardous Installations

### Learning Outcomes:

- Demonstrate knowledge of environmental conditions and installation procedures.
- Demonstrate knowledge of hazardous locations.
- Demonstrate knowledge of hazardous locations wiring methods.

### Occupational Standard Reference:

Integrated throughout the document.

### Suggested Hours:

6 Hours

### Theoretical Objectives:

1. Define terminology associated with installations in hazardous locations.
2. Interpret codes, regulations and standards associated with installations in hazardous locations.
3. Interpret information associated with installations in hazardous locations found on drawings and specifications.
4. Identify types of environmental conditions and describe safe work procedures.
  - wet
  - dusty
  - corrosive
  - hot
  - cold
  - hazard
    - asbestos
    - lead
5. Identify tools and equipment designed for installation and operation in areas according to environmental conditions.
6. Identify and describe wiring procedures and methods for areas according to environmental conditions.
7. Identify types of hazardous locations and describe their characteristics.
  - explosive gas

- explosive and combustible dust
  - combustible fibres and flyings
8. Identify types of potentially hazardous materials present and the procedures to designate an area to be a hazardous location.
  9. Identify equipment and fittings designed for installation and operation in hazardous locations.
    - boxes and enclosures
    - cables and conductors
    - conduits, tubing and fittings
    - motor control cable
    - lighting equipment and controls
    - wiring devices
    - raceways

**Practical Objectives:**

N/A

## **MENT-700          Mentoring I**

### **Learning Outcomes:**

- Demonstrate knowledge of effective communication practices as a learner.
- Demonstrate knowledge of strategies for learning skills in the workplace.

### **Occupational Standard Reference:**

7.01 Uses communication techniques.

7.02 Uses mentoring techniques.

### **Suggested Hours:**

6 hours

### **Learning Objectives:**

1. Describe the importance of one's own individual experiences.
2. Identify behaviours that demonstrate positive learning experiences.
3. Identify the benefits of workplace mentoring for the apprentice, mentor, and employer.
4. Identify the partners involved in apprenticeship training.
5. Describe the shared responsibilities for workplace learning in apprenticeship.
6. Identify different learning needs and strategies to address challenges or barriers in the workplace.
  - learning disabilities
  - language
  - underrepresentation
7. Identify the components that create a positive and inclusive workplace culture.
  - workplace characteristics
  - individual behaviours
8. Identify various learning styles and determine one's own learning preferences.
9. Explain how learning preferences impact learning new skills.
10. Identify different learning strategies to meet individual learning needs.
11. Describe the importance of adapting to a variety of teaching and learning methods in the workplace.



12. Identify techniques for effective communication as a learner.

- verbal and non-verbal
- active listening

13. Identify and describe personal responsibilities and attitudes that contribute to on-the-job success.

- self advocating
- asking questions
- accepting constructive feedback
- working safely
- employing time management techniques and being punctual

**Practical Objectives:**

N/A

**Level 2**  
**8 Weeks (240 hours)**

## **MENT-701 Mentoring II (6 hrs)**

### **Learning Outcomes:**

- Demonstrate knowledge of effective communication practices as a mentor.
- Demonstrate knowledge of strategies for teaching workplace skills.

### **Occupational Standard Reference:**

7.01 Uses communication techniques.

7.02 Uses mentoring techniques.

### **Suggested Hours:**

6 hours

### **Objectives and Content:**

1. Identify the different roles played by a workplace mentor.
2. Identify strategies to create a supportive learning environment.
3. Identify techniques for effective communication as a mentor.
  - constructive feedback
  - active listening
  - leading meetings, minuting and one-on-one sessions
4. Describe the steps in teaching a skill.
  - identifying the point of lesson
  - linking the lesson
  - demonstrating the skill
  - providing practice
  - giving feedback
  - assessing skill and progress
5. Identify strategies to assist in teaching a skill while meeting individual learning needs.
  - principles of instruction
  - coaching skills
6. Explain how to adjust a lesson for various situations.

**Practical Objectives:**

N/A

## CMT-200 Network Fundamentals

### Learning Outcomes:

- Demonstrate knowledge of basic fundamentals of networking.
- Demonstrate knowledge of the functions and operation of network components.
- Demonstrate knowledge of procedures to construct a simple LAN.

### Occupational Standard Reference:

Integrated throughout document.

