COURSE CTA3400: ELECTRICITY FUNDAMENTALS

Level: First Period Apprenticeship

Prerequisite: CTA3900: Apprenticeship Safety

Description: Students are introduced to the fundamentals of electricity and basic theory and to components of introductory circuits.

Parameters: Access to a material work centre, complete with basic instrumentation tools and materials, and to instruction from an individual with journeyperson certification in the communication technician trade.

Resources: Please refer to the books and materials listed at Tradesecrets: Trades & Occupations List.

Outcomes: The student will:

1. **describe the basic fundamentals of electricity including Ohm's law; analytical troubleshooting; conductors; analog and digital meters; and magnetism**
   - 1.1 describe practical applications of the general principles of electricity
   - 1.2 describe the components of basic circuits
   - 1.3 define, give symbols and state units of measurement for the following electrical terms:
     - 1.3.1 coulomb as a unit of charge
     - 1.3.2 volt as a unit of potential difference
     - 1.3.3 amp as a unit of current
     - 1.3.4 ohm as a unit of resistance
   - 1.4 describe the term closed circuit
   - 1.5 describe the term open circuit
   - 1.6 describe the term short circuit
   - 1.7 explain direction of current:
     - 1.7.1 electron flow
     - 1.7.2 conventional flow
   - 1.8 describe the difference between alternating current (AC) and direct current (DC)
   - 1.9 state the forms of Ohm's law
   - 1.10 perform calculations using all forms of Ohm's law
   - 1.11 explain power dissipation and work in a resistance
   - 1.12 calculate power dissipation in a resistance
   - 1.13 explain the relationship between voltage, current, resistance and power
   - 1.14 state forms and perform calculations using power formulas
   - 1.15 describe analog and digital multimeters
   - 1.16 explain types of conductors and insulators used in communications
   - 1.17 explain the effect of wire resistance in a circuit
   - 1.18 define the following magnetic terms:
     - 1.18.1 magnetic field
     - 1.18.2 magnetic flux
     - 1.18.3 flux density
     - 1.18.4 induction by magnetic fields
     - 1.18.5 reluctance
     - 1.18.6 ampere/turns

1.18.7 field intensity
1.18.8 Ohm's law of magnetic circuits
1.18.9 hysteresis

1.19 identify the types of magnets, including:
1.19.1 permanent
1.19.2 electromagnet

1.20 define permeability

1.21 explain magnetic shielding

2. explain the operation of passive electrical components including resistors, inductors, relays, capacitors and transformers

2.1 explain resistors

2.2 explain the induction of current

2.3 state Lenz's law

2.4 explain the generation of induced voltage

2.5 describe typical electrical circuit components, including:
2.5.1 switches
2.5.2 fuses
2.5.3 indicators

2.6 describe relay function

3. demonstrate basic competencies

3.1 demonstrate fundamental skills to:
3.1.1 communicate
3.1.2 manage information
3.1.3 use numbers
3.1.4 think and solve problems

3.2 demonstrate personal management skills to:
3.2.1 demonstrate positive attitudes and behaviours
3.2.2 be responsible
3.2.3 be adaptable
3.2.4 learn continuously
3.2.5 work safely

3.3 demonstrate teamwork skills to:
3.3.1 work with others
3.3.2 participate in projects and tasks

4. create a transitional strategy to accommodate personal changes and build personal values

4.1 identify short-term and long-term goals

4.2 identify steps to achieve goals

COURSE CTA3405: AC/DC

Level: First Period Apprenticeship

Prerequisite: CTA3900: Apprenticeship Safety

Description: Students develop an understanding of the fundamentals of direct current (DC) and alternating current (AC) power sources and their effect on a circuit.

Parameters: Access to a material work centre, complete with basic instrumentation tools and materials, and to instruction from an individual with journeyperson certification in the communication technician trade.

Resources: Please refer to the books and materials listed at Tradesecrets: Trades & Occupations List.

Outcomes: The student will:

1. **explain the operation of DC circuits and battery components**
   - 1.1 define, calculate and analyze series, parallel, and series-parallel DC circuits
   - 1.2 troubleshoot and analyze the effects of opens and shorts on a parallel circuit
   - 1.3 describe types of grounding, including:
     - 1.3.1 earth ground
     - 1.3.2 chassis ground
   - 1.4 describe DC power sources, including:
     - 1.4.1 battery
     - 1.4.2 transformer
   - 1.5 explain internal resistance of power sources
2. **describe small signal AC current and voltage, AC power sources, inductive circuits, capacitive circuits, RLC in AC circuits and resonance**
   - 2.1 explain the alternating current theory
   - 2.2 identify sources of small signal sinusoidal AC wave forms
   - 2.3 describe series and parallel inductive and capacitive AC circuits
   - 2.4 describe inductive reactance (XL) and capacitive reactance (XC) in terms of an AC impedance
   - 2.5 calculate XL and inductance (L), or XC and capacitance (C), and frequency given any two of the variables
   - 2.6 add inductive reactance in series and parallel
   - 2.7 identify applications of inductive and capacitive reactance
   - 2.8 explain the term back electromotive force, also known as counter-electromotive force (CEMF)
   - 2.9 describe the hazards associated with the high voltage produced by opening resistor-inductor (RL) circuits
   - 2.10 explain how a charge is stored in a dielectric
   - 2.11 explain the charging and discharging of capacitors
   - 2.12 describe typical capacitors, including:
     - 2.12.1 electrolytic
     - 2.12.2 bipolar
   - 2.13 describe the effects of stray inductance and capacitance
   - 2.14 explain AC maximum power transfer
   - 2.15 explain transformer theory

3. employ analytical troubleshooting techniques

- 3.1 define analytical troubleshooting
- 3.2 describe analytical problem solving techniques, considering:
  - 3.2.1 identifying the problem
  - 3.2.2 defining the problem
  - 3.2.3 examining the options
  - 3.2.4 acting on a plan
  - 3.2.5 looking at the consequences
- 3.3 identify causes against known standards or specifications
- 3.4 explain how multi-problem resolutions are accomplished through analytical troubleshooting techniques, including:
  - 3.4.1 isolating
  - 3.4.2 prioritizing
  - 3.4.3 resolving

4. demonstrate basic competencies

- 4.1 demonstrate fundamental skills to:
  - 4.1.1 communicate
  - 4.1.2 manage information
  - 4.1.3 use numbers
  - 4.1.4 think and solve problems
- 4.2 demonstrate personal management skills to:
  - 4.2.1 demonstrate positive attitudes and behaviours
  - 4.2.2 be responsible
  - 4.2.3 be adaptable
  - 4.2.4 learn continuously
  - 4.2.5 work safely
- 4.3 demonstrate teamwork skills to:
  - 4.3.1 work with others
  - 4.3.2 participate in projects and tasks

5. create a transitional strategy to accommodate personal changes and build personal values

- 5.1 identify short-term and long-term goals
- 5.2 identify steps to achieve goals

COURSE CTA3410: BASIC ELECTRICITY

Level: First Period Apprenticeship

Prerequisite: CTA3900: Apprenticeship Safety

Description: Students are introduced to safe work habits in the lab and complete basic electricity lab exercises using common tools, materials and equipment found in the lab setting.

