

COURSE ETA3400: ELECTRICAL PRINCIPLES

Level: First Period Apprenticeship

Prerequisite: ETA3900: Apprenticeship Safety

Description: Students solve trade-related mathematical problems and describe how changes in voltage, current or resistance affect the electrical circuit.

Parameters: Access to a materials work centre and to instruction from an individual with journeyperson certification as an electrician.

ILM Resources: First Period Math Applications 030102a; Current, Voltage and Resistance 030102b

Outcomes: The student will:

- 1. solve trade-related problems using basic mathematics skills**
 - 1.1 recognize and use basic mathematical symbols
 - 1.2 add and subtract whole, decimal and fractional numbers
 - 1.3 multiply and divide whole, decimal and fractional numbers
 - 1.4 state the correct sequence for mathematical operations, and solve equations that use brackets
 - 1.5 apply the math skill required for transposition of equations in relation to Ohm's law
- 2. predict how changes in the value of voltage, current or resistance affects the circuit**
 - 2.1 describe an electric current, considering:
 - 2.1.1 static electricity
 - 2.1.2 quantity of charge and current
 - 2.1.3 conventional flow and electron flow
 - 2.2 describe voltage, considering:
 - 2.2.1 electromotive force (EMF)
 - 2.2.2 an electric circuit
 - 2.2.3 sources of EMF
 - 2.2.4 symbols used for voltage
 - 2.3 describe resistance, and state and apply Ohm's law
- 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 ETA3405: ELECTRICAL CONCEPTS

Level:	First Period Apprenticeship
Prerequisites:	ETA3900: Apprenticeship Safety
Description:	Students analyze series and parallel circuits.
Parameters:	Access to a materials work centre and to instruction from an individual with journey person certification as an electrician.
ILM Resources:	Series Resistive Circuits 030102c; Parallel Resistive Circuits 030102d
Outcomes:	The student will:

1. connect and analyze a series resistive circuit

- 1.1 identify a series circuit
- 1.2 calculate resistance in a series circuit
- 1.3 state and apply Kirchhoff's voltage law in a series circuit
- 1.4 calculate current in a series circuit
- 1.5 determine circuit values by applying ratio and proportion
- 1.6 solve series circuits using the voltage divider rule
- 1.7 determine the voltage drop across closed-or-open components in a series circuit

2. connect and analyze a parallel resistive circuit

- 2.1 describe a parallel circuit
- 2.2 calculate resistance in a parallel circuit
- 2.3 state and apply Kirchhoff's current law to a parallel circuit
- 2.4 describe the effects of an open circuit on a parallel circuit
- 2.5 solve branch circuit currents using the current divider principle

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 ETA3410: RESISTIVE CIRCUITS

Level:	First Period Apprenticeship
Prerequisites:	ETA3405: Electrical Concepts
Description:	Students connect and analyze a series-parallel resistive circuit.
Parameters:	Access to a materials work centre and to instruction from an individual with journeyperson certification as an electrician.
ILM Resources:	Series-Parallel Resistive Circuits 030102e

Outcomes: The student will:

- 1. connect and analyze series-parallel resistive circuits**
 - 1.1 identify resistors that are in series
 - 1.2 identify resistors that are in parallel
 - 1.3 calculate the total resistance of a series-parallel circuit
 - 1.4 apply Kirchhoff's current law to a series-parallel circuit
 - 1.5 apply Kirchhoff's voltage law to a series-parallel circuit
 - 1.6 solve problems involving series-parallel circuits
- 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 ETA3415: EDISON 3-WIRE SYSTEM

Level: First Period Apprenticeship

Prerequisites: ETA3410: Resistive Circuits

Description: Students describe an Edison 3-wire distribution system commonly found in homes and in commercial establishments.

Parameters: Access to a materials work centre and to instruction from an individual with journeyperson certification as an electrician.

ILM Resources: Edison 3-Wire Distribution Systems 030102f

Outcomes: The student will:

1. connect and analyze an Edison 3-wire distribution system

- 1.1 identify the characteristics of an Edison 3-wire circuit
- 1.2 describe the properties of an Edison 3-wire circuit
- 1.3 describe and calculate the effects of a high resistance or broken neutral in an Edison 3-wire circuit

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 ETA3420: POWER & EFFICIENCY

Level: First Period Apprenticeship

Prerequisites: ETA3405: Electrical Concepts

Description: Students calculate the efficiency of circuits and equipment.