### Suggested Hours:

24 Hours

### Theoretical Objectives:

1. Define terminology associated with the basic fundamentals networking.
  - client/server
  - networking operating system (NOS)
  - peer-to-peer
  - local area network (LAN)
  - wide area network (WAN)
  - metropolitan area network (MAN)
  - network interface card (NIC)
  - switch
  - open systems interconnection (OSI) model
2. Identify hazards and describe safe work practices associated with networking.
3. Identify codes, regulations and standards associated with networking.
4. Interpret information associated with networking found on drawings and specifications.
5. Identify tools and equipment used to construct a simple LAN and describe their applications and procedures for use.
6. Interpret and describe the function of network devices.
  - physical layer
  - data link layer
  - network layer devices

7. Identify the function and applications of Layer 1 of the OSI model components.
  - transmission media
  - connection components (jacks, plugs, cables, patch panels)
8. Describe the characteristics and applications of physical LAN topologies.
  - bus
  - star
  - ring
  - mesh
9. Identify the function and applications of Layer 2 OSI model components.
  - NIC
  - media access control (MAC) addressing
  - switches
10. Describe the concept of collision domains.
  - hubs versus switches.
  - half duplex versus full duplex.
11. Identify layer 2 of the OSI model functions and protocols.
  - ethernet - collision sense multiple access/collision detect (CSMA/CD)
  - switches
  - physical (hardware) address (MAC)
12. Identify Layer 3 of the OSI model functions and protocols.
  - router
  - broadcast domains
  - network addressing
  - logical (host) addressing
  - network segments
  - basic path determination
13. Identify where devices fit within the enterprise network architecture
  - network hierarchy and basic design
14. Describe the procedure used to construct a simple LAN
  - build a simple LAN
  - construct a simple internetwork
  - troubleshoot a simple internetwork

**Practical Objectives:**

1. Construct a simple LAN.

## CMT-205 Cable Plant Architecture II

### Learning Outcomes:

- Demonstrate knowledge of procedures to prepare and install, upgrade and connect cable (inside and outside of plant).
- Demonstrate knowledge of procedures to service and maintain cable plant infrastructure.

### Occupational Standard Reference:

- 6.02 Tests communication and associated systems.
- 10.02 Conducts acceptance testing.
- 11.01 Installs cable into support infrastructure.
- 11.02 Terminates cable.
- 12.01 Performs cable plant audit.
- 12.02 Services cable plant faults.

### Suggested Hours:

42 Hours

### Theoretical Objectives:

1. Define terminology associated with the installation of cabling.
2. Identify codes, regulations and standards associated with the installation of cabling.
  - wide area network (WAN)
  - local area network (LAN)
  - campus area network (CAN)
3. Interpret information associated with the installation of cabling found on drawings and specifications.
4. Identify tools and equipment used to install, service and maintain cable and describe their applications and procedures for use.
  - fish tape
  - fish sticks
  - hammers for hammer on j hooks
  - toner and wand
5. Identify factors to consider when selecting communications cable for high data rates when planning and installing building wiring systems.
  - noise



- crosstalk
  - impedance
  - attenuation
6. Identify and describe types of coaxial cable.
    - electrical properties
    - use in network architecture
  7. Describe the characteristics of unshielded, shielded and screened twisted pair cables.
    - foil shielded vs braided shielded vs braid
    - foil vs non shielded and or armored vs conduit
  8. Identify and describe copper cable termination components.
  9. Identify types of connectors and describe their characteristics and applications.
    - RJ45 or 8P8C connector
    - Db9 to RJ45 connector (for serial applications)
    - 25-pair
      - R66
      - 110
      - RJ21
    - coaxial connectors
  10. Identify types of panels and blocks and describe their characteristics and applications.
    - patch panel
      - pre-loaded vs unpopulated
    - punch-down block (RJ-45)
    - fibre optic bays
    - blanking plates
  11. Describe application guidelines and work area outlets as per project specification document.
  12. Identify fibre optic cabling in planning and installation for building wiring systems.
  13. Describe general cable installation guidelines and procedures to install building wiring systems.
    - DC-350 standard.
    - TIA 568 series
    - TIA 569 series.
    - BICSI standards
  14. Describe the basic infrastructure of a multi-dwelling residential unit networking cabling system.

15. Describe the procedures used to install, upgrade and connect fibre optic and copper cabling.
16. Describe the procedures used to perform cable plant testing.
17. Describe the materials and procedures used to install firestop materials.
  - caulking
  - wrap strips
  - intumescent boards and collars
  - bricks
  - pillows
  - putty
  - mortar
  - mineral fibre
  - foams
  - cement
18. Describe the procedures used to service and maintain cable plant infrastructure.