Parameters: Access to a material work centre, complete with basic instrumentation tools and materials, and to instruction from an individual with journeyperson certification in the communication technician trade.

Resources: Please refer to the books and materials listed at Tradesecrets: Trades & Occupations List.

Outcomes: The student will:

1. **execute various basic electricity lab exercises including work with meters, circuits, voltage dividers, transformers, cells, power supplies, oscilloscope, inductors and capacitors**
   - 1.1 describe laboratory rules and procedures, considering:
     - 1.1.1 shoes shall be worn that provide full coverage of the feet, and appropriate personal clothing shall be worn in laboratories
     - 1.1.2 appropriate eye protection shall be worn when using toxic chemicals or operating mechanical equipment
     - 1.1.3 occupants shall be familiar with the locations and operation of safety and emergency equipment such as fire extinguishers; first aid kits; emergency eyewash stations and emergency showers; emergency power shut-off; emergency telephones; and emergency exits
     - 1.1.4 unauthorized person(s) shall not be allowed in a laboratory
     - 1.1.5 never open (remove cover) of any equipment in the laboratories
     - 1.1.6 all problems must be reported
     - 1.1.7 no power laboratory should be performed without instructor present
     - 1.1.8 before equipment is made live, circuit connections and layout should be checked by a instructor
     - 1.1.9 never make any changes to circuits or mechanical layout without first isolating the circuit by switching off and removing connections to supplies
     - 1.1.10 occupants shall be familiar with the electrical hazards associated with their workplace
     - 1.1.11 metal bracelets and watchstraps are removed
     - 1.1.12 occupants know the correct handling procedures for batteries, cells, capacitors, inductors and other high energy-storage devices
     - 1.1.13 equipment found to be faulty in any way should be reported immediately and not used until it is inspected and declared safe
     - 1.1.14 occupants shall know what must be done in an emergency
   - 1.2 correctly operate meters
   - 1.3 test, measure and verify basic circuits
   - 1.4 verify characteristics of loaded and unloaded voltage dividers
   - 1.5 test transformers for input/output current and voltage characteristics
   - 1.6 test cells and power supplies

1.7 measure and verify specified current characteristics using an oscilloscope
1.8 conduct specified lab exercises involving inductors
1.9 conduct specified lab exercises involving capacitors

2. demonstrate basic competencies

2.1 demonstrate fundamental skills to:
- 2.1.1 communicate
- 2.1.2 manage information
- 2.1.3 use numbers
- 2.1.4 think and solve problems

2.2 demonstrate personal management skills to:
- 2.2.1 demonstrate positive attitudes and behaviours
- 2.2.2 be responsible
- 2.2.3 be adaptable
- 2.2.4 learn continuously
- 2.2.5 work safely

2.3 demonstrate teamwork skills to:
- 2.3.1 work with others
- 2.3.2 participate in projects and tasks

3. create a transitional strategy to accommodate personal changes and build personal values

3.1 identify short-term and long-term goals
3.2 identify steps to achieve goals

COURSE CTA3415: MATHEMATICS

Level: First Period Apprenticeship

Prerequisite: CTA3400: Electricity Fundamentals

Description: Students develop the mathematical skills required to understand, calculate and isolate the characteristics of series and parallel circuits found in the communication technician trade.

Parameters: Access to a material work centre, complete with basic instrumentation tools and materials, and to instruction from an individual with journeyperson certification in the communication technician trade.

Resources: Please refer to the books and materials listed at Tradesecrets: Trades & Occupations List.

Outcomes: The student will:

1. **perform formula manipulation, solve the system of two equations and solve series-parallel circuit problems**
   - 1.1 perform formula manipulation as applied to basic AC/DC problems, including:
     - 1.1.1 current
     - 1.1.2 voltage
     - 1.1.3 resistance
   - 1.2 solve the system of two equations using methods of substitution and elimination
   - 1.3 solve series-parallel circuit problems, considering:
     - 1.3.1 current
     - 1.3.2 voltage
     - 1.3.3 resistance
     - 1.3.4 series IR voltage drops
     - 1.3.5 Kirchhoff's voltage law (KVL)
     - 1.3.6 total power in a series or parallel circuit
     - 1.3.7 Kirchhoff's current law (KCL)
     - 1.3.8 conductance in parallel
2. **define and manipulate alternative numbering systems**
   - 2.1 describe binary numbering system
   - 2.2 describe hexadecimal numbering systems
3. **demonstrate basic competencies**
   - 3.1 demonstrate fundamental skills to:
     - 3.1.1 communicate
     - 3.1.2 manage information
     - 3.1.3 use numbers
     - 3.1.4 think and solve problems

3.2 demonstrate personal management skills to:
    3.2.1 demonstrate positive attitudes and behaviours
    3.2.2 be responsible
    3.2.3 be adaptable
    3.2.4 learn continuously
    3.2.5 work safely
3.3 demonstrate teamwork skills to:
    3.3.1 work with others
    3.3.2 participate in projects and tasks

4. create a transitional strategy to accommodate personal changes and build personal values

4.1 identify short-term and long-term goals
4.2 identify steps to achieve goals

COURSE CTA3420: OUTSIDE CABLING

Level: First Period Apprenticeship

Prerequisite: CTA3900: Apprenticeship Safety

Description: Students develop the ability and skills to create cabling systems outside plant architecture according to appropriate cabling standards.

Parameters: Access to a material work centre, complete with basic instrumentation tools and materials, and to instruction from an individual with journeyperson certification in the communication technician trade.

Resources: Please refer to the books and materials listed at Tradesecrets: Trades & Occupations List.

Outcomes: The student will:

1. recognize and use the correct cabling standards and types of cables for given installations

1.1 discuss the reasons for cabling standards

1.2 discuss the various cabling standards, including:

1.2.1 International Organization for Standardization (ISO)

1.2.2 ISO 11801 (Generic Cabling for Customer Premises)

1.2.3 American National Standards Institute (ANSI)

1.2.4 Institute of Electrical and Electronics Engineers (IEEE), including IEEE 802.3 (Ethernet)

1.2.5 Electronic Industries Alliance (EIA)

1.2.6 Telecommunications Industries Association (TIA), including:

- ANSI/TIA/EIA-568-B.1 (Commercial Building Telecommunications Cabling), Standard Part 1: General Requirements
- ANSI/TIA/EIA-568-B.2 and B.2-ad10 (Commercial Building Telecommunications Cabling), Standard Part 2: Balanced Twisted Pair Cabling Components
- ANSI/TIA/EIA-568-B.3 (Commercial Building Telecommunications Cabling), Standard Part 3: Optical Fibre Cabling Component Standard
- ANSI/TIA/EIA-569-A, (Commercial Building Standard for Telecommunications Pathways and Spaces)
- ANSI/TIA/EIA-570-B (Residential and Light Commercial Telecommunications Wiring Standard); ANSI/TIA/EIA-606 (Administration Standard for the Telecommunications Infrastructure of Commercial Buildings)
- ANSI/TIA/EIA-607 (Commercial Building Grounding and Bonding Requirements for Telecommunications)
- ANSI/TIA/EIA-758 (Customer-owned Outside Plant Telecommunications Standard)