Parameters: Access to a materials work centre and to instruction from an individual with journeyperson certification as an electrician.

ILM Resources: Work, Energy, Power and Efficiency 030102g

Outcomes: The student will:

- 1. state and analyze the relationship between work, energy, power and efficiency**
 - 1.1 define mass, weight and force and their units of measurement
 - 1.2 define work, energy and power and their units of measurement
 - 1.3 describe electrical relationships of work, energy and power, considering:
 - 1.3.1 derived electrical power formulas
 - 1.3.2 horsepower and watts
 - 1.4 calculate efficiency, voltage drop and line loss
- 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 ETA3425: BATTERIES & MAGNETISM

Level: First Period Apprenticeship

Prerequisite: ETA3420: Power & Efficiency

Description: Students describe common batteries, including their care and handling and recharging precautions, and develop an understanding of magnetism and the operation of motors, generators, transformers, relays and meters.

Parameters: Access to a materials work centre and to instruction from an individual with journeyperson certification as an electrician.

ILM Resource: Methods of Producing EMF 030103a; Cells and Batteries 030103b; Magnetism & Electromagnetism 030103c; Generators 030103d

Outcomes: The student will:

- 1. identify the methods of producing electromotive force (EMF)**
 - 1.1 explain the production of EMF by using chemicals
 - 1.2 explain the production of EMF by using heat
 - 1.3 explain the production of EMF by using pressure
 - 1.4 explain the production of EMF by using light
 - 1.5 explain the production of EMF by using magnetism
 - 1.6 explain the production of EMF by using electrostatics
- 2. identify the requirements for installation and maintenance of batteries**
 - 2.1 define the basic terminology of cells, including:
 - 2.1.1 basic cell construction
 - 2.1.2 battery resistance
 - 2.2 describe the construction and operation of a basic primary cell, including:
 - 2.2.1 Leclanché cells
 - 2.2.2 dry cells such as mercuric oxide, lithium manganese or alkaline manganese
 - 2.3 describe the construction and operation of three types of lead-acid batteries, including:
 - 2.3.1 flooded cell batteries
 - 2.3.2 gelled electrolyte cell batteries
 - 2.3.3 AGM (absorptive glass mat) cell batteries
 - 2.4 describe the construction, operation and applications of a nickel-cadmium battery
 - 2.5 describe the construction and operation of a lithium battery
 - 2.6 describe the hazards and precautions to be observed when charging batteries
 - 2.7 describe the common battery performance ratings, including:
 - 2.7.1 ampere-hour rating
 - 2.7.2 cranking amps
 - 2.7.3 cold cranking amps
 - 2.7.4 reserve capacity rating
 - 2.8 calculate the effects of battery internal resistance

3. state the characteristics of magnetic and electromagnetic materials

- 3.1 describe the properties of magnetic materials, including:
 - 3.1.1 temporary and permanent magnets
 - 3.1.2 magnetic poles and their behaviour
- 3.2 define the terminology related to magnetism, including:
 - 3.2.1 magnetic flux
 - 3.2.2 flux density
 - 3.2.3 permeability
 - 3.2.4 reluctance
 - 3.2.5 residual magnetism
 - 3.2.6 retentivity
 - 3.2.7 saturation
- 3.3 describe electromagnetism and basic design for electromagnetic devices, including:
 - 3.3.1 direction of the magnetic field around a current-carrying conductor
 - 3.3.2 left-hand rule for conductors
 - 3.3.3 polarity of a magnetic coil
 - 3.3.4 factors affecting the strength of an electromagnet
 - 3.3.5 retentivity of the core material for an electromagnet
 - 3.3.6 magnetic core structural design and eddy currents
 - 3.3.7 core saturation
- 3.4 describe how an induced voltage is generated, considering:
 - 3.4.1 Faraday's law of induction
 - 3.4.2 Fleming's left-hand rule
 - 3.4.3 flux density or strength of the field
 - 3.4.4 length of the conductor
 - 3.4.5 rate at which lines of force are cut by the conductor
- 3.5 describe the process of electromagnetic induction, considering:
 - 3.5.1 Lenz's law of induction
 - 3.5.2 resistance and inductance
 - 3.5.3 mutual induction