**Practical Objectives:**

N/A

## CMT-210 Voice Networks

### Learning Outcomes:

- Demonstrate knowledge of traditional voice networks, their applications, components and operation.

### Occupational Standard Reference:

14.01 Install communication systems.

### Suggested Hours:

18 Hours

### Theoretical Objectives:

1. Define terminology associated with traditional voice networks.
  - public switched telephone network (PSTN)
  - trunks and lines
  - circuit switching
  - hosts/remotes
2. Identify hazards and describe safe work practices associated with voice networks.
3. Interpret codes, regulations and standards associated with voice networks.
4. Interpret information associated with voice networks found on drawings and specifications.
5. Identify tools and equipment associated with used to install, service and maintain voice networks.
6. Explain the architecture of a typical switch.
  - central processing unit
  - operating system software
  - peripheral processor – line cards / trunk cards / time slot assignment
7. Describe circuit switching and packet switching.
8. Identify voice network component placement using a functional diagram.
  - switching plan
  - customer connectivity
  - cellular connectivity

9. Identify the relationship between voice networks and numbering plans.
  - telephone number
  - North American numbering plan
  - world numbering plan
10. Describe the organization of digital key systems, PBC and Centrex service.
11. Identify current and emerging technologies.
  - cloud based offerings.
    - IaaS
    - PaaS
    - SaaS
  - Session Initiated Protocol (SIP) trunking.
  - communication servers
  - IP-PBX
12. Describe the requirements of an audio/visual multi-media meeting room
  - security
  - design issues
    - lighting overhead
    - HVAC vents
    - projector/screen location
    - mics
13. Explain the purpose of IPv4 and IPv6 addressing and where each is used.
14. Describe the classes and breakdown of IP addressing.
  - classes
  - public and private addressing
  - unicast, multicast and broadcast
  - reserved addresses including loopback

**Practical Objectives:**

1. Plan out a multi-media meeting room (incorporating projectors, screens, speakers and sight lines)

## CMT-215 IP Telephony and Unified Communications

### Learning Outcomes:

- Demonstrate knowledge of IP telephony and unified communications.
- Demonstrate knowledge of procedures to install, upgrade and connect IP telephony and unified communications.
- Demonstrate knowledge of procedures to test IP telephony and unified communications.
- Demonstrate knowledge of procedures to service and maintain IP telephony and unified communications.

### Occupational Standard Reference:

- 6.02 Tests communication and associated systems.
- 14.01 Installs communication systems.
- 14.02 Performs servicing of communication systems.

### Suggested Hours:

12 Hours

### Theoretical Objectives:

1. Define terminology associated with IP telephony and unified communications.
  - session initiation protocol (SIP)
  - quality of service (QoS)
  - VoIP protocols keyed to the OSI model
  - VoIP topologies
  - IPv4 addressing and its applications
  - video transmission of television
    - Internet Protocol Television (IPTV)
2. Identify the purpose of IPv4 addressing and describe its applications.
3. Interpret codes, standards and regulations associated with IP telephony and unified communications.
4. Interpret information associated with IP telephony and unified communications found on drawings and specifications.
5. Identify tools and equipment used to test IP telephony and unified communications.
6. Identify classes of IP addressing and describe their characteristics and applications.
  - public versus private

- unicast, multicast and broadcast.
  - reserved addresses including loopback.
7. Describe the procedures used to install, upgrade and connect IP telephony and unified communications.
  8. Describe the procedures used to perform commissioning and verification of IP telephony and unified communications.
  9. Describe the procedures used to test IP telephony and unified communications.
  10. Explain the theory concepts of IP subnetting.
  11. Identify types of IP addressing configuration on a host.
    - client IP
    - subnet mask
    - gateway IP
    - Domain Name System (DNS)
  12. Identify types of video transmission of television (VTV) and community antenna (CATV) systems.
    - Unshielded twisted pair (UTP)
    - Screened twisted pair (ScTP)
    - category cable
    - fibre optic
    - multi-mode and single-mode
    - coaxial
    - distributed antenna system (wireless)

**Practical Objectives:**

1. Implement QoS on an IP telephony vLan.

## CMT-220 Fibre Optics

### Learning Outcomes:

- Demonstrate knowledge of the fundamental principles of fibre optics.
- Demonstrate knowledge of fibre optics, their applications, components and operation.
- Demonstrate knowledge of procedures to construct, install, and test fibre optic systems.