1.2.7 Canadian Standards Association (CSA) and current CSA equivalent documents for ISO, ANSI, IEEE, EIA and TIA documents as listed

1.2.8 Canadian Electrical Code (CEC) sections (currently C22.1-06), including: Section 10 (Grounding and Bonding); Section 16 (Class 1 and Class 2 circuits); Section 56 (Optical Fibre Cables); Section 60 (Electrical Communication Systems)

2. identify the equipment components and structures of outside plant (OSP) architecture

2.1 describe the serving area concept (SAC)

2.2 describe underground, direct buried and aerial components for the following:

- 2.2.1 OSP infrastructure
- 2.2.2 OSP cable structure and cable types
- 2.2.3 OSP cable enclosures
- 2.2.4 OSP colour codes
- 2.2.5 OSP splicing techniques

3. demonstrate basic competencies

3.1 demonstrate fundamental skills to:

- 3.1.1 communicate
- 3.1.2 manage information
- 3.1.3 use numbers
- 3.1.4 think and solve problems

3.2 demonstrate personal management skills to:

- 3.2.1 demonstrate positive attitudes and behaviours
- 3.2.2 be responsible
- 3.2.3 be adaptable
- 3.2.4 learn continuously
- 3.2.5 work safely

3.3 demonstrate teamwork skills to:

- 3.3.1 work with others
- 3.3.2 participate in projects and tasks

4. create a transitional strategy to accommodate personal changes and build personal values

4.1 identify short-term and long-term goals

4.2 identify steps to achieve goals

COURSE CTA3425: INSIDE CABLING

Level: First Period Apprenticeship

Prerequisite: CTA3900: Apprenticeship Safety

Description: Students develop the ability and skills to create structured cabling systems inside plant architecture.

Parameters: Access to a material work centre, complete with basic instrumentation tools and materials, and to instruction from an individual with journeyperson certification in the communication technician trade.

Resources: Please refer to the books and materials listed at Tradesecrets: Trades & Occupations List.

Outcomes: The student will:

1. identify the equipment, components and structures of inside plant architecture

- 1.1 describe structured cabling systems (SCS), including:
  - 1.1.1 SCS infrastructure
  - 1.1.2 patch panels (PP)
  - 1.1.3 cross-connects (X-Conn)
  - 1.1.4 telecommunication outlets (TOs)
  - 1.1.5 multi-user telecommunication outlet assemblies (MUTOAs)
  - 1.1.6 SCS cable structure and cable types
  - 1.1.7 SCS colour codes
  - 1.1.8 SCS termination techniques
- 1.2 describe the relationship of networking systems and topologies, considering architectures
- 1.3 describe building entrances and demarcation points, including:
  - 1.3.1 central office
  - 1.3.2 main distribution frame (MDF)
  - 1.3.3 intermediate distribution frame (IDF)
  - 1.3.4 fibre main distribution frame (FMDF)
  - 1.3.5 tie cables
  - 1.3.6 co-locate rooms
  - 1.3.7 customer premises
- 1.4 identify and describe NID/NIB (network interface device/network interface board) component parts
- 1.5 describe the function of NID/NIB component parts
- 1.6 describe the correct wiring configuration for NID/NIB protectors
- 1.7 describe protective devices
- 1.8 identify the appropriate protection devices to protect life and property of subscribers
- 1.9 describe telecommunication rooms (TR)
- 1.10 describe vertical risers/backbone, including:
  - 1.10.1 pathways, spaces and access panels
  - 1.10.2 cable types, considering usage specifications and fire ratings

2. use correct bonding and grounding equipment and procedures for a given installation

2.1 explain the purpose of bonding and grounding, including the effects of:
- 2.1.1 lightning on communication systems
- 2.1.2 precipitation static on communication systems

2.2 identify electrical safety regulatory bodies governing bonding and grounding of communication facilities, including:
- 2.2.1 safety requirements for the last utility in
- 2.2.2 procedures to be followed when foreign voltages have been located
- 2.2.3 standard maximum measured voltage allowed before stopping work

2.3 describe bonding and grounding requirements for communications equipment, including:
- 2.3.1 remote sites
- 2.3.2 fibre optic transport system (FOTS) equipment
- 2.3.3 point of presence (POP) equipment
- 2.3.4 cellular sites
- 2.3.5 customer premises
- 2.3.6 subscriber carrier

2.4 describe latest developments in anti-static protection, including:
- 2.4.1 circuit pack handling
- 2.4.2 anti-static flooring systems
- 2.4.3 ground connections and maintenance
- 2.4.4 anti-static mats and wrist straps
- 2.4.5 static dissipative footwear

3. identify and use the correct tools to perform acceptable cable splicing and bonding and grounding procedures

3.1 perform terminations on various blocks and panels, considering:
- 3.1.1 outside plant (OSP) cable testing methodology and required tools
- 3.1.2 SCS cable testing methodology and required tools; e.g., punchdown tools and blades, pliers, crimpers, snips, wrenches, strippers, splitters, toners and probes
- 3.1.3 basic OSP cable splicing techniques
- 3.1.4 basic SCS cable splicing and termination techniques
- 3.1.5 basic bonding and grounding techniques

4. demonstrate basic competencies

4.1 demonstrate fundamental skills to:
- 4.1.1 communicate
- 4.1.2 manage information
- 4.1.3 use numbers
- 4.1.4 think and solve problems

4.2 demonstrate personal management skills to:
- 4.2.1 demonstrate positive attitudes and behaviours
- 4.2.2 be responsible
- 4.2.3 be adaptable
- 4.2.4 learn continuously
- 4.2.5 work safely

4.3 demonstrate teamwork skills to:
- 4.3.1 work with others
- 4.3.2 participate in projects and tasks

5. create a transitional strategy to accommodate personal changes and build personal values

5.1 identify short-term and long-term goals

5.2 identify steps to achieve goals

COURSE CTA3430: TELEPHONE BASICS

Level: First Period Apprenticeship

Prerequisite: CTA3900: Apprenticeship Safety

Description: Students are introduced to the telecommunications industry and learn that the industry encompasses any communication over a distance—telephone, television, radio, wireless network, computer network, telemetry or other means. Students also explore how these technologies and others continue to converge so that the lines between telecommunications and other industries, such as computer hardware and consumer electronics, are getting blurrier all the time.