4. explain the generation of electricity in alternating current (AC) and direct current (DC) generators

- 4.1 describe the basic construction of a generator, including:
 - 4.1.1 magnetic circuit
 - 4.1.2 electric circuit
- 4.2 describe how a generator produces a voltage, and identify the factors affecting its value
- 4.3 describe how a generator can be connected to produce AC or DC to a load

5. demonstrate basic competencies

- 5.1 demonstrate fundamental skills to:
 - 5.1.1 communicate
 - 5.2.1 manage information
 - 5.1.2 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 ETA3430: METERS & CONNECTIONS

Level: First Period Apprenticeship

Prerequisites: ETA3420: Power & Efficiency

Description: Students describe the proper use and care of various electrical meters and describe types of conductors and how and when they are used.

Parameters: Access to a materials work centre and to instruction from an individual with journeyperson certification as an electrician.

ILM Resources: Meters 030104a; Conductors 030104b; Splicing and Terminating (Low Voltage) 030104c; Resistors 030104d

Outcomes: The student will:

1. use electrical meters to measure circuit properties

- 1.1 state the applications of the various meters, including:
 - 1.1.1 voltmeters
 - 1.1.2 ammeters
 - 1.1.3 ohmmeters
 - 1.1.4 megohmmeters or meggers
 - 1.1.5 wattmeters
 - 1.1.6 multimeters
- 1.2 list the precautions that must be observed when using each one of the meters, including:
 - 1.2.1 voltmeters
 - 1.2.2 ammeters
 - 1.2.3 ohmmeters
 - 1.2.4 megohmmeters or meggers
 - 1.2.5 wattmeters
 - 1.2.6 multimeters
- 1.3 interpret meter readings, including:
 - 1.3.1 linear scales
 - 1.3.2 non-linear scales
 - 1.3.3 ohmmeter scales
 - 1.3.4 multimeter scales
- 1.4 recognize the connections for various meters, including:
 - 1.4.1 voltmeters
 - 1.4.2 ohmmeters
 - 1.4.3 ammeters
 - 1.4.4 clip-on ammeters
 - 1.4.5 megohmmeters
 - 1.4.6 wattmeters
 - 1.4.7 multimeters
- 1.5 connect and demonstrate proper range selection and connections of voltmeter, ammeter, ohmmeter and megger

- 2. identify the properties of conductors, semiconductors, insulators and fibre optic cables**
 - 2.1 state the types and forms of conductor materials, including:
 - 2.1.1 copper
 - 2.1.2 aluminum
 - 2.1.3 steel
 - 2.1.4 silver
 - 2.1.5 tin
 - 2.1.6 gold
 - 2.2 describe the electrical properties of conductors, semiconductors and insulators
 - 2.3 describe the factors affecting resistance
 - 2.4 determine the AWG (American Wire Gauge) wire size using a wire gauge
 - 2.5 calculate the cross-sectional area and resistance of conductors
 - 2.6 calculate the approximate voltage drop due to conductor resistance
 - 2.7 state the installation methods required for fibre optic cable
- 3. splice, tap and terminate conductors**
 - 3.1 describe four classes of terminations or connections used in the electrical trade
 - 3.2 describe the proper method for stripping conductors and insulating splices
 - 3.3 describe three common wire connections
 - 3.4 describe the techniques used for mechanical and compression splices and terminations
 - 3.5 describe the problems specific to aluminum conductor splices and terminations
- 4. identify resistor types and ratings**
 - 4.1 describe two categories of resistors and their construction
 - 4.2 describe the methods used to determine the ratings of fixed resistors
 - 4.3 determine the resistance of a resistor using a four-band colour code chart
- 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 ETA3435: SWITCHING CIRCUITS

Level:	First Period Apprenticeship
Prerequisites:	ETA3410: Resistive Circuits ETA3430: Meters & Connections
Description:	Students analyze low-voltage switching circuits.
Parameters:	Access to a materials work centre and to instruction from an individual with journeyperson certification as an electrician.
ILM Resources:	Switching Circuits 030104e
Outcomes:	The student will:

- 1. design and connect switching circuits using schematic and wiring diagrams**
 - 1.1 draw symbols that are commonly used in schematic and wiring diagrams
 - 1.2 describe applications of various types of switches, including:
 - 1.2.1 two-position switches
 - 1.2.2 three-position switches
 - 1.2.3 momentary contact switches
 - 1.2.4 multi-position switches
 - 1.2.5 lamps and resistors
 - 1.2.6 transformers and batteries
 - 1.2.7 power sources and ground connections
 - 1.2.8 wire crossings and connections
 - 1.3 draw schematic and wiring diagrams for typical lighting circuits, considering:
 - 1.3.1 switches in circuits
 - 1.3.2 terminal identification
 - 1.3.3 switch connections using non-metallic sheathed cable
 - 1.3.4 three-way switch connections
 - 1.3.5 four-way switch connections
 - 1.4 describe how to connect a set of door chimes
- 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 ETA3440: RELAYS & CONTROLS

Level: First Period Apprenticeship

Prerequisites: ETA3435: Switching Circuits

Description: Students understand the operation of relays and their control circuits and produce and interpret schematic and wiring diagrams.

Parameters: Access to a materials work centre and to instruction from an individual with journeyperson certification as an electrician.

ILM Resources: Relays and Controls 030104f

Outcomes: The student will:

1. connect and analyze relay control circuits

1.1 define specific terms that are used when referring to control circuits, including:

- 1.1.1 initiating device
- 1.1.2 load
- 1.1.3 solenoid
- 1.1.4 relay

1.2 identify the parts of a relay and explain their function, including the:

- 1.2.1 relay coil
- 1.2.2 core
- 1.2.3 return spring
- 1.2.4 armature
- 1.2.5 normally open contacts
- 1.2.6 normally closed contacts

1.3 describe the operating principle of a relay, including the:

- 1.3.1 control circuit
- 1.3.2 power circuit

1.4 draw the symbols that are used in control circuits, including:

- 1.4.1 pushbuttons
- 1.4.2 switches
- 1.4.3 control relays
- 1.4.4 buzzers
- 1.4.5 bells
- 1.4.6 transformers

1.5 draw schematic and wiring diagrams using a relay by:

- 1.5.1 using rulers and templates
- 1.5.2 using accepted symbols
- 1.5.3 labelling all terminals
- 1.5.4 showing all connections

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 ETA3445: SWITCHES & ALARMS

Level: First Period Apprenticeship

Prerequisites: ETA3410: Resistive Circuits
ETA3440: Relays & Controls

Description: Students understand the basic concepts and operation of low-voltage switching systems and develop an understanding of how residential alarm and smoke alarm systems are installed and interconnected.

Parameters: Access to a materials work centre and to instruction from an individual with journeyperson certification as an electrician.

ILM Resources: Extra Low Voltage Switching (0 – 30 V) 030104g; Alarm Systems and Smoke Alarms 030104h

Outcomes: The student will:

1. connect and analyze extra-low-voltage switching circuits

- 1.1 describe the basic concepts of an extra-low-voltage switching system
- 1.2 state the advantages of an extra-low-voltage switching system
- 1.3 describe the operation of an extra-low-voltage switching system, including:
 - 1.3.1 relays
 - 1.3.2 switches
 - 1.3.3 rectifying diode
- 1.4 connect and analyze low-voltage circuits

2. connect and analyze alarm systems and smoke alarms

- 2.1 identify various types of sensing and alarm devices used in alarm systems, including:
 - 2.1.1 intrusion sensing devices
 - 2.1.2 perimeter devices, such as magnetic reed switches, overhead door contacts, roller ball contact switches, window screen protectors and glass break detectors (also called shock sensors or shock detectors)
 - 2.1.3 internal devices or motion detectors, such as microwave motion detectors and passive infrared detectors (PIR)
 - 2.1.4 wireless devices
- 2.2 describe the operation of a basic alarm system, including:
 - 2.2.1 the central processing unit (CPU)
 - 2.2.2 signalling devices
 - 2.2.3 Canadian Electrical Code considerations
- 2.3 identify the function and applications of smoke alarms and carbon monoxide alarms, including:
 - 2.3.1 ionization smoke detectors
 - 2.3.2 photoelectric smoke alarms
 - 2.3.3 installation location in a building
 - 2.3.4 interconnection of smoke alarms