### Occupational Standard Reference:

6.02 Tests communication and associated systems.

### Suggested Hours:

30 Hours

### Learning Objectives:

1. Define terminology associated with fibre optics.
  - light transmission
  - optical fibre
  - cables and cable connectors
  - transmissions and reception
  - system components
  - testing
2. Identify hazards and describe safe work practices associated with fibre optics.
  - glass fibre
  - laser equipment and tools
3. Identify codes, regulations and regulations associated with fibre optic installations.
4. Interpret information associated with fibre optics found on drawings and specifications.
5. Identify tools and equipment associated with used to install, service and maintain IP fibre optics.
6. Describe the electromagnetic spectrum and its relevance to fibre optics.
7. Explain the principles of geometrical optics.
  - reflection and refraction
  - Snell's law
  - total internal reflection
  - Fresnel reflection

8. Describe the procedures used in fibre optic construction.
9. Describe the procedures used to clean fibre optics.
10. Identify types of optical fibre and describe their classifications.
  - multimode step-index fibre
  - single mode step-index fibre
11. Describe characteristics of optical fibre.
  - modal dispersion
  - material dispersion
  - dispersion shifted fibre
  - fibre bandwidth
  - numerical aperture and the number of modes
  - attenuation, scattering, and transmission windows
12. Identify types of buffer used in fibre optics.
13. Identify inside and outside plant cables used in fibre optics.
14. Identify and describe the purpose and operation of fibre optic connectors.
15. Identify types of splices and describe their characteristics and applications.
  - fusion splice
  - mass fusion splice
  - mechanical splice
16. Identify and describe the function of passive couplers in fibre optics.
17. Identify and describe light sources, transmitters and their features.
  - LED and laser transmitters
  - light modulation and basic transmitter topology
  - transmitter power rating
18. Identify detectors and receivers and describe their operation.
  - PN, PIN, and APD detectors
  - noise in photo detectors
  - basic receiver concepts
19. Explain the concept of loss budget in fibre optics.
20. Explain the concept of bandwidth budget in fibre optics.
21. Identify and describe the principle and operation of dense wave division multiplexing (DWDM).
22. Identify and describe optical fibre signal regeneration techniques.
23. Identify types of fibre networks and describe their characteristics and applications.



- computer system networks
- broadband applications

24. Identify standard tests used in fibre optics.

- OFSTP-14
- FOTP-141
- FOTP-61

25. Identify and explain the function and operation of optical time-domain reflectometry (OTDR).

26. Describe the procedures used to perform OTDR testing.

- understanding OTDR equipment and the dead zone
- performing basic OTDR testing
- measuring fibre attenuation
- evaluating splice loss
- calculating link loss

**Practical Objectives:**

1. Install fibre connectors.
2. Prepare fibre optic cable.
3. Install fibre optic connectors.
4. Inspect and rectify connector loss.
5. Perform fusion splicing.

## CMT-225 Wireless Systems

### Learning Outcomes:

- Demonstrate knowledge of wireless systems, their applications, components and operation.
- Demonstrate knowledge of broadband radio communications principles.
- Demonstrate knowledge of procedures to install, upgrade and connect wireless systems.

### Occupational Standard Reference:

Integrated throughout document.

### Suggested Hours:

30 Hours

### Theoretical Objectives:

1. Define terminology associated with wireless systems.
  - distributed antenna systems (DAS)
  - 802.11 wifi
2. Identify hazards and describe safe work practices associated with wireless systems.
3. Interpret codes, standards and regulations associated with wireless systems.
4. Identify and interpret information associated with wireless systems found on drawings and specifications.
5. Identify tools and equipment used to install, service and maintain wireless systems.
6. Describe the radio frequency spectrum and convert between frequency and wavelength.
7. Explain the propagation of radio waves in free space.
  - power density and electric and magnetic field intensity
  - free space attenuation and path loss
  - maximum communication range for line-of-site propagation.
8. Describe the difference between path loss in mobile environments to that in free space.
9. Explain the operating principles of antennas.
  - radiation
  - isotropic
  - dipole
  - omni directional