Parameters: Access to a material work centre, complete with basic instrumentation tools and materials, and to instruction from an individual with journeyperson certification in the communication technician trade.

Resources: Please refer to the books and materials listed at Tradesecrets: Trades & Occupations List.

Outcomes: The student will:

1. **define the scope of the communication technician trade, and be familiar with common terms associated with the trade**
   - 1.1 outline the history of the telecommunication industry
   - 1.2 describe the present telecommunication environment
   - 1.3 identify emerging technologies, trends and opportunities for future growth
   - 1.4 describe various terms associated with the communication technician trade, including but not limited to:
     - 1.4.1 co-locate; e.g., point of interface (POI), peak power output (PPO), point of train (POT)
     - 1.4.2 ILEC/CLEC (i.e., incumbent local and competitive local exchange carrier) interconnect
     - 1.4.3 primary rate interface (PRI)
     - 1.4.4 competitive digital network access (CDNA); e.g., DS1, DS3
     - 1.4.5 global positioning system (GPS)
2. **draw and interpret simple and complex telephone circuits, and describe cable characteristics**
   - 2.1 draw and explain a simple telephone circuit; e.g., telephone to central office
   - 2.2 draw and explain a complex telephone circuit; e.g., loop improvement equipment, loop extenders, virtual routing and forwarding (VFR), loading schemes
   - 2.3 describe cable characteristics
3. **explain the operation of the basic telephone set**
   - 3.1 identify components of a typical telephone set
   - 3.2 explain the theory of operation of the:
     - 3.2.1 transmitter
     - 3.2.2 receiver
     - 3.2.3 touch-tone pad
     - 3.2.4 hook switch
     - 3.2.5 ringer and capacitor
     - 3.2.6 network (sidetone)

3.3 describe the characteristics of:
    3.3.1 a 2500 set
    3.3.2 an electronic set
    3.3.3 a digital set
    3.3.4 a cordless phone

4. interpret block diagrams, and describe the North American network systems, digital multiplexing, subscriber interfacing and basic signaling technology

4.1 describe intra-office call systems
4.2 describe inter-office call systems, including:
    4.2.1 local dialing
    4.2.2 10-digit local dialing
    4.2.3 local number portability
4.3 describe numbering schemes, including:
    4.3.1 North American
    4.3.2 world
    4.3.3 Internet Protocol (IP) addressing
4.4 describe the North American switched network, including:
    4.4.1 switching office arrangements
    4.4.2 common channel signaling
4.5 describe the long distance market, including:
    4.5.1 1-800 service
    4.5.2 equal access toll and local access
4.6 explain a block diagram of a telecommunication system that incorporates:
    4.6.1 telephone sets
    4.6.2 key equipment
    4.6.3 private branch exchange (PBX) and central office exchange service (Centrex)
    4.6.4 a virtual corporate network
    4.6.5 cellular/mobile service
4.7 explain a block diagram of a telecommunication system as it relates to multiplex and carrier systems, including:
    4.7.1 coaxial cable
    4.7.2 copper cable
    4.7.3 high frequency (HF) and very high frequency (VHF) radio
    4.7.4 microwave
    4.7.5 satellite
    4.7.6 fibre optics

5. demonstrate basic competencies

5.1 demonstrate fundamental skills to:
    5.1.1 communicate
    5.1.2 manage information
    5.1.3 use numbers
    5.1.4 think and solve problems
5.2 demonstrate personal management skills to:
    5.2.1 demonstrate positive attitudes and behaviours
    5.2.2 be responsible
    5.2.3 be adaptable
    5.2.4 learn continuously
    5.2.5 work safely

5.3 demonstrate teamwork skills to:
    5.3.1 work with others
    5.3.2 participate in projects and tasks

6. create a transitional strategy to accommodate personal changes and build personal values

6.1 identify short-term and long-term goals
6.2 identify steps to achieve goals

COURSE CTA3435: SWITCHING & EQUIPMENT

Level: First Period Apprenticeship

Prerequisite: CTA3900: Apprenticeship Safety

Description: Students are introduced to switching systems and learn that the systems generally perform these three basic functions: transmit signals over the connection and alert (ring) the called station; establish connections through a switching network for conversational use during the entire call; and process the signal information to control and supervise the establishment and disconnection of the switching network connection.

Parameters: Access to a material work centre, complete with basic instrumentation tools and materials, and to instruction from an individual with journeyperson certification in the communication technician trade.

Resources: Please refer to the books and materials listed at Tradesecrets: Trades & Occupations List.

Outcomes: The student will:

1. **describe basic switching system functions including interconnecting, functions, control systems and power requirements**
   - 1.1 describe interconnecting
   - 1.2 describe the eight-step operation of a telephone call, including:
     - 1.2.1 alerting
     - 1.2.2 attending
     - 1.2.3 information transmitting
     - 1.2.4 information translating
     - 1.2.5 busy testing
     - 1.2.6 conversation
     - 1.2.7 supervising
     - 1.2.8 clearing and restoring
   - 1.3 explain block diagrams of a telecommunication system as it relates to:
     - 1.3.1 distribution/concentration/expansion
     - 1.3.2 distributed versus common control
   - 1.4 describe direct current (DC) power requirements of switching systems; e.g., 48-volt battery system
2. **use a block diagram to describe the operation of basic customer terminal equipment, and describe the technology trends with customer terminal equipment**
   - 2.1 describe the operation of basic customer terminal equipment using a block diagram, including:
     - 2.1.1 fax machines
     - 2.1.2 modems
     - 2.1.3 automatic call distributor (ACD)
     - 2.1.4 pay phones
     - 2.1.5 voice over Internet protocol (VoIP)

3. perform various analyses of telephony operation

- 3.1 measure voltage and current on the subscriber loop
- 3.2 measure frequency response on cables
- 3.3 perform decibel (dB) loss measurements
- 3.4 perform noise measurements

4. demonstrate basic competencies

- 4.1 demonstrate fundamental skills to:
  - 4.1.1 communicate
  - 4.1.2 manage information
  - 4.1.3 use numbers
  - 4.1.4 think and solve problems
- 4.2 demonstrate personal management skills to:
  - 4.2.1 demonstrate positive attitudes and behaviours
  - 4.2.2 be responsible
  - 4.2.3 be adaptable
  - 4.2.4 learn continuously
  - 4.2.5 work safely
- 4.3 demonstrate teamwork skills to:
  - 4.3.1 work with others
  - 4.3.2 participate in projects and tasks

5. create a transitional strategy to accommodate personal changes and build personal values

- 5.1 identify short-term and long-term goals
- 5.2 identify steps to achieve goals

COURSE CTA3440: NETWORK FUNDAMENTALS

Level: First Period Apprenticeship

Prerequisite: CTA3900: Apprenticeship Safety

Description: Students are introduced to the concept of networking and the codes and regulations applied to the various types of networks commonly used in the communication industry.

Parameters: Access to a material work centre, complete with basic instrumentation tools and materials, and to instruction from an individual with journeyperson certification in the communication technician trade.