- 2.4 describe the operation of a basic fire alarm system, including:
 - 2.4.1 fire detection and alarm systems
 - 2.4.2 conditions of a fire alarm system
 - 2.4.3 electrical supervision
 - 2.4.4 conventional non-addressable 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 value**
 - 4.1 identify short-term and long-term goals
 - 4.2 identify steps to achieve goals

COURSE ETA3450: INTRODUCTION TO CODE

Level:	First Period Apprenticeship
Prerequisites:	ETA3430: Meters & Connections
Description:	Students develop an understanding of Part I of the Canadian Electrical Code (CEC), which provides standards for the installation of electrical equipment to ensure that buildings are provided with adequate electrical service and that the systems work properly and safely, and understand terms as they apply in the CEC.
Parameters:	Access to a materials work centre and to instruction from an individual with journey person certification as an electrician.
ILM Resources:	Introduction to Code 030105a; General Rules – Section 2 030105b; Conductor Material and Sizes – Section 4 030105c
Supporting Resources:	Canadian Electrical Code, Part I, current edition; Alberta electrical STANDATA; <i>Safety Codes Act</i> ; and the Canadian Standards Association (CSA), Part I Errata Sheet, current edition
Outcomes:	The student will:

1. recognize the purpose and organization of the Canadian Electrical Code, Part I and the Alberta electrical STANDATA

- 1.1 explain the purpose of the CEC, Part I
- 1.2 describe the procedures for the acceptance of the CEC by the provinces and by local authorities, including:
 - 1.2.1 *Safety Codes Act*
 - 1.2.2 how the CEC is adopted as law in Alberta
 - 1.2.3 the Safety Codes Council
 - 1.2.4 Alberta Fire Code
 - 1.2.5 Alberta Building Code
 - 1.2.6 National Electrical Code
- 1.3 describe the function of the electrical STANDATA
- 1.4 describe the organizational layout of the CEC, including the:
 - 1.4.1 general sections
 - 1.4.2 supplementary or amendatory sections
- 1.5 locate specific information in the CEC, using a variety of methods
- 1.6 identify those responsible for an electrical installation, using:
 - 1.6.1 2-024 Use of Approved Equipment
 - 1.6.2 2-102 Rebuilt Equipment
 - 1.6.3 2-108 Quality of Work

2. interpret the general rules in Section 2 of the CEC

- 2.1 define the specific terms that apply to the first period code program
- 2.2 describe the administrative rules
- 2.3 describe the technical requirements

- 3. determine the conductors required for installations in Section 4 of the CEC**
 - 3.1 define the specific terms that apply to the first period code program
 - 3.2 apply specific rules to determine conductor sizes, using the appropriate tables and appendices
 - 3.3 determine the allowable ampacity of a conductor given load current and conditions of use
 - 3.4 determine the allowable ampacity of flexible cords and equipment wire and conditions of use
 - 3.5 identify neutral conductors and determine their size
 - 3.6 state the CEC standards for conductor colours
- 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 ETA3455: CONDUCTORS & GROUNDING

Level: First Period Apprenticeship

Prerequisite: ETA3450: Introduction to Code

Description: Students determine the loading of services, feeders and branch circuits for single dwellings; describe components, installation and proper grounding of overhead and underground services to a single dwelling; and understand terms as they apply in the Canadian Electrical Code.

Parameters: Access to a materials work centre and to instruction from an individual with journeyperson certification as an electrician.

ILM Resources: Service and Grounding Requirements 030105d; Service Feeders and Branch Circuits–Section 8 030105e

Supporting Resources: Canadian Electrical Code, Part I, current edition; Alberta electrical STANDATA; *Safety Codes Act*; and the Canadian Standards Association (CSA), Part I Errata Sheet, current edition

Outcomes: The student will:

1. determine the components, installation methods and proper grounding and bonding for a single dwelling