- gain
- beam width
- bandwidth
- polarization
- impedance

10. Describe the gain, bandwidth and application of antennas.

- half wave dipole
- folded dipole
- yagi
- collinear
- horn
- parabolic

11. Describe applications that use a wireless medium.

- paging systems
- wireless LAN devices (printers, cameras)
- hot spots
- bluetooth devices
- global positioning systems (GPS)
- master clock system
- digital wayfinding beacons
- lighting controllers
- blind controllers
- real-time locating systems

12. Identify current and emerging technologies.

- smart phones
- audio visual room types (large, medium and small boardrooms)

13. Describe the bandwidth requirements for entertainment content on wireless devices.

- downloadable content (music files, games)
- streaming content
- interactive content

14. Describe the procedures used to install, upgrade and connect wireless systems.

- site assessment and planning
- predictive surveys using RF mapping software
- WLAN settings and configuration
- post-installation site surveys

**Practical Objectives:**

N/A

# CMT-230 Commissioning and Decommissioning

## Learning Outcomes:

- Demonstrate knowledge of commissioning/decommissioning and its purpose.

## Occupational Standard Reference:

- 5.01 Performs commissioning of communication and associated systems.
- 5.02 Performs decommissioning of communication and associated systems.

## Suggested Hours:

12 Hours

## Theoretical Objectives:

1. Define terminology associated with commissioning and decommissioning.
2. Identify hazards and describe safe work practices associated with commissioning and decommissioning systems and equipment.
3. Identify and interpret information sources and documentation associated with commissioning and decommissioning.
  - equipment shop drawings
  - as-built drawings
  - test results
4. Explain the purpose of commissioning and decommissioning.
5. Identify diagnostic and test equipment used when commissioning and decommissioning systems and describe their applications and procedures for use.
6. Describe the procedures used to commission systems and equipment.
7. Describe the procedures used to decommission systems and equipment.

## Practical Objectives:

N/A

## CMT-235 Job Planning

### Learning Outcomes:

- Demonstrate knowledge of procedures to plan and organize jobs.

### Red Seal Occupational Standard Reference:

- 3.02 Organizes materials and supplies.
- 3.03 Plans project tasks and procedures.
- 3.04 Prepares worksite.
- 6.03 Performs final inspection of communication and associated systems.

### Suggested Hours:

6 Hours

### Theoretical Objectives:

1. Define terminology associated with job planning.
2. Identify sources of information relevant to job planning.
  - safety and work-related documentation
  - drawings and specifications
  - related professionals/other trades
  - clients
3. Interpret codes, standards and regulations associated with job planning.
  - standards and regulations
  - codes and by laws
  - permits
    - communications cabling
  - inspections
4. Identify factors to consider that affect scheduling and timing of work.
  - site, weather and environmental considerations
  - work of other trades
  - material and supplies availability
  - public safety
  - accessibility to work area
  - customer requirements
  - shut down requirements

- work sequence
5. Describe considerations to plan and organize job tasks and procedures.
    - schedule/sequence
    - personnel
    - tools and equipment
    - accessible installations awareness
    - sustainability and environmentally friendly techniques
  6. Describe the procedures used to coordinate job tasks and work requirements.
    - conduct job site/hazard assessment
    - prepare lists of materials and supplies
    - determine building envelope specifications
    - determine installation priorities
    - requisition equipment, components and accessories
    - arrange for delivery and storage of equipment/materials
    - determine utility requirements
    - coordinate/control access to work area
    - conduct work area inspection
    - coordinate activities with customer and other professionals
    - perform final inspection
  7. Describe the procedures used to estimate work requirements.
    - tools and equipment
    - components and accessories
    - time and costs
  8. Explain how changes in workplace documents impact project requirements.
    - request for information
    - change orders
    - engineers' reports
  9. Identify elements in concrete walls and floors, concrete slab on grade and in soil and describe the types of equipment used to locate them.
    - conduits
    - heating cables
    - pipes
    - reinforcement bar
    - post-tensioned cables
    - x-raying of floors in buildings.
    - direct buried versus underground conduit.

10. Describe the procedures used to locate existing pathways.

- flags and paint colours

**Practical Objectives:**

N/A



## CMT-240 Security and Surveillance Systems

### Learning Outcomes:

- Demonstrate knowledge of security and surveillance systems, their applications, components and operation.
- Demonstrate knowledge of procedures to install, upgrade and connect security and surveillance systems.
- Demonstrate knowledge of procedures to test security and surveillance systems.
- Demonstrate knowledge of procedures to service and maintain security and surveillance systems.