Resources: Please refer to the books and materials listed at Tradesecrets: Trades & Occupations List.

Outcomes: The student will:

1. describe networking and terminology

- 1.1 define and explain the need for networking
- 1.2 discuss the historical progression of networking starting with the Advanced Research Projects Agency Network (ARPANET), including:
  - 1.2.1 creation
  - 1.2.2 deployment
  - 1.2.3 growth and evolution
  - 1.2.4 technology
  - 1.2.5 legacy
- 1.3 define the following networking terms:
  - 1.3.1 client/server
  - 1.3.2 network operating system (NOS)
  - 1.3.3 peer-to-peer
  - 1.3.4 local area network (LAN)
  - 1.3.5 wide area network (WAN)
  - 1.3.6 metropolitan area network (MAN)
  - 1.3.7 network interface card (NIC)
  - 1.3.8 switch
  - 1.3.9 router
  - 1.3.10 multicasting

2. describe and compare networking models and standards

- 2.1 explain the need for standards, considering:
  - 2.1.1 IETF (Internet Engineering Task Force)
  - 2.1.2 ISO (International Organization of Standardization)
  - 2.1.3 ITU (International Telecommunication Union)

2.2 describe the seven layers of the Open Systems Interconnection (OSI) model and its advantages, including:
    2.2.1 identifying the seven layers: physical (Layer 1), data link (Layer 2), network (Layer 3) transport (Layer 4), session (Layer 5), presentation (Layer 6), application (Layer 7)
    2.2.2 describing the data encapsulation process in comparison to the OSI model
    2.2.3 describing the OSI model as compared to the DOD (Department of Defense) model
    2.2.4 describing TCP/IP (Transmission Control Protocol/Internet Protocol) networks

3. demonstrate basic competencies

3.1 demonstrate fundamental skills to:
    3.1.1 communicate
    3.1.2 manage information
    3.1.3 use numbers
    3.1.4 think and solve problems
3.2 demonstrate personal management skills to:
    3.2.1 demonstrate positive attitudes and behaviours
    3.2.2 be responsible
    3.2.3 be adaptable
    3.2.4 learn continuously
    3.2.5 work safely
3.3 demonstrate teamwork skills to:
    3.3.1 work with others
    3.3.2 participate in projects and tasks

4. create a transitional strategy to accommodate personal changes and build personal values

4.1 identify short-term and long-term goals
4.2 identify steps to achieve goals

COURSE CTA3445: NETWORK DEVICES & IP

Level: First Period Apprenticeship

Prerequisite: CTA3900: Apprenticeship Safety
CTA3440: Network Fundamentals

Description: Students understand how most common network devices operate and learn about the protocols, which are crucial to the success of building reliable, high-performance networks.

Parameters: Access to a material work centre, complete with basic instrumentation tools and materials, and to instruction from an individual with journeyperson certification in the communication technician trade.

Resources: Please refer to the books and materials listed at Tradesecrets: Trades & Occupations List.

Outcomes: The student will:

1. describe physical layer, data link layer and network layer devices

- 1.1 describe the function of the following Layer 1 components, including:
  - 1.1.1 transmission media; e.g., twisted-pair cable, coaxial cable, fibre optic cable
  - 1.1.2 connection components; e.g., jacks, plugs, cables, patch panels
  - 1.1.3 hubs
- 1.2 describe physical LAN (local area network) topologies, including:
  - 1.2.1 bus
  - 1.2.2 star
  - 1.2.3 ring
  - 1.2.4 mesh
- 1.3 describe the function of the following Layer 2 components, including:
  - 1.3.1 network interface controller (NIC)
  - 1.3.2 media access control (MAC) addressing
  - 1.3.3 switches
- 1.4 explain the concept of collision domains, including:
  - 1.4.1 hubs versus switches
  - 1.4.2 half-duplex versus full-duplex
- 1.5 describe Layer 2 functions and protocols, including:
  - 1.5.1 Ethernet; e.g., collision sense multiple access/collision detect (CSMA/CD)
  - 1.5.2 switches
  - 1.5.3 physical (hardware) address; e.g., MAC
- 1.6 describe Layer 3 functions and protocols, including:
  - 1.6.1 router
  - 1.6.2 broadcast domains
  - 1.6.3 network addressing
  - 1.6.4 logical (host) address Internet Protocol (IP)
  - 1.6.5 network segments
  - 1.6.6 basic path determination

1.7 describe where the devices fit within the enterprise network architecture, including:
    1.7.1 network hierarchy
    1.7.2 basic design

2. explain the purpose of Internet Protocol version 4 (IPv4) addressing

2.1 explain the process of converting decimal to binary and binary to decimal as it relates to the IPv4 addressing scheme
2.2 describe the classes and breakdown of IP addressing, considering:
    2.2.1 types of classes
    2.2.2 public addressing versus private
    2.2.3 unicast vs. multicast vs. broadcast
    2.2.4 reserved addresses including loopback
2.3 explain IP subnetting
2.4 identify the common components of an IP addressing configuration on a host, including:
    2.4.1 client IP
    2.4.2 subnet mask
    2.4.3 gateway IP
    2.4.4 domain name system (DNS) IP
    2.4.5 section D Lab
2.5 explain the use of variable length subnet masks (VLSM)

3. construct a simple LAN

3.1 design an IP addressing plan
3.2 build a simple LAN
3.3 construct a simple internetwork
3.4 troubleshoot a simple internetwork
3.5 use a network protocol analyzer

4. demonstrate basic competencies

4.1 demonstrate fundamental skills to:
    4.1.1 communicate
    4.1.2 manage information
    4.1.3 use numbers
    4.1.4 think and solve problems
4.2 demonstrate personal management skills to:
    4.2.1 demonstrate positive attitudes and behaviours
    4.2.2 be responsible
    4.2.3 be adaptable
    4.2.4 learn continuously
    4.2.5 work safely
4.3 demonstrate teamwork skills to:
    4.3.1 work with others
    4.3.2 participate in projects and tasks

5. create a transitional strategy to accommodate personal changes and build personal values

5.1 identify short-term and long-term goals
5.2 identify steps to achieve goals

COURSE CTA3450: CTA PRACTICUM A

Level: First Period Apprenticeship

Prerequisite: None

Description: Students, on the work site, continue to develop and refine those competencies developed in related Career and Technology Studies (CTS) occupational areas, previous practicums and other experiences.

Parameters: This course should be accessed only by students continuing to work toward attaining a recognized credential offered by an agency external to the school. Practicum courses extend the competencies developed in related CTS occupational areas. The practicum courses may not be delivered as stand-alone courses and may not be combined with core courses. This course may not be used in conjunction with Registered Apprenticeship Program courses. This practicum course may be delivered on- or off-campus. Instruction must be delivered by a qualified teacher with journeyperson certification or an experienced professional with journeyperson certification, who is under the supervision of the qualified teacher; both must be authorized to supervise trainees for the external credential.