- 1.1 define specific terms from Section 6 of the CEC that apply to a residential occupancy, including:
 - 1.1.1 supply service
 - 1.1.2 consumer's service
 - 1.1.3 service box
- 1.2 describe the wiring methods used for the installation of overhead services, considering the:
 - 1.2.1 wiring method to be used
 - 1.2.2 required clearances of supply conductors
 - 1.2.3 location of the service head
- 1.3 describe the wiring methods used for the installation of underground services
- 1.4 describe the requirements for service equipment in a single dwelling, including:
 - 1.4.1 overhead or underground service
 - 1.4.2 a service box
 - 1.4.3 metering equipment
- 1.5 define specific terms from Section 10 of the CEC that apply to a single dwelling, including:
 - 1.5.1 grounding terminology, including ground, grounded, grounding, grounding conductor, grounding electrode and grounding circuit
 - 1.5.2 bonding terminology, including bonding and bonding conductor
- 1.6 determine the grounding requirements for a single dwelling, including:
 - 1.6.1 electrical systems
 - 1.6.2 service equipment
 - 1.6.3 electrodes
 - 1.6.4 non-electrical equipment
- 1.7 determine the bonding requirements for a single dwelling

- 2. determine the loading on services, feeders and branch circuits for single dwellings**
 - 2.1 determine specific terms from Section 8 of the CEC that apply to a residential occupancy, including:
 - 2.1.1 demand factors
 - 2.1.2 demand load
 - 2.1.3 calculated demand
 - 2.1.4 calculated load
 - 2.2 determine the minimum ampacity of service or feeder conductors supplying a single dwelling
 - 2.3 determine the minimum required number of branch circuit positions for a single dwelling, utilizing:
 - 2.3.1 panelboard requirements
 - 2.3.2 bus bar ampacity
 - 2.3.3 branch circuit spaces
 - 2.4 determine the ampacity requirements for branch circuit conductors and ampere ratings of overcurrent devices applicable to a single dwelling
- 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 ETA3460: WIRING & INSTALLATION

Level:	First Period Apprenticeship
Prerequisites:	ETA3455: Conductors & Grounding
Description:	Students determine the type of conductors that are required and how they should be installed; understand rules dealing with storage batteries, ground-fault circuit interrupters, arc-fault breakers and brand circuit requirements; and understand the rules ensuring safe installation of lighting equipment.
Parameters:	Access to a materials work centre and to instruction from an individual with journeyperson certification as an electrician.
ILM Resources:	Wiring Methods–Section 12 030105f; Installation of Electrical Equipment–Section 26 030105g; Installation of Lighting Equipment–Section 30 030105h
Supporting Resources:	Canadian Electrical Code, Part I, current edition; Alberta electrical STANDATA; <i>Safety Codes Act</i> ; and the Canadian Standards Association (CSA), Part I Errata Sheet, current edition
Outcomes:	The student will:

1. determine installation wiring methods

- 1.1 define specific terms from Section 12 of the CEC, Part I that apply to a residential occupancy, including:
 - 1.1.1 accessible
 - 1.1.2 building
 - 1.1.3 cabinet
 - 1.1.4 conduit
 - 1.1.5 electrical equipment
 - 1.1.6 electrical installation
 - 1.1.7 outlet
 - 1.1.8 common cable and raceway
- 1.2 identify the General Requirements 12-010 to 12-020, including:
 - 1.2.1 ducts and plenums
 - 1.2.2 underground installations
- 1.3 identify the subsection of Conductors 12-100 to 12-120, including:
 - 1.3.1 conductors
 - 1.3.2 factors affecting conductor selection
 - 1.3.3 multi-conductor and single-conductor cables
 - 1.3.4 conductors in parallel
 - 1.3.5 aluminum conductors
 - 1.3.6 conductor support
- 1.4 describe the conditions for use of exposed wiring located outdoors, including:
 - 1.4.1 types of conductors
 - 1.4.2 conductors on or between buildings
 - 1.4.3 use of neutral supported cables
 - 1.4.4 clearance of conductors