### Red Seal Occupational Standard Reference:

6.02 Tests communication and associated systems.

13.01 Installs security and surveillance systems.

13.02 Performs servicing of security and surveillance systems.

### Suggested Hours:

6 Hours

### Theoretical Objectives:

1. Define terminology associated with security and surveillance systems.
2. Identify hazards and describe safe work practices associated with security and surveillance systems.
3. Interpret codes, regulations and standards associated with security and surveillance systems.
4. Interpret information associated with security and surveillance systems found on drawings and specifications.
5. Identify tools and equipment used to install, service and maintain security and surveillance systems.
6. Identify types of security and surveillance systems and describe their characteristics and applications.
  - perimeter
  - space
  - spot
7. Describe the interconnection with other networked systems.

8. Identify security and surveillance system components and describe their characteristics and applications.
  - Cameras (pan-tilt zoom, fixed)
  - video recorders
  - sensors
  - card readers
  - electronic locks
  - horns
  - panels
  - monitors
  - bio-scanners
  - voice recognition
  - RFID tags
  - keypads
  - power supplies
  - servers
  - Graphic User Interface (GUI)
9. Describe the procedures used to install, upgrade and connect security and surveillance systems and their components.
10. Describe the procedures used to perform commissioning of security and surveillance systems.
11. Describe the procedures used to test security and surveillance systems and their components.
12. Describe possible effects of cabling service and maintenance on other networked systems.
13. Describe the procedures used to service and maintain security and surveillance systems and their components.

**Practical Objectives:**

N/A

## CMT-245 VDV, IPTV and CATV Systems

### Learning Outcomes:

- Demonstrate knowledge of voice/data/video (VDV), internet protocol television (IPTV) and community antenna television (CATV) systems, their applications, components and operation.
- Demonstrate knowledge of procedures to install VDV, IPTV and CATV systems.
- Demonstrate knowledge of procedures to test VDV, IPTV and CATV systems.
- Demonstrate knowledge of procedures to service and maintain VDV, IPTV and CATV systems.

### Occupational Standard Reference:

- 6.02 Tests communication and associated systems.
- 14.01 Installs communication systems.
- 14.02 Performs servicing of communication systems.

### Suggested Hours:

9 Hours

### Theoretical Objectives:

1. Define terminology associated with VDV, IPTV and CATV systems.
2. Identify hazards and describe safe work practices associated with VDV, IPTV and CATV systems.
3. Interpret codes, regulations and standards associated with VDV, IPTV and CATV systems.
4. Interpret information associated with VDV, IPTV and CATV systems found on drawings and specifications.
5. Identify tools and equipment used to install, service and maintain VDV, IPTV and CATV systems.
6. Identify types of VDV, IPTV and CATV systems and describe their characteristics and applications.
  - unshielded twisted pair (UTP)
  - screen twisted pair (SCTP)
  - foil shielded twisted pair (FSTP)
  - foil unshielded twisted pair (FUTP)
  - category cable

- fibre optic
  - multi-mode and single-mode
  - coaxial
  - distributed antenna system (wireless)
7. Describe the interconnection with other networked systems.
  8. Identify VDV, IPTV and CATV system components and describe their characteristics and applications.
    - cabling
    - connectors
    - head end equipment and end-points
    - cable supports
    - surge protection devices
    - cabinets
    - racks
    - active network equipment
    - transmitters
    - receiving equipment
    - amplifiers
    - bonding hardware
  9. Identify considerations and requirements for selecting VDV, IPTV and CATV systems and their components.
  10. Describe the procedures used to install, upgrade and connect VDV, IPTV and CATV systems and their components.
  11. Describe the procedures used to perform commissioning and verification of VDV, IPTV and CATV systems.
  12. Describe the procedures used to test VDV, IPTV and CATV systems and their components.
  13. Describe possible effects of VDV, IPTV and CATV service and maintenance on other networked systems.
  14. Describe the procedures used to service and maintain VDV, IPTV and CATV systems and their components.

**Practical Objectives:**

N/A

## CMT-250 Public Address, Mass Notification and Intercom Systems

### Learning Outcomes:

- Demonstrate knowledge of public address (PA), mass notification and intercom systems, their applications, components and operation.
- Demonstrate knowledge of procedures to install, upgrade and connect PA, mass notification and intercom systems.
- Demonstrate knowledge of procedures to test PA, mass notification and intercom systems.
- Demonstrate knowledge of procedures to service and maintain PA, mass notification and intercom systems.