Outcomes: The student will:

1. **perform assigned tasks and responsibilities efficiently and effectively, as required by the agency granting credentials**
   - 1.1 identify regulations and regulatory bodies related to the credential
   - 1.2 describe personal roles and responsibilities, including:
     - 1.2.1 key responsibilities
     - 1.2.2 support functions/responsibilities
     - 1.2.3 code of ethics
   - 1.3 describe personal work responsibilities and categorize them as:
     - 1.3.1 routine tasks; e.g., daily, weekly, monthly, yearly
     - 1.3.2 non-routine tasks; e.g., emergencies
     - 1.3.3 tasks requiring personal judgement
     - 1.3.4 tasks requiring approval of a supervisor
2. **analyze personal performance in relation to established standards**
   - 2.1 evaluate application of competencies developed in related CTS courses
   - 2.2 evaluate standards of performance in terms of:
     - 2.2.1 quality of work
     - 2.2.2 quantity of work
   - 2.3 evaluate adherence to workplace policies and procedures related to health and safety
   - 2.4 evaluate the work environment in terms of:
     - 2.4.1 location
     - 2.4.2 floor plan of work area
     - 2.4.3 analysis of workflow patterns

2.5 evaluate a professional in a related occupation in terms of:
- 2.5.1 training and certification
- 2.5.2 interpersonal skills
- 2.5.3 technical skills
- 2.5.4 professional ethics

3. demonstrate basic competencies

3.1 demonstrate fundamental skills to:
- 3.1.1 communicate
- 3.1.2 manage information
- 3.1.3 use numbers
- 3.1.4 think and solve problems

3.2 demonstrate personal management skills to:
- 3.2.1 demonstrate positive attitudes and behaviours
- 3.2.2 be responsible
- 3.2.3 be adaptable
- 3.2.4 learn continuously
- 3.2.5 work safely

3.3 demonstrate teamwork skills to:
- 3.3.1 work with others
- 3.3.2 participate in projects and tasks

COURSE CTA3455: CTA PRACTICUM B

Level: First Period Apprenticeship

Prerequisite: None

Description: Students, on the work site, continue to develop and refine those competencies developed in related Career and Technology Studies (CTS) occupational areas, previous practicums and other experiences.

Parameters: This course should be accessed only by students continuing to work toward attaining a recognized credential offered by an agency external to the school. Practicum courses extend the competencies developed in related CTS occupational areas. The practicum courses may not be delivered as stand-alone courses and may not be combined with core courses. This course may not be used in conjunction with Registered Apprenticeship Program courses. This practicum course may be delivered on- or off-campus. Instruction must be delivered by a qualified teacher with journeyperson certification or an experienced professional with journeyperson certification, who is under the supervision of the qualified teacher; both must be authorized to supervise trainees for the external credential.

Outcomes: The student will:

1. **perform assigned tasks and responsibilities efficiently and effectively, as required by the agency granting credentials**
   - 1.1 identify regulations and regulatory bodies related to the credential
   - 1.2 describe personal roles and responsibilities, including:
     - 1.2.1 key responsibilities
     - 1.2.2 support functions/responsibilities
     - 1.2.3 code of ethics
   - 1.3 describe personal work responsibilities and categorize them as:
     - 1.3.1 routine tasks; e.g., daily, weekly, monthly, yearly
     - 1.3.2 non-routine tasks; e.g., emergencies
     - 1.3.3 tasks requiring personal judgement
     - 1.3.4 tasks requiring approval of a supervisor
2. **analyze personal performance in relation to established standards**
   - 2.1 evaluate application of competencies developed in related CTS courses
   - 2.2 evaluate standards of performance in terms of:
     - 2.2.1 quality of work
     - 2.2.2 quantity of work
   - 2.3 evaluate adherence to workplace policies and procedures related to health and safety
   - 2.4 evaluate the work environment in terms of:
     - 2.4.1 location
     - 2.4.2 floor plan of work area
     - 2.4.3 analysis of workflow patterns

2.5 evaluate a professional in a related occupation in terms of:
- 2.5.1 training and certification
- 2.5.2 interpersonal skills
- 2.5.3 technical skills
- 2.5.4 professional ethics

3. demonstrate basic competencies

3.1 demonstrate fundamental skills to:
- 3.1.1 communicate
- 3.1.2 manage information
- 3.1.3 use numbers
- 3.1.4 think and solve problems

3.2 demonstrate personal management skills to:
- 3.2.1 demonstrate positive attitudes and behaviours
- 3.2.2 be responsible
- 3.2.3 be adaptable
- 3.2.4 learn continuously
- 3.2.5 work safely

3.3 demonstrate teamwork skills to:
- 3.3.1 work with others
- 3.3.2 participate in projects and tasks

COURSE CTA3460: CTA PRACTICUM C

Level: First Period Apprenticeship

Prerequisite: None

Description: Students, on the work site, continue to develop and refine those competencies developed in related Career and Technology Studies (CTS) occupational areas, previous practicums and other experiences.

Parameters: This course should be accessed only by students continuing to work toward attaining a recognized credential offered by an agency external to the school. Practicum courses extend the competencies developed in related CTS occupational areas. The practicum courses may not be delivered as stand-alone courses and may not be combined with core courses. This course may not be used in conjunction with Registered Apprenticeship Program courses. This practicum course may be delivered on- or off-campus. Instruction must be delivered by a qualified teacher with journeyperson certification or an experienced professional with journeyperson certification, who is under the supervision of the qualified teacher; both must be authorized to supervise trainees for the external credential.

Outcomes: The student will:

1. **perform assigned tasks and responsibilities efficiently and effectively, as required by the agency granting credentials**
   - 1.1 identify regulations and regulatory bodies related to the credential
   - 1.2 describe personal roles and responsibilities, including:
     - 1.2.1 key responsibilities
     - 1.2.2 support functions/responsibilities
     - 1.2.3 code of ethics
   - 1.3 describe personal work responsibilities and categorize them as:
     - 1.3.1 routine tasks; e.g., daily, weekly, monthly, yearly
     - 1.3.2 non-routine tasks; e.g., emergencies
     - 1.3.3 tasks requiring personal judgement
     - 1.3.4 tasks requiring approval of a supervisor
2. **analyze personal performance in relation to established standards**
   - 2.1 evaluate application of competencies developed in related CTS courses
   - 2.2 evaluate standards of performance in terms of:
     - 2.2.1 quality of work
     - 2.2.2 quantity of work
   - 2.3 evaluate adherence to workplace policies and procedures related to health and safety
   - 2.4 evaluate the work environment in terms of:
     - 2.4.1 location
     - 2.4.2 floor plan of work area
     - 2.4.3 analysis of workflow patterns

2.5 evaluate a professional in a related occupation in terms of:
- 2.5.1 training and certification
- 2.5.2 interpersonal skills
- 2.5.3 technical skills
- 2.5.4 professional ethics

3. demonstrate basic competencies

3.1 demonstrate fundamental skills to:
- 3.1.1 communicate
- 3.1.2 manage information
- 3.1.3 use numbers
- 3.1.4 think and solve problems

3.2 demonstrate personal management skills to:
- 3.2.1 demonstrate positive attitudes and behaviours
- 3.2.2 be responsible
- 3.2.3 be adaptable
- 3.2.4 learn continuously
- 3.2.5 work safely

3.3 demonstrate teamwork skills to:
- 3.3.1 work with others
- 3.3.2 participate in projects and tasks

COURSE CTA3465: CTA PRACTICUM D

Level: First Period Apprenticeship

Prerequisite: None

Description: Students, on the work site, continue to develop and refine those competencies developed in related Career and Technology Studies (CTS) occupational areas, previous practicums and other experiences.