- 1.5 describe the conditions for use of non-metallic sheathed cable
- 1.6 describe the conditions for use of armoured and mineral-insulated cable
- 1.7 describe the conditions for use of raceways in general, including:
 - 1.7.1 types of raceways
 - 1.7.2 parallel conductors in raceways
 - 1.7.3 mechanical protection
 - 1.7.4 number of bends in raceways
- 1.8 describe the conditions for use of specific raceways, including:
 - 1.8.1 conduit for more than one size of conductor
 - 1.8.2 conduit for conductors of one size
 - 1.8.3 coefficient of expansion
 - 1.8.4 bonding conductors
 - 1.8.5 non-metal raceways
 - 1.8.6 flexible metal raceways
- 1.9 describe the installation of boxes, cabinets and outlets, including:
 - 1.9.1 vapour barriers
 - 1.9.2 sizing boxes
- 2. determine electrical requirements for a residential occupancy**
 - 2.1 define specific terms from Section 26 of the CEC, Part I that apply to the first period code program, including:
 - 2.1.1 mineral-insulated cable
 - 2.1.2 aluminum-sheathed cable
 - 2.1.3 outlet
 - 2.1.4 receptacle
 - 2.1.5 multi-outlet assembly
 - 2.1.6 ground-fault circuit interrupter (GFCI)
 - 2.1.7 branch circuit
 - 2.1.8 dwelling unit
 - 2.2 apply specific rules of Section 26 that deal with the electrical installation in battery rooms
 - 2.3 describe the information required when selecting a receptacle for a specific application
 - 2.4 determine the branch circuit requirements and the number and location of receptacles required for areas (other than kitchens) of a residential occupancy in general and, specifically, a single dwelling
 - 2.5 describe the operation and applications of GFCIs (ground-fault circuit interrupters) and AFCIs (arc-fault circuit interrupters)
 - 2.6 determine the branch circuits required, the number and type of receptacles required and the location of each for a kitchen
 - 2.7 determine where the disconnecting means for a furnace must be installed
- 3. determine code requirements for lighting equipment**
 - 3.1 define specific terms used in the lighting industry, including:
 - 3.1.1 light
 - 3.1.2 correlated colour temperature (CCT)
 - 3.1.3 colour rendering index (CRI)
 - 3.1.4 candela
 - 3.1.5 lumen
 - 3.1.6 lux
 - 3.1.7 efficacy
 - 3.2 describe the different types of electric lighting sources, including:
 - 3.2.1 incandescent
 - 3.2.2 electric discharge lighting; i.e., fluorescent and high-intensity discharge
 - 3.2.3 light-emitting diode

- 3.3 define specific terms that apply to the first period code program, including:
 - 3.3.1 lamp
 - 3.3.2 luminaire
 - 3.3.3 lampholder
 - 3.3.4 ballast
 - 3.3.5 luminaire canopy
 - 3.3.6 canopy switch
 - 3.3.7 polarization
- 3.4 describe the general requirements for interior lighting equipment
- 3.5 describe the factors that relate to the location of lighting equipment
- 3.6 describe the factors that relate to the installation of lighting equipment, including:
 - 3.6.1 lighting fixture support
 - 3.6.2 fixtures mounted on suspended ceilings
 - 3.6.3 recessed luminaires
- 3.7 describe the methods of wiring various types of lighting equipment
- 3.8 describe the bonding requirements of lighting equipment
- 3.9 identify the ratings and control methods of lampholders
- 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 ETA3465: DIAGRAMS & DRAWINGS

Level:	First Period Apprenticeship
Prerequisites:	ETA3460: Wiring & Installation
Description:	Students identify Class 1 and Class 2 circuits and connect and analyze control circuits that use relays.
Parameters:	Access to a materials work centre and to instruction from an individual with journeyperson certification as an electrician.
ILM Resources:	Class 1 and Class 2 Circuits – Section 16 030105i; Orthographic Projection and Diagrams 030105j; Drawings 030105k; Drawings Interpretation 030105l
Supporting Resources:	Canadian Electrical Code, Part I, current edition; Alberta electrical STANDATA; <i>Safety Codes Act</i> ; and the Canadian Standards Association (CSA), Part I Errata Sheet, current edition

Outcomes: The student will:

- 1. determine the code requirements for Class 1 and Class 2 circuits**
 - 1.1 identify the terms and topics from Section 16 of CEC, Part I that apply to the first period code program, including:
 - 1.1.1 remote control circuit
 - 1.1.2 signal circuit
 - 1.1.3 extra-low-voltage power circuit
 - 1.1.4 low-energy power circuit
 - 1.2 determine the requirements for Class 1 and Class 2 circuits, including:
 - 1.2.1 circuit limitations and overcurrent protection
 - 1.2.2 circuit conductors and wiring methods
 - 1.2.3 grounding
 - 1.3 identify the Class 2 circuits in a typical single dwelling
- 2. interpret orthographic projections and block, wiring and schematic diagrams**
 - 2.1 describe the basic views of objects using orthographic projection
 - 2.2 identify basic orthographic projections to views of a building, including:
 - 2.2.1 plans
 - 2.2.2 elevations
 - 2.3 identify the lines found on a blueprint, including:
 - 2.3.1 visible or object lines
 - 2.3.2 hidden lines
 - 2.3.3 extension lines
 - 2.3.4 dimension lines
 - 2.3.5 break lines
 - 2.3.6 cutting plane lines
 - 2.4 describe a block diagram and a wiring diagram
 - 2.5 interpret electrical schematic diagrams, using:
 - 2.5.1 schematic drawing symbols
 - 2.5.2 sequence of operation

- 3. interpret construction drawings**
 - 3.1 interpret dimensions from a drawing
 - 3.2 determine dimensions from a drawing using the scale
 - 3.3 identify electrical symbols
 - 3.4 identify abbreviations used on drawings
 - 3.5 interpret technical terms used on drawings
 - 3.6 state the different types of drawings and their uses in a set of construction drawings
 - 3.7 describe the disciplines and types of drawings used in a set of construction drawings, including:
 - 3.7.1 architectural
 - 3.7.2 structural
 - 3.7.3 mechanical
 - 3.7.4 electrical
 - 3.7.5 landscape
- 4. interpret residential electrical construction drawings**
 - 4.1 interpret information from a drawing, including:
 - 4.1.1 plans
 - 4.1.2 elevations
 - 4.1.3 sections
 - 4.1.4 schedules
 - 4.2 interpret a drawing of an overhead service for a single dwelling
 - 4.3 interpret a drawing of an underground service for a single dwelling
 - 4.4 interpret a partial floor plan of a typical residential electrical installation and do a material estimate, using the:
 - 4.4.1 scale of the plan
 - 4.4.2 general routing of the wires
 - 4.4.3 ceiling height
 - 4.4.4 installation height of receptacles, light fixtures and switches from the floor
 - 4.5 calculate the main service requirements for a single dwelling, including:
 - 4.5.1 minimum ampacity
 - 4.5.2 basic load
- 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 ETA3470: ETA 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 ETA3475: ETA 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 ETA3480: ETA 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 ETA3485: ETA 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 ETA3900: 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 electrician industry) and/or an electrician.
ILM Resources:	Safety Legislation, Regulations and Industry Policy in the Trades 650101a; Climbing, Lifting, Rigging and Hoisting 650101b; Hazardous Materials and Fire Protection 650101c; Electrician Apprenticeship Training Program Orientation 030101d; Electrical Safety 030101e; Communications 190101d;
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 electrician 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, Canadian Standards Association

- 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 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, 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 electrician 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, considering:
 - 2.3.1 wire rope slings
 - 2.3.2 synthetic fibre web slings
 - 2.3.3 chain slings
 - 2.3.4 rigging hardware inspection
 - 2.3.5 sling angle on load rigging
 - 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 electrician 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 electrician apprenticeship trade and of apprenticeship opportunities that exist by creating a personal career portfolio**
 - 5.1 demonstrate an understanding of the electrician 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 electrician 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. apply safe work practices for electricians**
 - 6.1 identify the safe work practices to protect from arc flash hazards
 - 6.2 identify and describe lockout procedures
 - 6.3 identify the use of common hand tools and equipment related to the electrician trade
 - 6.4 describe the use of common power and specialty tools related to the electrician trade
- 7. demonstrate basic competencies**
 - 7.1 demonstrate fundamental skills to:
 - 7.1.1 communicate
 - 7.1.2 manage information
 - 7.1.3 use numbers
 - 7.1.4 think and solve problems
 - 7.2 demonstrate personal management skills to:
 - 7.2.1 demonstrate positive attitudes and behaviours
 - 7.2.2 be responsible
 - 7.2.3 be adaptable
 - 7.2.4 learn continuously
 - 7.2.5 work safely
 - 7.3 demonstrate teamwork skills to:
 - 7.3.1 work with others
 - 7.3.2 participate in projects and tasks
- 8. create a transitional strategy to accommodate personal changes and build personal values**
 - 8.1 identify short-term and long-term goals
 - 8.2 identify steps to achieve goals