### Occupational Standard Reference:

- 6.02 Tests communication and associated systems.
- 14.01 Installs communication systems.
- 14.02 Performs servicing of communication systems.

### Suggested Hours:

3 Hours

### Theoretical Objectives:

1. Define terminology associated with PA, mass notification and intercom systems.
2. Identify hazards and describe safe work practices associated with PA, mass notification and Intercom systems.
3. Interpret codes, regulations and standards associated with PA, mass notification and intercom systems.
4. Interpret information associated with PA, mass notification and intercom systems found on drawings and specifications.
5. Identify tools and equipment used to install, service and maintain PA and intercom systems.
6. Identify types of PA, mass notification and intercom systems and describe their characteristics and applications.
  - PA and mass notification
    - perimeter
    - space
  - intercom
    - one to one

- one to many
7. Describe the interconnection with other networked systems.
  8. Identify PA, mass notification and intercom system components and describe their characteristics and applications.
  9. Describe the procedures used to install, upgrade and connect PA, mass notification and intercom systems and their components.
  10. Describe the procedures used to perform commissioning and verification of PA, mass notification and intercom systems.
  11. Describe the procedures used to test PA, mass notification and intercom systems and their components.
  12. Describe possible effects of PA, mass notification and intercom system service and maintenance on other networked systems.
  13. Describe the procedures used to service and maintain PA, mass notification and intercom systems and their components.

**Practical Objectives:**

N/A

## CMT-255 Nurse Call Systems

### Learning Outcomes:

- Demonstrate knowledge of nurse call systems, their applications, components and operation.
- Demonstrate knowledge of procedures to install, upgrade and connect nurse call systems.
- Demonstrate knowledge of procedures to test nurse call systems.
- Demonstrate knowledge of procedures to service and maintain nurse call systems.

### Occupational Standard Reference:

- 6.02 Tests communication and associated systems.  
14.01 Installs communication systems.  
14.02 Performs servicing of communication systems.

### Suggested Hours:

3 Hours

### Theoretical Objectives:

1. Define terminology associated with nurse call systems.
2. Identify hazards and describe safe work practices associated with nurse call systems.
3. Interpret codes, regulations and standards associated with nurse call systems.
  - UL 1069 nurse call code
4. Interpret information pertaining to nurse call systems found on drawings and specifications.
5. Identify tools and equipment used to install, service and maintain nurse call systems.
6. Identify types of nurse call systems and describe their characteristics and applications.
  - tone/bell and light
  - one way notification
  - one way voice, two-way voice
  - networked versus proprietary cabling
7. Describe the interconnection with other networked systems.
8. Identify nurse call system components and describe their characteristics and applications.
9. Describe the procedures to install, upgrade and connect nurse call systems and their components.

10. Describe the procedures to perform commissioning and verification of nurse call systems.
11. Describe the procedures used to test nurse call systems and their components
12. Describe possible effects of nurse call system service and maintenance on other networked systems.
13. Describe the procedures used to service and maintain nurse call systems and their components.

**Practical Objectives:**

N/A



## CMT-260 Audio Visual Systems

### Learning Outcomes:

- Demonstrate knowledge of audio visual (AV) systems, their applications, components and operation.
- Demonstrate knowledge of procedures to install, upgrade and connect AV systems.
- Demonstrate knowledge of procedures to test AV systems.
- Demonstrate knowledge of procedures to service and maintain AV systems.

### Occupational Standard Reference:

- 6.02 Tests communication and associated systems.
- 14.01 Installs communication systems.
- 14.02 Performs servicing of communication systems.

### Suggested Hours:

3 Hours

### Theoretical Objectives:

1. Define terminology associated with AV systems.
2. Identify hazards and describe safe work practices associated with AV systems.
3. Interpret codes, regulations and standards associated with AV systems.
4. Interpret information associated with AV systems found on drawings and specifications.
5. Identify tools and equipment used to install, service and maintain AV systems.
6. Identify types of AV systems and describe their characteristics and applications.
7. Describe the interconnection with other networked systems.
8. Identify AV system components and describe their characteristics and applications.
  - displays (monitors and projectors)
  - audio systems (speakers, microphones and audio mixers)
  - video systems (cameras, video equipment)
  - control systems (touch panels, remote controls)
  - cables and connectors (data cabling, fibre optic cables, modular connectors)
9. Describe the procedures to install, upgrade and connect AV systems and their components.
10. Describe the procedures to perform commissioning and verification of AV systems.