Parameters: This course should be accessed only by students continuing to work toward attaining a recognized credential offered by an agency external to the school. Practicum courses extend the competencies developed in related CTS occupational areas. The practicum courses may not be delivered as stand-alone courses and may not be combined with core courses. This course may not be used in conjunction with Registered Apprenticeship Program courses. This practicum course may be delivered on- or off-campus. Instruction must be delivered by a qualified teacher with journeyperson certification or an experienced professional with journeyperson certification, who is under the supervision of the qualified teacher; both must be authorized to supervise trainees for the external credential.

Outcomes: The student will:

1. **perform assigned tasks and responsibilities efficiently and effectively, as required by the agency granting credentials**
   - 1.1 identify regulations and regulatory bodies related to the credential
   - 1.2 describe personal roles and responsibilities, including:
     - 1.2.1 key responsibilities
     - 1.2.2 support functions/responsibilities
     - 1.2.3 code of ethics
   - 1.3 describe personal work responsibilities and categorize them as:
     - 1.3.1 routine tasks; e.g., daily, weekly, monthly, yearly
     - 1.3.2 non-routine tasks; e.g., emergencies
     - 1.3.3 tasks requiring personal judgement
     - 1.3.4 tasks requiring approval of a supervisor
2. **analyze personal performance in relation to established standards**
   - 2.1 evaluate application of competencies developed in related CTS courses
   - 2.2 evaluate standards of performance in terms of:
     - 2.2.1 quality of work
     - 2.2.2 quantity of work
   - 2.3 evaluate adherence to workplace policies and procedures related to health and safety
   - 2.4 evaluate the work environment in terms of:
     - 2.4.1 location
     - 2.4.2 floor plan of work area
     - 2.4.3 analysis of workflow patterns

2.5 evaluate a professional in a related occupation in terms of:
- 2.5.1 training and certification
- 2.5.2 interpersonal skills
- 2.5.3 technical skills
- 2.5.4 professional ethics

3. demonstrate basic competencies

3.1 demonstrate fundamental skills to:
- 3.1.1 communicate
- 3.1.2 manage information
- 3.1.3 use numbers
- 3.1.4 think and solve problems

3.2 demonstrate personal management skills to:
- 3.2.1 demonstrate positive attitudes and behaviours
- 3.2.2 be responsible
- 3.2.3 be adaptable
- 3.2.4 learn continuously
- 3.2.5 work safely

3.3 demonstrate teamwork skills to:
- 3.3.1 work with others
- 3.3.2 participate in projects and tasks

COURSE CTA3900: APPRENTICESHIP SAFETY

Level: First Period Apprenticeship

Prerequisite: None

Description: Students develop knowledge, skills and attitudes in the practice of workshop health and safety, communication and career planning.

Parameters: Access to a materials work centre and to instruction from an individual with specialized training in occupational health and safety (and understanding of the telecommunication industry) and/or a communication technician.

ILM Resources: Safety Legislation, Regulations and Industry Policy in the Trades 650101a; Climbing, Lifting, Rigging and Hoisting 650101b; Hazardous Materials and Fire Protection 650101c; Communication 090101d

Note: This course may promote discussions around sensitive topics (e.g., injury and death) in the context of student safety with respect to workplace hazards.

Outcomes: The student will:

1. describe legislation, regulations and practices intended to ensure a safe workplace in the communication technician apprenticeship trade

- 1.1 demonstrate the ability to apply the *Occupational Health and Safety (OHS) Act*, *Regulation* and *Code*, as well as the changes from Bill C-45
- 1.2 explain the core requirements applicable to all industries, including:
  - 1.2.1 engineering controls
  - 1.2.2 administrative controls
  - 1.2.3 personal protective equipment (PPE)
- 1.3 demonstrate an understanding of the 26 parts of the OHS Code requirements applicable to all industries
- 1.4 demonstrate an understanding of the 12 parts of the OHS Code requirements applicable to specific industries and activities
- 1.5 demonstrate an understanding of the 11 OHS Code Schedules that the Explanation Guide does not address
- 1.6 explain the role of the employer and employee in regard to Occupational Health and Safety legislation, considering:
  - 1.6.1 employer responsibilities (OHS Regulation)
  - 1.6.2 employee responsibilities (OHS Regulation)
  - 1.6.3 Workplace Hazardous Materials Information System (WHMIS)
  - 1.6.4 fire regulations
  - 1.6.5 Workers' Compensation Board (WCB)
  - 1.6.6 related advisory bodies and agencies; e.g., Alberta Construction Safety Association (ACSA), Construction Owners Association of Alberta (COAA), Occupational Health and Safety Council (OHSC), Work Safe Alberta, Safety Codes Council
- 1.7 explain industry practices for hazard assessment and control procedures in four main hazard categories, including:
  - 1.7.1 biological
  - 1.7.2 chemical

1.7.3 ergonomic
1.7.4 physical hazards

1.8 identify and describe hazard assessment tools that both employees and employers must use in assessing and controlling work-site hazards, including:
1.8.1 work-site hazard identification and assessment
1.8.2 health and safety plan
1.8.3 joint work site health and safety committee
1.8.4 emergency response plans
1.8.5 first-aid and incident reports

1.9 identify and describe employer engineering controls that provide the highest level of worker protection, including:
1.9.1 elimination
1.9.2 substitution
1.9.3 redesign
1.9.4 isolation
1.9.5 automation

1.10 identify and describe employer administrative controls that limit hazards to the lowest level possible, including:
1.10.1 safe work practices
1.10.2 job procedures, policies and rules
1.10.3 work/rest schedules to reduce exposure
1.10.4 limiting hours of work
1.10.5 scheduling hazardous work during non-peak times
1.10.6 using optional methods

1.11 describe the responsibilities of employees and employers to apply emergency procedures, including:
1.11.1 emergency response plans
1.11.2 first aid

1.12 describe positive tradesperson attitudes with respect to legal responsibilities for all workers, including:
1.12.1 housekeeping
1.12.2 lighting
1.12.3 personal protective equipment (PPE)
1.12.4 emergency procedures