11. Describe the procedures used test AV systems and their components.
12. Describe possible effects of AV system service and maintenance on other networked systems.
13. Describe the procedures used to service and maintain AV systems and their components.

**Practical Objectives:**

N/A

## CMT-265 Building Automation Systems

### Learning Outcomes:

- Demonstrate knowledge of building automation systems, their applications, components and operation.
- Demonstrate knowledge of procedures to install, upgrade and building automation systems.
- Demonstrate knowledge of procedures to test building automation systems.
- Demonstrate knowledge of procedures to service and maintain building automation systems.

### Occupational Standard Reference:

- 6.02 Tests communication and associated systems.  
15.01 Installs building automation systems.  
15.02 Performs servicing of building automation systems.

### Suggested Hours:

6 Hours

### Theoretical Objectives:

1. Define terminology associated with building automation systems.
2. Interpret codes, standards and regulations associated with building automation systems.
  - ASHRAE - HVAC
3. Interpret information associated with building automation systems found on drawings and specifications.
4. Identify tools and equipment used to install, service and maintain building automation systems.
5. Identify types of building automation systems and describe their characteristics and applications.
  - alert and alarm
  - environmental control
  - lighting control
  - energy management
  - occupancy
  - sustainability
  - operational efficiency

6. Describe the interconnection with other networked systems.
7. Identify building automation system components and describe their characteristics and applications.
  - network cabling
  - sensors (occupancy levels, light levels)
  - servers
  - power over ethernet (POE) switches
  - graphic user interface (GUI)
8. Identify considerations and requirements for selecting cable associated with building automation systems and their components.
9. Describe the procedures used to install, upgrade and connect building automation systems and their components.
10. Describe the procedures to perform commissioning and verification of building automation systems.
11. Describe the procedures used to test building automation systems and their components.
12. Describe possible effects of service and maintenance on other networked systems.
13. Describe the procedures used to service and maintain building automation systems and their components.

**Practical Objectives:**

N/A

## CMT-270 Program Review

### Learning Outcomes:

- Demonstrate knowledge of the Occupational Standard and its relationship to the Certification Examination.
- Demonstrate knowledge of overall comprehension of the trade in preparation for the Certification Examination.

### Occupational Standard Reference:

Entire Occupational Standard.

### Suggested Hours:

30 Hours

### Theoretical Objectives:

1. Define terminology associated with an Occupational Standard.
  - major work activities (MWA)
  - tasks
  - sub-tasks
2. Explain how an Occupational Standard is developed and the link it has with the Certification Examination.
  - development
  - validation
  - MWA and task weighting
  - examination breakdown (pie-chart)
3. Identify exam preparation resources and products and describe their use for preparing for the Certification Examination.
  - Red Seal and Agency websites
  - Red Seal examination preparation guide
  - exam breakdowns
  - sample questions
4. Explain the relationship between the Occupational Standard and the Curriculum Standard.
5. Review common occupational skills for the Communications Technician trade as identified in the Occupational Standard.

- performs safety-related functions
  - uses tools and equipment
  - organizes work
  - installs support components
  - commissions and decommissions communication systems
  - performs labelling, testing and documentation
  - uses communication and mentoring techniques
6. Review process to install and service cables inside and outside plant for the Communications Technician trade as identified in the Occupational Standard.
- lays out and creates cable pathways (inside plant)
  - lay out and creates cable pathways (outside plant)
  - selects and prepares cable for installation (inside and outside plant)
  - installs cable (inside and outside plant)
  - services cable plant infrastructure
7. Review process to install and service signaling, communication and associated systems for the Communications Technician trade as identified in the Occupational Standard.
- installs and services security and surveillance systems
  - installs and services voice/data/video, internet protocol television and community antenna television systems
  - installs and services public address, mass notification and intercom systems
  - installs and services nurse call systems
  - installs and services audio visual systems
  - installs and services building automation systems

**Practical Objectives:**

N/A

## Feedback and Revisions

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This curriculum standard will be amended periodically; comments or suggestions for improvements should be directed to:

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Any comments or suggestions received will be reviewed and considered to determine the course of action required. If the changes are deemed to be minor, they will be held for implementation during the next review cycle. If immediate change is deemed appropriate, it will result in a revision to this version of the curriculum standard and will be detailed in the following section.

### Version Changes

Revision Date	Revision	Implementation Date