1.13 describe the roles and responsibilities of employers and employees with respect to the selection and use of personal protective equipment (PPE), including:
1.13.1 eye protection; e.g., class 1 (spectacles), class 2 (goggles), class 3 (welding helmets), class 4 (welding hand shields), class 5 (hoods), class 6 (face shields), class 7 (respirator face pieces)
1.13.2 flame resistant clothing
1.13.3 foot protection; e.g., category 1, 2 or 3 footwear requirements
1.13.4 head protection; e.g., class G (general), class E (electrical), class C (conducting)
1.13.5 hearing protection; e.g., earplugs or earmuffs
1.13.6 life jackets and personal flotation devices (PFDs)
1.13.7 limb and body protection
1.13.8 respiratory protective equipment; e.g., particulate filters; chemical cartridges or canisters; airline respirators, hoods, helmets and suits; self-contained breathing apparatus (SCBA)
1.13.9 a combination of any of the above

2. describe the use of personal protective equipment (PPE) and safe practices for climbing, lifting, rigging and hoisting in the communication technician apprenticeship trade

- 2.1 select, use and maintain specialized PPE and materials for climbing, lifting and loading, including:
  - 2.1.1 full body harness
  - 2.1.2 body belt
  - 2.1.3 ladders
  - 2.1.4 scaffold systems
  - 2.1.5 lifting and moving equipment
  - 2.1.6 PPE for lifting
  - 2.1.7 materials handling equipment; e.g., forklift, four-wheel dolly, chain hoist, overhead crane
- 2.2 describe manual lifting procedures, including correct body mechanics, considering:
  - 2.2.1 back safety
  - 2.2.2 general procedure for lifting
  - 2.2.3 employer and employee preventive actions to avoid back injuries
- 2.3 describe rigging hardware and the safe work load associated with:
  - 2.3.1 wire rope slings
  - 2.3.2 synthetic fibre web slings
  - 2.3.3 chain slings
  - 2.3.4 rigging hardware inspection
- 2.4 select the correct equipment for rigging typical loads, including:
  - 2.4.1 eye bolts
  - 2.4.2 shackles
  - 2.4.3 rings and links
  - 2.4.4 hooks
  - 2.4.5 swivels
  - 2.4.6 spreader bars and equalization beams
  - 2.4.7 blocks
  - 2.4.8 sheaves
  - 2.4.9 turnbuckles
- 2.5 describe hoisting and load-moving procedures
- 2.6 explain the most commonly used sling configurations to connect a load to a hook, including:
  - 2.6.1 vertical hitch
  - 2.6.2 bridle hitch
  - 2.6.3 single and double basket hitch
  - 2.6.4 wrap hitch
  - 2.6.5 single and double choker hitch
- 2.7 demonstrate the standard movement signals a signaler is required to know to signal a crane operator, including:
  - 2.7.1 hoist and lower load
  - 2.7.2 raise and lower boom
  - 2.7.3 swing boom
  - 2.7.4 stop
  - 2.7.5 emergency stop
  - 2.7.6 dog everything

3. describe the safety practices for hazardous materials and fire protection in the communication technician apprenticeship trade

- 3.1 describe the roles, responsibilities, features and practices related to the Workplace Hazardous Materials Information System (WHMIS) program, including:
  - 3.1.1 suppliers', employers' and employees' responsibilities
  - 3.1.2 WHMIS classifications
  - 3.1.3 health effects from exposure to chemicals
- 3.2 describe the three key elements of WHMIS, including:
  - 3.2.1 worker education
  - 3.2.2 supplier and workplace product labelling
  - 3.2.3 material safety data sheets
- 3.3 describe handling, storage and transportation procedures when dealing with hazardous material, including:
  - 3.3.1 handling, storing and transporting flammable liquids
  - 3.3.2 handling, storing and transporting compressed gas
  - 3.3.3 storing incompatible materials
- 3.4 describe safe venting procedures when working with hazardous materials, including:
  - 3.4.1 mechanical general ventilation
  - 3.4.2 local ventilation
  - 3.4.3 portable smoke extractor
  - 3.4.4 working in a confined space
- 3.5 describe fire hazards, classes, procedures and equipment related to fire protection, including:
  - 3.5.1 elements of a fire
  - 3.5.2 classes of fires
  - 3.5.3 fire extinguisher labels
  - 3.5.4 extinguishing small fires
  - 3.5.5 the PASS method

4. demonstrate communication skills and workshop safety as they pertain to occupational health and safety standards

- 4.1 use various types of communication to provide trade-related information, employing standard terms for components and operations, including:
  - 4.1.1 personal appearance
  - 4.1.2 business appearance
  - 4.1.3 suppliers and sales representatives
  - 4.1.4 customers
  - 4.1.5 tradespeople
- 4.2 identify key areas of responsibility that an employee has in regards to shop and trade safety, including:
  - 4.2.1 housekeeping
  - 4.2.2 waste containers
  - 4.2.3 power tools and rotating machinery
  - 4.2.4 compressed air
  - 4.2.5 exhaust gases
  - 4.2.6 control of carbon monoxide (CO)
  - 4.2.7 hazardous materials, dangerous goods and controlled products
- 4.3 explain the correct use of fire extinguishers, and explain fire prevention techniques

5. demonstrate an understanding of the communication technician apprenticeship trade and of apprenticeship opportunities that exist by creating a personal career portfolio

- 5.1 demonstrate an understanding of the communication technician apprenticeship trade and related job opportunities
- 5.2 describe what it means to be an apprentice and describe requirements for the employee and employer
- 5.3 refine and present a personal career portfolio, showing evidence of strengths and competencies, including:
  - 5.3.1 application completion
  - 5.3.2 cover letter
  - 5.3.3 résumé with references
- 5.4 demonstrate knowledge of workplace requirements, rights and responsibilities and relate this knowledge to personal career/employment expectations
- 5.5 outline the educational requirements to move into the communication technician apprenticeship trade and:
  - 5.5.1 conduct successful employment searches
  - 5.5.2 communicate in the language in which business is conducted
  - 5.5.3 prepare a personal employment search portfolio
  - 5.5.4 use technologies, tools and information systems appropriately for job preparation

6. demonstrate basic competencies

- 6.1 demonstrate fundamental skills to:
  - 6.1.1 communicate
  - 6.1.2 manage information
  - 6.1.3 use numbers
  - 6.1.4 think and solve problems
- 6.2 demonstrate personal management skills to:
  - 6.2.1 demonstrate positive attitudes and behaviours
  - 6.2.2 be responsible
  - 6.2.3 be adaptable
  - 6.2.4 learn continuously
  - 6.2.5 work safely
- 6.3 demonstrate teamwork skills to:
  - 6.3.1 work with others
  - 6.3.2 participate in projects and tasks

7. create a transitional strategy to accommodate personal changes and build personal values

- 7.1 identify short-term and long-term goals
- 7.2 identify steps to achieve goals